ENERGY FROM THE WIND

Annotated Bibliography

THIRD SUPPLEMENT

April 1982

Engineering Sciences

Compiled By

Barbara L. Burke
Libraries
Colorado State University

Branch Library

Technical Advisor

Robert N. Meroney
Fluid Mechanics & Wind Engineering Program
College of Engineering
Colorado State University

SOLAR ENERGY APPLICATIONS LABORATORY
College of Engineering
Colorado State University
Foothills Campus
Fort Collins, Colorado 80523

Available from: Publications Department, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523



U18401 0074213

TABLE OF CONTENTS

Introduction to Third Supplement

WINDSEARCH

WINDSEARCH Request Form

Bibliography

Author Index

Subject Index

Report Number Index

Conference Proceedings Index

INTRODUCTION TO THIRD SUPPLEMENT

Supplement Three of ENERGY FROM THE WIND — ANNOTATED BIBLIOGRAPHY adds another 2455 references to the 3381 collected in the previous three volumes (Basic Volume, 1975; First Supplement, 1977; Second Supplement, 1979). The entire file is now on computer, resulting in a data base of over 6300 references on wind energy which is searchable by author, subject, report number, publisher, date, or other parameters. See more information about the search service, WINDSEARCH, on the following pages.

This volume is formatted, as were the others, to be combined with the earlier volumes if desired, or to stand alone. Entry numbers for each year begin with the next consecutive number following the last entry number for that year in Supplement Two.

This volume includes Author, Subject, Report Number, and Conference Proceedings Indexes just for Supplement Three. A volume of cumulative indexes covering all four volumes is available separately. The Basic Volume and First Supplement were manually produced and have a cumbersome "Broad Subject or Type of Material Index". The new Subject Index (in the volume of Cumulative Indexes) uses a detailed thesaurus and is far superior. It is also very useful for defining search strategies for WINDSEARCH.

Future supplements are planned, to be issued at more frequent intervals. A change in scope is also planned. Originally there was so little in the literature on wind energy that anything mentioning it was picked up. Today the literature is so voluminous that future supplements will only cite references to publications which have wind energy as the only, or one of few, emphases. This will help to keep future volumes smaller, less expensive, easier to use, and more relevant.

As always, comments or suggestions are welcome at any time — especially references to publications somehow missed, or corrections to existing entries. Please contact me directly:

Barbara L. Burke
Engineering Sciences Branch Library
Colorado State University
Engineering Research Center
Fort Collins, Colorado 80523

Computerization of ENERGY FROM THE WIND was possible through the support of the Department of Energy.

AN ALTERNATIVE TO
TEDIOUS MANUAL LITERATURE SEARCHING –

WINDSEARCH

ENERGY FROM THE WIND – ANNOTATED BIBLIOGRAPHY now includes in four volumes over 6300 references to wind power. Manually searching these volumes could be very time-consuming and, due to the single-term approach necessary, not very efficient. The entire file is on computer and searchable. The main advantage of this is the ability to combine terms to fine-tailor searches to specific interests. Also, some terms are so frequently used as to be virtually useless in manually searching. But, when combined with other terms by the computer, they can help identify a very specific body of literature.

We are offering WINDSEARCH – access to the data base at low, cost-recovery rates. You may find that a fairly inexpensive WINDSEARCH is much more cost-effective than manually searching the four volumes of ENERGY FROM THE WIND. You simply submit a statement of the subject of your search, including all relevant keywords, synonyms, and other requirements (language, date, geographic location, type of material, etc.). Through various combinations of these parameters we produce a special listing of relevant citations.

This service is priced to just recover our costs, and will vary from search to search, depending on their complexity. Searches will range from $10.00 minimum to $40.00 or $50.00 for more complicated strategies. Search requests can be mailed, or phoned in, and will be invoiced when printouts are mailed to you.

For more information, or to discuss or order a search, call:

Barbara Burke
303-491-8476

To order a WINDSEARCH by mail, use the request form on the reverse of this page.

WINDSEARCH

ENERGY FROM THE WIND - ANNOTATED BIBLIOGRAPHY

The computer system used to produce ENERGY FROM THE WIND has a search component which allows the running of custom literature searches tailored to the requestor's needs. Keywords can be combined using the Boolean "and", "or", or "and not" to produce specialized lists of references on narrower aspects of wind energy. Any part of the references can be searched. The most common, and efficient, use of the system is to combine descriptors from the Subject Index. These can be further combined with free terms, date of publication, language, issuing agency, or any other parameters which can be easily identified in the reference.

SAMPLE SEARCHES:

1. All references on "design – small scale" and ("developing countries" or "remote areas" or "appropriate technology").
2. All references from the Brace Research Institute.
3. All references to "patents" on "vertical axis" turbines from 1976 to date.

* *

WINDSEARCH REQUEST FORM

SUBJECT OF WINDSEARCH:

A. State subject of search in sentence form, using descriptors from Subject Index when appropriate: _____

B. List additional descriptors, free terms, synonyms relevant to the subject: _____

C. List any additional requirements, such as years to be covered, type of material, etc.: _____

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE ( )
*MAXIMUM CHARGES ACCEPTED $ _____

MAIL TO: Barbara L. Burke
Engineering Research Center
Colorado State University
Fort Collins, Colorado 80523

*You will be billed a minimum of $10.00 for your WINDSEARCH. The actual amount will depend on the complexity of the search and be based on our costs.

BIBLIOGRAPHY

The bibliography is organized by year, in entry number order. So that this supplement may be merged with the previous volumes if desired, entry numbers are assigned to follow consecutively those entry numbers used in the earlier volumes. Therefore, in most years entry numbers do not begin with "1", but with a number to immediately follow the last entry number used for that year in the Second Supplement.

The Third Supplement may be merged with the first three volumes, or left separate. The indexes in this supplement are for the Third Supplement only, so that if the four volumes are merged, the old indexes must be retained. A volume of Cumulative Indexes covering all four volumes has been produced, and is available separately. For information on the Cumulative Indexes, contact Publications, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523.

1981-0001 AKINS R E
METHODS FOR ANALYSIS OF WIND RIPPLE IN WIND TURBINES.
NTIS, APRIL 1981. 75 P.
SAND-81-7006

EFFICIENT AND ECONOMICAL UTILIZATION OF WIND POWER WILL REQUIRE THE ABILITY TO MEASURE AND ULTIMATELY PREDICT THE EFFECTS FLUCTUATIONS IN THE INCIDENT WIND WILL HAVE ON A WIND TURBINE. IN ORDER TO BEGIN TO QUANTITATIVELY ASSESS THESE EFFECTS, EXPERIMENTAL TECHNIQUES HAVE BEEN DEVELOPED WHICH ALLOW ANALYSIS OF FULL-SCALE PERFORMANCE OF WIND TURBINES WITH PARTICULAR EMPHASIS ON THE EFFECTS CAUSED BY TURBULENCE IN THE INCIDENT WIND.

1981-0002 ARONSON E A, CASKEY D L, CASKEY B C
SOLSTOR DESCRIPTION AND USER'S GUIDE.
NTIS, MARCH 1981. 131 P.
SAND-79-2330

THIS REPORT DESCRIBES THE COMPUTER SIMULATION CODE SOLSTOR. THE CODE SIMULATES ENERGY SYSTEMS IN WHICH ELECTRICITY IS GENERATED BY EITHER A PHOTOVOLTAIC (PV) SYSTEM OR A WIND TURBINE GENERATOR (WTG). STORAGE MAY OR MAY NOT BE PRESENT. BACKUP ELECTRICITY, IF NEEDED, IS PROVIDED EITHER FROM A UTILITY GRID OR FROM A FUEL-BURNING GENERATOR. SOLSTOR MINIMIZES THE LIFE CYCLE COST OF PROVIDING ENERGY BY CHOOSING THE OPTIMAL SOLAR OR WIND SYSTEM COMPONENT SIZES. RATES FOR ELECTRICITY PURCHASED FROM THE GRID CAN INCLUDE TIME-OF-DAY (TOD) ENERGY CHARGES AS WELL AS TIME-OF-DAY PEAK DEMAND CHARGES. SELL-BACK TO THE GRID OF EXCESS COLLECTED ENERGY IS ALSO CONSIDERED.

1981-0003 BALMER T, METZGER B
GEARING UP FOR WIND TURBINES.
ALTERN. SOURCES ENERGY NO. 49: 33-35, MAY/JUNE 1981.

1981-0004 BANKAITIS H
LIGHTNING ACCOMMODATION SYSTEM FOR WIND TURBINE GENERATOR SAFETY.
NTIS, 1981. 14 P.
DOE/NASA/20320-31, NASA-TM-82601

WIND TURBINE GENERATORS ARE BEING EVALUATED AS ALTERNATE SOURCES OF ELECTRICAL ENERGY. THE WIND TURBINE SAFETY PROGRAM IDENTIFIES THE NATURALLY OCCURRING LIGHTNING PHENOMENON AS A HAZARD WITH THE POTENTIAL TO CAUSE LOSS OF PROGRAM OBJECTIVES, INJURE PERSONNEL, DAMAGE SYSTEM INSTRUMENTATION, STRUCTURE OR SUPPORT EQUIPMENT AND FACILITIES. THE LEWIS RESEARCH CENTER IS RESPONSIBLE FOR THE DEVELOPMENT OF LARGE WIND TURBINES IN THE 100 KW TO MULTIMEGAWATT SIZE RANGE. IN SUPPORT OF THIS PROGRAM, SEVERAL CANDIDATE METHODS OF LIGHTNING ACCOMMODATION FOR EACH BLADE HAVE BEEN DESIGNED, ANALYZED, AND TESTED BY SUBMITTING SAMPLE BLADE SECTIONS TO SIMULATED LIGHTNING. AT THE PRESENT TIME, LIGHTNING ACCOMMODATION SYSTEMS FOR COMPOSITE BLADES ARE BEING INDIVIDUALLY DEVELOPED. THEIR EFFECTIVENESS IS EVALUATED BY SUBMITTING THE SYSTEMS TO SIMULATED LIGHTNING STRIKES. THE TEST DATA IS ANALYZED AND SYSTEM DESIGNS ARE REVIEWED ON THE BASIS OF THE ANALYSIS. THIS ACTIVITY IS DIRECTED AT DEFINING DESIGN AND PROCEDURAL CONSTRAINTS, REQUIREMENTS FOR SAFETY DEVICES AND WARNING METHODS, SPECIAL PROCEDURES, PROTECTIVE EQUIPMENT AND PERSONNEL TRAINING.

1981-0005 BARNA P S
SCALE MODEL STUDIES FOR IMPROVEMENT OF FLOW PATTERNS OF A LOW-SPEED TUNNEL.
NTIS, MARCH 1981. 29 P.
N81-18065, NASA-CR-164030

FLOW ALONG A NACELLE WAS INVESTIGATED WITH AND WITHOUT AN ORIFICE PLATE INSERTED INTO THE AIRSTREAM. THE FLOW BECAME MORE UNIFORM IN TRANSIT THROUGH THE ORIFICE WHEN COMPARED WITH THE UPSTREAM FLOW AND REMAINED MORE UNIFORM IMMEDIATELY DOWNSTREAM FROM THE ORIFICE. NO IMPROVEMENT WAS FOUND FARTHER DOWNSTREAM WITH OR WITHOUT THE ORIFICE PLATE. VARIOUS WINDMILLS WERE STUDIED TO DETERMINE THEIR EFFECTS ON THE DOWNSTREAM FLOW PATTERN. THE WINDMILL RETARDED FLOW VELOCITY INSIDE THE CIRCLE INSCRIBED BY THE TIP OF FREE WHEELING PROPELLERS (USED AS SUBSTITUTE WINDMILLS), WHILE THE MAIN STREAM PASSED OVER THE BLADES SEEMINGLY UNRESTRICTED AND WITHOUT SHOWING ANY INCREASE IN DIAMETER. RESULTS SHOW THAT BY VARYING A TORQUE, THE FLOW ACROSS A WINDMILL CAN BE EFFECTIVELY REDISTRIBUTED, AN EFFECT THAT COULD BE GAINFULLY EMPLOYED IN SITUATIONS WHERE THE MAIN FLOW INTO A DIFFUSER IS CONCENTRATED NEAR THE CENTER. THE CONSTRUCTION OF THE 1/24 SCALE MODEL TUNNEL AND THE VELOCITY TRANSVERSES OBTAINED ON THE MODEL ARE DISCUSSED. THE TRANSVERSES INDICATE THAT THE VELOCITY DISTRIBUTION MAY BE CONSIDERED WORSE IN THE VERTICAL THAN IN THE HORIZONTAL PLANE.

1981-0006 BASE T E, PHILLIPS P, ROBERTSON G, NOWAK E S
ON THE WAKE OF A DARRIEUS TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 51-66.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

IN THE PAPER, THE THEORY AND EXPERIMENTAL MEASUREMENTS ON THE AERODYNAMIC DECAY OF A WAKE FROM HIGH PERFORMANCE VERTICAL AXIS WIND TURBINE WILL BE DISCUSSED. IN THE INITIAL EXPERIMENTAL STUDY, THE WAKE DOWNSTREAM OF A MODEL DARRIEUS ROTOR, 28 CM DIAMETER AND A HEIGHT OF 45.5 CM, WAS MEASURED IN THE UNIVERSITY BOUNDARY LAYER WIND TUNNEL. THE WIND TURBINE WAS RUN AT THE DESIGN TIP SPEED RATIO OF 5.5. IT WAS FOUND THAT THE WAKE DECAYED AT A SLOWER RATE WITH DISTANCE DOWNSTREAM OF THE TURBINE, THAN A WAKE FROM A SCREEN WITH SIMILAR TROPOSKEIN SHAPE AND DRAG FORCE CHARACTERISTICS AS THE DARRIEUS ROTOR. THE INITIAL WIND TUNNEL RESULTS INDICATED THAT THE VERTICAL AXIS WIND TURBINES SHOULD BE SPACED AT LEAST FORTY DIAMETERS APART TO AVOID MUTUAL POWER DEPRECIATION GREATER THAN TEN PER CENT.

1981-0007 BEANS E W
AN APPROXIMATE METHOD FOR SOLUTION TO VARIABLE MOMENT OF INERTIA PROBLEMS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 173-176.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE "WEATHERING VANING" MOTION OF A WIND TURBINE WITH A MOVING ROTOR IS AN OSCILLATORY PROBLEM WITH A VARIABLE MOMENT OF INERTIA. THE ANALYSIS OF SUCH A MOTION REQUIRES THE SOLUTION OF A NON-LINEAR DIFFERENTIAL EQUATION. IN THIS ARTICLE AN APPROXIMATION METHOD IS PRESENTED FOR REDUCING THE PROBLEM TO AN EQUIVALENT CONSTANT MOMENT OF INERTIA PROBLEM. THE METHOD IS BASED ON THE ASSUMPTION THAT A MOVING ROTOR IS AN INTEGRATOR AND, THEREFORE, THE PROBLEM WILL BEHAVE AS IF IT HAS AN AVERAGE MOMENT OF INERTIA. IT IS FURTHER ASSUMED THAT THIS WILL BE A VALID SOLUTION TO THE PROBLEM IF THE ROTATING SPEED OF THE WIND TURBINE IS INFINITE. THE METHOD CONSISTS OF DETERMINING THE INTEGRATED AVERAGE OF THE MOMENT OF INERTIA FOR A SINGLE ROTATION. THIS AVERAGED VALUE CAN THEN BE USED TO DETERMINE EQUIVALENT NATURAL FREQUENCY OF THE SYSTEM AND OTHER DYNAMIC PROPERTIES. THE METHOD

IS SHOWN TO BE VALID BY SOLVING THE NON-LINEAR DIFFERENTIAL EQUATION FOR VARIOUS ROTATING SPEEDS.

1981-0008 BEAULIEU G, NOISEUX D
COMPUTATION OF THE MODES AND POLAR MOMENT OF INERTIA OF THE BLADES OF AN HAWT.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 177-187.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE NUMERICAL SOLUTION OF THE COUPLED DIFFERENTIAL EQUATIONS OF MOTION OF THE BLADES OF AN HORIZONTAL AXIS WIND TURBINE IS A MORE DIRECT APPROACH THAN THE TECHNIQUE OF FINITE ELEMENTS, PERMITTING THE OPTIMIZATION OF THE DESIGN AT RELATIVELY LOW COST. THE PROCEDURE CONSISTS OF TRANSFORMING THE EQUATION OF MOTION INTO A SET OF FIRST ORDER EQUATIONS AND SOLVING THEM WITH FOURTH ORDER RUNGE-KUTTA INTEGRATORS. THIS TECHNIQUE IS APPLIED TO A TWISTED, TAPERED BLADE OF VARIABLE CROSS SECTION AND STIFFNESS INCLUDING DISCONTINUITIES. THE FIRST SIX NATURAL FREQUENCIES AND MODE SHAPES ARE OBTAINED. THIS TECHNIQUE IS EXTENDED TO OBTAIN THE POLAR MOMENT OF INERTIA OF THE BLADES AS A FUNCTION OF FREQUENCY AND ROTATIONAL SPEED. A GOOD MATCH WITH THE EXPERIMENTAL RESULTS IS ACHIEVED.

1981-0009 BELEW W W, WOOD B L, MARIE T L, REINHARDT C L
WIND ENERGY SYSTEMS INFORMATION USER STUDY.
NTIS, JANUARY 1981. 254 P.
SERI/TR-751-749

THIS REPORT DESCRIBES THE RESULTS OF A SERIES OF TELEPHONE INTERVIEWS WITH USERS OF INFORMATION ON WIND ENERGY SYSTEMS. THESE RESULTS, PART OF A LARGE STUDY ON MANY DIFFERENT SOLAR TECHNOLOGIES, IDENTIFY TYPES OF INFORMATION EACH GROUP NEEDED AND THE BEST WAYS TO GET INFORMATION TO EACH GROUP. THE REPORT IS ONE OF 10 DISCUSSING STUDY RESULTS. RESULTS FROM 10 WIND ENERGY GROUPS ARE ANALYZED IN THIS REPORT: DOE-FUNDED RESEARCHERS, NON-DOE-FUNDED RESEARCHERS, REPRESENTATIVES OF MANUFACTURERS, DISTRIBUTORS, ENGINEERS (2 GROUPS), REPRESENTATIVES OF UTILITIES, EDUCATORS, COOPERATIVE EXTENSION SERVICE COUNTY AGENTS, AND SMALL SYSTEM USERS. THE DATA WILL BE USED AS INPUT TO THE DETERMINATION OF INFORMATION PRODUCTS AND SERVICES THE SOLAR ENERGY RESEARCH INSTITUTE, THE SOLAR ENERGY INFORMATION DATA BANK NETWORK, AND THE ENTIRE INFORMATION OUTREACH COMMUNITY SHOULD BE PREPARING AND DISSEMINATING.

1981-0010 BERGESON L, CLEMMER G L, YORK J E, BATES A P, MAYS J H
WIND PROPULSION FOR SHIPS OF THE AMERICAN MERCHANT MARINE. FINAL REPORT.
NTIS, MARCH 1981. 276 P.
PB81-162455

THIS REPORT PRESENTS THE TECHNICAL AND ECONOMIC RATIONALE FOR UTILIZING WIND PROPULSION SYSTEMS FOR COMMERCIAL SHIPPING--SPECIFICALLY VESSELS OF THE AMERICAN MERCHANT MARINE. ALTERNATIVE RIG CONFIGURATIONS RANGING FROM FORE-AND-AFT AND SQUARE SAILS TO WING SAILS AND WIND TURBINES ARE EVALUATED FOR THEIR AERODYNAMIC EFFICIENCY, TECHNICAL FEASIBILITY AND COST. AN INTEGRATED, ANALYTICAL COMPUTER MODEL IS DESCRIBED AND USED FOR THE PARAMETRIC ANALYSIS OF CONVENTIONALLY POWERED AND MOTOR SAILING VESSELS. U.S.-FOREIGN OCEANBORNE TRADE ROUTES ARE EVALUATED FOR THEIR SAIL-ASSIST POTENTIAL. THE CONCEPTUAL DESIGN OF A 20,000 CDWT SAIL-ASSIST MULTIPURPOSE DRY CARGO VESSEL IS PRESENTED AND DISCUSSED.

1981-0011 BOARDMAN R W, PATTON R, CURTICE D H
IMPACT OF DISPERSED SOLAR AND WIND SYSTEMS ON ELECTRIC DISTRIBUTION PLANNING AND OPERATION.
NTIS, FEBRUARY 1981. 189 P.
ORNL/SUB-7662/1

SMALL-SCALE DISPERSED SOLAR PHOTOVOLTAIC AND WIND GENERATION (DSW) WILL AFFECT THE GENERATION, TRANSMISSION, AND DISTRIBUTION SYSTEMS OF AN ELECTRIC UTILITY. THIS STUDY EXAMINES THE TECHNICAL AND ECONOMIC IMPACTS OF DISPERSING DSW DEVICES WITHIN THE DISTRIBUTION SYSTEM.

1981-0012 BOTTRELL G W
PASSIVE CYCLIC PITCH CONTROL FOR HORIZONTAL AXIS WIND TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 271-275.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

A NEW FLEXIBLE ROTOR CONCEPT, CALLED THE BALANCED-PITCH ROTOR, IS DESCRIBED. THE SYSTEM PROVIDES PASSIVE ADJUSTMENT OF CYCLIC PITCH IN RESPONSE TO UNBALANCED PITCHING MOMENTS ACROSS THE ROTOR DISK. VARIOUS APPLICATIONS ARE DESCRIBED AND PERFORMANCE PREDICTIONS ARE MADE FOR WIND SHEAR AND CROSS WIND OPERATING CONDITIONS. COMPARISONS WITH THE TEETERED HUB ARE MADE AND SIGNIFICANT COST SAVINGS ARE PREDICTED.

1981-0013 BROOKS B M
MOD-0 WIND TURBINE DYNAMICS TEST CORRELATIONS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 287-293.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE BEHAVIOR OF THE TEETERED, DOWNWIND, FREE YAW, MOD-0 WIND TURBINE, AS REPRESENTED BY NASA DYNAMIC TEST DATA, WAS USED TO SUPPORT CONFIDENCE IN THE HAMILTON STANDARD COMPUTER CODE SIMULATIONS. TRIM POSITION, PERFORMANCE AT TRIM, AND TEETER RESPONSE AS PREDICTED BY THE COMPUTER CODES WERE COMPARED TO TEST RESULTS. USING THE COMPUTER CODES, OTHER POSSIBLE CONFIGURATIONS FOR MOD-0 WERE INVESTIGATED. SEVERAL NEW TEST CONFIGURATIONS ARE RECOMMENDED FOR EXPLORING FREE YAW BEHAVIOR. IT IS SHOWN THAT ELIMINATING ROTOR TILT AND OPTIMIZING CONING AND BLADE TWIST CAN CONTRIBUTE TO GOOD FREE YAW BEHAVIOR AND STABILITY. THE EFFECTS OF ROTOR TEETER, TEETER GRAVITY BALANCE, INFLOW AND OTHER PHYSICAL AND OPERATING PARAMETERS WERE ALSO INVESTIGATED.

1981-0014 BROWNING J A
THE HYDRAULIC WINDMILL.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 151-154.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE HYDRAULIC WINDMILL PUMPS PRESSURIZED OIL FROM ROTOR SHAFT LEVEL TO THE GROUND WHERE A MOTOR-GENERATOR PRODUCES ELECTRICITY. ALTERNATIVELY, THE USEFUL OUTPUT MAY BE HEAT. ROTOR SPEED IS GOVERNED BY A FLOW VALVE. OVER PRESSURE, THE RESULT OF HIGH WIND VELOCITY, ROTATES THE TAIL TO MOVE THE ROTOR BLADES OUT-OF-THE-WIND. LOSS OF OIL PRESSURE CAUSES A BRAKE TO CLOSE AS WELL AS TO SWING THE TAIL TO ITS MAXIMUM DISTANCE FROM THE ROTOR PLANE.

1981-0015 CARNE T G
GUY CABLE DESIGN AND DAMPING FOR VERTICAL AXIS WIND TURBINES.
NTIS, MAY 1981. 35 P.
SAND-80-2669

GUY CABLES ARE FREQUENTLY USED TO SUPPORT VERTICAL AXIS WIND TURBINES SINCE GUYING THE TURBINE REDUCES SOME OF THE STRUCTURAL REQUIREMENTS ON THE TOWER. THE GUYS MUST BE DESIGNED TO PROVIDE BOTH THE REQUIRED STRENGTH AND THE REQUIRED STIFFNESS AT THE TOP OF THE TURBINE. THE AXIAL LOAD WHICH THE GUYS APPLY TO THE TOWER, BEARINGS, AND FOUNDATIONS IS AN UNDESIRABLE CONSEQUENCE OF USING GUYS TO SUPPORT THE TURBINE. LIMITING THE AXIAL LOAD SO THAT IT DOES NOT SIGNIFICANTLY AFFECT THE COST OF THE TURBINE IS AN IMPORTANT OBJECTIVE OF THE CABLE DESIGN. THE LATERAL VIBRATION OF THE CABLES IS ANOTHER FEATURE OF THE CABLE DESIGN WHICH NEEDS TO BE CONSIDERED. THESE ASPECTS OF THE CABLE DESIGN ARE DISCUSSED IN THIS PAPER, AND A TECHNIQUE FOR DAMPING CABLE VIBRATIONS IS MATHEMATICALLY ANALYZED AND DEMONSTRATED WITH EXPERIMENTAL DATA.

1981-0016 CARNE T G
GUY CABLE DESIGN AND DAMPING FOR VERTICAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 255-264.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

GUY CABLES ARE FREQUENTLY USED TO SUPPORT VERTICAL AXIS WIND TURBINES SINCE GUYING THE TURBINE REDUCES SOME OF THE STRUCTURAL REQUIREMENTS ON THE TOWER. THE GUYS MUST BE DESIGNED TO PROVIDE BOTH THE REQUIRED STRENGTH AND THE REQUIRED STIFFNESS AT THE TOP OF THE TURBINE. THE AXIAL LOAD WHICH THE GUYS APPLY TO THE TOWER, BEARINGS, AND FOUNDATIONS IS AN UNDESIRABLE CONSEQUENCE OF USING GUYS TO SUPPORT THE TURBINE. LIMITING THE AXIAL LOAD SO THAT IT DOES NOT SIGNIFICANTLY AFFECT THE COST OF THE TURBINE IS AN IMPORTANT OBJECTIVE OF THE CABLE DESIGN. THE LATERAL VIBRATION OF THE CABLES IS ANOTHER FEATURE OF THE CABLE DESIGN WHICH NEEDS TO BE CONSIDERED. THESE ASPECTS OF THE CABLE DESIGN ARE DISCUSSED IN THIS PAPER, AND A TECHNIQUE FOR DAMPING CABLE VIBRATIONS IS MATHEMATICALLY ANALYZED AND DEMONSTRATED WITH EXPERIMENTAL DATA.

1981-0017 CLAUSS D B, CARNE T G
VERTICAL AXIS WIND TURBINE DRIVE TRAIN TRANSIENT DYNAMICS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 305-314.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

START-UP OF A VERTICAL AXIS WIND TURBINE CAUSES TRANSIENT TORQUE OSCILLATIONS IN THE DRIVE TRAIN WITH PEAK TORQUES WHICH MAY BE OVER TWO AND ONE-HALF TIMES THE RATED TORQUE OF THE TURBINE. THESE PEAK TORQUES ARE OF SUFFICIENT MAGNITUDE TO POSSIBLY DAMAGE THE DRIVE TRAIN; SAFE AND RELIABLE OPERATION REQUIRES THAT MECHANICAL COMPONENTS BE OVERDESIGNED TO CARRY THE PEAK TORQUES CAUSED BY TRANSIENT EVENTS. A COMPUTER CODE, BASED ON A LUMPED PARAMETER MODEL OF THE DRIVE TRAIN, HAS BEEN DEVELOPED AND TESTED FOR THE LOW COST 17-METER TURBINE; THE RESULTS SHOW EXCELLENT AGREEMENT WITH FIELD DATA. THE CODE HAS SUBSEQUENTLY BEEN USED TO PREDICT THE EFFECT OF A SLIP CLUTCH ON TRANSIENT TORQUE OSCILLATIONS. IT HAS BEEN DEMONSTRATED THAT A SLIP CLUTCH LOCATED BETWEEN THE MOTOR AND BRAKE CAN REDUCE PEAK TORQUES BY THIRTY-EIGHT PERCENT.

1981-0018 CLAUSS D B, CARNE T G
VERTICAL AXIS WIND TURBINE DRIVE TRAIN TRANSIENT DYNAMICS.
NTIS, MARCH 1981. 51 P.
SAND-80-2646

START-UP OF A VERTICAL AXIS WIND TURBINE CAUSES TRANSIENT TORQUE OSCILLATIONS IN THE DRIVE TRAIN WITH PEAK TORQUES WHICH MAY BE OVER TWO AND ONE-HALF TIMES THE RATED TORQUE OF THE TURBINE. THESE PEAK TORQUES ARE OF SUFFICIENT MAGNITUDE TO POSSIBLY DAMAGE THE DRIVE TRAIN; SAFE AND RELIABLE OPERATION REQUIRES THAT MECHANICAL COMPONENTS BE OVERDESIGNED TO CARRY THE PEAK TORQUES CAUSED BY TRANSIENT EVENTS. A COMPUTER CODE, BASED ON A LUMPED PARAMETER MODEL OF THE DRIVE TRAIN, HAS BEEN DEVELOPED AND TESTED FOR THE LOW COST 17-METER TURBINE; THE RESULTS SHOW EXCELLENT AGREEMENT WITH FIELD DATA. THE CODE HAS SUBSEQUENTLY BEEN USED TO PREDICT THE EFFECT OF A SLIP CLUTCH ON TRANSIENT TORQUE OSCILLATIONS. IT HAS BEEN DEMONSTRATED THAT A SLIP CLUTCH LOCATED BETWEEN THE MOTOR AND BRAKE CAN REDUCE PEAK TORQUES BY THIRTY-EIGHT PERCENT.

1981-0019 CLAUSS D B, CARNE T G
VERTICAL AXIS WIND TURBINE DRIVE TRAIN TRANSIENT DYNAMICS.
NTIS, 1981. 17 P.
SAND-80-2646C, CONF-810226-1

START-UP OF A VERTICAL AXIS WIND TURBINE CAUSES TRANSIENT TORQUE OSCILLATIONS IN THE DRIVE TRAIN WITH PEAK TORQUES WHICH MAY BE OVER TWO AND ONE-HALF TIMES THE RATED TORQUE OF THE TURBINE. THESE PEAK TORQUES ARE OF SUFFICIENT MAGNITUDE TO POSSIBLY DAMAGE THE DRIVE TRAIN; SAFE AND RELIABLE OPERATION REQUIRES THAT MECHANICAL COMPONENTS BE OVERDESIGNED TO CARRY THE PEAK TORQUES CAUSED BY TRANSIENT EVENTS. A COMPUTER CODE, BASED ON A LUMPED PARAMETER MODEL OF THE DRIVE TRAIN, HAS BEEN DEVELOPED AND TESTED FOR THE LOW COST 17-METER TURBINE; THE RESULTS SHOW EXCELLENT AGREEMENT WITH FIELD DATA. THE CODE HAS SUBSEQUENTLY BEEN USED TO PREDICT THE EFFECT OF A SLIP CLUTCH ON TRANSIENT TORQUE OSCILLATIONS.

1981-0020 CURRIN H
NORTH WIND 4 KW "PASSIVE" CONTROL SYSTEM DESIGN.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 265-270.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN OVERVIEW OF A MECHANICAL ROTOR CONTROL DESIGN IS PRESENTED. OPERATION AT CONSTANT RPM AND RAPID RESPONSE ARE OBTAINED BY USING BLADE PITCH MOMENTS FOR BOTH SENSING CONTROL NEED AND BLADE PITCH ACTUATION. THE BASIC CONCEPT, STATIC OR EQUILIBRIUM DESIGN, AND DYNAMIC ANALYSIS ARE BRIEFLY PRESENTED.

1981-0021 CURTICE D, PATTON J
OPERATION OF SMALL WIND TURBINES ON A DISTRIBUTION SYSTEM. FINAL REPORT.
NTIS, MARCH 1981. 193 P.
RFP-3177-2

THIS STUDY HAS ANALYZED TECHNICAL INTERCONNECTION PROBLEMS ASSOCIATED WITH THE DISPERSED WIND TURBINE (WT) APPLICATION SCENARIO: WTS CONNECTED ON DISTRIBUTION SYSTEMS PRODUCING AC POWER DIRECTLY OR DC POWER FED INTO AN INVERTER, WITHOUT STORAGE SYSTEMS, FEEDING BACK SURPLUS POWER WHENEVER THE WIND IS BLOWING. ITS SPECIFIC

OBJECTIVES INCLUDED ANALYSIS OF: UTILITY PERSONNEL SAFETY; DISTRIBUTION SYSTEM AND WT PROTECTION EQUIPMENT; WTS' EFFECTS ON DISTRIBUTION FEEDER VOLTAGE AND REGULATION EQUIPMENT, AND LINE LOSSES; AND DEVELOPMENT OF A METHOD TO ANALYZE UTILITY LOAD-FREQUENCY CONTROL PROBLEMS WITH LOAD PATTERNS PRODUCED BY CUSTOMER DEMAND AND THE WTS' INTERMITTENT POWER OUTPUT.

1981-0022 CURTICE D, PATTON J
OPERATION OF SMALL WIND TURBINES ON A DISTRIBUTION SYSTEM. EXECUTIVE SUMMARY.
NTIS, MARCH 1981. 25 P.
RFP-3177-1

1981-0023 DEVELOPMENT OF SMALL WIND SYSTEMS IN THE USA.
INT. POWER GENERATION 4(1): 77-79, FEBRUARY 1981.

IN PARALLEL WITH THE WELL-KNOWN MOD PROGRAMME, THE WIND PROGRAMME OF THE US DOE ALSO ENCOMPASSES THE TESTING OF SMALL WIND GENERATOR SYSTEMS, UP TO 100 KW, AT A TEST SITE AT ROCKY FLATS, COLORADO. THIS PART OF THE PROGRAMME IS OPERATED FOR THE DOE BY ROCKWELL INTERNATIONAL AND IT IS INTENDED TO TEST MORE THAN 100 MACHINES AT THIS SITE.

1981-0024 DREIER M E, HOFFMAN J A
WIND ENERGY SYSTEM TIME-DOMAIN (WEST) ANALYZERS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 211-219.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

USING THE LATEST HYBRID ELECTRONICS TECHNOLOGY, A PORTABLE ANALYZER WHICH SIMULATES IN REAL TIME THE COMPLEX NONLINEAR DYNAMICS OF HORIZONTAL AXIS WIND ENERGY SYSTEMS HAS BEEN CONSTRUCTED. MATH MODELS FOR AN AEROELASTIC ROTOR FEATURING NONLINEAR AERODYNAMIC AND INERTIAL TERMS HAVE BEEN IMPLEMENTED WITH HIGH SPEED DIGITAL CONTROLLERS AND ANALOG CALCULATION; THIS ROTOR MODEL IS THEN COMBINED WITH OTHER MATH MODELS OF ELASTIC SUPPORTS, CONTROL SYSTEMS, A POWER TRAIN AND GIMBALLED ROTOR KINEMATICS. THE ANALYZER ALSO FEATURES A STROBOSCOPIC DISPLAY SYSTEM GRAPHICALLY DEPICTING DISTRIBUTED BLADE LOADS, MOTION, AND OTHER AERODYNAMIC FUNCTIONS ON A CATHODE RAY TUBE. THE VIEWER SEES A CLEAR PICTURE OF ROTOR DYNAMICS IN THE START-UP, SHUT-DOWN, AND TRIM STATES, AS WELL AS OPERATION IN SPECIAL TRANSIENT CONDITIONS SUCH AS GUST AND EMERGENCY SHUTDOWN. LIMITED CORRELATION EFFORTS HAVE SHOWN GOOD COMPARISON BETWEEN THE RESULTS OF THIS ANALYZER AND OTHER SOPHISTICATED DIGITAL SIMULATIONS; THE DIGITAL SIMULATION RESULTS HAVE BEEN SUCCESSFULLY CORRELATED WITH TEST DATA.

1981-0025 DUGUNDJI J, WENDELL J H
REVIEW OF ANALYSIS FOR ROTATING SYSTEMS WITH PERIODIC COEFFICIENTS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 165-172.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE PRESENT ARTICLE REVIEWS TWO OF THE MORE COMMON PROCEDURES FOR ANALYZING THE STABILITY AND FORCED RESPONSE OF EQUATIONS WITH PERIODIC COEFFICIENTS, NAMELY, THE USE OF FLOQUET METHODS, AND THE USE OF MULTIBLADE COORDINATE AND HARMONIC BALANCE METHODS. THE ANALYSIS PROCEDURES OF THESE PERIODIC COEFFICIENT SYSTEMS ARE COMPARED WITH THOSE OF THE MORE FAMILIAR CONSTANT COEFFICIENT SYSTEM.

1981-0026 EGOLF T A, LANDGREBE A J
THE UTRC WIND ENERGY CONVERSION SYSTEM PERFORMANCE ANALYSIS FOR HORIZONTAL AXIS WIND TURBINES (WECSPER).
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 27-34.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE THEORY FOR THE UTRC WIND ENERGY CONVERSION SYSTEM PERFORMANCE ANALYSIS (WECSPER) FOR THE PREDICTION OF HORIZONTAL AXIS WIND TURBINE PERFORMANCE IS PRESENTED. MAJOR FEATURES OF THE ANALYSIS ARE THE ABILITY TO: (1) TREAT THE WIND TURBINE BLADES AS LIFTING LINES WITH A PRESCRIBED WAKE MODEL; (2) SOLVE FOR THE WAKE-INDUCED INFLOW AND BLADE CIRCULATION USING REAL NONLINEAR AIRFOIL DATA; AND (3) ITERATE INTERNALLY TO OBTAIN A COMPATIBLE WAKE TRANSPORT VELOCITY AND BLADE LOADING SOLUTION. THIS ANALYSIS ALSO PROVIDES AN APPROXIMATE TREATMENT OF WAKE DISTORTIONS DUE TO TOWER SHADOW OR WIND SHEAR PROFILES. FINALLY, SELECTED RESULTS OF INTERNAL UTRC APPLICATION OF THE ANALYSIS TO EXISTING WIND TURBINES AND CORRELATION WITH LIMITED TEST DATA ARE DESCRIBED.

1981-0027 ENDLICH R M, LUDWIG F L, BHUMRALKAR C M, ESTOQUE M A
A PRACTICAL METHOD FOR ESTIMATING WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
NTIS, 1981. 178 P.
PNL-3808

TERRAIN FEATURES AND VARIATIONS IN THE DEPTH OF THE ATMOSPHERIC BOUNDARY LAYER PRODUCE LOCAL VARIATIONS IN WIND, AND THESE VARIATIONS ARE NOT DEPICTED WELL BY STANDARD WEATHER REPORTS. WE HAVE DEVELOPED A METHOD TO COMPUTE LOCAL WINDS FOR USE IN ESTIMATING THE WIND ENERGY AVAILABLE AT ANY POTENTIAL SITE FOR A WIND TURBINE. THE METHOD USES THE TERRAIN HEIGHTS FOR AN AREA SURROUNDING THE SITE AND A SERIES OF WIND AND PRESSURE REPORTS FROM THE NEAREST FOUR OR FIVE NATIONAL WEATHER SERVICE STATIONS. AN INITIAL ESTIMATE OF THE WINDS IN THE ATMOSPHERIC BOUNDARY LAYER IS MADE, THEN THESE WINDS ARE ADJUSTED TO SATISFY THE CONTINUITY EQUATION. IN THIS MANNER THE FLOW IS MADE TO REFLECT THE INFLUENCES OF THE TERRAIN AND THE SHAPE OF THE BOUNDARY-LAYER TOP. WE HAVE APPLIED THE METHOD TO SEVEN SITES IN THE UNITED STATES FOR 1977. FOR FOUR OF THE SITES, THE WINDFLOW MODEL WAS "TUNED" BY ALTERING ITS ADJUSTABLE FEATURES AND COMPARING THE CORRESPONDING WIND SIMULATIONS TO WIND MEASURMENTS THAT WERE MADE AT THE SITES UNDER THE AUSPICES OF THE PACIFIC NORTHWEST LABORATORY (PNL). FOR THE OTHER THREE SITES, SIMULATIONS WERE MADE WITHOUT TUNING THE MODEL. THIS REPORT DESCRIBES IN DETAIL OUR METHODOLOGY AND RESULTS, AND PROVIDES DESCRIPTIONS OF THE COMPUTER PROGRAMS, INSTRUCTIONS FOR USING THEM, AND COMPLETE PROGRAM LISTINGS.

1981-0028 EXPLOITING ORKNEY WINDS.
INT. POWER GENERATION 4(2): 9, 11, MARCH 1981.

THE USE OF WIND POWER HAS TAKEN A BIG STEP FORWARD IN THE UK WITH THE ANNOUNCEMENT THAT THE CONSTRUCTION OF A 3 MW WIND TURBINE GENERATOR IS TO GO AHEAD IN THE ORKNEY ISLANDS. THE MACHINE IS EXPECTED TO COST MORE THAN 5.6 MILLION AND THE MACHINE SHOULD BE IN OPERATION BY 1983/4, SUPPLYING POWER FOR THE ORKNEY GRID SYSTEM. A 250 KW WIND GENERATOR IS TC BE ERECTED ON AN ADJACENT SITE TO PROVIDE DATA FOR OPERATING THE LARGER MACHINE.

1981-0029 FADDOUL J R

TEST EVALUATION OF A LAMINATED WOOD WIND TURBINE BLADE CONCEPT.
NTIS, MAY 1981. 45 P.
DOE/NASA/20320-30, NASA-TM-81719

BECAUSE OF THE HIGH STIFFNESS AND FATIGUE STRENGTH OF WOOD (AS COMPARED TO DENSITY) ALONG WITH THE LOW COST MANUFACTURING TECHNIQUES AVAILABLE, A LAMINATED WOOD WIND TURBINE BLADE APPLICATION HAS BEEN STUDIED. THIS REPORT PRESENTS THE RESULTS OF THE TESTING PERFORMED ON ELEMENTS OF THE WOOD BLADE-TO-HUB TRANSITION SECTION WHICH USES STEEL STUDS CAST INTO A LAMINATED WOOD SPAR WITH A FILLED EPOXY.

1981-0030 FALLEN M, ZIEGLER J
PERFORMANCE CALCULATION OF A WIND POWER CONVERTER WITH A VERTICAL AXIS.
BRENNST.-WAERME-KRAFT 33(2): 54-59, FEBRUARY 1981. (IN GERMAN)

THE BASIS FOR THE PERFORMANCE CALCULATION IS THE DART CALCULATION MODEL BY STRICKLAND WHICH WAS MODIFIED FOR THE H-DARRIEUS ROTOR. THE ESSENTIAL EQUATIONS ARE SHOWN WHICH CAN BE SOLVED BY ITERATION ONLY. THE EFFECTS OF THE NUMBER OF BLADES, GEOMETRY OF THE WHEEL AND PROFILE FORM ON THE PERFORMANCE COEFFICIENT ARE DETERMINED BY CALCULATION. THE RESULTS ARE COMPARED WITH THOSE OF OTHER WIND MILL DESIGNS.

1981-0031 FINLAYSON A N
MAKING WINDPOWER AN IMPORTANT PART OF A NATIONAL ENERGY PLAN.
ASME PAPER 81-PET-11, 1981. 5 P.

A NEW AND RADICAL WIND TURBINE CONCEPT ILLUSTRATES A PROPOSED PHILOSOPHY FOR WIDESPREAD CONVERSION OF RENEWABLE ENERGY. WITH AN UNUSUALLY BROAD OPERATIONAL RANGE AND HIGH EFFICIENCY, THIS DEVICE DEMONSTRATES THE PRACTICAL USE OF A LOW DENSITY, CYCLIC ENERGY SOURCE. DUE TO ITS SIMPLICITY, LONGEVITY, AND USE OF READILY AVAILABLE MATERIALS AND TECHNOLOGY, THIS UNIT COULD PROVIDE LOW COST SUPPLEMENTAL SPACE AND WATER HEATING AS A SIGNIFICANT CONTRIBUTION TO A NATIONAL ENERGY PLAN.

1981-0032 FLAVIN C
WIND POWER: A TURNING POINT.
WORLDWATCH PAPER 45. WASHINGTON, D.C., WORLDWATCH INSTITUTE, JULY 1981. 56 P.

THIS IS A GENERAL REVIEW OF THE CURRENT STATUS OF WIND POWER AS AN ENERGY SOURCE IN THE WORLD TODAY.

1981-0033 FRANK A L
WINDMILL CLUSTERS AND GIANT TURBINES LOG MANY UPS, ONE DOWN.
SOL. AGE 6(6): 17, JUNE 1981.

RECENT DEVELOPMENTS IN LARGE-SCALE WIND PROJECTS ARE DESCRIBED, INCLUDING FAILURE OF A 500 KW TURBINE IN CALIFORNIA.

1981-0034 FREEMAN D L, HADLEY D L, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 2. THE NORTH CENTRAL REGION.
NTIS, FEBRUARY 1981. 191 P.
PNL-3195-WERA-2

THE NORTH CENTRAL ATLAS ASSIMILATES SIX COLLECTIONS OF WIND RESOURCE DATA: ONE FOR THE REGION AND ONE FOR EACH OF THE FIVE STATES THAT COMPOSE THE NORTH CENTRAL REGION (IOWA, MINNESOTA, NEBRASKA, NORTH DAKOTA, AND SOUTH DAKOTA). AT THE STATE LEVEL, FEATURES OF THE CLIMATE, TOPOGRAPHY AND WIND RESOURCE ARE DISCUSSED IN GREATER DETAIL THAN IS PROVIDED IN THE REGIONAL DISCUSSION, AND THE DATA LOCATIONS ON WHICH THE ASSESSMENT IS BASED ARE MAPPED. VARIATIONS, OVER SEVERAL TIME SCALES, IN THE WIND RESOURCE AT SELECTED STATIONS IN EACH STATE ARE SHOWN ON GRAPHS OF MONTHLY AVERAGE AND INTERANNUAL WIND SPEED AND POWER, AND HOURLY AVERAGE WIND SPEED FOR EACH SEASON. OTHER GRAPHS PRESENT SPEED DIRECTION AND DURATION FREQUENCIES OF THE WIND AT THESE LOCATIONS.

1981-0035 FROST W, LIN M-C
TWO-DIMENSIONAL TURBULENCE MODELS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 155-161.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

TWO-DIMENSIONAL TURBULENCE MODELS DESCRIBED IN THE NASA TECHNICAL PAPER 1359, "ENGINEERING HANDBOOK ON THE ATMOSPHERIC AND ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT", ARE COMPARED WITH EXPERIMENTAL MEASUREMENTS MADE USING AN ARRAY OF INSTRUMENTED TOWERS. DISCUSSION OF THE SPATIAL CORRELATION COEFFICIENT, THE TWO-POINT SPECTRUM OR CROSS SPECTRUM, AND THE COHERENCE FUNCTION IS GIVEN. THE PREDICTION TECHNIQUES IN GENERAL AGREE REASONABLY WELL WITH THE EXPERIMENTAL RESULTS. MEASUREMENTS OF THE INTEGRAL LENGTH SCALE HOWEVER, DO NOT CORRELATE WELL WITH THE PREDICTION MODEL RECOMMENDED IN THE DESIGN HANDBOOK.

1981-0036 FUNG T K, SCHEFFLER R L, STOLPE J
WIND ENERGY - A UTILITY PERSPECTIVE.
IEEE TRANS. POWER APPAR. SYST. PAS-100(3): 1176-1182, MARCH 1981.

OF ALL THE RENEWABLE ENERGY SYSTEMS, WIND TURBINE GENERATORS (WTGS) ARE LIKELY TO MAKE THE EARLIEST SIGNIFICANT COST-EFFECTIVE CONTRIBUTION TO THE UTILITY GRID. IN ORDER TO ACCELERATE THE COMMERCIAL DEPLOYMENT OF WTGS, SEVERAL ISSUES MUST BE ADDRESSED IN A TIMELY MANNER. THIS PAPER PRESENTS SOME OF THE ISSUES FACING THE UTILITY INDUSTRY AS THEY RELATE TO IMPLEMENTATION OF AN EFFECTIVE WIND ENERGY PROGRAM. IN ADDITION, THE SOUTHERN CALIFORNIA EDISON COMPANY'S WIND ENERGY PROGRAM IS PRESENTED, WHICH IS DESIGNED TO PROVIDE PERTINENT ANSWERS TO THE TECHNICAL, ECONOMIC AND ENVIRONMENTAL ISSUES CONCERNING WTG INSTALLATIONS AND THEIR COMMERCIAL VIABILITY AS A FUTURE GENERATION RESOURCE.

1981-0037 GLASGOW J C, MILLER D R, CORRIGAN R D
COMPARISON OF UPWIND AND DOWNWIND ROTOR OPERATIONS OF THE DOE/NASA 100 KW MOD-0 WIND TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 225-234.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

TESTS HAVE BEEN CONDUCTED ON A 38 M DIAMETER HORIZONTAL AXIS WIND TURBINE, WHICH HAD FIRST A ROTOR DOWNWIND OF THE SUPPORTING TRUSS TOWER AND THEN UPWIND OF THE TOWER. ASIDE FROM THE PLACEMENT OF THE ROTOR AND THE DIRECTION OF ROTATION OF THE DRIVE TRAIN, THE WIND TURBINE WAS IDENTICAL FOR BOTH TESTS. THREE ASPECTS OF THE TEST RESULTS ARE COMPARED: ROTOR BLADE BENDING LOADS, ROTOR TEETER RESPONSE, AND NACELLE YAW MOMENTS. AS A RESULT OF THE TESTS, IT IS SHOWN THAT WHILE MEAN FLATWISE BENDING MOMENTS WERE UNAFFECTED BY THE PLACEMENT OF

THE ROTOR, CYCLIC FLATWISE BENDING TENDED TO INCREASE WITH WIND SPEED FOR THE DOWNWIND ROTOR WHILE REMAINING SOMEWHAT UNIFORM WITH WIND SPEED FOR THE UPWIND ROTOR, REFLECTING THE EFFECTS OF INCREASED FLOW DISTURBANCE FOR A DOWNWIND ROTOR. ROTOR TEETER RESPONSE WAS NOT SIGNIFICANTLY AFFECTED BY THE ROTOR LOCATION RELATIVE TO THE TOWER, BUT APPEARS TO REFLECT REDUCED TEETER STABILITY NEAR RATED WIND SPEED FOR BOTH CONFIGURATIONS. TEETER STABILITY APPEARS TO RETURN ABOVE RATED WIND SPEED, HOWEVER. NACELLE YAW MOMENTS ARE HIGHER FOR THE UPWIND ROTOR BUT DO NOT INDICATE SIGNIFICANT DESIGN PROBLEMS FOR EITHER CONFIGURATION.

1981-0038 GLASGOW J C, MILLER D R, CORRIGAN R D
COMPARISON OF UPWIND AND DOWNWIND ROTOR OPERATIONS OF THE DOE/NASA 100 KW MOD-0 WIND TURBINE.
NTIS, 1981. 10 P.
DOE/NASA/1028-31, NASA-TM-81744, N81-22472

TESTS HAVE BEEN CONDUCTED ON A 38 M DIAMETER HORIZONTAL AXIS WIND TURBINE, WHICH HAD FIRST A ROTOR DOWNWIND OF THE SUPPORTING TRUSS TOWER AND THEN UPWIND OF THE TOWER. ASIDE FROM THE PLACEMENT OF THE ROTOR AND THE DIRECTION OF ROTATION OF THE DRIVE TRAIN, THE WIND TURBINE WAS IDENTICAL FOR BOTH TESTS. THREE ASPECTS OF THE TEST RESULTS ARE COMPARED: ROTOR BLADE BENDING LOADS, ROTOR TEETER RESPONSE, AND NACELLE YAW MOMENTS. AS A RESULT OF THE TESTS, IT IS SHOWN THAT WHILE MEAN FLATWISE BENDING MOMENTS WERE UNAFFECTED BY THE PLACEMENT OF THE ROTOR, CYCLIC FLATWISE BENDING TENDED TO INCREASE WITH WIND SPEED FOR THE DOWNWIND ROTOR WHILE REMAINING SOMEWHAT UNIFORM WITH WIND SPEED FOR THE UPWIND ROTOR, REFLECTING THE EFFECTS OF INCREASED FLOW DISTURBANCE FOR A DOWNWIND ROTOR. ROTOR TEETER RESPONSE WAS NOT SIGNIFICANTLY AFFECTED BY THE ROTOR LOCATION RELATIVE TO THE TOWER, BUT APPEARS TO REFLECT REDUCED TEETER STABILITY NEAR RATED WIND SPEED FOR BOTH CONFIGURATIONS. TEETER STABILITY APPEARS TO RETURN ABOVE RATED WIND SPEED, HOWEVER. NACELLE YAW MOMENTS ARE HIGHER FOR THE UPWIND ROTOR BUT DO NOT INDICATE SIGNIFICANT DESIGN PROBLEMS FOR EITHER CONFIGURATION.

1981-0039 GREENE G C
MEASURED AND CALCULATED CHARACTERISTICS OF WIND TURBINE NOISE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 355-362.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THIS PAPER PRESENTS THE RESULTS OF AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF WIND TURBINE NOISE. NOISE CALCULATIONS INDICATE THAT FOR CONFIGURATIONS WITH THE ROTOR DOWNWIND OF THE SUPPORT TOWER, THE PRIMARY SOURCE OF NOISE IS THE RAPID CHANGE IN ROTOR LOADING WHICH OCCURS AS THE ROTOR PASSES THROUGH THE TOWER WAKE. NOISE MEASUREMENTS ARE PRESENTED FOR SOLID AND TRUSS-TYPE TOWER MODELS WITH BOTH UPWIND AND DOWNWIND ROTORS. UPWIND ROTOR CONFIGURATIONS ARE SHOWN TO BE SIGNIFICANTLY QUIETER THAN DOWNWIND CONFIGURATIONS. THE MODEL DATA SUGGEST THAT AVERAGED NOISE MEASUREMENTS AND NOISE CALCULATIONS BASED ON AVERAGED TOWER WAKE CHARACTERISTICS MAY NOT ACCURATELY REPRESENT THE IMPULSIVE NOISE CHARACTERISTICS OF DOWNWIND ROTOR CONFIGURATIONS.

1981-0040 HAM N D
FLUTTER OF DARRIEUS WIND TURBINE BLADES: CORRELATION OF THEORY AND EXPERIMENT.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 199-200.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

1981-0041 HIESTER T R, PENNELL W T
METEOROLOGICAL ASPECTS OF SITING LARGE WIND TURBINES.
NTIS, JANUARY 1981. 512 P.
PNL-2522

THIS REPORT, WHICH FOCUSES ON THE METEOROLOGICAL ASPECTS OF SITING LARGE WIND TURBINES (TURBINES WITH A RATED OUTPUT EXCEEDING 100 KW), HAS FOUR MAIN GOALS. THE FIRST IS TO OUTLINE THE ELEMENTS OF A SITING STRATEGY THAT WILL IDENTIFY THE MOST FAVORABLE WIND ENERGY SITES IN A REGION AND THAT WILL PROVIDE SUFFICIENT WIND DATA TO MAKE RESPONSIBLE ECONOMIC EVALUATIONS OF THE SITE WIND RESOURCE POSSIBLE. THE SECOND IS TO CRITIQUE AND SUMMARIZE SITING TECHNIQUES THAT WERE STUDIED IN THE DEPARTMENT OF ENERGY (DOE) WIND ENERGY PROGRAM. THE THIRD GOAL IS TO EDUCATE UTILITY TECHNICAL PERSONNEL, ENGINEERING CONSULTANTS, AND METEOROLOGICAL CONSULTANTS (WHO MAY HAVE NOT YET UNDERTAKEN WIND ENERGY CONSULTING) ON METEOROLOGICAL PHENOMENA RELEVANT TO WIND TURBINE SITING IN ORDER TO ENHANCE DIALOGUES BETWEEN THESE GROUPS. THE FOURTH GOAL IS TO MINIMIZE THE CHANCES OF FAILURE OF EARLY SITING PROGRAMS DUE TO INSUFFICIENT UNDERSTANDING OF WIND BEHAVIOR.

1981-0042 HINRICHSEN E N, NOLAN P J
DYNAMICS AND STABILITY OF WIND TURBINE GENERATORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 315-323.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THIS PAPER DESCRIBES THE DYNAMIC AND STABILITY PROPERTIES OF WIND TURBINE GENERATORS CONNECTED TO POWER SYSTEMS. BOTH SYNCHRONOUS AND INDUCTION GENERATORS ARE CONSIDERED. A COMPARISON IS MADE BETWEEN WIND TURBINES, STEAM, AND HYDRO UNITS. THE UNUSUAL PHENOMENA ASSOCIATED WITH WIND TURBINES ARE EMPHASIZED. THE GENERAL CONTROL REQUIREMENTS ARE DISCUSSED, AS WELL AS VARIOUS SCHEMES FOR TORSIONAL DAMPING SUCH AS SPEED SENSITIVE STABILIZER AND BLADE PITCH CONTROL. INTERACTION BETWEEN ADJACENT WIND TURBINES IN A "WIND FARM" IS ALSO CONSIDERED.

1981-0043 HOFFER T, REALE T, ELFIQI A
ICING ON WIND ENERGY SYSTEMS.
NTIS, JANUARY 1981. 75 P.
DOE/ET/23170-80/1

A PARTICULARLY IMPORTANT ASPECT TO CONSIDER PRIOR TO THE INSTALLATION OF A WIND ENERGY SYSTEM IS THE POTENTIAL FOR ATMOSPHERIC ICING. THIS REPORT PRESENTS PROCEDURES FOR ANALYZING METEOROLOGICAL DATA TO DETERMINE THE MAXIMUM POSSIBLE ICING TO BE EXPECTED AT SPECIFIED LOCATIONS. MODELS DEVELOPED TO SIMULATE THE MAXIMUM POSSIBLE ICE BUILDUP ON AN EXPOSED SURFACE USING THE RAINFALL AND CLOUD WATER DATA AS INPUT ARE ALSO PRESENTED. IN ADDITION TO THE MAXIMAL DYNAMIC AND STATIC ICING LOADS, COMPARATIVE ICING VALUES BASED ON AN ATTEMPT TO SIMULATE ACTUAL FIELD CONDITIONS ARE ALSO SHOWN. INCLUDED ARE ASSUMPTIONS OF DROPLET SPLASHING AND WATER DRAINAGE FOR THE GLAZE CASES AND ATMOSPHERIC MIXING DURING OROGRAPHIC LIFTING FOR RIME CASES.

1981-0044 HOHENEMSER K H, SWIFT A H P
DYNAMICS OF AN EXPERIMENTAL TWO BLADED HORIZONTAL AXIS WIND TURBINE WITH BLADE CYCLIC PITCH VARIATION.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 277-286.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE HORIZONTAL AXIS WIND TURBINE UNDER STUDY INCORPORATES THE COMBINATION OF TWO FEATURES: THE APPLICATION OF BLADE CYCLIC PITCH VARIATION AND THE USE OF YAW ANGLE CONTROL FOR ROTOR SPEED AND TORQUE REGULATION. DUE TO ITS "EMASCULATION" BY PASSIVE CYCLIC PITCH VARIATION THE ROTOR CAN BE RAPIDLY YAWED WITHOUT ENCOUNTERING GYROSCOPIC AND AERODYNAMIC HUB MOMENTS AND WITHOUT NOTICEABLE OUT-OF-PLANE BLADE EXCURSIONS. THE TWO BLADED UPWIND ROTOR IS VANE STABILIZED AND OF VERY SIMPLE AND RUGGED DESIGN. THE PRINCIPLE WAS FIRST CHECKED OUT WITH A SMALL SCALE WIND TUNNEL MODEL AND THEN TESTED IN THE ATMOSPHERE WITH A 7.6 METER DIAMETER EXPERIMENTAL FULLY INSTRUMENTED WIND TURBINE DRIVING A 3 PHASE ALTERNATOR. THE ROTOR TO TAIL VANE FURL ANGLE WAS CONTROLLED THROUGH AN ELECTRIC ACTUATOR BY A MANUALLY OPERATED TOGGLE SWITCH OVERRIDDEN BY AN AUTOMATIC ROTOR OVERSPEED RELAY. THE PAPER SUMMARIZES THE TEST RESULTS WITH RESPECT TO STRUCTURAL DYNAMICS AND YAW DYNAMICS.

1981-0045 HOLLEY W E, THRESHER R W, LIN S-R
WIND TURBULENCE INPUTS FOR HORIZONTAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 101-112.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

IN ORDER TO PREDICT WIND TURBINE RESPONSE CHARACTERISTICS IN THE PRESENCE OF ATMOSPHERIC TURBULENCE, TWO MAJOR MODELING STEPS ARE REQUIRED. FIRST, THE IMPORTANT ATMOSPHERIC SOURCES FOR THE FORCE EXCITATIONS FELT BY THE WIND TURBINE SYSTEM MUST BE IDENTIFIED AND CHARACTERIZED. SECOND, A DYNAMIC MODEL MUST BE DEVELOPED WHICH DESCRIBES HOW THESE EXCITATIONS ARE TRANSMITTED THROUGH THE STRUCTURE AND POWER TRAIN. THE GOAL OF THIS PAPER IS TO ESTABLISH THE FIRST MODELING STEP, THAT OF QUANTIFYING THE IMPORTANT EXCITATIONS DUE TO THE ATMOSPHERIC TURBULENCE. THE DYNAMIC MODELING OF THE SECOND STEP IS UNDERTAKEN IN THE ACCOMPANYING PAPER. (SEE ENTRY 1981-0112).

1981-0046 HOOKE W H
A REVIEW OF REMOTE-SENSOR POTENTIAL FOR WIND-ENERGY STUDIES.
NTIS, MARCH 1981. 183 P.
DOE/ET/23151-80/1

THIS REPORT EVALUATES A NUMBER OF REMOTE-SENSING SYSTEMS SUCH AS RADARS, LIDARS, AND ACOUSTIC ECHO SOUNDERS WHICH ARE POTENTIAL ALTERNATIVES TO THE CUP- AND PROPELLER-ANEMOMETERS ROUTINELY USED IN WIND ENERGY SITING. THE HIGH COSTS AND DEMANDING OPERATION REQUIREMENTS OF THESE SENSORS CURRENTLY PRECLUDE THEIR USE IN THE EARLY STAGES OF A MULTI-PHASE WIND ENERGY STRATEGY, BUT THEY CAN BE USED EFFECTIVELY IN THE LATTERMOST STAGES OF THE SITING PROCESS--NECESSARY ONLY FOR THE SITING OF LARGE WIND-ENERGY CONVERSION SYSTEMS (WECS) OR CLUSTERS. FOUR TECHNIQUES WHICH APPEAR TO BE OPERATIONAL NOW ARE: OPTICAL TRANSVERSE WIND SENSORS, ACOUSTIC DOPPLER SOUNDERS, TIME-OF-FLIGHT AND CONTINUOUS WAVE (CW) DOPPLER LIDAR, AND FREQUENCY-MODULATED, CONTINUOUS WAVE (FW-CW) DOPPLER RADAR.

1981-0047 HOWES H E, BOWES M A, PERLEY R
DEVELOPMENT OF A 40 KILOWATT WIND TURBINE GENERATOR. PHASE I. DESIGN AND ANALYSIS.
NTIS, FEBRUARY 1981. 296 P.
RFP-3094-2

KAMAN AEROSPACE CORPORATION IS CURRENTLY ENGAGED IN A PROGRAM TO DESIGN, FABRICATE AND TEST A HORIZONTAL AXIS WIND TURBINE GENERATOR CAPABLE OF PRODUCING 40 KW ELECTRICAL OUTPUT POWER IN A 20 MPH WIND. THIS REPORT PRESENTS THE RESULTS OF THE PHASE I PROGRAM EFFORT COVERING DESIGN TRADEOFF STUDIES, PRELIMINARY DESIGN AND ANALYSIS, AND THE FINAL DESIGN EFFORT. ADDITIONAL WORK COVERED UNDER PHASE I INCLUDED COST STUDIES AND TEST PLANNING ACTIVITIES. THE PROGRAM IS CURRENTLY IN THE CONTRACTOR TEST STAGE OF PHASE II.

1981-0048 HOWES H E, BOWES M A, PERLEY R
DEVELOPMENT OF A 40 KILOWATT WIND TURBINE GENERATOR. PHASE I. DESIGN AND ANALYSIS. EXECUTIVE SUMMARY.
NTIS, FEBRUARY 1981. 22 P.
RFP-3094-1

1981-0049 IGRA O
RESEARCH AND DEVELOPMENT FOR SHROUDED WIND TURBINES.
ENERGY CONVERS. MANAGE. 21(1): 13-48, 1981.

IN ORDER TO EXPLOIT WIND POWER AS ECONOMICALLY AS POSSIBLE, IT WAS SUGGESTED THAT THE WIND TURBINE SHOULD BE ENCLOSED INSIDE A SPECIALLY DESIGNED SHROUD. VARIOUS GEOMETRIES ARE DISCUSSED; IT IS SHOWN THAT WITH A FAIRLY COMPACT SHROUD A SIGNIFICANT POWER AUGMENTATION CAN BE ACHIEVED. FOR IMPROVING THE SHROUD PERFORMANCE, THE USE OF A RING-SHAPED FLAP OR BOUNDARY LAYER CONTROL TECHNIQUE IS INTRODUCED. IT IS SHOWN THAT UP TO 80% IMPROVEMENT IN THE SHROUD POWER AUGMENTATION CAN BE OBTAINED BY THE USE OF AN APPROPRIATE RING-SHAPED FLAP WHILE PROPER BLEEDING OF THE SHROUD'S EXTERNAL FLOW INTO ITS INNER REAR PART WILL INCREASE ITS POWER AUGMENTATION BY ABOUT 25%. THE PRESENT REVIEW ALSO DISCUSSED THE DESIGN AND PERFORMANCE OF AN AXIAL FLOW TURBINE WHICH IS THE MOST SUITABLE FOR THE PROPOSED SHROUDS. IT IS SHOWN THAT SUCH A TURBINE PRODUCES A FAIRLY STABLE OUTPUT FOR VARYING WIND SPEEDS WHILE EXHIBITING A FAIRLY HIGH EFFICIENCY. BASED ON THE REPORTED RESEARCH WITH SHROUDS, A PILOT PLANT PRODUCING 1 HP AT 5 M/S WITH A 3 M DIAMETER TURBINE WAS BUILT. ITS DESIGN AND PRELIMINARY FIELD TEST RESULTS ARE ALSO INCLUDED IN THE REVIEW.

1981-0050 JANETZKE D C, KAZA K R V
WHIRL FLUTTER ANALYSIS OF A HORIZONTAL-AXIS WIND TURBINE WITH A TWO-BLADED TEETERING ROTOR.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 201-210.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN INVESTIGATION TO EXPLORE THE POSSIBILITY OF WHIRL FLUTTER AND TO FIND THE EFFECT OF PITCH-FLAP COUPLING (DELTA-3) ON TEETERING MOTION OF THE DOE/NASA MOD-2 WIND TURBINE IS PRESENTED. THE EQUATIONS OF MOTION ARE DERIVED FOR AN IDEALIZED FIVE-DEGREE-OF-FREEDOM MATHEMATICAL MODEL OF A HORIZONTAL-AXIS WIND TURBINE WITH A TWO-BLADED TEETERING ROTOR. THE MODEL ACCOUNTS FOR THE OUT-OF-PLANE BENDING MOTION OF EACH BLADE, THE TEETERING MOTION OF THE ROTOR, AND BOTH THE PITCHING AND YAWING MOTIONS OF THE ROTOR SUPPORT. RESULTS SHOW THAT THE MOD-2 DESIGN IS FREE FROM WHIRL FLUTTER. SELECTED RESULTS ARE PRESENTED INDICATING THE EFFECT OF VARIATIONS IN ROTOR SUPPORT DAMPING, ROTOR SUPPORT STIFFNESS, AND DELTA-3 ON PITCHING, YAWING, TEETERING, AND BLADE BENDING MOTIONS.

1981-0051 JARASS L
WIND ENERGY: AN ASSESSMENT OF THE TECHNICAL AND ECONOMIC POTENTIAL: A CASE STUDY FOR THE FEDERAL REPUBLIC OF GERMANY, COMMISSIONED BY THE INTERNATIONAL ENERGY AGENCY.
BERLIN, NEW YORK, SPRINGER-VERLAG, 1981. TRANSLATION OF "WINDENERGIE".

1981-0052 GRIFFIN T, TATE M
USING A WIND ELECTRIC SYSTEM TO GENERATE POWER INTO A UTILITY GRID: A PROJECT IN SOUTH CENTRAL RURAL MINNESOTA.
NTIS, 1981. 22 P.
DOE/R5/10134-1

DESIGN SPECIFICATIONS ARE PRESENTED FOR THE NEWLY DESIGNED JACOBS 10 KVA WIND TURBINE SYSTEM.

1981-0053 JENG D R, KEITH T G, ALIAKBARKHANAFJEH A
AERODYNAMIC PERFORMANCE PREDICTION OF HORIZONTAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 9-18.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE PURPOSE OF THIS WORK IS TO DESCRIBE A NEW METHOD FOR CALCULATING THE AERODYNAMIC PERFORMANCE OF HORIZONTAL AXIS WIND TURBINES. THE METHOD, ENTITLED THE HELICAL VORTEX METHOD, DIRECTLY CALCULATES THE LOCAL INDUCED VELOCITY DUE TO HELICAL VORTICES THAT ORIGINATE AT THE ROTOR BLADE. FURTHERMORE, THE METHOD DOES NOT REQUIRE A SPECIFIED CIRCULATION DISTRIBUTION. RESULTS OF THE METHOD ARE COMPARED TO SIMILAR RESULTS OBTAINED FROM WILSON PROP CODE METHODS (PRANDTL, GOLDSTEIN, NASA AND NO TIP LOSS) AS WELL AS TO EXISTING EXPERIMENTAL DATA TAKEN FROM THE NASA MOD-0 WIND TURBINE. IT IS SHOWN THAT RESULTS OF THE PROPOSED METHOD AGREE WELL WITH EXPERIMENTAL VALUES OF THE POWER OUTPUT BOTH NEAR CUT-IN AND AT RATED WIND SPEEDS. FURTHER, IT IS FOUND THAT THE METHOD DOES NOT EXPERIENCE SOME OF THE NUMERICAL DIFFICULTIES ENCOUNTERED BY THE PROP CODE WHEN RUN AT LOW WIND VELOCITIES.

1981-0054 KELLEY N D
ACOUSTIC NOISE GENERATION BY THE DOE/NASA MOD-1 WIND TURBINE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 375-387.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE RESULTS OF A SERIES OF MEASUREMENTS TAKEN OVER THE PAST YEAR OF THE ACOUSTIC EMISSIONS FROM THE DOE/NASA MOD-1 WIND TURBINE HAVE SHOWN THE MAXIMUM ACOUSTIC ENERGY IS CONCENTRATED IN THE LOW FREQUENCY RANGE, OFTEN BELOW 100 HZ. THE TEMPORAL AS WELL AS THE FREQUENCY CHARACTERISTICS OF THE TURBINE SOUNDS HAVE BEEN SHOWN TO BE IMPORTANT SINCE THE MOD-1 IS CAPABLE OF RADIATING BOTH COHERENT AND INCOHERENT NOISE. THE COHERENT SOUNDS ARE USUALLY IMPULSIVE AND ARE MANIFESTED IN AN AVERAGED FREQUENCY DOMAIN PLOT AS LARGE NUMBERS OF DISCRETE ENERGY BANDS EXTENDING FROM THE BLADE PASSAGE FREQUENCY TO BEYOND 50 HZ ON OCCASION. IT IS THESE IMPULSIVE SOUNDS WHICH ARE IDENTIFIED AS THE PRINCIPAL SOURCE OF THE ANNOYANCE TO A DOZEN FAMILIES LIVING WITHIN 3 KM OF THE TURBINE. THE SOURCE OF THE COHERENT NOISE APPEARS TO BE THE RAPID, UNSTEADY BLADE LOADS ENCOUNTERED AS THE BLADE PASSES THROUGH THE WAKE OF THE TOWER STRUCTURE. ANNOYING LEVELS ARE OCCASIONALLY REACHED AT NEARBY HOMES DUE TO THE INTERACTION OF THE LOW-FREQUENCY, HIGH ENERGY PEAKS IN THE ACOUSTIC IMPULSES AND THE STRUCTURAL MODES OF THE HOMES AS WELL AS BY DIRECT RADIATION OUTDOORS. THE PEAK LEVELS OF THESE IMPULSES CAN BE ENHANCED OR SUBDUED THROUGH COMPLEX PROPAGATION.

1981-0055 KLIMAS P C
RECENT DARRIEUS VERTICAL AXIS WIND TURBINE AERODYNAMICAL EXPERIMENTS AT SANDIA NATIONAL LABORATORIES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 67-76.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

EXPERIMENTS CONTRIBUTING TO THE UNDERSTANDING OF THE AERODYNAMICS OF AIRFOILS OPERATING IN THE VERTICAL AXIS WIND TURBINE (VAWT) ENVIRONMENT ARE DESCRIBED. THESE EXPERIMENTS ARE ULTIMATELY INTENDED TO REDUCE VAWT COST OF ENERGY AND INCREASE SYSTEM RELIABILITY. THEY INCLUDE CHORDWISE PRESSURE SURVEYS, CIRCUMFERENTIAL BLADE ACCELERATION SURVEYS, EFFECTS OF BLADE CAMBER, PITCH AND OFFSET, BLADE BLOWING, AND USE OF SECTIONS DESIGNED SPECIFICALLY FOR VAWT APPLICATION.

1981-0056 LAWLESS-BUTTERFIELD C, GUERRERO J V, PYKKONEN K, STATES L
ISSUES AND EXAMPLES OF DEVELOPING UTILITY INTERCONNECTION GUIDELINES FOR SMALL POWER PRODUCTION.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, JANUARY 1981. 92 P.
TM-IP/81-5

THIS REPORT WILL SUMMARIZE WHAT SEVERAL STATES ARE DOING TO ESTABLISH INTERCONNECTION GUIDELINES UNDER PURPA RULES FOR SMALL POWER PRODUCERS, IN PARTICULAR SMALL (UNDER 100 KW) WIND ENERGY CONVERSION SYSTEMS (SWECS). THE EMPHASIS OF THE REPORT IS TO DISCUSS ISSUES RELEVANT TO INTERCONNECTING SWECS.

1981-0057 LINSCOTT B S, DENNETT J T, GORDON L H
THE MOD-2 WIND TURBINE DEVELOPMENT PROJECT.
NTIS, JULY 1981. 23 P.
DOE/NASA/20305-5, NASA-TM-82681

THE MOD-2 IS DESCRIBED. IT HAS A 2.5 MW POWER RATING, IS HORIZONTAL AXIS, AND WAS DESIGNED FOR GENERATION OF ELECTRICAL POWER ON UTILITY NETWORKS. THREE MACHINES HAVE BEEN BUILT AND ARE LOCATED IN A CLUSTER AT GOODNOE HILLS, WASHINGTON. ALL TECHNICAL ASPECTS OF THE PROJECT ARE DESCRIBED: DESIGN APPROACH, SIGNIFICANT INNOVATION FEATURES, THE MECHANICAL SYSTEM, THE ELECTRICAL POWER SYSTEM, THE CONTROL SYSTEM, AND THE SAFETY SYSTEM.

1981-0058 LIU H, TSAO I S
WIND ENERGY POTENTIAL IN A TYPHOON ENVIRONMENT.
CONFERENCE ON WIND ENERGY TECHNOLOGY, KANSAS CITY, MISSOURI, MARCH 1981. 4 P.

TAIWAN EXPERIENCES AN AVERAGE OF FOUR TYPHOONS PER YEAR, BRINGING WITH EACH HIGH WINDS AND HEAVY RAINS. THE QUESTION IN THE UTILIZATION OF WIND ENERGY IN A TYPHOON ENVIRONMENT IS NOT WHETHER THE WIND ENERGY CONTAINED IN TYPHOONS CAN BE HARNESSED BUT RATHER WHETHER WINDMILLS CAN WITHSTAND THE FIERCE FORCES GENERATED BY THE TYPHOON WIND. THE QUESTION HAS BEEN ANSWERED HEREIN BY COMPARING THE WIND INTENSITY ASSOCIATED WITH A GIVEN RECURRENCE INTERVAL TO THE SURVIVAL SPEED OF WINDMILLS. IT WAS FOUND THAT WINDMILLS HAVING A SURVIVAL SPEED OF 56 M/S (125 MPH) ARE ADEQUATE FOR THE WEST COAST OF TAIWAN. HIGHER SURVIVAL SPEEDS MAY BE NEEDED ON THE EAST COAST, AND ARE DEFINITELY NEEDED FOR SPECIAL PLACES SUCH AS THE ORCHARD ISLAND. THE PAPER ALSO PROVIDES A PRELIMINARY ASSESSMENT OF TAIWAN'S WIND ENERGY POTENTIAL, THE DIRECTION THE NATION SHOULD PROCEED IN DEVELOPING HER WIND ENERGY RESOURCE, AND POSSIBLE INTERACTION WITH U.S. WIND ENERGY RESEARCHERS AND THE WINDMILL INDUSTRY.

1981-0059 LOBITZ D W
DYNAMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE ROTORS.
NTIS, 1981. 8 P.
SAND-80-2820C, CONF-810226-2

THE DYNAMIC RESPONSE CHARACTERISTICS OF THE VAWT ROTOR ARE IMPORTANT FACTORS GOVERNING THE SAFETY AND FATIGUE LIFE OF VAWT SYSTEMS. THE PRINCIPAL PROBLEMS ARE THE DETERMINATION OF CRITICAL ROTOR SPEEDS (RESONANCES) AND THE ASSESSMENT OF FORCED VIBRATION RESPONSE AMPLITUDES. THE SOLUTION TO THESE PROBLEMS IS COMPLICATED BY CENTRIFUGAL AND CORIOLIS EFFECTS WHICH CAN HAVE SUBSTANTIAL INFLUENCE ON ROTOR RESONANT FREQUENCIES AND MODE SHAPES. THIS PAPER WILL DESCRIBE AND DISCUSS THE PRIMARY TOOLS NOW IN USE AT SANDIA NATIONAL LABORATORIES FOR ROTOR ANALYSIS. THESE TOOLS INCLUDE A LUMPED SPRINGMASS MODEL (VAWTDYN) AND ALSO FINITE-ELEMENT BASED APPROACHES. THE DISCUSSION WILL CENTER ON THE ACCURACY AND COMPLETENESS OF CURRENT CAPABILITIES AND PLANS FOR FUTURE RESEARCH.

1981-0060 LOBITZ D W
DYNAMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE ROTORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 189-197.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE DYNAMIC RESPONSE CHARACTERISTICS OF THE VAWT ROTOR ARE IMPORTANT FACTORS GOVERNING THE SAFETY AND FATIGUE LIFE OF VAWT SYSTEMS. THE PRINCIPAL PROBLEMS ARE THE DETERMINATION OF CRITICAL ROTOR SPEEDS (RESONANCES) AND THE ASSESSMENT OF FORCED VIBRATION RESPONSE AMPLITUDES. THE SOLUTION TO THESE PROBLEMS IS COMPLICATED BY CENTRIFUGAL AND CORIOLIS EFFECTS WHICH CAN HAVE SUBSTANTIAL INFLUENCE ON ROTOR RESONANT FREQUENCIES AND MODE SHAPES. THIS PAPER WILL DESCRIBE AND DISCUSS THE PRIMARY TOOLS NOW IN USE AT SANDIA NATIONAL LABORATORIES FOR ROTOR ANALYSIS. THESE TOOLS INCLUDE A LUMPED SPRINGMASS MODEL (VAWTDYN) AND ALSO FINITE-ELEMENT BASED APPROACHES. THE DISCUSSION WILL CENTER ON THE ACCURACY AND COMPLETENESS OF CURRENT CAPABILITIES AND PLANS FOR FUTURE RESEARCH

1981-0061 LOEFFLER A L
FLOW FIELD ANALYSIS AND PERFORMANCE OF WIND TURBINES EMPLOYING SLOTTED DIFFUSERS.
ASME TRANS. J. SOL. ENERGY ENG. 103(1): 17-22, FEBRUARY 1981.

OPERATION OF DIFFUSER-AUGMENTED WIND TURBINES (DAWTS) UTILIZING SLOTTED WALLS FOR TANGENTIAL BLOWING AS A BOUNDARY LAYER CONTROL MEASURE HAS BEEN ANALYZED USING THE METHOD OF SINGULARITIES (MOS). THE DIFFUSER WALL AND THE DROP IN TOTAL PRESSURE THROUGH THE TURBINE ARE REPRESENTED BY A SERIES OF RING VORTICES ALONG THE DIFFUSER SURFACE AND ALONG THE WAKE BOUNDARY. DIFFUSER INCLUDED ANGLES OF 60 TO 80 DEGREES ARE CONSIDERED, IN CONTRAST TO THE CONVENTIONAL RANGE OF 7 TO 10 DEGREES. AGREEMENT WITH GRUMMAN RESEARCH DEPARTMENT EXPERIMENTAL DATA WITH RESPECT TO OVERALL PERFORMANCE AND PRESSURE AND VELOCITY DISTRIBUTIONS IS REASONABLY GOOD. IN PARTICULAR, THE EXISTENCE OF THE OBSERVED LARGE PRESSURE REDUCTION AT THE DIFFUSER EXIT PLANE IS PREDICTED. A CONSEQUENCE OF THIS AGREEMENT IS THAT REYNOLDS NUMBER SCALING EFFECTS ARE SMALL FOR SLOTTED DAWTS, SO THAT MOS ANALYSES HOLD PROMISE FOR OTHER INNOVATIVE DIFFUSER DESIGNS AND FLOW PROBLEMS.

1981-0062 LOOIJESTEIJN C J, VALTER G P
THE EXPERIMENTAL WIND TURBINE AT PETTEN.
ENERGIESPECTRUM 5(2): 34-39, FEBRUARY 1981. (IN DUTCH)

THE EXPERIMENTAL WIND TURBINE AT PETTEN IN THE NETHERLANDS HAS AN AXLE HEIGHT ABOVE GROUND OF 22 METRES AND A ROTOR DIAMETER OF 25 METRES. THE ROTOR AXLE IS ALMOST HORIZONTAL AND IS MOUNTED ON A STEEL TOWER SUPPORTED ON A CONCRETE PANEL BASE. THE ROTOR HUB SUPPORTS TWO BLADES EACH WITH AN AEROFOIL SECTION AND A WIDTH OF 180 CM AT THE ROOT AND 30 CM AT THE TIP. EACH BLADE TIP IS INCLINED INWARDS ON THE LEEWARD SIDE AT AN ANGLE BETWEEN 0 DEGREES AND ABOUT 16 DEGREES DURING THE GENERATION PERIOD. SOME ROTOR FEATURES ALREADY DETERMINED INCLUDE ROTOR COUPLES IN KN/M, UP TO 60 FOR VARIOUS WIND SPEEDS AND BLADE ANGLES. NOMINAL SPEEDS ARE ROTOR 80 RPM, GENERATOR 900-1600 RPM, WHICH LEADS TO A REGULATED POWER OUTPUT AT 720 V CONNECTOR TO A CONVERTER TO GIVE 10 KV MAINS OUTPUT UP TO 400 KW (GENERATOR) OR 300 KW (TURBINE). A PARKING POSITION, WITH EACH BLADE ANGLE 90 DEGREES IS AVAILABLE, AND THIS MAY WITHSTAND WIND VELOCITIES UP TO 72 M/SEC.

1981-0063 MARIER D
WINDPOWER FOR THE HOMEOWNER: A GUIDE TO SELECTING, SITING AND INSTALLING AN ELECTRICITY-GENERATING WIND POWER SYSTEM.
MILACA, MINNESOTA, ALTERNATIVE SOURCES OF ENERGY, INC., 1981. 381 P.

THIS BOOK SHOWS YOU HOW TO: SELECT A SITE AND MEASURE WIND SPEEDS; CHOOSE THE GENERATOR AND EQUIPMENT WHICH MEET YOUR INDIVIDUAL NEEDS; DETERMINE FINANCING AND PAYBACK; FIND APPLIANCES YOU CAN USE; CONNECT (OR DISCONNECT) TO YOUR UTILITY; DISCUSS THE FUTURE OF WIND POWER, AND MORE.

1981-0064 MARTINEZ R, WIDNALL S E, HARRIS W L
PREDICTIONS OF LOW-FREQUENCY AND IMPULSIVE SOUND RADIATION FROM HORIZONTAL-AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 401-409.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THIS PAPER DEVELOPS THEORETICAL MODELS TO PREDICT THE RADIATION OF LOW-FREQUENCY AND IMPULSIVE SOUND FROM HORIZONTAL-AXIS WIND TURBINES DUE TO THREE SOURCES: (1) STEADY BLADE LOADS; (2) UNSTEADY BLADE LOADS DUE TO OPERATION IN A GROUND SHEAR; (3) UNSTEADY LOADS FELT BY THE BLADES AS THEY CROSS THE TOWER WAKE. THESE MODELS ARE THEN USED TO PREDICT THE ACOUSTIC OUTPUT OF MOD-1, THE LARGE WIND TURBINE OPERATED NEAR BOONE, N.C. PREDICTED ACOUSTIC TIME SIGNALS ARE COMPARED TO THOSE ACTUALLY MEASURED NEAR MOD-1; GOOD AGREEMENT IS OBTAINED.

1981-0065 MCNERNEY G M
ACCELEROMETER MEASUREMENTS OF AERODYNAMIC TORQUE ON THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE.
NTIS, APRIL 1981. 23 P.
SAND-80-2776

AN EXPERIMENT WAS CONDUCTED ON THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE, USING ROTOR SHAFT TORQUE AND ROTOR ANGULAR ACCELERATION DATA TO DEDUCE THE FUNCTIONAL FORMS OF THE AERODYNAMIC TORQUE. AN ANALYSIS OF THE EXPERIMENT, ALONG WITH ERRORS ENCOUNTERED, IS PRESENTED AND THE RESULTS LISTED IN BOTH GRAPHIC AND ANALYTICAL FORM.

1981-0066 MCNERNEY G M
AUTOMATIC CONTROL ALGORITHM EFFECTS ON ENERGY PRODUCTION.

WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERS TY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 333-342.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

ALGORITHM CONTROL STRATEGY FOR UNATTENDED WIND TURBINE OPERATION IS A POTENTIALLY IMPORTANT ASPECT OF WIND ENERGY PRODUCTION THAT HAS THUS FAR ESCAPED TREATMENT IN THE LITERATURE. EARLY EXPERIENCE IN AUTOMATIC OPERATION OF THE SANDIA 17-M VAWT HAS DEMONSTRATED THE NEED FOR A SYSTEMATIC STUDY OF CONTROL ALGORITHMS. TO THIS END, A COMPUTER MODEL HAS BEEN DEVELOPED USING ACTUAL WIND TIME SERIES AND TURBINE PERFORMANCE DATA TO SIMULATE THE POWER PRODUCED BY THE SANDIA 17-M VAWT OPERATING IN AUTOMATIC CONTROL. THE MODEL HAS BEEN USED TO INVESTIGATE THE INFLUENCE OF STARTING ALGORITHMS ON ANNUAL ENERGY PRODUCTION. THE RESULTS INDICATE THAT, DEPENDING ON TURBINE AND LOCAL WIND CHARACTERISTICS, A BAD CHOICE OF A CONTROL ALGORITHM CAN SIGNIFICANTLY REDUCE OVERALL ENERGY PRODUCTION. THE MODEL CAN BE USED TO SELECT CONTROL ALGORITHMS AND THRESHOLD PARAMETERS THAT MAXIMIZE LONG-TERM ENERGY PRODUCTION. AN ATTEMPT HAS BEEN MADE TO GENERALIZE THESE RESULTS FROM LOCAL SITE AND TURBINE CHARACTERISTICS TO OBTAIN GENERAL GUIDELINES FOR CONTROL ALGORITHM DESIGN.

1981-0067 METZGER F B, KLATTE R J
STATUS REPORT ON DOWNWIND ROTOR HORIZONTAL AXIS WIND TURBINE NOISE PREDICTION.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 425-430.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

NASA AND INDUSTRY ARE CURRENTLY COOPERATING IN THE CONDUCT OF EXTENSIVE EXPERIMENTAL AND ANALYTICAL STUDIES TO UNDERSTAND AND PREDICT THE NOISE OF LARGE, HORIZONTAL-AXIS WIND TURBINES. THIS EFFORT CONSISTS OF (1) OBTAINING HIGH QUALITY NOISE DATA UNDER WELL-CONTROLLED AND DOCUMENTED TEST CONDITIONS, (2) ESTABLISHING THE ANNOYANCE CRITERIA FOR IMPULSE NOISE OF THE TYPE GENERATED BY HORIZONTAL-AXIS WIND TURBINES WITH ROTORS DOWNWIND OF THE SUPPORT TOWER, (3) DEFINING THE WAKE CHARACTERISTICS DOWNWIND AT THE AXIAL LOCATION OF THE PLANE OF ROTATION, (4) COMPARING PREDICTIONS WITH MEASUREMENTS MADE BY USE OF WAKE DATA, AND (5) COMPARING PREDICTIONS WITH ANNOYANCE CRITERIA. THIS REPORT BRIEFLY SUMMARIZES THE STATUS OF WORK BY HAMILTON STANDARD IN THE ABOVE AREAS WHICH WAS DONE IN SUPPORT OF THE COOPERATIVE NASA AND INDUSTRY STUDIES.

1981-0068 MOMENT R L
THE TECHNOLOGIES OF SMALL WIND ENERGY CONVERSION SYSTEMS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, MARCH 1981. 6 P.
TM-TD/81-6

1981-0069 MORETTI P M, THRESHER R W
OVERVIEW OF WIND ENERGY SYSTEMS: ISSUES IN DEVELOPMENT AND APPLICATION.
ASME TRANS. J. SOL. ENERGY ENG. 103(1): 3-10, FEBRUARY 1981.

AN OVERVIEW OF THE CURRENT STATUS OF WIND ENERGY TECHNOLOGY AND SYSTEM DEVELOPMENT IS PRESENTED WITH MAJOR EMPHASIS PLACED ON KEY ISSUES WHICH FACE THE COMMERCIALIZATION OF WIND TECHNOLOGY. THE BASIC FUNDAMENTALS OF THE TECHNOLOGY ARE REVIEWED AND THE DIRECTION OF CURRENT DEVELOPMENT IS OUTLINED. ECONOMIC CONSIDERATIONS ARE DISCUSSED BOTH FROM A MACHINE DEVELOPMENT POINT OF VIEW AND THE UTILITY-INDUSTRY COST-OF-SERVICE APPROACH. IN ADDITION, THE PROBLEMS ASSOCIATED WITH WIND TURBINE PERFORMANCE TESTING ARE DISCUSSED AND A SHORT REVIEW OF OPERATIONAL EXPERIENCE IS PROVIDED. THESE TOPICS ARE ALL CONSIDERED IN THE CONTEXT OF PROVIDING THE READER WITH AN UNDERSTANDING OF WIND SYSTEM TECHNOLOGY, A GENERAL KNOWLEDGE OF CURRENT PROBLEMS, AND THE EXPECTED TRENDS FOR THE FUTURE.

1981-0070 NATHAN G K, GOH T N
WIND MEASUREMENTS IN AN EQUATORIAL REGION (SINGAPORE).
SOL. ENERGY 26(3): 275-278, 1981.

THERE ARE MORE THAN 10,000 ISLANDS IN SOUTH-EAST ASIA, AND THE PROSPECTS FOR USING WIND ENERGY THERE APPEAR GOOD. WIND MEASUREMENTS OF SUFFICIENT RELIABILITY ARE, HOWEVER, NOT READILY AVAILABLE. THE AUTHORS PRESENT A SUMMARY OF WIND DATA IN A FEW OF THESE ISLANDS AROUND SINGAPORE, PROVIDING A BASIS FOR EVALUATION OF WIND ENERGY POTENTIAL IN THE REGION.

1981-0071 NEUSTADTER H E, SPERA D A
APPLICATIONS OF THE DOE/NASA WIND TURBINE ENGINEERING INFORMATION SYSTEM.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 113-120.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE NASA LEWIS RESEARCH CENTER MANAGES FOR THE DEPARTMENT OF ENERGY, THE TECHNOLOGY AND ENGINEERING DEVELOPMENT OF LARGE HORIZONTAL AXIS WIND TURBINES. IN SUPPORT OF THIS ACTIVITY EACH WIND TURBINE HAS A VARIETY OF INFORMATION SYSTEMS USED TO ACQUIRE, PROCESS AND ANALYZE DATA. IN GENERAL FOUR CATEGORIES OF DATA SYSTEMS, EACH RESPONDING TO A DISTINCT INFORMATION NEED, CAN BE IDENTIFIED. THE CATEGORIES ARE: CONTROL, TECHNOLOGY, ENGINEERING AND PERFORMANCE. THE FOCUS OF THIS REPORT IS ON THE INFORMATION THAT CAN BE EXTRACTED BY STATISTICAL ANALYSIS OF DATA OBTAINED FROM THE TECHNOLOGY AND ENGINEERING INFORMATION SYSTEMS. THESE SYSTEMS CONSIST OF THE FOLLOWING ELEMENTS: (1) SENSORS WHICH MEASURE CRITICAL PARAMETERS (E.G., WIND SPEED AND DIRECTION, OUTPUT POWER, BLADE LOADS AND COMPONENT VIBRATIONS); (2) REMOTE MULTIPLEXING UNITS (RMUS) ON EACH WIND TURBINE WHICH FREQUENCY-MODULATE, MULTIPLEX AND TRANSMIT SENSOR OUTPUTS; (3) ON-SITE INSTRUMENTATION TO RECORD, PROCESS AND DISPLAY THE SENSOR OUTPUT; AND (4) STATISTICAL ANALYSIS OF DATA AT THE NASA-LEWIS RESEARCH CENTER IN CLEVELAND, OHIO. TWO EXAMPLES OF THE CAPABILITIES OF THESE SYSTEMS ARE PRESENTED. THE FIRST ILLUSTRATES THE STANDARDIZED FORMAT FOR APPLICATION OF STATISTICAL ANALYSIS TO EACH DIRECTLY MEASURED PARAMETER. THE SECOND SHOWS THE USE OF A MODEL TO ESTIMATE THE VARIABILITY OF THE ROTOR THRUST LOADING, WHICH IS A DERIVED PARAMETER.

1981-0072 NOLA F J
ELECTRICAL POWER GENERATING SYSTEM.
U.S. PATENT APPLICATION. NTIS, MARCH 16, 1981.
PAT-APPL-6-243 683, NASA-CASE-MFS-25302-1, N81-22280

AN ALTERNATING CURRENT POWER GENERATION SYSTEM ADOPTED TO INJECT POWER IN AN ALREADY POWERED POWER LINE IS DISCUSSED. THE POWER GENERATING SYSTEM SERVES TO ADJUSTABLY COUPLE AN INDUCTION MOTOR, AS A GENERATOR, TO AN AC POWER LINE WHEREIN THE MOTOR AND POWER LINE ARE CONNECTED THROUGH A TRIAC. THE TRIAC IS REGULATED TO NORMALLY TURN ON AT A RELATIVELY LATE POINT IN EACH HALF CYCLE OF ITS OPERATION, WHEREBY AT LESS THAN OPERATING SPEED, AND THUS WHEN THE INDUCTION MOTOR FUNCTIONS AS A MOTOR RATHER THAN AS A GENERATOR, POWER CONSUMPTION FROM THE LINE IS SUBSTANTIALLY REDUCED. THE PRINCIPAL APPLICATION WILL BE FOR WINDMILL POWERED GENERATION.

1981-0073 NOUN R J
LAND-USE IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, FEBRUARY 1981. 6 P.
SERI/TP-744-1099

UTILITIES CONSIDERING WIND FARMS MUST ASSESS LAND USE IMPLICATIONS, SUCH AS PROXIMITY OF SITES TO TRANSMISSION LINES, ENVIRONMENTAL IMPACTS, AESTHETICS, LEGAL CONCERNS, AS WELL AS ALTERNATIVE USES FOR THE LAND.

1981-0074 NOUN R J, LOTKER M, FRIESEMA H P
UTILITY SITING OF WECS: A PRELIMINARY LEGAL-REGULATORY ASSESSMENT.
NTIS, MAY 1981. 105 P.
SERI/TR-744-778

ELECTRIC UTILITIES INVESTIGATING WIND ENERGY AS A POWER GENERATION SOURCE WILL NEED TO CONSIDER A NUMBER OF LEGAL AND REGULATORY QUESTIONS RAISED BY WIND ENERGY SYSTEM SITING: LAND ACQUISITION AND USE; AESTHETIC CONTROLS; PUBLIC ACCEPTANCE; AND WIND RIGHTS. THESE ARE DISCUSSED.

1981-0075 O'LONE R G
UTILITIES TURN TO ADVANCED WINDMILLS.
AVIAT. WEEK SPACE TECHNOL. 114(12): 42-44, MARCH 23, 1981.

THE THREE MOD-2'S ERECTED IN EASTERN WASHINGTON, NEAR GOLDENDALE, ARE DESCRIBED. THE UNITS ARE PRODUCING ELECTRICITY FOR THE BONNEVILLE POWER ADMINISTRATION.

1981-0076 OSBORN W C, DOWNEY W T
NEAR-TERM HIGH POTENTIAL COUNTIES FOR SWECS. FINAL REPORT.
NTIS, FEBRUARY 1981. 103 P.
SERI/TR-98282-11

THE PURPOSE OF THE REPORT IS TO PROVIDE UP-TO-DATE MARKET INFORMATION TO MANUFACTURERS OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TO ASSIST THEM IN DEVELOPING MARKETING STRATEGIES FOR THEIR PRODUCTS. THE DATA HAVE BEEN ARRANGED IN A FORMAT THAT PERMITS RAPID INDENTIFICATION OF A PARTICULAR LOCATION OR MARKET SEGMENT FOR FURTHER INVESTIGATION. IN ADDITION, EXTENSIVE BACK-UP INFORMATION IS AVAILABLE BY STATE AND COUNTY IN STATE SWECS MARKET REPORTS IN AN APPENDIX. IT IS HOPED THAT THE INFORMATION IN THIS REPORT AND THE APPENDIX WILL BE USEFUL TO SWECS MANUFACTURERS FOR PLANNING NEW MARKETING AND ADVERTISING ACTIVITIES.

1981-0077 OSBORN W C, DOWNEY W T
NEAR-TERM HIGH POTENTIAL COUNTIES FOR SWECS. FINAL REPORT. APPENDIX.
NTIS, FEBRUARY 1981. 506 P.
SERI/TR-98282-11(APP.)

THIS APPENDIX PROVIDES BY STATE AND COUNTY THE RESULTS AND BACKGROUND DATA OF THE NEAR TERM HIGH-POTENTIAL COUNTIES FOR SWECS. BECAUSE THE APPENDIX IS DESIGNED TO BE USED APART FROM THE REPORT ITSELF, IT INCLUDES A BRIEF SUMMARY OF THE METHODOLOGY USED TO COMPARE MARKET POTENTIAL. (FOR A MORE DETAILED DISCUSSION OF THE METHODOLOGY, THE READER SHOULD CONSULT THE REPORT ITSELF.) IT ALSO INCLUDES A GUIDE TO THE STATE SWECS MARKET DATA REPORTS AND SOME EXAMPLES OF HOW A SWECS MANUFACTURER MIGHT USE THE DATA IN MARKET PLANNING. FINALLY, THE STATE REPORTS ARE PROVIDED, PRESENTING ESSENTIAL MARKET INFORMATION FOR EVERY RURAL COUNTY IN THE COUNTRY.

1981-0078 PARASCHIVOIU I
DOUBLE-MULTIPLE STREAMTUBE MODEL FOR DARRIEUS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 19-25.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN ANALYTICAL MODEL IS PROPOSED FOR CALCULATING THE ROTOR PERFORMANCE AND AERODYNAMIC BLADE FORCES FOR DARRIEUS WIND TURBINES WITH CURVED BLADES. THE METHOD OF ANALYSIS USES A MULTIPLE-STREAMTUBE MODEL, DIVIDED INTO TWO PARTS: ONE MODELING THE UPSTREAM HALF-CYCLE OF THE ROTOR AND THE OTHER, THE DOWNSTREAM HALF-CYCLE. THE UPWIND AND DOWNWIND COMPONENTS OF THE INDUCED VELOCITIES AT EACH LEVEL OF THE ROTOR WERE OBTAINED USING THE PRINCIPLE OF TWO ACTUATOR DISKS IN TANDEM. VARIATION OF THE INDUCED VELOCITIES IN THE TWO PARTS OF THE ROTOR PRODUCES LARGER FORCES IN THE UPSTREAM ZONE AND SMALLER FORCES IN THE DOWNSTREAM ZONE. COMPARISONS OF THE OVERALL ROTOR PERFORMANCE WITH PREVIOUS METHODS AND FIELD TEST DATA SHOW THE IMPORTANT IMPROVEMENT OBTAINED WITH THE PRESENT MODEL. THE CALCULATIONS WERE MADE USING THE COMPUTER CODE CARDAA DEVELOPED AT IREQ. THE DOUBLE-MULTIPLE STREAMTUBE MODEL, PRESENTED IN THIS PAPER, HAS TWO MAJOR ADVANTAGES: IT REQUIRES A MUCH SHORTER COMPUTER TIME THAN THE THREE-DIMENSIONAL VORTEX MODEL AND IS MORE ACCURATE THAN MULTIPLE-STREAMTUBE MODEL IN PREDICTING THE AERODYNAMIC BLADE LOADS.

1981-0079 PARK J
THE WIND POWER BOOK.
PALO ALTO, CALIFORNIA, CHESHIRE BOOKS, 1981. 253 P.

1981-0080 PATON D L, BASS A, SMITH D G, ELLIOTT D L, BARCHET W R
WIND ENERGY RESOURCE ATLAS. VOLUME 3. GREAT LAKES REGION.
NTIS, FEBRUARY 1981. 187 P.
PNL-3195-WERA-3

THE GREAT LAKES REGION ATLAS ASSIMILATES SIX COLLECTIONS OF WIND RESOURCE DATA, ONE FOR THE REGION AND ONE FOR EACH OF THE FIVE STATES THAT COMPOSE THE GREAT LAKES REGION: ILLINOIS, INDIANA, MICHIGAN, OHIO, WISCONSIN. AT THE STATE LEVEL, FEATURES OF THE CLIMATE, TOPOGRAPHY, AND WIND RESOURCE ARE DISCUSSED IN GREATER DETAIL THAN IN THE REGIONAL DISCUSSION AND THE DATA LOCATIONS ON WHICH THE ASSESSMENT IS BASED ARE MAPPED. VARIATIONS OVER SEVERAL TIME SCALES ARE SHOWN ON GRAPHS OF MONTHLY AVERAGE AND INTERANNUAL WIND SPEED AND POWER, AND OF HOURLY AVERAGE WIND SPEED FOR EACH SEASON. OTHER GRAPHS PRESENT SPEED, DIRECTION, AND DURATION FREQUENCIES OF THE WIND AT THESE LOCATIONS.

1981-0081 PERCIVAL D, HARPER J
ELECTRIC UTILITY VALUE DETERMINATION FOR WIND ENERGY. VOLUME I: A METHODOLOGY.
NTIS, FEBRUARY 1981. 97 P.
SERI/TR-732-604(VOL.I)

THIS REPORT DESCRIBES A METHOD ELECTRIC UTILITIES CAN USE TO DETERMINE THE VALUE OF WIND ENERGY SYSTEMS. IT IS PERFORMED BY A PACKAGE OF COMPUTER MODELS AVAILABLE FROM SERI THAT CAN BE USED WITH MOST UTILITY PLANNING

MODELS. THE FINAL OUTPUT OF THESE MODELS GIVES A FINANCIAL VALUE ($/KW) OF THE WIND ENERGY SYSTEM UNDER CONSIDERATION IN THE SPECIFIC UTILITY SYSTEM. THIS REPORT, FIRST OF TWO VOLUMES, DESCRIBES THE VALUE DETERMINATION METHOD AND GIVES DETAILED DISCUSSION ON EACH COMPUTER PROGRAM AVAILABLE FROM SERI. THE SECOND VOLUME IS A USER'S GUIDE FOR THESE PROGRAMS.

1981-0082 PERCIVAL D, HARPER J
ELECTRIC UTILITY VALUE DETERMINATION FOR WIND ENERGY. VOLUME II: A USER'S GUIDE.
NTIS, FEBRUARY 1981. 116 P.
SERI/TR-732-604(VOL.II)

THIS IS VOLUME TWO OF A TWO-VOLUME REPORT WHICH DESCRIBES A METHOD ELECTRIC UTILITIES CAN USE TO DETERMINE THE VALUE OF WIND ENERGY SYSTEMS. VOLUME I DESCRIBES THE METHOD, WHICH USES A PACKAGE OF COMPUTER MODELS AVAILABLE FROM SERI, AS WELL AS PROVIDING A DETAILED DISCUSSION ON EACH COMPUTER PROGRAM IN THE PACKAGE. THIS VOLUME IS A USER'S GUIDE FOR THESE PROGRAMS.

1981-0083 PERCIVAL D, HARPER J
VALUE ANALYSIS OF WIND ENERGY SYSTEMS TO ELECTRIC UTILITIES.
NTIS, JANUARY 1981. 9 P.
SERI/TP-732-1064

A METHOD HAS BEEN DEVELOPED FOR DETERMINING THE VALUE OF UTILITY-OPERATED WIND ENERGY SYSTEMS TO ELECTRIC UTILITIES. THE ANALYSIS IS PERFORMED BY A PACKAGE OF COMPUTER MODELS THAT INTERFACE WITH MOST CONVENTIONAL UTILITY PLANNING MODELS. WEATHER DATA ARE CONVERTED TO WIND TURBINE OUTPUT POWERS, WHICH ARE USED TO MODIFY THE UTILITY LOAD REPRESENTATION. EXECUTION OF THE UTILITY PLANNING MODELS WITH BOTH THE ORIGINAL AND MODIFIED LOAD REPRESENTATION YIELDS THE GROSS AND MARGINAL VALUE ($/RATED KW) OF THE ADDED WIND ENERGY SYSTEMS. THIS VALUE IS THEN COMPARED WITH COST ESTIMATES TO DETERMINE IF FOR ECONOMIC REASONS THE WIND ENERGY SYSTEMS SHOULD BE INCLUDED IN FUTURE GENERATION PLANS.

1981-0084 PERKINS F W, JONES R
THE EFFECT OF DELTA-3 ON A YAWING HAWT BLADE AND ON YAW DYNAMICS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 295-301.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

A SINGLE DEGREE OF FREEDOM AEROELASTIC COMPUTER MODEL, WMSTAB3, HAS BEEN EMPLOYED TO PERFORM A PARAMETRIC ANALYSIS OF HAWT BLADE BEHAVIOR DURING YAW MANEUVERS. OVER 1,000 DIFFERENT COMBINATIONS OF DELTA-3 AND NORMAL FREQUENCY WERE ANALYZED. THE EFFECT OF DELTA-3 AND FLAPPING STIFFNESS ON FLAPPING FREQUENCY, PHASE, AND MAGNITUDE ARE DISCUSSED. THE MOMENTS TRANSMITTED TO THE FIXED SYSTEM DURING YAW MANEUVERS ARE CALCULATED AND REDUCED TO TIME CONSTANTS OF RESPONSE TO STEP CHANGES IN WIND DIRECTION. THE SIGNIFICANCE OF THE TIME CONSTANTS FOR THE CONFIGURATIONS CONSIDERED RELATIVE TO YAW RESPONSE RATE AND LAG ANGLE IS DISCUSSED, ALONG WITH THEIR POSSIBLE SIGNIFICANCE FOR LARGE HAWT.

1981-0085 PERLEY R
KAMAN 40 KW WIND TURBINE GENERATOR - CONTROL SYSTEM DYNAMICS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 325-332.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE KAMAN 40 KW WIND TURBINE GENERATOR DESIGN INCORPORATES AN INDUCTION GENERATOR FOR APPLICATIONS WHERE A UTILITY IS PRESENT AND A SYNCHRONOUS GENERATOR FOR STANDALONE APPLICATIONS. A COMBINATION OF FEED FORWARD AND FEEDBACK CONTROL IS USED TO ACHIEVE SYNCHRONOUS SPEED PRIOR TO CONNECTING THE GENERATOR TO THE LOAD, AND TO CONTROL THE POWER LEVEL ONCE THE GENERATOR IS CONNECTED. THE DYNAMICS OF THE DRIVE TRAIN AFFECT SEVERAL ASPECTS OF THE SYSTEM OPERATION. THESE HAVE BEEN ANALYZED TO ARRIVE AT THE REQUIRED SHAFT STIFFNESS. THE ROTOR PARAMETERS THAT AFFECT THE STABILITY OF THE FEEDBACK CONTROL LOOP VARY CONSIDERABLY OVER THE WIND SPEED RANGE ENCOUNTERED. THEREFORE, THE CONTROLLER GAIN WAS MADE A FUNCTION OF WIND SPEED IN ORDER TO MAINTAIN CONSISTENT OPERATION OVER THE WHOLE WIND SPEED RANGE. THE VELOCITY REQUIREMENT FOR THE PITCH CONTROL MECHANISM IS RELATED TO THE NATURE OF THE WIND GUSTS TO BE ENCOUNTERED, THE DYNAMICS OF THE SYSTEM, AND THE ACCEPTABLE POWER FLUCTUATIONS AND GENERATOR DROPCUT RATE. A MODEL WAS DEVELOPED THAT ALLOWS THE PROBABLE DROPOUT RATE TO BE DETERMINED FROM A STATISTICAL MODEL OF WIND GUSTS AND THE VARIOUS SYSTEM PARAMETERS, INCLUDING THE ACCEPTABLE POWER FLUCTUATION.

1981-0086 PLACE T W
RESIDENTIAL ENERGY STORAGE FLYWHEEL WITH A WIND TURBINE SUPPLY.
NTIS, APRIL 1981. 103 P.
SAND-79-7098

THE CONCEPTUAL DESIGN WAS DEVELOPED FOR A MINIMUM COST FLYWHEEL ENERGY STORAGE SYSTEM WHICH IS SUITABLE FOR MECHANICAL INTERFACING WITH A WIND-TURBINE ENERGY SOURCE. THE SYSTEM HAS 10 KWH STORAGE CAPACITY AND WILL PROVIDE 5 KW PEAK POWER OUTPUT. SPECIAL EMPHASIS WAS PLACED ON ASSURING THAT THE SYSTEM DESIGN IS ADAPTABLE FOR UPWARD-SCALING TO 50 KWH STORAGE CAPACITY AND 10 KW PEAK POWER OUTPUT. IN ACCORDANCE WITH THE SANDIA CONTRACT REQUIREMENTS, THE DESIGN IS BASED ON CURRENT TECHNOLOGY AND CAN BE BUILT USING CONVENTIONAL MANUFACTURING FACILITIES AND PROCESSES. THE SYSTEM WILL PROVIDE 76% ROUND TRIP EFFICIENCY AND 1%/H MAXIMUM RUNDOWN LOSS. FOR PRODUCTION RATES OF 100,000 UNITS PER YEAR, THE ESTIMATED SELLING PRICES FOR THE SYSTEM IN THE 10 KWH AND 50 KWH STORAGE SIZES ARE $3581 ($358/KWH) AND $9800 ($196/KWH), RESPECTIVELY. THIS REPORT TRACES THE EVOLUTION OF THE SYSTEM DESIGN FROM THE INITIAL BASELINE CONCEPT TO THE FINAL CONFIGURATION AND DISCUSSES THE TECHNICAL AND ECONOMIC CONSIDERATIONS AND DECISIONS WHICH SHAPED THAT EVOLUTION.

1981-0087 POWELL W R
AN ANALYTICAL EXPRESSION FOR THE AVERAGE OUTPUT POWER OF A WIND MACHINE.
SOL. ENERGY 26(1): 77-80, 1981.

THE OUTPUT POWER OF A WIND MACHINE IS A SIMPLE FUNCTION OF WIND SPEED, EXCEPT IN THE PARTIAL POWER RANGE VI LESS THAN V, WHICH IS LESS THAN VR, WHERE VI IS THE MINIMUM OR CUT-IN WIND SPEED AND VR IS THE RATED SPEED. TWO EARLIER MODELS OF OUTPUT POWER IN THIS RANGE ARE DISCUSSED AND A NEW FUNCTIONAL FORM IS SUGGESTED. THE NEW METHODOLOGY PERMITS THE AVERAGE POWER OF A WIND MACHINE IN WEIBULL DISTRIBUTION OF WIND SPEEDS TO BE ESTIMATED WITHOUT USING NUMERICAL METHODS AND NEVER PREDICTS NEGATIVE OUTPUT POWER AS WIND MACHINE PARAMETERS ARE VARIED. ANALYTICAL RESULTS FOR THE AVERAGE POWER ARE PRESENTED IN TERMS OF WIND AND WIND MACHINE PARAMETERS. THE METHODOLOGY DOES NOT INCLUDE THE EFFECT OF DIFFERENT MACHINE SPEED CONTROL OPTIONS (CONSTANT VS. VARIABLE RPM).

1981-0088 ROBBINS W H, THOMAS R L, BALDWIN D H

FEDERAL WIND PROJECTS.
WIND POWER DIG. NO. 21: 34-39, WINTER 1980-1981.

THIS ARTICLE DESCRIBES SEVERAL ONGOING WIND SYSTEM DEVELOPMENT PROJECTS MANAGED BY THE NASA LEWIS RESEARCH CENTER, ORIENTED PRIMARILY TOWARD UTILITY APPLICATION.

1981-0089 SAMMELLS A F, FEJER A A
WIND ENERGY FOR ELECTRIC VEHICLE RECHARGE.
POWERCONVERS. INT. 7(2): 63-65, 69, FEBRUARY 1981.

THIS ARTICLE DISCUSSES ENERGY SUPPLY FOR ELECTRIC VEHICLES INTENDED FOR LOCAL TRAFFIC IN SUBURBAN AREAS, WHERE INDIVIDUALLY OWNED WINDMILLS COULD BE USED FOR THIS PURPOSE. THESE WINDMILLS WOULD CHARGE LARGE STATIONARY BATTERIES AND THE BATTERIES WOULD TRANSFER THEIR CHARGE OVERNIGHT TO THE SMALL BATTERIES CARRIED BY THE VEHICLES. SUCH SYSTEMS, USING WIND GENERATORS OF RELATIVELY SMALL SIZE (5 TO 10 KW), ARE SIMPLE AND RUGGED AND SHOULD BE ABLE TO OPERATE OVER LONG PERIODS BETWEEN OVERHAULS. SINCE THEY WOULD BE EQUIPPED WITH AUTOMATIC CONTROLS, THEY COULD OPERATE UNATTENDED AND COULD BRING ABOUT A SIGNIFICANT NEAR-TERM SAVINGS IN THE FUEL REQUIRED FOR TRANSPORTATION.

1981-0090 SANDUSKY W F
CANDIDATE WIND-TURBINE-GENERATOR SITE ANNUAL DATA SUMMARY FOR JANUARY 1979 THROUGH DECEMBER 1979.
NTIS, MARCH 1981. 151 P.
PNL-3703

SUMMARIZED HOURLY METEOROLOGICAL DATA FOR FIFTEEN CANDIDATE AND WIND TURBINE GENERATOR SITES ARE PRESENTED IN THIS REPORT. THESE DATA ARE COLLECTED FOR THE DEPARTMENT OF ENERGY FOR THE PURPOSE OF EVALUATING THE WIND ENERGY POTENTIAL AT THESE SITES AND ARE USED TO ASSIST IN SELECTION OF POTENTIAL SITES FOR INSTALLATION AND TESTING OF LARGE WIND TURBINES IN ELECTRIC UTILITY SYSTEMS. FOR EACH SITE, DATA ARE GIVEN IN EIGHT TABLES AND ONE FIGURE. USE OF INFORMATION FROM THESE TABLES, WITH INFORMATION ABOUT SPECIFIC WIND TURBINES, SHOULD ALLOW THE USER TO ESTIMATE THE POTENTIAL FOR WIND ENERGY PRODUCTION AT EACH SITE.

1981-0091 SCHATZLE P R, KLIMAS P C, SPAHR H R
AERODYNAMIC INTERFERENCE BETWEEN TWO DARRIEUS WIND TURBINES.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, APRIL 1981. 36 P.
SAND-81-0896

THE EFFECT OF AERODYNAMIC INTERFERENCE ON THE PERFORMANCE OF TWO CURVED BLADED DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES HAS BEEN CALCULATED USING A VORTEX/LIFTING LINE AERODYNAMIC MODEL. THE TURBINES HAVE A TOWER-TO-TOWER SEPARATION DISTANCE OF 1.5 TURBINE DIAMETERS, WITH THE LINE OF TURBINE CENTERS VARYING WITH RESPECT TO THE AMBIENT WIND DIRECTION. THE EFFECTS OF FREESTREAM TURBULENCE WERE NEGLECTED. FOR THE CASES EXAMINED, THE CALCULATIONS SHOWED THAT THE DOWNWIND TURBINE POWER DECREMENT (1) WAS SIGNIFICANT ONLY WHEN THE LINE OF TURBINE CENTERS WAS COINCIDENT WITH THE AMBIENT WIND DIRECTION, (2) INCREASED WITH INCREASING TIPSPEED RATIO, AND (3) IS DUE MORE TO INDUCED FLOW ANGULARITIES DOWNSTREAM THAN TO SPEED DEFICITS NEAR THE DOWNSTREAM TURBINE.

1981-0092 SCHIENBEIN L A
PERFORMANCE TESTING OF A 50 KW VAWT IN A BUILT-UP ENVIRONMENT.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 129-138.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE RESULTS OF PERFORMANCE TESTS OF A DAF INDAL 50 KW VERTICAL AXIS WIND TURBINE CARRIED OUT AT THE COMPANY'S PLANT NEAR TORONTO, CANADA, ARE PRESENTED. RESULTS OF LIMITED FREE STREAM TURBULENCE AND VERTICAL WIND SHEAR MEASUREMENTS AT THE SITE ARE ALSO PRESENTED. THE CLOSE AGREEMENT BETWEEN MEASURED AND PREDICTED ENERGY OUTPUTS, REQUIRED TO VERIFY THE WIND TURBINE POWER OUTPUT PERFORMANCE RELATIONSHIP, WAS NOT ATTAINED. A DISCUSSION IS PRESENTED OF FACTORS THAT MAY HAVE CONTRIBUTED TO THE LACK OF BETTER AGREEMENT.

1981-0093 SCHLUETER R A, PARK G L, LOTFALLIAN M, DORSEY J, SHAYANFAR H
EFFECT OF WIND TURBINE GENERATOR MODEL AND SITING ON WIND POWER CHANGES OUT OF LARGE WECS ARRAYS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 343-352.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

PREVIOUS RESULTS HAVE BEEN CONCERNED WITH ESTABLISHING (1) WHETHER OPERATING PROBLEMS COULD EXIST WHEN WECS GENERATION IS SIGNIFICANT AND (2) THE PROPER MODIFICATION OF UNIT COMMITMENT, REGULATION, AND ECONOMIC DISPATCH REQUIRED TO PROVIDE SUFFICIENT SYSTEM SECURITY AND ALLEVIATE THE OPERATING PROBLEMS CAUSED BY WECS GENERATION CHANGES. THIS PAPER DISCUSSES METHODS OF REDUCING THE WECS GENERATION CHANGE THROUGH SELECTION OF THE WIND TURBINE MODEL FOR EACH SITE, SELECTION OF AN APPROPRIATE SITING CONFIGURATION, AND WIND ARRAY CONTROLS. AN ANALYSIS OF WIND GENERATION CHANGE FROM AN ECHELON AND A FARM FOR PASSAGE OF A THUNDERSTORM IS PRESENTED TO ESTABLISH THE FACTORS CONCERNING THE WIND TURBINE MODEL AND SITING CONFIGURATION THAT CONTRIBUTE TO THESE VARIATIONS. DETAILED SIMULATION RESULTS INDICATE MORE PRECISELY HOW THESE FACTORS CAN BE EXPLOITED TO MINIMIZE THE WECS GENERATION CHANGES OBSERVED. REDUCTION OF THE WIND GENERATION CHANGES OVER TEN MINUTES IS SHOWN TO REDUCE THE INCREASE IN SPINNING RESERVE, UNLOADABLE GENERATION AND LOAD FOLLOWING REQUIREMENTS ON UNIT COMMITMENT WHEN SIGNIFICANT WECS GENERATION IS PRESENT AND THE FARM PENETRATION CONSTRAINT IS SATISFIED. CONTROLS ON THE BLADE PITCH ANGLE OF ALL WIND TURBINES IN AN ARRAY OR A BATTERY CONTROL ARE SHOWN TO REDUCE BOTH THE WIND GENERATION CHANGE OUT OF AN ARRAY AND THE EFFECTIVE FARM PENETRATION IN ANTICIPATION OF A STORM SO THAT THE FARM PENETRATION CONSTRAINT MAY BE SATISFIED.

1981-0094 SCHROEDER T A, HORI A M, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 11. HAWAII AND PACIFIC ISLANDS REGION.
NTIS, FEBRUARY 1981. 127 P.
PNL-3195-WERA-11

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH DIVISION OF THE REGION. BACKGROUND ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED IS PRESENTED. AN INTRODUCTION AND OUTLINE TO THE DESCRIPTIONS OF THE WIND RESOURCE FOR EACH DIVISION ARE PROVIDED. ASSESSMENTS FOR INDIVIDUAL DIVISIONS ARE PRESENTED AS SEPARATE CHAPTERS. MUCH OF THE INFORMATION IN THE DIVISION CHAPTERS IS GIVEN IN GRAPHIC OR TABULAR FORM. THE SEQUENCES FOR EACH CHAPTER ARE SIMILAR, BUT SOME PRESENTATIONS USED FOR HAWAII ARE INAPPROPRIATE OR IMPRACTICAL FOR PRESENTATION WITH THE PACIFIC ISLANDS. HAWAII CHAPTER FIGURE AND TABLES ARE CITED BELOW AND APPROPRIATE PACIFIC ISLANDS FIGURE AND TABLE NUMBERS ARE INCLUDED IN BRACKETS.

1981-0095 SCOTT D
WORLD'S BIGGEST WIND MACHINE IS A ONE-ARMED MONSTER.
POP. SCI. 218(1): 83-85, 128-129, JANUARY 1981.

DESCRIBED IS THE GIANT WINDMILL, GROWIAN II, WHICH WILL BE BUILT BY MESSERSCHMIDT-BOLKOW-BLOHM, GERMANY'S LEADING AEROSPACE COMBINE. THE 5-MW WINDMILL WILL TOWER 395 FEET ABOVE THE GROUND, DWARFING THE GIANT 2-MW MACHINES IN JUTLAND, DENMARK, AND NEARLY TWICE THE HEIGHT OF THE MOD-2 IN SOUTHERN WASHINGTON. THE WINDMILL WILL HAVE A 238-FOOT BLADE WEIGHING 26 TONS, BALANCED BY A 35-TON COUNTERWEIGHT ON A STUBBY ARM.

1981-0096 SHELDAHL R E, KLIMAS P C
AERODYNAMIC CHARACTERISTICS OF SEVEN SYMMETRICAL AIRFOIL SECTIONS THROUGH 180-DEGREE ANGLE OF ATTACK FOR USE IN AERODYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES.
NTIS, MARCH 1981. 120 P.
SAND-80-2114

THIS REPORT DESCRIBES WIND TUNNEL TEST SERIES OBTAINED FOR FOUR SYMMETRICAL BLADE-CANDIDATE AIRFOIL SECTIONS (NACA-0009, -0012, -0012H, AND -0015).

1981-0097 SHELDAHL R E
COMPARISON OF FIELD AND WIND TUNNEL DARRIEUS WIND TURBINE DATA.
NTIS, JANUARY 1981. 21 P.
SAND-80-2469

A 2-M-DIA DARRIEUS VERTICAL AXIS WIND TURBINE WITH NACA-0012 BLADES WAS EXTENSIVELY TESTED IN THE VOUGHT CORPORATION LOW SPEED WIND TUNNEL. THIS SAME TURBINE WAS INSTALLED IN THE FIELD AT THE SANDIA NATIONAL LABORATORIES WIND TURBINE TEST SITE AND OPERATED TO DETERMINE IF FIELD DATA CORRESPONDED TO DATA OBTAINED IN THE WIND TUNNEL. IT IS BELIEVED THAT THE ACCURACY OF THE WIND TUNNEL TEST DATA WAS VERIFIED AND THUS THE CREDIBILITY OF THE DATA BASE FURTHER ESTABLISHED.

1981-0098 SHEPERDSON W
A MOUNTAIN OF WIND AND CONTROVERSY.
ALTERN. SOURCES ENERGY NO. 47: 22-24, JANUARY/FEBRUARY 1981.

OBJECTIONS OF RESIDENTS OF THE TOWN OF LINCOLN, VERMONT, TO THE CONSTRUCTION OF A WIND TURBINE ON LINCOLN MOUNTAIN ARE DISCUSSED. LINCOLN IS ONE OF THE CANDIDATE SITES FOR NASA'S LARGE SCALE, UTILITY CONNECTED, HORIZONTAL AXIS WIND TURBINE PROJECT.

1981-0099 SNYDER M H, WENTZ W H
DYNAMICS OF WAKES DOWNSTREAM OF WIND TURBINE TOWERS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 363-373.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE NEAR-FIELD WAKES DOWNSTREAM OF CIRCULAR CYLINDERS AND OF 12-SIDED CYLINDERS WERE SURVEYED IN A WIND TUNNEL. LOCAL VELOCITY AND VELOCITY DEFICIT DIAGRAMS ARE PRESENTED. THE VARIATION OF TURBULENCE IN THE WAKE WAS SURVEYED AND THE FREQUENCY OF THE PERIODIC COMPONENT OF WAKE MOTION WAS DETERMINED. DIFFERENCES BETWEEN WAKES OF CIRCULAR CYLINDERS AND OF 12-SIDED CYLINDERS ARE DISCUSSED. ALSO EFFECTS OF STRAKES, ORIENTATION OF THE 12-SIDED CYLINDERS, AND ROUNDING OF THE CORNERS ARE NOTED.

1981-0100 SPENCER R H
NOISE GENERATION OF UPWIND ROTOR WIND TURBINE GENERATORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 419-423.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

NOISE SOURCES OF WIND TURBINES WITH ROTORS UPSTREAM OF THE SUPPORT STRUCTURE ARE DISCUSSED ALONG WITH METHODOLOGY FOR SOUND LEVEL PREDICTION. ESTIMATED NOISE LEVELS FOR THE MOD-2 WIND TURBINE ARE PRESENTED OPERATING IN BOTH THE UPWIND AND DOWNWIND CONFIGURATIONS. RESULTS INDICATE THAT UPWIND ROTOR CONFIGURATIONS MAY BE ADVANTAGEOUS FROM AN ACOUSTICAL STANDPOINT.

1981-0101 SPERA D A
CALCULATION OF GUARANTEED MEAN POWER FROM WIND TURBINE GENERATORS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 139-150.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

MUCH RESEARCH HAS BEEN DEVOTED TO THE NOMINAL POWER GENERATED BY WIND MACHINES, BUT LITTLE WORK HAS BEEN DONE ON THE SUBJECT OF GUARANTEED POWER. YET POWER GUARANTEES WILL BE PART OF THE COMMERCIALIZATION OF WIND ENERGY SYSTEMS. THIS PAPER DESCRIBES IN STEP-BY-STEP FASHION A PROPOSED METHOD FOR CALCULATING THE "GUARANTEED MEAN" POWER OUTPUT OF A WIND TURBINE GENERATOR. THE TERM "MEAN POWER" AS USED IN THIS STUDY REFERS TO THE AVERAGE POWER GENERATED AT SPECIFIED WIND SPEEDS DURING SHORT-TERM TESTS. EXTRAPOLATION TO AN ANNUAL MEAN POWER, BASED ON WIND STATISTICS, IS BEYOND THE SCOPE OF THIS PAPER. GUARANTEED ENERGY IS NOT ADDRESSED. THE DOE/NASA MOD-0A 200 KW PLANT IN CLAYTON, NEW MEXICO, IS USED AS A SAMPLE CASE. SUBJECTS DISCUSSED AND ILLUSTRATED ARE CORRELATION OF ANEMOMETERS, THE METHOD OF BINS FOR ANALYZING NON-STEADY DATA, THE PROP CODE FOR PREDICTING TURBINE POWER, AND STATISTICAL ANALYSIS OF DEVIATIONS IN TEST DATA FROM THEORY. GUARANTEED MEAN POWER DENSITY FOR THE CLAYTON MOD-0A SYSTEM WAS FOUND TO BE 8 WATTS PER SQUARE METER LESS THAN THEORETICAL POWER DENSITY AT ALL POWER LEVELS, WITH A CONFIDENCE LEVEL OF 0.999. THIS AMOUNTS TO 4 PERCENT OF RATED POWER.

1981-0102 STAFFORD R W, GREEB F J, SMITH M F, DES CHENES C, WEAVER N L
ECONOMIC ANALYSIS OF WIND-POWERED FARMHOUSE AND FARM BUILDING HEATING SYSTEMS. FINAL REPORT, JANUARY 1981.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JANUARY 1981. 361 P.
DOE/SEA-3408-20691/81/1

THE STUDY EVALUATED THE BREAK-EVEN VALUES OF WIND ENERGY FOR SELECTED FARMHOUSES AND FARM BUILDINGS FOCUSING ON THE EFFECTS OF THERMAL STORAGE ON THE USE OF WECS PRODUCTION AND VALUE. FARMHOUSE STRUCTURAL MODELS INCLUDE THREE TYPES DERIVED FROM A NATIONAL SURVEY--AN OLDER, A MORE MODERN, AND A PASSIVE SOLAR STRUCTURE. THE EIGHT FARM BUILDING APPLICATIONS THAT WERE ANALYZED INCLUDE: POULTRY-LAYERS, POULTRY-BROODING/LAYERS, POULTRY-BROILERS, POULTRY-TURKEYS, SWINE-FARROWING, SWINE-GROWING/FINISHING, DAIRY, AND LAMBING. THESE FARM BUILDINGS REPRESENT THE SPECTRUM OF ANIMAL TYPES, HEATING ENERGY USE, AND MAJOR CONTRIBUTIONS TO NATIONAL AGRICULTURAL ECONOMIC VALUES.

1981-0103 STATE FINANCIAL INCENTIVES FOR SMALL WIND ENERGY SYSTEMS.
WIND POWER DIG. NO. 21: 44-46, WINTER 1980-1981.

THIS ARTICLE OUTLINES INCENTIVES TO PURCHASERS OF RENEWABLE ENERGY SYSTEMS ON A STATE-BY-STATE BASIS.

1981-0104 STEVENS D G, SHEPHERD K P, GROSVELD F
WIND TURBINE ACOUSTIC STANDARDS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 431-435.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

A PROGRAM IS BEING CONDUCTED TO DEVELOP NOISE STANDARDS FOR WIND TURBINES WHICH MINIMIZE ANNOYANCE AND WHICH CAN BE USED IN DESIGN SPECIFICATIONS. THE APPROACH CONSISTS OF PRESENTING WIND TURBINE NOISE STIMULI TO TEST SUBJECTS IN A LABORATORY LISTENING CHAMBER. THE RESPONSES OF THE SUBJECTS ARE RECORDED FOR A RANGE OF STIMULI WHICH ENCOMPASS THE DESIGNS, OPERATING CONDITIONS, AND AMBIENT NOISE LEVELS OF CURRENT AND FUTURE INSTALLATIONS. RESULTS TO DATE HAVE ESTABLISHED THE THRESHOLD OF DETECTABILITY FOR A RANGE OF IMPULSIVE STIMULI OF THE TYPE ASSOCIATED WITH BLADE/TOWER-WAKE INTERACTIONS. THE STATUS OF THE ONGOING PSYCHOACOUSTIC TESTS, THE SUBJECTIVE DATA, AND THE APPROACH TO THE DEVELOPMENT OF ACOUSTIC CRITERIA/STANDARDS ARE DESCRIBED.

1981-0105 STOECKER R R
A WIND POWERED HOME HEATING SYSTEM.
ALTERN. SOURCES ENERGY NO. 47: 25-27, JANUARY/FEBRUARY 1981.

THE PURPOSE OF THIS BRIEF NARRATIVE IS TO TRACE THE STEPS IN THE DESIGN AND CONSTRUCTION OF A MEDIUM SIZE WIND ELECTRIC SYSTEM.

1981-0106 STRICKLAND J H, SMITH T, SUN K
A VORTEX MODEL OF THE DARRIEUS TURBINE: AN ANALYTICAL AND EXPERIMENTAL STUDY.
NTIS, JUNE 1981. 189 P.
SAND-81-7017

IMPROVEMENTS IN A VORTEX/LIFTING, LINE-BASED DARRIEUS WIND TURBINE, AERODYNAMIC PERFORMANCE/LOADS MODEL ARE DESCRIBED. THESE IMPROVEMENTS INCLUDE CONSIDERATION OF DYNAMIC STALL, PITCHING CIRCULATION, AND ADDED MASS. VALIDATION OF THESE CALCULATIONS WAS DONE THROUGH WATER TOW TANK EXPERIMENTS. CERTAIN COMPUTER RUN TIME REDUCTION SCHEMES FOR THE CODE ARE DISCUSSED.

1981-0107 STRICKLAND J H, SMITH T, SUN K
A USER'S MANUAL FOR THE VERTICAL AXIS WIND TURBINE CODE VDART3.
NTIS, JUNE 1981. 70 P.
SAND-81-7020

THIS USER'S MANUAL PROVIDES DETAILS ON THE DARRIEUS WIND TURBINE AERODYNAMIC PERFORMANCE/LOADS PREDICTION COMPUTER CODE, VDART3. THE CODE IS THE LATEST GENERATION OF VORTEX-BASED MODELS AND INCLUDES THE EFFECTS OF DYNAMIC STALL, PITCHING CIRCULATION, AND ADDED MASS.

1981-0108 SULLIVAN T L
A REVIEW OF RESONANCE RESPONSE IN LARGE, HORIZONTAL-AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 237-244.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

FIELD OPERATION OF THE MOD-0 AND MOD-1 WIND TURBINES HAS PROVIDED VALUABLE INFORMATION CONCERNING RESONANCE RESPONSE IN LARGE, TWO-BLADED, HORIZONTAL AXIS WIND TURBINES. OPERATIONAL EXPERIENCE HAS SHOWN THAT 1 PER REV EXCITATION EXISTS IN THE DRIVE TRAIN, HIGH AERODYNAMIC DAMPING PREVENTS RESONANCE RESPONSE OF THE BLADE FLATWISE MODES AND TEETERING THE HUB SUBSTANTIALLY REDUCES THE CHORDWISE BLADE RESPONSE TO ODD HARMONIC EXCITATION. THESE RESULTS CAN BE USED BY THE DESIGNER AS A GUIDE TO SYSTEM FREQUENCY PLACEMENT. IN ADDITION IT HAS BEEN FOUND THAT PRESENT ANALYTICAL TECHNIQUES CAN ACCURATELY PREDICT WIND TURBINE NATURAL FREQUENCIES.

1981-0109 SUNDAR R M, SULLIVAN J P
PERFORMANCE OF WIND TURBINES IN A TURBULENT ATMOSPHERE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 79-86.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE EFFECT OF ATMOSPHERIC TURBULENCE ON THE POWER FLUCTUATIONS OF LARGE WIND TURBINES IS STUDIED. THE SIGNIFICANCE OF SPATIAL NON-UNIFORMITIES OF THE WIND IS EMPHASIZED. THE TURBULENT WIND WITH CORRELATION IN TIME AND SPACE IS SIMULATED ON THE COMPUTER BY SHINOZUKAS METHOD. THE WIND TURBULENCE IS MODELLED ACCORDING TO THE DAVENPORT SPECTRUM WITH AN EXPONENTIAL SPATIAL CORRELATION FUNCTION. THE ROTOR AERODYNAMICS IS MODELLED BY SIMPLE BLADE ELEMENT THEORY. COMPARISON OF THE SPECTRUM OF POWER OUTPUT SIGNAL BETWEEN 1-D AND 3-D TURBULENCE, SHOWS THE SIGNIFICANT POWER FLUCTUATIONS CENTERED AROUND THE BLADE PASSAGE FREQUENCY.

1981-0110 TAYLOR D
WHAT'S IN THE WIND WITH RENEWABLES?
ELECTR. REV. 208(1): 16-17, JANUARY 9, 1981.

THE AUTHOR SURVEYS THE PROSPECTS FOR ELECTRICITY GENERATION FROM RENEWABLE SOURCES. HE TAKES A LOOK AT WIND AND TIDAL PROSPECTS.

1981-0111 THOMSON D W, ROTH S D
ENHANCEMENT OF FAR-FIELD SOUND LEVELS BY REFRACTIVE FOCUSING.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 397-400.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

THE ENHANCEMENT OF SOUND PRESSURE LEVELS RESULTING FROM REFRACTIVE FOCUSING HAS BEEN CALCULATED FOR METEOROLOGICAL CONDITIONS REPRESENTATIVE OF THOSE OBSERVED AT THE MOD-1 SITE NEAR BOONE, N.C. THE RESULTS SHOW THAT 10 TO 20 DB ENHANCEMENTS CAN OCCUR OVER RANGES OF SEVERAL HUNDRED METERS. LOCALIZED ENHANCEMENTS IN EXCESS OF 20 DB CAN OCCUR BUT WILL PROBABLY BE OF LIMITED DURATION AS A CONSEQUENCE OF NORMAL TEMPORALLY VARYING METEOROLOGICAL CONDITIONS.

1981-0112 THRESHER R W, HOLLEY W E, JAFAREY N
WIND RESPONSE CHARACTERISTICS OF HORIZONTAL AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 87-99.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

IT WAS THE OBJECTIVE OF THE WORK REPORTED HERE, AND IN THE COMPANION PAPER (SEE ENTRY 1981-0045), TO TAKE A BROADER LOOK AT WIND TURBINE DYNAMIC RESPONSE TO TURBULENCE, AND ATTEMPT TO ASCERTAIN THE FEATURES OF TURBULENCE THAT WIND TURBINES ARE MOST SENSITIVE TO. A STATISTICAL DESCRIPTION OF THE WIND INPUT INCLUDING ALL THREE WIND COMPONENTS AND ALLOWING LINEAR WIND GRADIENTS ACROSS THE ROTOR DISK, WAS USED TOGETHER WITH QUASI-STATIC AERODYNAMIC THEORY AND AN ELEMENTARY STRUCTURAL MODEL INVOLVING ONLY A FEW DEGREES OF FREEDOM. THE IDEA WAS TO KEEP THE TURBINE MODEL SIMPLE AND SHOW THE BENEFITS OF THIS TYPE OF STATISTICAL WIND REPRESENTATION BEFORE ATTEMPTING TO USE A MORE COMPLEX TURBINE MODEL. AS FAR AS POSSIBLE, THE ANALYSIS WAS KEPT IN THE SIMPLEST FORM, WHILE STILL PRESERVING KEY PHYSICAL RESPONSES.

1981-0113 TROYER J
WIND POWERED TRANSPORT RETURNS.
WIND POWER DIG. NO. 21: 6-9, WINTER 1980-1981.

VARIOUS DESIGNS REALIZING THE POTENTIAL OF SAILING SHIPS FOR A PRACTICAL ALTERNATIVE TO PRESENT DAY, WORLD MERCHANT FLEETS ARE DESCRIBED.

1981-0114 UTILITIES BOOST WIND POWER.
ENG. NEWS-REC. 206(9): 17, FEBRUARY 26, 1981.

DEMONSTRATION PROJECTS IN CALIFORNIA, WISCONSIN, AND WYOMING ARE DESCRIBED. THE CALIFORNIA PROJECT IS TESTING A 3-MW VERTICAL AXIS TURBINE. THE WISCONSIN PROJECT IS INVESTIGATING THE FEASIBILITY OF THE UTILITY COMPANY SELLING 8 TO 25-KW TURBINES TO AREA FARMS. THE WYOMING PROJECT IS INSTALLING TURBINES AT MEDICINE BOW RATED AT 4 AND 2.5 MW TO BE TIED INTO A HYDROELECTRIC POWER SYSTEM.

1981-0115 VEERS P
RESIDUAL STRESSES IN DARRIEUS VERTICAL AXIS WIND TURBINE BLADES.
NTIS, APRIL 1981. 63 P.
SAND-81-0923

A NUMERICAL PACKAGE CALLED RESID HAS BEEN ASSEMBLED TO CALCULATE THE RESIDUAL STRESSES IN VAWT BLADES INDUCED DURING COLD FORMING. USING A STRENGTH OF MATERIALS-ELEMENTARY BEAM THEORY APPROACH, RESID MODELS THE MATERIAL RESPONSE WITH A BILINEAR STRESS-STRAIN CURVE, AND THE CROSS-SECTIONAL GEOMETRY WITH AN ARRAY OF "AREA INCREMENTS." THROUGH AN ITERATIVE SOLUTION PROCEDURE RESIDUAL STRESSES ARE PREDICTED FOR A SPECIFIED FINAL RADIUS OF CURVATURE OR APPLIED BENDING MOMENT. RESID RESULTS ARE COMPARED TO THEORETICAL SOLUTIONS FOR SIMPLE GEOMETRIES AND WITH MARC FINITE ELEMENT RESULTS FOR VAWT BLADE GEOMETRIES. CALCULATING RESIDUAL STRESS LEVELS, DETERMINING ACCEPTABLE RESIDUAL STRESS LEVELS, AND A METHOD OF REDUCING RESIDUAL STRESSES ARE DISCUSSED. A COMPLETE LISTING AND SAMPLE RUN ARE INCLUDED IN THE APPENDICES.

1981-0116 VITERNA L A
THE NASA-LERC WIND TURBINE SOUND PREDICTION CODE.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 411-418.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

SINCE REGULAR OPERATION OF THE DOE/NASA MOD-1 WIND TURBINE BEGAN IN OCTOBER 1979 ABOUT 10 NEARBY HOUSEHOLDS HAVE COMPLAINED OF NOISE FROM THE MACHINE. DEVELOPMENT OF THE NASA-LERC WIND TURBINE SOUND PREDICTION CODE BEGAN IN MAY 1980 AS PART OF AN EFFORT TO UNDERSTAND AND REDUCE THE NOISE GENERATED BY MOD-1. TONE SOUND LEVELS PREDICTED WITH THIS CODE ARE IN GENERALLY GOOD AGREEMENT WITH MEASURED DATA TAKEN IN THE VICINITY OF THE MOD-1 WIND TURBINE (LESS THAN 2 ROTOR DIAMETERS). COMPARISON IN THE FAR FIELD INDICATES THAT PROPAGATION EFFECTS DUE TO TERRAIN AND ATMOSPHERIC CONDITIONS MAY BE AMPLIFYING THE ACTUAL SOUND LEVELS BY ABOUT 6 DB. PARAMETRIC ANALYSIS USING THE CODE HAS SHOWN THAT THE PREDOMINANT CONTRIBUTORS TO MOD-1 ROTOR NOISE ARE (1) THE VELOCITY DEFICIT IN THE WAKE OF THE SUPPORT TOWER, (2) THE HIGH ROTOR SPEED, AND (3) OFF-OPTIMUM OPERATION.

1981-0117 WALDON C A
AN OVERVIEW OF FATIGUE FAILURES AT THE ROCKY FLATS WIND SYSTEM TEST CENTER.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 121-128.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

INITIALLY, WIND ENERGY STATE-OF-THE-ART ADVANCEMENTS INVOLVED THE QUANTITY AND QUALITY OF THE POWER PRODUCED BY SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). AS WIND ENERGY COMMERCIALIZATION INCREASES, HOWEVER, SWECS MANUFACTURERS MUST RAPIDLY ADOPT RIGID RELIABILITY PROGRAMS. WIND MACHINES MUST NOT ONLY MEET DESIGN PERFORMANCE SPECIFICATIONS, BUT THEY MUST ALSO PERFORM WITHOUT COSTLY COMPONENT OR STRUCTURAL FAILURES TO ASSURE CONTINUED MARKET GROWTH. THIS PAPER IS INTENDED TO IDENTIFY POTENTIAL SWECS DESIGN PROBLEMS AND THEREBY IMPROVE PRODUCT QUALITY AND RELIABILITY. MASS PRODUCED COMPONENTS SUCH AS GEARBOXES, GENERATORS, BEARINGS, ETC., ARE GENERALLY RELIABLE DUE TO THEIR WIDESPREAD UNIFORM USE IN OTHER INDUSTRIES. THE LIKELIHOOD OF FAILURE INCREASES, THOUGH, IN THE INTERFACING OF THESE COMPONENTS AND IN SWECS COMPONENTS DESIGNED FOR A SPECIFIC SYSTEM USE. PROBLEMS RELATING TO THE STRUCTURAL INTEGRITY OF SUCH COMPONENTS ARE DISCUSSED AND ANALYZED IN THIS REPORT WITH TECHNIQUES CURRENTLY USED IN QUALITY ASSURANCE PROGRAMS IN OTHER MANUFACTURING INDUSTRIES.

1981-0118 WEBER R C, SEIFERT J
WIND: A POWER SOURCE FOR FORKLIFT TRUCKS.
MECH. ENG. 103(1): 30-35, JANUARY 1981.

WIND POWER IS NOW BEING SERIOUSLY CONSIDERED AS A SOURCE OF ENERGY TO POWER SEVERAL FORKLIFT TRUCKS, AN APPLICATION HERE SHOWN TO BE FEASIBLE EVEN AT MODERATE RATES OF INFLATION. THE DECISION INVOLVED IN THE PURCHASE OF A FORKLIFT TRUCK HAS HERETOFORE BEEN SIMPLY A CHOICE BETWEEN ELECTRIC OR PROPANE POWER. HOWEVER, AS THE ENERGY SITUATION WORSENS AND TECHNICAL ADVANCES IN THE AREA OF WIND GENERATION INCREASE, THE DECISION MATRIX TAKES ON THE ADDED DIMENSION OF WIND POWER. ON-SITE STUDIES TO DETERMINE WIND CHARACTERISTICS AND FORKLIFT TRUCK USE PATTERNS WERE CONDUCTED AT WISCONSIN CENTRIFUGAL INC. OF WAUKESHA, WIS. AN ECONOMIC ANALYSIS WAS THEN PERFORMED, AND IT SHOWED THAT WIND GENERATION DOES INDEED ENTER THE DECISION MATRIX. THE ON-SITE STUDIES AT WISCONSIN CENTRIFUGAL INC. INDICATE THAT THE WIND IS SUFFICIENT TO PROVIDE ENOUGH ENERGY FOR

RECHARGING APPROXIMATELY ONE BATTERY PER DAY. OBVIOUSLY, TRUCK USE PATTERNS WOULD DETERMINE THE PRACTICABILITY OF INSTALLATION OF A WIND SYSTEM.

1981-0119 WELLS R J
GE MOD-1 NOISE STUDY.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 389-395.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

NOISE STUDIES OF THE MOD-1 WIND TURBINE GENERATOR ARE SUMMARIZED, AND A SIMPLE MATHEMATICAL MODEL IS PRESENTED WHICH IS ADEQUATE TO CORRELATE THE SOUND LEVELS FOUND NEAR THE MACHINE. A SIMPLE ACOUSTIC MEASURE IS SUGGESTED FOR USE IN EVALUATING FAR FIELD SOUND LEVELS. USE OF THIS MEASURE AS INPUT TO A CURRENTLY AVAILABLE SOUND COMPLAINT PREDICTION PROGRAM IS DISCUSSED. RESULTS OF A RECENT STATISTICAL SURVEY RELATIVE TO THE FAR FIELD VARIATION OF THIS ACOUSTIC MEASURE BECAUSE OF ATMOSPHERIC EFFECTS ARE DESCRIBED.

1981-0120 WENTZ W H, CALHOUN J T
ANALYTICAL STUDIES OF THE NEW AIRFOILS FOR WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 41-49.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

COMPUTER STUDIES HAVE BEEN CONDUCTED TO ANALYZE THE POTENTIAL GAINS ASSOCIATED WITH UTILIZING NEW AIRFOILS FOR LARGE WIND TURBINE ROTOR BLADES. ATTEMPTS TO INCLUDE 3-DIMENSIONAL STALLING EFFECTS ARE INCONCLUSIVE. IT IS RECOMMENDED THAT BLADE PRESSURE MEASUREMENTS BE MADE TO CLARIFY THE NATURE OF BLADE STALLING. IT IS ALSO RECOMMENDED THAT NEW NASA LAMINAR FLOW AIRFOILS BE USED AS ROTOR BLADE SECTIONS.

1981-0121 WILSON R E
AERODYNAMIC POTPOURRI.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 3-7.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AERODYNAMIC DEVELOPMENTS FOR VERTICAL AXIS AND HORIZONTAL AXIS WIND TURBINES ARE GIVEN THAT RELATE TO THE PERFORMANCE AND AERODYNAMIC LOADING OF THESE MACHINES. INCLUDED ARE: (1) A FIXED WAKE AERODYNAMIC MODEL OF THE DARRIEUS VERTICAL AXIS WIND TURBINE; (2) EXPERIMENTAL RESULTS THAT SUGGEST THE EXISTENCE OF A LAMINAR FLOW DARRIEUS VERTICAL AXIS TURBINE; (3) A SIMPLE AERODYNAMIC MODEL FOR THE TURBULENT WINDMILL/VORTEX RING STATE OF HORIZONTAL AXIS ROTORS; AND (4) A YAWING MOMENT OF A RIGID HUB HORIZONTAL AXIS WIND TURBINE THAT IS RELATED TO BLADE CONING.

1981-0122 WILSON R E, WALKER S N
FIXED WAKE ANALYSIS OF THE DARRIEUS ROTOR.
NTIS, JULY 1981. 89 P.
SAND-81-7026

DEVELOPMENT AND VALIDATION OF A DARRIEUS WIND TURBINE AERODYNAMIC PERFORMANCE PREDICTION MODEL IS DESCRIBED. USING A FIXED-WAKE APPROACH, THE MODEL COMBINES SOME OF THE MORE DESIRABLE FEATURES OF VORTEX-LIFTING LINE AND CONSERVATION OF MOMENTUM/STREAMTUBE APPROACHES. THE MODEL THUS ACCOUNTS FOR UP- AND DOWNWIND DIFFERENCES THAT ARE PREDICTED BY VORTEX APPROACHES WHILE RETAINING THE SHORT COMPUTER RUN TIMES FOUND WITH STREAMTUBE MODELS. THE MODEL TREATS THE EFFECTS OF STALL, CURVED BLADES, BLADE PITCH, AND BLADE ATTACHMENT LOCATION. RESULTS AGREE WITH THOSE OBTAINED WITH SANDIA NATIONAL LABORATORIES' 17-M-DIAMETER DARRIEUS VAWT.

1981-0123 THE WIND COMMERCIALIZATION BILL.
WIND POWER DIG. NO. 21: 47-48, WINTER 1980-1981.

THE "WIND ENERGY SYSTEMS ACT OF 1980", AN AGGRESSIVE SUPPORT PACKAGE FOR THE WIND ENERGY INDUSTRY THAT IS DESIGNED TO HELP "COMMERCIALIZE" WIND ENERGY TECHNOLOGY, IS REVIEWED HERE.

1981-0124 WRIGHT A D, SEXTON J H, BUTTERFIELD C P, THRESHER R W
SWECS TOWER DYNAMICS ANALYSIS METHODS AND RESULTS.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 245-253.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AT THE ROCKY FLATS WIND SYSTEMS CENTER, SEVERAL DIFFERENT TOWER DYNAMICS ANALYSIS METHODS AND COMPUTER CODES ARE USED TO DETERMINE THE NATURAL FREQUENCIES AND MODE SHAPES OF BOTH GUYED AND FREESTANDING WIND TURBINE TOWERS. IN THIS PAPER THESE ANALYSIS METHODS ARE DESCRIBED AND THE RESULTS FOR TWO TYPES OF TOWERS, A GUYED TOWER AND A FREESTANDING TOWER, ARE SHOWN. THE ADVANTAGES AND DISADVANTAGES IN THE USE OF AND THE ACCURACY OF EACH METHOD ARE ALSO DESCRIBED.

1981-0125 YOUNG B J
THE VELOCITY FIELD OF A SYSTEM OF UNSTEADY CYCLOIDAL VORTICES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 35-40.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

AN ESSENTIAL DIFFERENCE BETWEEN TWO-DIMENSIONAL AND THREE-DIMENSIONAL MODELS OF CYCLOIDAL ROTORS IS THE PRESENCE OF UNSTEADY TRAILING CYCLOIDAL VORTICES IN THE WAKE. THE VELOCITY INDUCED BY THESE VORTICES IS THE PRIMARY MECHANISM PRODUCING FLOW RETARDATION FOR LOW SPAN/RADIUS RATIO, FINITE BLADE NUMBER ROTORS. AN IDEALIZED RIGID WAKE MODEL OF FINITE BLADE CYCLOIDAL ROTORS IS USED TO INVESTIGATE SOME CYCLOIDAL ROTOR PROBLEMS.

1981-0126 YU Y-Y
EXPERIENCE ON THE USE OF MOSTAB-HFW COMPUTER CODE FOR HORIZONTAL-AXIS WIND TURBINES.
WIND TURBINE DYNAMICS. PROCEEDINGS FOR A WORKSHOP HELD AT CLEVELAND STATE UNIVERSITY, CLEVELAND, OHIO, FEBRUARY 24-26, 1981. NTIS, 1981. P. 221-223.
SERI/CP-635-1238, NASA-CP-2185, CONF-810226

EXPERIENCE GAINED FROM THE DYNAMIC ANALYSIS OF HORIZONTAL AXIS TURBINE ROTORS BASED ON THE USE OF THE MOSTAB-HFW COMPUTER CODE IS DESCRIBED. THREE TOPICS ARE COVERED, DEALING WITH THE FREQUENCIES OF A ROTATING BEAM, THE USE OF THE FUNDAMENTAL MODE OF A UNIFORM CANTILEVER BEAM, AND THE ANALYSIS OF RESONANCE DWELL.

IMMENSELY HIGH PEAK LOADS WERE GENERATED BY THE CODE FOR RESONANCE DWELL, INDICATING FURTHER NEED FOR INCLUDING STRUCTURAL DAMPING AND FOR TRANSIENT ANALYSIS CAPABILITY. THE EFFECT OF STRUCTURAL DAMPING, NEWLY INCORPORATED IN THE CODE, IS FINALLY DESCRIBED.

1981-0127 ZABRANSKY J, VILARDO J M, SCHAKENBACH J T, ELLIOTT D L, BARCHET W R
WIND ENERGY RESOURCE ATLAS. VOLUME 6. THE SOUTHEAST REGION.
NTIS, JANUARY 1981. 175 P.
PNL-3195-WERA-6

THE SOUTHEAST ATLAS ASSIMILATES SIX COLLECTIONS OF WIND RESOURCE DATA: ONE FOR THE REGION AND ONE FOR EACH OF THE FIVE STATES THAT COMPOSE THE SOUTHEAST REGION (ALABAMA, FLORIDA, GEORGIA, MISSISSIPPI, AND SOUTH CAROLINA). AT THE STATE LEVEL, FEATURES OF THE CLIMATE, TOPOGRAPHY AND WIND RESOURCE ARE DISCUSSED IN GREATER DETAIL THAN IS PROVIDED IN THE REGIONAL DISCUSSION, AND THE DATA LOCATIONS ON WHICH THE ASSESSMENT IS BASED ARE MAPPED. VARIATIONS, OVER SEVERAL TIME SCALES, IN THE WIND RESOURCE AT SELECTED STATIONS IN EACH STATE ARE SHOWN ON GRAPHS OF MONTHLY AVERAGE AND INTERANNUAL WIND SPEED AND POWER, AND HOURLY AVERAGE WIND SPEED FOR EACH SEASON. OTHER GRAPHS PRESENT SPEED, DIRECTION AND DURATION FREQUENCIES OF THE WIND AT THESE LOCATIONS.

1981-0128 LISSAMAN P B S, ZALAY A D, HIBBS B H
ADVANCED AND INNOVATIVE WIND ENERGY CONCEPT DEVELOPMENT: DYNAMIC INDUCER SYSTEM. RESEARCH REPORT.
NTIS, MAY 1981. 77 P.
SERI/TR-8085-1-T2

THE PERFORMANCE BENEFITS OF THE DYNAMIC INDUCER TIPVANE SYSTEM HAVE BEEN EXPERIMENTALLY DEMONSTRATED FOR THE FIRST TIME. TOW-TESTS CONDUCTED ON A THREE-BLADED, 3.6-METER DIAMETER ROTOR HAVE SHOWN THAT A DYNAMIC INDUCER CAN ACHIEVE A POWER COEFFICIENT (BASED UPON POWER BLADE SWEPT AREA) OF 0.5, WHICH EXCEEDS THAT OF A PLAIN ROTOR BY ABOUT 35%. WIND TUNNEL TESTS CONDUCTED ON A ONE-THIRD SCALE MODEL OF THE DYNAMIC INDUCER ACHIEVED A POWER COEFFICIENT OF 0.62 WHICH EXCEEDED THAT OF A PLAIN ROTOR BY ABOUT 70%. THE DYNAMIC INDUCER SUBSTANTIALLY IMPROVES THE PERFORMANCE OF CONVENTIONAL ROTORS AND INDICATIONS ARE THAT HIGHER POWER COEFFICIENTS CAN BE ACHIEVED THROUGH ADDITIONAL AERODYNAMIC OPTIMIZATION. IT IS NOTED THAT THE WIND TURBINE SYSTEM USED AS A BASELINE UNIT IS THE KEDCO 1200, A CONVENTIONAL PROPELLER-TYPE WIND TURBINE WITH POWER BLADES DESIGNED FOR OPTIMUM PERFORMANCE WITHOUT TIP VANE AUGMENTATION. IN ADDITION, THE TIP VANE UTILIZED A STANDARD CONVENTIONAL NACA AIRFOIL SELECTED ON CONSERVATIVE GROUNDS TO GUARANTEE ACCEPTABLE PERFORMANCE. MORE ADVANCED HIGH LIFT-TO-DRAG AIRFOIL SECTIONS ARE EXPECTED TO IMPROVE THE TIP VANE EFFECTIVENESS. THE ANALYTICAL AND EXPERIMENTAL DEVELOPMENT EFFORTS SUMMARIZED IN THIS REPORT SUGGEST THAT THE DYNAMIC INDUCER CAN PLAY A MAJOR ROLE IN FUTURE TURBINE TECHNOLOGY. A NEW METHOD FOR CALCULATING WIND TUNNEL CORRECTIONS FOR AUGMENTED WIND TURBINES IS DEVELOPED. THIS SHOWS THAT CORRECTIONS ARE VERY SIGNIFICANT. FOR EXAMPLE, WITH A BLOCKAGE OF 16%, THE CORRECTED POWER COEFFICIENT IS ABOUT 20% LOWER THAN THAT ACTUALLY MEASURED.

1980-0001 ARTHUR COOK AND THE AGWAY CONNECTION.
WIND POWER DIG. NO. 19: 42-43, SPRING 1980.

1980-0002 CAMPBELL "CHINESE" MILL.
WIND POWER DIG. NO. 19: 40, SPRING 1980.

1980-0003 CHARLIER M
ARCHITECTURE IS PEOPLE.
ALTERN. SOURCES ENERGY NO. 44: 4-8, JULY/AUGUST 1980.

ED DOERR'S CONSULTING BUSINESS IS DESCRIBED. HE ASSISTS PEOPLE IN ARCHITECTURAL DESIGN USING ALTERNATIVE SOURCES OF ENERGY, TAKING INTO ACCOUNT BOTH THE LIMITATIONS OF THE TECHNOLOGY AS WELL AS LIMITATIONS OF THE PEOPLE. HE RECOMMENDS SYSTEMS THAT WILL SUIT THE PEOPLE, THEIR CIRCUMSTANCES, AND THEIR LIFE STYLES.

1980-0004 CHROMALLOY CONSIDERS VAWT'S.
WIND POWER DIG. NO. 19: 46, SPRING 1980.

1980-0005 DOE PROPOSING $80 MILLION FY81 BUDGET.
WIND ENERGY REP.: 3, JANUARY 1980.

1980-0006 DEPARTMENT OF ENERGY SOLAR BUDGET UP, BUT NOT AS MUCH AS RATE OF INFLATION.
SOL. ENERGY INTELL. REP. 6(1): 2, JANUARY 7, 1980.

WIND ENERGY CONVERSION IS SLATED TO GET $80-MILLION, ONE OF THE BIGGEST INCREASES IN THE SOLAR BUDGET, AND ENOUGH TO START THE COMMERCIALIZATION PROGRAM OUTLINED IN PENDING LEGISLATION.

1980-0007 DOWN-UNDER DARRIEUS.
WIND POWER DIG. NO. 19: 41, SPRING 1980.

1980-0008 DUNHAM B
PINSON; AN ALTERNATE SOLUTION.
WIND POWER DIG. NO. 19: 51-52, SPRING 1980.

1980-0009 FIGARD R L, SCHETZ J A
FLOWFIELD NEAR THE ROTOR OF A 10 KW HORIZONTAL-AXIS WINDMILL.
J. ENERGY 4(2): 64-69, MARCH-APRIL 1980.

A THREE-PRONGED STUDY OF THE FLOWFIELD IMMEDIATELY BEHIND THE ROTOR OF A 10 KW HORIZONTAL-AXIS WINDMILL IS PRESENTED. THE PREDICTIONS OF A COMPUTERIZED BLADE-ELEMENT ANALYSIS AND THE SCALED RESULTS OF WIND TUNNEL TESTS OF A 1/5TH SCALE MODEL ARE COMPARED WITH FIELD MEASUREMENTS TAKEN WITH THE FULL-SCALE UNIT. IN ADDITION, TURBULENCE MEASUREMENTS TAKEN IN THE FIELD AND IN THE WIND TUNNEL TESTS ARE GIVEN. BOTH THE ANALYTICAL PREDICTIONS AND THE SCALED WIND TUNNEL RESULTS AGREE WITH THE FIELD DATA TO WITHIN ABOUT PLUS OR MINUS 10 PERCENT FOR TOTAL POWER. THE AXIAL VELOCITY PROFILE PREDICTED IN THE ROTOR DISK BY THE ANALYSIS IS IN REASONABLE AGREEMENT WITH THAT MEASURED JUST BEHIND THE ROTOR IN THE FIELD. THE AGREEMENT WITH THE SCALED WIND TUNNEL IS NOT AS GOOD.

1980-0010 FOKKER-VFW DEVELOPES (SIC) DARRIEUS.
WIND POWER DIG. NO. 19: 39, SPRING 1980.

1980-0011 FRANCIS B
SANDIA; DARRIEUS TECHNOLOGY ADVANCES.
WIND POWER DIG. NO. 19: 27-29, SPRING 1980.

1980-0012 GIPE P
ALCOA; SOON TO DOMINATE VAWT MARKET.
WIND POWER DIG. NO. 19: 20-25, SPRING 1980.

1980-0013 GIPE P
MECHANICSBURG 1--MCLOUGHLIN O.
WIND POWER DIG. NO. 19: 54-56, SPRING 1980.

1980-0014 GIPE P
P.I. SPECIALISTS MARKET BRITISH TURBINE.
WIND POWER DIG. NO. 19: 44-45, SPRING 1980.

1980-0015 GIPE P
VAWT'S; A BRIEF INTRODUCTION.
WIND POWER DIG. NO. 19: 9-11, SPRING 1980.

1980-0016 GIROMILL READY FOR ROCKY FLATS.
WIND POWER DIG. NO. 19: 36-37, SPRING 1980.

1980-0017 GLADDEN MILL SURVIVES.
WIND POWER DIG. NO. 19: 43, SPRING 1980.

1980-0018 GLASGOW J C, MILLER D R
TEETERED, TIP-CONTROLLED ROTOR: PRELIMINARY TEST RESULTS FROM MOD-0 100-KW EXPERIMENTAL WIND TURBINE.
NTIS, 1980. 16 P.
DOE/NASA/1028-80/26, NASA-TM-81445

RESULTS OF TESTS CONDUCTED USING THE MOD-0 100 KW EXPERIMENTAL WIND TURBINE ARE EVALUATED. THE TEETERED ROTOR SIGNIFICANTLY DECREASED LOADS ON THE YAW DRIVE MECHANISM AND REDUCED BLADE CYCLIC FLAPWISE BENDING MOMENTS BY 25 PERCENT AT THE 20 PERCENT SPAN LOCATION WHEN COMPARED TO THE RIGID HUB ROTOR. THE TEETERED HUB PERFORMED WELL, BUT IMPACTED THE TEETER STOPS ON OCCASION AS WIND SPEED AND/OR DIRECTION VARIED RAPIDLY. THE TIP-CONTROLLED ROTOR PERFORMED SATISFACTORILY WITH SOME EXPECTED LOSS OF CONTROL WHEN COMPARED TO THE FULL SPAN PITCHABLE BLADE. THE PERFORMANCE RESULTS INDICATE THAT A REVIEW OF TECHNIQUES USED TO CALCULATE ROTOR POWER IS IN ORDER.

1980-0019 HAMILTON STANDARD WINS MEDICINE BOW SVU AWARD.
WIND ENERGY REP. : 1-2, JANUARY 1980.

1980-0020 KRAWIEC S
ECONOMICS OF SELECTED WECS DISPERSED APPLICATIONS.
NTIS, APRIL 1980. 38 P.
SERI/TR-431-580

THE OBJECTIVE OF THIS PAPER IS TO ANALYZE THE COST OF ELECTRICITY GENERATED BY SELECTED WIND ENERGY SYSTEMS IN RESIDENTIAL AND AGRICULTURAL APPLICATIONS, THE BREAKEVEN COST OF WIND SYSTEMS ABLE TO COMPETE ECONOMICALLY WITH CONVENTIONAL POWER SOURCES IN DISPERSED APPLICATIONS, AND THE IMPACT OF MAJOR ECONOMIC FACTORS ON THE COST PERFORMANCE INDEX. THE TWO MAJOR MEASURES OF ECONOMICS USED ARE BREAKEVEN PERIOD AND LEVELIZED COST OF ELECTRICITY (LIFE-CYCLE COST).

1980-0021 MCCONNELL R D
A SCREENING METHOD FOR WIND ENERGY CONVERSION SYSTEMS.
NTIS, MARCH 1980. 6 P.
SERI/TP-731-649

WE HAVE DEVELOPED A SCREENING METHOD FOR EVALUATING WIND ENERGY CONVERSION SYSTEMS (WECS) LOGICALLY AND CONSISTENTLY. IT IS A SET OF PROCEDURES SUPPORTED BY A DATA BASE FOR LARGE CONVENTIONAL WECS. THE PROCEDURES ARE FLEXIBLE ENOUGH TO ACCOMMODATE CONCEPTS LACKING COST AND ENGINEERING DETAIL, AS IS THE CASE WITH MANY INNOVATIVE WIND ENERGY CONVERSION SYSTEMS (IWECS). THE METHOD USES BOTH VALUE INDICATORS AND SIMPLIFIED COST ESTIMATING PROCEDURES. VALUE INDICATORS ARE SELECTED RATIOS OF ENGINEERING PARAMETERS INVOLVING ENERGY, MASS, AREA, AND POWER. COST MASS RATIOS AND COST ESTIMATING RELATIONSHIPS WERE DETERMINED FROM THE CONVENTIONAL WECS DATA BASE TO ESTIMATE OR VERIFY INSTALLATION COST ESTIMATES FOR IWECS. THESE VALUE INDICATORS AND COST ESTIMATING PROCEDURES ARE SHOWN FOR CONVENTIONAL WECS. AN APPLICATION OF THE METHOD TO A TRACKED-VEHICLE AIRFOIL CONCEPT IS PRESENTED.

1980-0022 MCGEORGE J
JOHN'S WORKSHOP.
ALTERN. SOURCES ENERGY NO. 43: 34-38, MAY/JUNE 1980.

1980-0023 ZAMBRANO T G
ASSESSING THE LOCAL WINDFIELD WITH INSTRUMENTATION.
NTIS, OCTOBER 1980. 277 P.
PNL-3622

THIS REPORT CONCERNS THE DEVELOPMENT AND TESTING OF A TECHNIQUE FOR THE INITIAL SCREENING AND EVALUATION OF POTENTIAL SITES FOR WIND ENERGY CONVERSION SYSTEMS (WECS). THE METHODOLOGY WAS DEVELOPED THROUGH A REALISTIC SITING EXERCISE. THE SITING EXERCISE INVOLVED MEASUREMENTS OF WIND ALONG THE SURFACE AND WINDS ALOFT USING A RELATIVELY NEW INSTRUMENT SYSTEM, THE TETHERED AERODYNAMIC LIFTING ANEMOMETER (TALA) KITE; NOTATION OF ECOLOGICAL FACTORS SUCH AS VEGETATION FLAGGING, SOIL EROSION AND SITE EXPOSURE, AND VERIFICATION OF AN AREA BEST SUITED FOR WIND-ENERGY DEVELOPMENT BY ESTABLISHING AND MAINTAINING A WIND MONITORING NETWORK. THE SITING EXERCISE WAS CARRIED OUT IN AN APPROXIMATELY 100-SQUARE-MILE REGION OF THE TEHACHAPI MOUNTAINS OF SOUTHERN CALIFORNIA. THE RESULTS SHOWED THAT A COMPREHENSIVE SITE SURVEY INVOLVING FIELD MEASUREMENTS, ECOLOGICAL SURVEY, AND WIND-MONITORING CAN BE AN EFFECTIVE TOOL FOR PRELIMINARY EVALUATION OF WECS SITES.

1980-0024 MCNERNEY G M
AN AUTOMATIC-CONTROL SYSTEM FOR THE 17 METRE VERTICAL-AXIS WIND TURBINE (VAWT).
NTIS, MARCH 1980. 49 P.
SAND-78-0984

THE 17-METRE DOE/SANDIA VAWT BEGAN OPERATION IN MARCH 1977. SINCE THAT TIME THE TURBINE HAS BEEN OPERATED STRICTLY BY MANUAL CONTROL FOR THE PURPOSE OF DATA ACQUISITION AND PERFORMANCE ANALYSIS; THIS PROCEDURE HAS LIMITED THE VAWT OPERATION TIME AND POWER OUTPUT. AN AUTOMATIC-CONTROL SYSTEM HAS BEEN DESIGNED AND IMPLEMENTED TO STUDY AUTOMATIC CONTROL OF A VAWT AND TO BETTER JUDGE THE FATIGUE LIFE AND RELIABILITY OF THE VAWT UNDER WHAT WILL BE NORMAL OPERATING CONDITIONS FOR POWER PRODUCTION. THIS SYSTEM, INCLUDING THE NECESSARY HARDWARE, IS DISCUSSED IN DETAIL ALONG WITH A SIMPLIFIED COST ANALYSIS.

1980-0025 KSU ROTOR EXPERIMENT.
WIND POWER DIG. NO. 19: 38-39, SPRING 1980.

1980-0026 LEVY G W, FIELD J
SOLAR ENERGY EMPLOYMENT AND REQUIREMENTS 1978-1985. SUMMARY AND HIGHLIGHTS.
NTIS, APRIL 1980. 209 P.
DOE/TIC-11154

THE PURPOSE OF THIS STUDY IS TO PROVIDE A DESCRIPTION OF THE PRESENT STATUS OF THE SOLAR ENERGY AREA IN TERMS OF MANPOWER, AND TO DEVELOP AND APPLY A METHODOLOGY FOR PROJECTING MANPOWER REQUIREMENTS IN SOLAR ENERGY. THIS INCLUDES IDENTIFICATION AND DESCRIPTION OF EMPLOYERS ENGAGED IN SOLAR AND SOLAR-RELATED ACTIVITIES; COLLECTION OF EMPLOYMENT DATA BY OCCUPATION; DEFINITION OF NEW OCCUPATIONAL SPECIALTIES AND CHANGES IN TRADITIONAL OCCUPATION; ANALYSIS OF THE EDUCATION AND EXPERIENCE OF THOSE EMPLOYED IN SOLAR AND SOLAR-RELATED AREAS; PROJECTION OF SHORT-TERM AND MID-TERM SOLAR EMPLOYMENT BY OCCUPATION, AND DEVELOPMENT OF A METHODOLOGY FOR FORMULATING FUTURE PROJECTIONS.

1980-0027 LIU M K, YOCKE M A
SITING OF WIND TURBINE GENERATORS IN COMPLEX TERRAIN.
J. ENERGY 4(1): 10-16, JANUARY-FEBRUARY 1980.

ACCURATE DETERMINATION OF WIND DISTRIBUTIONS IN THE ATMOSPHERIC SURFACE LAYER IS A PREREQUISITE FOR THE SUCCESSFUL SITING AND DESIGN OF WIND TURBINE GENERATORS. A GENERAL METHODOLOGY WHICH COMBINES A CLIMATOLOGICAL APPROACH AND A DIAGNOSTIC WIND MODEL IS PROPOSED FOR SELECTING OPTIMUM WIND POWER SITES IN COMPLEX TERRAIN. THE DEVELOPMENT OF THE DIAGNOSTIC WIND MODEL, WHICH IS BASED UPON THE NUMERICAL SOLUTION OF THE THREE-DIMENSIONAL MASS CONTINUITY EQUATION WITH THE APPROPRIATE PHYSICAL PROCESSES PARAMETERIZED, IS DELINEATED. TO DEMONSTRATE ITS UTILITY, THE PROPOSED METHODOLOGY IS APPLIED TO THE ISLAND OF MAUI IN HAWAII. THE PREDICTED WIND FIELD APPEARS TO RETRIEVE QUANTITATIVELY THE ESSENTIAL FEATURES OF THE MEASURED WIND FLOWS; ADDITIONALLY, THE AREAS IDENTIFIED AS POTENTIAL WIND POWER APPLICATION SITES CORRESPOND TO THOSE DETERMINED EARLIER VIA FIELD STUDIES.

1980-0028 LUNDE P
WINDMILLS: FROM JIDDAH TO YORKSHIRE.

ARAMCO WORLD MAG. 31(1): 32-35, JANUARY-FEBRUARY 1980.

THIS ARTICLE REVIEWS THE HISTORY OF WIND ENERGY AND MENTIONS CURRENT PROJECTS IN QUEBEC, YORKSHIRE, AND NORTH CAROLINA.

1980-0029 MIGLIORE P G, WOLFE W P, FANUCCI J B
FLOW CURVATURE EFFECTS ON DARRIEUS TURBINE BLADE AERODYNAMICS.
J. ENERGY 4(2): 49-55, MARCH-APRIL 1980.

THE EFFECTS OF CURVILINEAR FLOW ON DARRIEUS BLADE AERODYNAMICS ARE DESCRIBED. ANALYSIS SHOWS THAT THESE EFFECTS CAN HAVE A SIZEABLE IMPACT ON PERFORMANCE FOR BLADES OF LARGE CHORD. EXPERIMENTAL DATA ARE PRESENTED WHICH VERIFY THIS FORECAST. UNUSUALLY LARGE BOUNDARY-LAYER RADIAL PRESSURE GRADIENTS AND VIRTUALLY ALTERED CAMBER AND INCIDENCE ARE IDENTIFIED AS CASUAL PHENOMENA. CONFORMAL MAPPING TECHNIQUES ARE USED TO TRANSFORM GEOMETRIC AIRFOILS IN CURVED FLOW TO THEIR VIRTUAL EQUIVALENTS IN RECTILINEAR FLOW. IT IS ARGUED THAT FLOW CURVATURE IS AN IMPORTANT DETERMINANT OF DARRIEUS TURBINE BLADE AERODYNAMIC EFFICIENCY AND THAT ITS PROPER CONSIDERATION WILL YIELD PERFORMANCE IMPROVEMENTS, EVEN FOR BLADES OF SMALL CHORD.

1980-0030 MORRIS D
FROM THE GROUND UP. DEFINING SMALL SCALE.
SOLAR AGE 5(1): 8, JANUARY 1980.

HOW VARIOUS REGULATORY AGENCIES DEFINE SMALL SCALE PROJECTS (SOME WIND) IS DISCUSSED.

1980-0031 NATURE PAYS THE BILLS HERE.
HOUSE GARDEN 152(2): 106-109, FEBRUARY 1980.

DON MAYER (VICE PRESIDENT OF THE NORTH WIND POWER CO.) HAS AN ENERGY EFFICIENT HOME IN VERMONT USING A VARIETY OF ALTERNATIVE SOURCES OF ENERGY IN COMBINATION. THE HOME, USING ACTIVE SOLAR FOR HOT WATER HEATING, PASSIVE SOLAR HEATING, WINDMILL, AND OTHER IDEAS, IS DESCRIBED IN THIS ILLUSTRATED ARTICLE.

1980-0032 NESEC CALCULATES SETBACK REQUIREMENTS.
WIND POWER DIG. NO 19: 57, SPRING 1980.

1980-0033 NEW HAMPSHIRE ZONING FIGHT.
WIND POWER DIG. NO. 19: 56, SPRING 1980.

1980-0034 PG&E TO ISSUE RFP FOR LARGE WECS; BENDIX MIGHT BUY WIND ENGINEERING THIS MONTH.
SOL. ENERGY INTELL. REP. 6(11): 105, MARCH 17, 1980.

1980-0035 PUTHOFF R L, COLLINS J L, WOLF R A
INSTALLATION AND CHECKOUT OF THE DOE/NASA MOD-1 2000-KW WIND TURBINE GENERATOR.
NTIS, 1980. 25 P.
DOE/NASA/1010-80/6, NASA-TM-81444

THE MOD-1 MACHINE WAS ASSEMBLED WITHOUT THE BLADES, TESTED, AND SENT TO THE SITE AT BOONE, NORTH CAROLINA FOR ERECTION. THE BLADES WERE TRANSPORTED DIRECTLY TO THE SITE. A SERIES OF CHECKOUT TESTS WERE THEN CONDUCTED TO EVALUATE PERFORMANCE AND LOADS. THE RESULTS OF THESE TESTS COMPARED WELL WITH THE DESIGN DATA.

1980-0036 RCS PROGRAM SETTING UP SWECS STANDARDS.
WIND ENERGY REP. : 5, JANUARY 1980.

1980-0037 REMOTE AND ISOLATED AREA WIND SYSTEMS MARKET ANALYSIS.
WIND ENERGY REP. : 6-10, JANUARY 1980.

THIS IS A CONDENSED EXCERPT FROM THE DOE REPORT: "A MARKET ANALYSIS OF THE POTENTIAL FOR WIND SYSTEMS USE IN REMOTE AND ISOLATED AREA APPLICATIONS."

1980-0038 SHELDAHL R E, KLIMAS P C, FELTZ L V
AERODYNAMIC PERFORMANCE OF A 5-METRE-DIAMETER DARRIEUS TURBINE WITH EXTRUDED ALUMINUM NACA-0015 BLADES.
NTIS, MARCH 1980. 41 P.
SAND-80-0179

A 5-METRE-DIAMETER VERTICAL-AXIS WIND TURBINE HAS UNDERGONE CONTINUED TESTING SINCE 1976 AT THE SANDIA LABORATORIES WIND TURBINE SITE. THE LATEST TESTS OF THIS MACHINE HAVE BEEN WITH EXTRUDED ALUMINUM BLADES OF NACA-0015 AIRFOIL CROSS SECTION. THE RESULTS OF THESE TESTS AT SEVERAL TURBINE ROTATIONAL SPEEDS ARE PRESENTED AND COMPARED WITH EARLIER TEST RESULTS. A PERFORMANCE COMPARISON IS MADE WITH A VORTEX/LIFTING LINE COMPUTATIONAL CODE. THE PERFORMANCE OF THE TURBINE WITH THE EXTRUDED BLADES MET ALL EXPECTATIONS.

1980-0039 SHEPERDSON W
DYNERGY; ONE ENTREPRENEUR'S EXPERIENCE IN WIND.
WIND POWER DIG. NO. 19: 13-18, SPRING 1980.

1980-0040 SMEALLIE P H, WOLFF B
CAPITAL FORMATION FOR SMALL WIND ENERGY CONVERSION SYSTEM MANUFACTURERS. A GUIDE TO METHODS AND SOURCES. FINAL REPORT.
NTIS, MAY 1980. 57 P.
SERI/TR-98298-1

A WORKSHOP OF WIND MACHINE MANUFACTURERS AND FINANCIAL EXPERTS CONTRIBUTED TO THE DEVELOPMENT OF THIS GUIDE TO CAPITAL FORMATION. SOURCES OF CAPITAL ARE DESCRIBED AND THE DEVELOPMENT OF A BUSINESS PLAN EXPLAINED. THE REPORT INCLUDES CASE HISTORIES OF FOUR WIND COMPANIES' EXPERIENCES IN RAISING CAPITAL.

1980-0041 STRAIGHT BLADE DEVELOPMENT.
WIND POWER DIG. NO. 19: 41, SPRING 1980.

1980-0042 STRICKLAND J H, WEBSTER B T, NGUYEN T
A VORTEX MODEL OF THE DARRIEUS TURBINE: AN ANALYTICAL AND EXPERIMENTAL STUDY.
NTIS, FEBRUARY 1980. 155 P.
SAND-79-7058

A PRELIMINARY AERODYNAMIC PERFORMANCE PREDICTION MODEL HAS BEEN CONSTRUCTED FOR THE DARRIEUS TURBINE USING A VORTEX LATTICE METHOD OF ANALYSIS. A SERIES OF EXPERIMENTS WERE CONDUCTED FOR THE EXPRESS PURPOSE OF VALIDATING THE ANALYTICAL MODEL. THESE EXPERIMENTS WERE CONDUCTED ON A SERIES OF TWO DIMENSIONAL ROTOR CONFIGURATIONS WHICH WERE TOWED IN A LARGE TANK OF WATER. THE USE OF WATER AS A WORKING FLUID WAS INTENDED TO FACILITATE BOTH FLOW VISUALIZATION AND THE ABILITY TO MEASURE AERODYNAMIC BLADE FORCES WHILE ALLOWING OPERATION AT SUFFICIENTLY HIGH REYNOLDS NUMBERS. THE PRIMARY PURPOSE OF THIS RESEARCH WAS TO ALLOW REASONABLE PREDICTIONS OF AERODYNAMIC BLADE FORCES AND MOMENTS TO BE MADE. PREVIOUS AERODYNAMIC MODELS BASED ON SIMPLE MOMENTUM PRINCIPLES WERE INADEQUATE FOR PREDICTING BLADE LOADING. A SECONDARY MOTIVATION OF THIS RESEARCH WAS TO ALLOW PREDICTION OF THE NEAR WAKE STRUCTURE FOR THE PURPOSE OF BEING ABLE TO SPECIFY SEPARATION DISTANCES BETWEEN TURBINES PLACED IN ARRAYS.

1980-0043 SZOSTAK J
D A F.
WIND POWER DIG. NO.19: 30-32, SPRING 1980.

1980-0044 SZOSTAK J, TOLLER B, WHITEWAY D
NRC; REBIRTH OF THE DARRIEUS ROTOR.
WIND POWER DIG. NO. 19: 33-35, SPRING 1980.

1980-0045 TARP.
WIND POWER DIG. NO. 19: 37-38, SPRING 1980.

1980-0046 TILTING WING.
WIND POWER DIG. NO. 19: 40. SPRING 1980.

1980-0047 TORNADO VORTEX.
WIND POWER DIG. NO. 19: 47. SPRING 1980.

1980-0048 TUMAC INDUSTRIES MARKETS VAWT.
WIND POWER DIG. NO. 19: 46, SPRING 1980.

1980-0049 VAS I E
A REVIEW OF THE CURRENT STATUS OF THE WIND ENERGY INNOVATIVE SYSTEMS PROJECTS.
NTIS, MARCH 1980. 77 P.
SERI/TP-635-469

THE RESPONSIBILITY TO PROVIDE PROGRAM MANAGEMENT OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM WAS TRANSFERRED TO THE SOLAR ENERGY RESEARCH INSTITUTE FROM THE DEPARTMENT OF ENERGY DURING THE LATTER PART OF FY78. THE MAJOR ACTIVITIES CARRIED OUT IN THIS PROGRAM ARE SUBCONTRACTED RESEARCH AND DEVELOPMENT (R&D) STUDIES AND ASSESSMENTS OF INNOVATIVE CONCEPTS. THE PRESENT PAPER REVIEWS THE EFFORTS OF EIGHT OF THE R&D SUBCONTRACTORS.

1980-0050 VINAYAGALINGAM T
PRELIMINARY WIND TUNNEL TESTS ON THE PEDAL WIND TURBINE.
J. ENERGY 4(3): 142-144, MAY-JUNE 1980.

HIGH SOLIDITY-LOW SPEED WIND TURBINES ARE RELATIVELY SIMPLE TO CONSTRUCT AND CAN BE USED ADVANTAGEOUSLY IN MANY DEVELOPING COUNTRIES FOR SUCH DIRECT APPLICATIONS AS WATER PUMPING. ESTABLISHED DESIGNS IN THIS CLASS, SUCH AS THE SAVONIUS AND THE AMERICAN MULTIBLADE ROTORS, HAVE THE DISADVANTAGE THAT THEIR MOVING SURFACES REQUIRE A RIGID CONSTRUCTION, THEREBY RENDERING LARGE UNITS UNECONOMICAL. IN THIS RESPECT. THE PEDAL WIND TURBINE RECENTLY REPORTED BY THE AUTHOR AND WHICH INCORPORATES SAIL TYPE ROTORS OFFERS A NUMBER OF ADVANTAGES. THIS NOTE REPORTS PRELIMINARY RESULTS FROM A SERIES OF WIND TUNNEL TESTS WHICH WERE CARRIED OUT TO ASSESS THE AERODYNAMIC TORQUE AND POWER CHARACTERISTICS OF THE TURBINE.

1980-0051 WATSON R A
COMPARISON WITH STRAIN GAGE DATA OF CENTRIFUGAL STRESSES PREDICTED BY FINITE ELEMENT ANALYSIS ON THE DOE/SANDIA 17-M DARRIEUS TURBINE.
NTIS, FEBRUARY 1980. 21 P.
SAND-78-1990

BY THE USE OF STRAIN GAGES, THE BLADE STRUCTURAL RESPONSE TO PURELY CENTRIFUGAL LOADING WAS MEASURED ON THE DOE/SANDIA 17-M DARRIEUS ROTOR. THE MEASUREMENTS OBTAINED ARE COMPARED IN THIS REPORT WITH MARC-H NONLINEAR FINITE ELEMENT STRESS PREDICTIONS. IT WAS NECESSARY TO INCLUDE GRAVITATIONAL EFFECTS IN THE FINITE ELEMENT MODEL TO EXPLAIN CERTAIN ASYMMETRIES IN THE DATA. THE MODEL WITH GRAVITATIONAL EFFECTS SHOWS GOOD AGREEMENT WITH THE DATA. EXAMINATION OF RESULTS SUGGESTS THAT REFINEMENT OF THE MODEL TO INCLUDE MORE STRUCTURAL DETAIL IN THE REGION WHERE THE BLADE JOINS THE TOWER WOULD PROBABLY ENHANCE THE ACCURACY OF THE MODEL.

1980-0052 WECS MARKET POTENTIAL LARGE IN REMOTE AREAS.
WIND ENERGY REP. : 6, JANUARY 1980.

1980-0053 WHOLEY J
HARNESSING THE WIND.
HOUSE GARDEN 152(2): 30,32-34, FEBRUARY 1980.

THIS GENERAL REVIEW OF THE POSSIBILITY FOR USE OF WIND ENERGY FOR DOMESTIC ELECTRICITY IS PRESENTED FOR HOME-OWNERS.

1980-0054 WIND POWER BUSINESS BRISK.
ENG. NEWS-REC. 204(7): 32, FEBRUARY 14, 1980.

TWO LARGE WIND ENERGY PROJECTS ARE DESCRIBED BRIEFLY: (1) A 4-MW TURBINE PROJECT IN MEDICINE BOW, WYOMING, WHICH COMBINES UTILITY-SIZE WIND TURBINE GENERATORS WITH LARGE HYDROELECTRIC PLANTS AND DISTRIBUTION SYSTEMS; (2) NASA'S 4-MW MOD-5 PROJECT.

1980-0055 WINDFARMS LTD. BUYING SIX ALCOA VAWTS.
WIND ENERGY REP. : 1,4, JANUARY 1980.

1980-0056 ABARIKWU O I, MERONEY R N
A STUDY OF THE D.A.F. DARRIEUS VERTICAL AXIS WIND TURBINE AT THE C.S.U. DAIRY FARM.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, DEPARTMENT OF CIVIL ENGINEERING, CIVIL ENGINEERING REPORT CER80-810IA-RNM1, JULY 1980. 35 P.

PERFORMANCE OF THE DARRIEUS TURBINE USED AT C.S.U.'S DAIRY FARM FOR THE COOLING OF MILK IS DESCRIBED. TWO FAILURES, CAUSED BY HIGH GUSTS, OR WINDY RAIN, HAVE BEEN THE ONLY PROBLEMS. SEVERAL SYSTEM DESIGN IMPROVEMENTS HAVE BEEN MADE.

1980-0057 LOYD M L
CROSSWIND KITE POWER.
J. ENERGY 4(3): 106-111, MAY-JUNE 1980.

THIS PAPER DESCRIBES A CONCEPT FOR LARGE-SCALE WIND POWER PRODUCTION BY MEANS OF AERODYNAMICALLY EFFICIENT KITES. BASED ON AIRCRAFT CONSTRUCTION, THESE KITES FLY TRANSVERSE TO THE WIND AT HIGH SPEED. THE LIFT PRODUCED AT THIS SPEED IS SUFFICIENT TO BOTH SUPPORT THE KITE AND GENERATE POWER. THE EQUATIONS OF MOTION ARE DEVELOPED, AND EXAMPLES ARE PRESENTED. ONE VERSION, BASED ON THE C-5A AIRCRAFT, RESULTS IN 6.7 MW PRODUCED BY A 10-M/S WIND. EXTRAPOLATION TO NEWER TECHNOLOGY, WHICH IS MORE COMPARABLE TO MODERN WIND TURBINES, INDICATES THE PRODUCTION OF 45 MW FROM A SINGLE MACHINE. THE DETAILED CALCULATIONS ARE VALIDATED BY COMPARISON OF THEIR RESULTS WITH SIMPLE ANALYTICAL MODELS. THE METHODOLOGY USED HERE LAYS THE FOUNDATION FOR THE SYSTEMATIC STUDY OF POWER-PRODUCING KITES.

1980-0058 AKINS R E
PERFORMANCE EVALUATION OF WIND TURBINES.
ASCE TRANSP. ENG. J. 106(1): 19-29, JANUARY 1980.

A RELATIVELY STRAIGHT FORWARD TECHNIQUE TERMED THE METHOD OF BINS HAS BEEN DEVELOPED THAT MAY BE USED IN THE DETERMINATION OF THE AVERAGE OUTPUT CHARACTERISTICS OF A PARTICULAR WIND TURBINE. THE TECHNIQUE IS APPLICABLE TO ANY SIZE OR TYPE WIND TURBINE. THE OUTPUT POWER OF A WIND TURBINE AS A FUNCTION OF WIND SPEED IS NOT AN ADEQUATE MEASURE OF THE POWER PRODUCTION OF A WIND TURBINE. HOWEVER, THE OUTPUT POWER AS A FUNCTION OF WIND SPEED CAN BE COMBINED WITH EITHER A KNOWLEDGE OR AN ESTIMATE OF THE WIND CHARACTERISTICS AT A PARTICULAR LOCATION TO PREDICT THE ANNUAL POWER PRODUCED BY THE TURBINE. THIS APPROACH OF ESTIMATING THE ANNUAL POWER PRODUCTION OF A WIND TURBINE IN SOME ASSUMED ENVIRONMENT IS A USEFUL WAY OF EVALUATING DIFFERENT MACHINES OR OF EVALUATING THE EFFECTS OF LOCATING A PARTICULAR MACHINE AT DIFFERENT SITES.

1980-0059 ALLISON W D
MOUNTING FOR WINDMILLS.
U.S. PATENT NO. 4,217,501, AUGUST 12, 1980.

THIS WINDMILL STRUCTURE IS COMPRISED OF A PAIR OF SUBSTANTIALLY HORIZONTAL, FLEXIBLE CABLE MEMBERS SUSPENDED BETWEEN SUPPORTS. FIRST AND SECOND POINTS ON THE CABLE MEMBERS, RESPECTIVELY, ARE VERTICALLY SPACED AND ALIGNED RELATIVE TO EACH OTHER. THE WINDMILL HAS CONNECTING MOUNTING STRUCTURE TO BOTH FLEXIBLE CABLE MEMBERS AT FIRST AND SECOND POINTS FOR ROTATION THROUGH AT LEAST ONE REVOLUTION OF THE MOUNTING STRUCTURE RELATIVE TO FLEXIBLE MEMBERS ABOUT A VERTICAL AXIS PASSING THROUGH POINTS AND MOUNTING STRUCTURE. THE WINDMILL IS SUPPORTED ON A MOUNTING STRUCTURE THAT IS IN ACCORDANCE WITH THE DIRECTION OF THE WIND.

1980-0060 ANKRUM G T
GOVERNMENT COMMERCIALIZATION PLANS FOR WIND ENERGY.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 343-348.
CONF-791097

THIS PAPER DISCUSSED THE ATTENTION DOE IS GIVING TO THE COMMERCIALIZATION ISSUES OF WIND ENERGY.

1980-0061 BAHRAMI K, STALLKAMP J A, WALTON A
DISPERSED STORAGE AND GENERATION CASE STUDIES.
NTIS, MARCH 15, 1980. 187 P.
N80-22782/0, JPL-PUBL-79-98

THREE INSTALLATIONS UTILIZING SEPARATE DISPERSED STORAGE AND GENERATION (DSG) TECHNOLOGIES WERE INVESTIGATED. EACH OF THE SYSTEMS IS DESCRIBED IN COSTS AND CONTROL. SELECTED INSTITUTIONAL AND ENVIRONMENTAL ISSUES ARE DISCUSSED, INCLUDING LIFE CYCLE COSTS. NO UNRESOLVED TECHNICAL, ENVIRONMENTAL, OR INSTITUTIONAL PROBLEMS WERE ENCOUNTERED IN THE INSTALLATIONS. THE WIND AND SOLAR PHOTOVOLTAIC DSG WERE INSTALLED FOR TEST PURPOSES, AND APPEAR TO BE PRESENTLY UNECONOMICAL. HOWEVER, A NUMBER OF FACTORS ARE DECREASING THE COST OF DSG RELATIVE TO CONVENTIONAL ALTERNATIVES, AND AN INCREASED DSG PENETRATION LEVEL MAY BE EXPECTED IN THE FUTURE.

1980-0062 BALOMBIN J R
AN EXPLORATORY SURVEY OF NOISE LEVELS ASSOCIATED WITH A 100KW WIND TURBINE.
NTIS, 1980. 20 P.
NASA-TM-81486, E-424

NOISE MEASUREMENTS OF A 125-FOOT DIAMETER, 100 KW WIND TURBINE ARE PRESENTED. THE DATA INCLUDE MEASUREMENTS AS FUNCTIONS OF DISTANCE FROM THE TURBINE AND DIRECTIVITY ANGLE AND COVER A FREQUENCY RANGE FROM 1 HZ TO SEVERAL KHZ. POTENTIAL COMMUNITY IMPACT IS DISCUSSED IN TERMS OF A-WEIGHTED NOISE LEVELS RELATIVE TO BACKGROUND LEVELS, AND THE INTRASONIC SPECTRAL CONTENT. FINALLY, THE CHANGE IN THE SOUND POWER SPECTRUM ASSOCIATED WITH A CHANGE IN THE ROTOR SPEED IS DESCRIBED. THE ACOUSTIC IMPACT OF THIS SIZE WIND TURBINE IS JUDGED TO BE MINIMAL.

1980-0063 BARRETT C I
BUREAU OF RECLAMATION'S WIND/HYDROELECTRIC ENERGY PROJECT.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 197-202.
CONF-791097

THE STUDY, WHICH COVERS A 600 SQUARE MILE AREA, HAS AS ITS PRINCIPAL OBJECTIVE THE EVALUATION OF INTEGRATING A WIND ENERGY FARM HAVING ABOUT 100 MEGAWATT CAPACITY WITH STORAGE AND ELECTRIC GENERATING CAPABILITIES OF THE COLORADO RIVER STORAGE PROJECT.

1980-0064 BERRIE T
THE SIGNIFICANCE OF NON-FIRM ENERGY FOR THE TRANSMISSION ENGINEER.
ELECTR. REV. 206(1): 28-30, JANUARY 4, 1980.

THE SUBJECT OF NON-FIRM (NON-CONSTANT) ENERGY PRODUCTION IS NOT NEW--IT HAS HAD TO BE DEALT WITH SINCE THE EARLIEST DAYS OF ELECTRICITY SUPPLY BY HYDRO-ELECTRIC ENGINEERS AND BY THOSE DEALING WITH TIE-LINE CONNECTIONS TO A NEIGHBOURING ELECTRICITY UTILITY. YET IT HAS BECOME NEWS AGAIN BECAUSE OF THE INTEREST IN THE "NON-CONVENTIONAL" ENERGY SOURCES SUCH AS WINDPOWER, WAVEPOWER AND SOLAR ENERGY. MANY OF THE WELL-TRIED

METHODS OF EVALUATING HYDRO ENERGY CAN BE USED TO FIND THE ECONOMIC WORTH OF NON-CONVENTIONAL ENERGY. BUT NEW METHODS ARE ALSO NEEDED AS IS A DIFFERENT ATTITUDE BY TRANSMISSION/DISTRIBUTION DESIGNERS AND BY MANUFACTURERS WHOSE CHOICE OF EQUIPMENT SOMETIMES FORCES SYSTEM DESIGNS ON PLANNERS.

1980-0065 BONDI H
INDIRECT UTILIZATION OF SOLAR ENERGY (WAVE AND WIND ENERGY).
R. SOC. LONDON PHILOS. TRANS. A 295(1414): 501-506, 1980.

THIS PAPER EXAMINES THE PROSPECTS FOR THE UTILIZATION OF WAVE AND WIND ENERGY.

1980-0066 BRAASCH R H
DARRIEUS VERTICAL AXIS WIND TURBINE PROGRAM OVERVIEW - FALL 1979.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 39-58.
CONF-791097

SANDIA LABORATORIES IS DEVELOPING DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT) TECHNOLOGY WITH THE OBJECTIVE OF ENCOURAGING PRIVATE INDUSTRY TO PRODUCE ECONOMICALLY FEASIBLE, COMMERCIALLY MARKETABLE WIND ENERGY SYSTEMS. THE FIRST FULL CYCLE OF DEVELOPMENT IS ESSENTIALLY COMPLETE, AND RESULTING CURRENT TECHNOLOGY DESIGNS HAVE BEEN EVALUATED FOR COST-EFFECTIVENESS. AERODYNAMIC, STRUCTURAL, AND SYSTEM ANALYSES CAPABILITIES HAVE EVOLVED DURING THIS CYCLE TO SUPPORT AND EVALUATE THE SYSTEM DESIGNS. THIS REPORT PRESENTS SOME OF THE MORE SALIENT RECENT DEVELOPMENTS, FIRST GENERATION COSTS, CURRENT ACTIVITIES, AND FUTURE PLANS. POTENTIAL DESIGN IMPROVEMENTS IDENTIFIED IN THE FIRST DEVELOPMENT CYCLE ARE PRESENTED ALONG WITH THEIR COST BENEFITS.

1980-0067 BRANDELS L
THE SWEDISH WIND ENERGY PROGRAM OVERVIEW.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 457-460.
CONF-791097

THE GENERAL OBJECTIVE OF THE WIND PROGRAM IS TO PROVIDE A FACTUAL BASIS FOR A PARLIAMENTARY DECISION TO BE TAKEN IN 1985 CONCERNING LARGE-SCALE INTRODUCTION OF WIND GENERATED POWER INTO THE NATIONAL GRID.

1980-0068 BRAUN H R, BRISTOW D J, WAKE S J
EVALUATION OF THE VERTICAL AXIS WIND TURBINE AT DREO.
NTIS, JANUARY 1980. 101 P.
AD-A983961, DREO-R-822

THIS REPORT DEALS WITH AN EVALUATION STUDY OF A VERTICAL AXIS WIND TURBINE-BATTERY STORAGE SYSTEM FOR A LOW-POWER UNATTENDED POWER SOURCE. THE SYSTEM'S WIND TURBINE, ENERGY-GENERATING AND BATTERY-STORAGE SYSTEM, MECHANICAL DRIVE SYSTEM, INSTALLATION, CONTROL-CIRCUITRY AND DATA-ACQUISITION SYSTEM ARE DESCRIBED. ALSO, A PERFORMANCE-HISTORY OUTLINING THE PROBLEM AREAS ENCOUNTERED AND A DATA-SUMMARY OF TWO YEARS OF PERFORMANCE-DATA ACQUIRED DURING THIS STUDY ARE PRESENTED. THE OBJECTIVE OF THIS STUDY WAS TO ASSESS THE SYSTEM'S ABILITY TO PROVIDE SIXTY WATTS OF CONTINUOUS POWER.

1980-0069 BULLO P
ENERGY FROM WIND. PROJECTS IN PROGRESS AND THEIR PROBLEMS.
ELLETRIFICAZIONE NO. 1: 27-31, JANUARY 1980. (IN ITALIAN)

THIS PAPER DEALS WITH PROJECTS TO USE WIND AS A SOURCE OF POWER AND MENTIONS THAT 10/SUP 11/ KW OF ELECTRIC POWER COULD BE PRODUCED BY PROPERLY SITED WIND DRIVEN MOTORS IN A SPECIFIC BELT OF AMERICA. IT DETAILS ACTUAL PROJECTS IN PROGRESS IN THE USA, IN GREAT BRITAIN, DENMARK, FRANCE AND GERMANY, AND DEALS AT LENGTH WITH THE RESEARCH PROGRAMS UNDERTAKEN IN ITALY BY ENEL, FIAT AND OTHER CENTRES. IT DISCUSSES THE DESIGN PROBLEMS OF THE LOCATION OF THE TOWERS; THE DESIGN AND NUMBER OF THE PROPELLERS, VARIABLE PITCH BLADES, SYSTEMS OF POWER TRANSMISSION, AND THE TURBINE SYSTEMS TO BE ERECTED ON THE TOWERS.

1980-0070 BULLO P
AEOLIAN (WIND) ENERGY. HOW MUCH IT COSTS AND HOW IT CAN BE USED.
ELLETRIFICAZIONE NO. 2: 79-83, FEBRUARY 1980. (IN ITALIAN)

THE VARIOUS FACTORS, SUCH AS THE SITES OF INSTALLATION, THE COST OF THE PLANT AND THE VALUE OF THE POWER GENERATED, WHICH DETERMINE THE SWITCHABILITY OF WIND POWER FOR ELECTRICAL GENERATION ARE EXAMINED. THE FACTORS DETERMINING THE SIZE OF THE MARKET FOR SUCH EQUIPMENT, SUCH AS WHETHER IT IS FOR THE INDUSTRIALIZED OR THE DEVELOPING COUNTRIES ARE THEN DISCUSSED. THE SCALE OF THE UNITS NEEDED IS DIFFERENT IN THE TWO BROAD FIELDS, AND CONSIDERATIONS OF COMPATIBILITY WITH EXISTING POWER NETWORKS (OR WHETHER THESE EXIST) ARE OBVIOUSLY IMPORTANT.

1980-0071 CASE C W, CLARK H R, KAY J, LUCARELLI F B, RIZER S
PROJECTS FROM FEDERAL REGION IX: DEPARTMENT OF ENERGY APPROPRIATE ENERGY TECHNOLOGY PROGRAM. PART II.
NTIS, JANUARY 1980. 50 P.
LBL-10098

DETAILS AND PROGRESS OF APPROPRIATE ENERGY TECHNOLOGY PROGRAMS IN REGION IX ARE PRESENTED. IN ARIZONA, THE PROJECTS ARE SOLAR HOT WATER FOR THE PRESCOTT ADULT CENTER AND SOLAR PROTOTYPE HOUSE FOR A RESIDENTIAL COMMUNITY. IN CALIFORNIA, THE PROJECTS ARE SOLAR AQUADOME DEMONSTRATION PROJECT; SOLAR POWERED LIQUID CIRCULATING PUMP; APPROPRIATE ENERGY TECHNOLOGY RESOURCE CENTER; DIGESTER FOR WASTEWATER GROWN AQUATIC PLANTS; PERFORMANCE CHARACTERISTICS OF AN ANAEROBIC WASTEWATER LAGOON PRIMARY TREATMENT SYSTEM; APPROPRIATE ENERGY/ENERGY CONSERVATION DEMONSTRATION PROJECT; SOLAR ENERGY FOR COMPOSTING TOILETS; DRY CREEK RANCHERIA SOLAR DEMONSTRATION PROJECTS; DEMONSTRATION FOR ENERGY RETROFIT ANALYSIS AND IMPLEMENTATION; AND ACTIVE SOLAR SPACE HEATING SYSTEM FOR THE INTEGRAL URBAN HOUSE. IN HAWAII, THE PROJECTS ARE: JAVA PLUM ELECTRIC; LOW-COST POND DIGESTERS FOR HAWAIIAN PIG FARM ENERGY NEEDS; SOLAR BEESWAX MELTER; METHANE GAS PLANT FOR OPERATING BOILERS AND GENERATING STEAM; AND SOLAR WATER HEATING IN SUGARCANE SEED-TREATMENT PLANTS. A WIND-POWERED LIGHTED NAVIGATION BUOYS PROJECT FOR GUAM IS ALSO DESCRIBED. A REVISED DESCRIPTION OF THE BIOGAS ENERGY FOR HAWAIIAN SMALL FARMS AND HOMESTEADS IS GIVEN IN AN APPENDIX.

1980-0072 CHERRY N J
WIND ENERGY RESOURCE SURVEY METHODOLOGY.
J. IND. AERODYN. 5(3-4): 247-280, MAY 1980.

THE WIND ENERGY RESOURCE SURVEY IS AN ESSENTIAL ELEMENT IN A PROGRAMME INVOLVING THE EXTENSIVE USE OF WIND ENERGY. PREVIOUS SURVEY PROGRAMMES SERVE AS A GUIDE FOR THE PROCEDURE, STARTING WITH A REVIEW OF THE AVAILABLE INFORMATION, SURVEY METHODS AND EXISTING WIND DATA. AN OBSERVATIONAL PROGRAMME IS USUALLY NECESSARY IF THE

RESOURCE BECOMES A SERIOUS OPTION FOR DEVELOPMENT. A REGIONAL SURVEY TO OBTAIN DATA FROM LIKELY SITES CAN BE FOLLOWED BY DETAILED STUDIES AT THE MOST PROMISING LOCATIONS. INITIALLY THE SURVEY CAN BE USED TO CHOOSE THE BEST SITES FOR SUPPLYING THE CHEAPEST ENERGY. A CAREFULLY SET-OUT SYSTEM MIGHT ALSO PROVIDE CAPACITY SUBSTITUTION, WHICH IS AN IMPORTANT FACTOR IN THE ECONOMICS.

1980-0073 DOE RESEARCH ON WIND ENERGY (A BIBLIOGRAPHY).
NTIS, MARCH 1980. 59 P.
DOE/TIC/SDI-2002

THIS BIBLIOGRAPHY WITH ABSTRACTS WAS COMPILED BY THE TECHNICAL INFORMATION CENTER OF THE DEPARTMENT OF ENERGY, FROM THE ENERGY DATA BASE. THE BIBLIOGRAPHY CONTAINS 126 ABSTRACTS.

1980-0074 DEMEO E A
KEY ISSUES ASSOCIATED WITH THE ECONOMICS AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 203-209.
CONF-791097

KEY ISSUES RELATED TO ELECTRIC UTILITY ACCEPTANCE OF WIND GENERATION AND THE ULTIMATE INTEGRATION OF WIND INTO UTILITY SYSTEMS ARE PRESENTED. THESE ISSUES ARE IN SEVERAL AREAS. FIRST OF ALL ARE ISSUES RELATING TO PRIMARY IMPACTS OF WIND GENERATION ON UTILITY SYSTEMS. WE ARE TALKING HERE ABOUT LARGE SCALE UTILITY TYPE APPLICATION OF WIND. THE VALUE OF WIND SYSTEMS IS CERTAINLY OF KEY IMPORTANCE--ENERGY VALUE, CAPACITY VALUE, VALUE AS A FUEL SAVER.

1980-0075 DEMEO E A
OVERVIEW OF U.S. ELECTRIC UTILITY INDUSTRY ACTIVITIES IN WIND ENERGY CONVERSION.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 161-173.
CONF-791097

BARRING A MAJOR UNFORESEEN HARDWARE CATASTROPHE, IT IS BECOMING GENERALLY RECOGNIZED THAT WIND GENERATION WILL BE THE FIRST OF THE NEW SOLAR ELECTRIC TECHNOLOGIES TO EMERGE FOR CONSIDERATION AS A POWER GENERATION ALTERNATIVE. CONSEQUENTLY, A NUMBER OF UTILITIES ARE ATTENTIVELY FOLLOWING HARDWARE DEVELOPMENTS IN HOPES OF ESTABLISHING A LEVEL OF CONFIDENCE IN BOTH WIND TURBINE GENERATOR (WTG) PERFORMANCE AND WIND ENERGY RESOURCE AVAILABILITY SUFFICIENT TO ALLOW RESPONSIBLE CONSIDERATION OF WIND GENERATION IN FUTURE SYSTEM EXPANSION PLANS.

1980-0076 DEMEO E A
WORKSHOP SUMMARY. ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 553-561.
CONF-791097

1980-0077 DODGE D
WORKSHOP SUMMARY. SMALL WIND TURBINE SYSTEMS: A WORKSHOP ON R&D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 547-552.
CONF-791097

1980-0078 DULIKRAVICH D S
NUMERICAL CALCULATION OF STEADY INVISCID FULL POTENTIAL COMPRESSIBLE FLOW ABOUT WIND TURBINE BLADES.
NTIS, 1980. 11 P.
N80-18497/1

AN EXACT NONLINEAR MATHEMATICAL MODEL THAT ACCOUNTS FOR THREE-DIMENSIONAL CASCADE EFFECTS ABOUT THE INNER PORTIONS OF THE ROTOR BLADES AND COMPRESSIBILITY EFFECTS ABOUT THE TIP REGIONS OF THE BLADES WAS DERIVED. AN ARTIFICIALLY TIME DEPENDENT VERSION WAS INTERACTIVELY SOLVED BY A FINITE VOLUME TECHNIQUE INVOLVING AN ARITFICIAL VISCOSITY AND A THREE-LEVEL CONSECUTIVE MESH REFINEMENT. THE EXACT BOUNDARY CONDITIONS WERE APPLIED BY GENERATING A BOUNDARY CONFORMING PERIODIC COMPUTATION MESH.

1980-0079 DYER G
LONG LIVE OLD WINCOS (RESTORING WIND TURBINES).
ALTERN. SOURCES ENERGY NO. 42: 29-31, MARCH-APRIL 1980.

1980-0080 EDWARDS P J, DAWBER K R
AN INVESTIGATION OF WIND-ENERGY PROSPECTS IN THE OTAGO REGION OF NEW ZEALAND.
J. IND. AERODYN. 5(3-4): 281-296, MAY 1980.

THE INVESTIGATION REPORTED HERE COVERS THE OTAGO REGION OF THE SOUTH ISLAND OF NEW ZEALAND EAST OF 169 DEGREES EAST LONGITUDE, AN AREA OF 2.5*10/SUP 6/ HECTARES CENTERED NEAR 45 DEGREES LATITUDE. THREE YEARS OF DATA FROM AN ANEMOMETER NETWORK INSTALLED AS PART OF A NATIONAL WIND-ENERGY RESOURCE SURVEY HAVE BEEN ANALYZED TO PROVIDE (A) AN INVENTORY OF THE WIND ENERGY AVAILABLE ANNUALLY IN THE REGION; (B) A DESCRIPTION OF THE CHARACTERISTICS OF PROSPECTIVE AEROGENERATION SITES.

1980-0081 ELFORD W G, CRAIG R L
UPPER ATMOSPHERE WIND OBSERVATIONS AT ADELAIDE 35 DEGREES, AUGUST 1974.
J. ATMOS. TERR. PHYS. 42(1): 61-67, JANUARY 1980.

THIS PAPER PRESENTS A BRIEF DESCRIPTON OF THE ADELAIDE RADIO METEOR WIND SYSTEM, AND A DISCUSSION OF WINDS OBSERVED DURING THE FIRST INTERVAL OF THE CO-OPERATIVE TIDAL OBSERVATIONS PROGRAM, 10-16 AUGUST 1974. HOURLY VALUES OF THE ZONAL AND MERIDIONAL WINDS WERE OBTAINED AT HEIGHT INTERVALS OF 2 KM BETWEEN 90 AND 100 KM THROUGHOUT THE PERIOD OF OBSERVATION. THE MAIN FEATURES OF THE WINDS ARE PREVAILING COMPONENTS, 24- AND 12-H TIDAL COMPONENTS, QUASI TWO-DAY OSCILLATIONS AND SIGNIFICANT WIND ENERGY AT LONG PERIODS.

1980-0082 EULER K-J
ALTERNATIVE ENERGY SOURCES--NO REAL ALTERNATIVE.
ELEKTRO-ANZ. 33(3): 18-20, FEBRUARY 23, 1980. (IN GERMAN)

THIS REPORT DISCUSSES THE SIX PAPERS WHICH WERE THE SUBJECT OF A COLLOQUIUM HELD IN SEPTEMBER 1979 AT THE TECHNOLOGY HQ IN ESSEN. REVIEWING THE PAST AND PRESENT ENDEAVOURS IN VARIOUS AREAS OF THE WORLD SHOWS THAT THE ALTERNATIVES USUALLY PROPOSED SUCH AS SOLAR AND GEOTHERMAL ENERGIES, TIDES, WINDS, WAVES AND NATURAL DEPRESSIONS BELOW SEA LEVEL, ARE NOT LIKELY TO BECOME EFFECTIVE COMPETITORS TO CONVENTIONAL FUELS BECAUSE OF THEIR COST. CONTROLLED NUCLEAR FUSION IS SEEN AS A MORE LIKELY ALTERNATIVE. THE PAPER OUTLINES THE LINES OF RESEARCH BEING PURSUED IN VARIOUS COUNTRIES INCLUDING THE MORE RECENT EXPERIMENTS WITH LASER BEAMS. ENERGY

BALANCES FOR EACH ALTERNATIVE ARE GIVEN. SOLAR CELLS AND ENERGY FROM PLANTS WERE NOT INCLUDED IN THE DISCUSSIONS.

1980-0083 FEGAN G R, PERCIVAL C D
PROBLEMS IN THE INTEGRATION OF INTERMITTENT SOURCES INTO UTILITY PRODUCTION COSTING MODELS.
NTIS, JANUARY 1980. 5 P.
SERI/TP-351-546

THE INTERMITTENT GENERATION SOURCE, A SOURCE OVER WHICH THE UTILITY DISPATCHER HAS MINIMAL CONTROL WITH REGARD TO POWER AVAILABILITY, PRESENTS SERIOUS PROBLEMS TO THE UTILITY PLANNER IN TERMS OF RELIABILITY, DETERMINATION OF WORTH, AND INCLUSION IN EXPANSION PLANS. THE PROBLEMS INVOLVED WITH THE INTEGRATION OF PHOTOVOLTAIC CELLS, WIND MACHINES, AND OTHER RENEWABLE SOURCES WITH LIMITED STORAGE INTO UTILITY PRODUCTION COST MODELS ARE UNFORTUNATELY A FUNCTION OF THE DIFFERENT RESOURCES. THE PROBLEMS ARE DIFFERENTIATED INTO THOSE DEALING WITH RENEWABLE RESOURCES WHICH ARE CORRELATED TO THE DEMAND AND THOSE DEALING WITH RENEWABLE RESOURCES WHICH APPEAR TO ACT INDEPENDENTLY OF DEMAND.

1980-0084 FEGAN G R, PERCIVAL C D
INTEGRATION OF INTERMITTENT SOURCES INTO BALERIAUX-BOOTH PRODUCTION COST MODELS.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, NEW YORK, FEBRUARY 3-8, 1980. NEW YORK, IEEE, NO. CH1523-4/80, 1980. 6 P.

AN INTERMITTENT GENERATION SOURCE IS ONE OVER WHICH A UTILITY DISPATCHER HAS MINIMAL CONTROL WITH REGARD TO THE AMOUNT OF POWER AVAILABLE AT ANY INSTANT. THE POWER MAY FLUCTUATE FREELY OVER THE RANGE FROM ZERO TO SOME MAXIMUM. EXAMPLES OF SUCH SOURCES ARE WIND MACHINES, PHOTOVOLTAIC CELLS AND, IN SOME CASES, RUN-OF-RIVER HYDRO. FOR A UTILITY PLANNER THIS FORM OF RESOURCE PRESENTS PROBLEMS IN THE DETERMINATION OF RELIABILITY AND WORTH. A METHOD OF INTEGRATING THESE RESOURCES INTO A UTILITY PRODUCTION COST MODEL IS PRESENTED: THE METHOD SHOULD IMPROVE APPROXIMATIONS IN PRODUCTION COSTING AND IN THE LOSS-OF-LOAD CALCULATION.

1980-0085 FINNEGAN P M
WORKSHOP SUMMARY. LARGE WIND TURBINE DESIGN CHARACTERISTICS AND RESEARCH AND DEVELOPMENT REQUIREMENTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 561-568.
CONF-791097

A WORKSHOP ON LARGE WIND TURBINE DESIGN CHARACTERISTICS AND RESEARCH AND DEVELOPMENT REQUIREMENTS WAS HELD IN CLEVELAND IN 1979. THE WORKSHOP SCOPE INCLUDED BOTH HORIZONTAL AND VERTICAL AXIS WIND TURBINES. THE WORKSHOP CONSISTED PRIMARILY OF DETAILED TECHNICAL PRESENTATIONS ON LARGE WIND TURBINE R&D ACTIVITIES SPONSORED BY DOE. INFORMATION ON LARGE WIND TURBINES BEING DEVELOPED BY SEVERAL PRIVATE ORGANIZATIONS WAS ALSO PRESENTED AND DENMARK, SWEDEN AND GERMANY REVIEWED THEIR LARGE WIND TURBINE PROJECTS. PANEL DISCUSSSIONS AFTER EACH MAJOR SESSION PROVIDED AN OPPORTUNITY TO DISCUSS ISSUES AND PROBLEMS.

1980-0086 FINNEGAN P M
SUMMARY OF APRIL 1979 WORKSHOP ON LARGE WIND TURBINE DESIGN CHARACTERISTICS AND RESEARCH AND DEVELOPMENT REQUIREMENTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 119-136.
CONF-791097

THE DOE OBJECTIVES FOR THE SERIES OF WORKSHOPS WERE (1) PRESENT THE PROGRESS AND SIGNIFICANT RESULTS OF ONGOING PROJECTS SPONSORED BY DOE, (2) PROVIDE A FORUM TO FACILITATE THE EXCHANGE OF NEW IDEAS AND INFORMATION, AND (3) PROVIDE AN OPPORTUNITY FOR IN-DEPTH DISCUSSION OF SPECIFIC ISSUES CONFRONTING WIND TURBINE DEVELOPERS AS THE TECHNOLOGY MOVES CLOSER TO THE GOAL OF COMMERCIALIZATION.

1980-0087 FORDHAM J W, PECK M K, MCMULLEN R, CUNNINGHAM A B
HYBRID ENERGY SYSTEM: WIND AND WATER.
NTIS, FEBRUARY 1980. 78 P.
PUB-41062, PB80-171218

THE POTENTIAL FOR USING WIND TOGETHER WITH HYDRO GENERATION TO MEET SMALL AREA ENERGY DEMANDS WAS EXAMINED AND A PROTOTYPE WIND-HYDRO SYSTEM WAS MODELED FOR A NEVADA SITE TO DETERMINE OPTIMUM COMPONENT SIZES AND OPERATION. THE WIND-HYDRO SYSTEM IS DESIGNED AS AN ALTERNATIVE TO CONVENTIONAL POWER GENERATION METHODS EXPECIALLY IN REMOTE AREAS WHERE THE CONSTRUCTION OF TRANSMISSION LINES IS NOT ECONOMICALLY PRACTICAL. THE SYSTEM INCLUDES A RESERVOIR TO CATCH AS MUCH RUNOFF AS POSSIBLE, A HYDROELECTRIC GENERATION PLANT, A WIND TURBINE, AND A GENERATOR. TO OFFSET THE VARIABILITY OF ENERGY SUPPLY FROM THE WIND, ENERGY CONVERSION SYSTEMS(WECS) DRIVE RECHARGE PUMPS TO THE UPSTREAM RESERVOIR WHERE WATER IS STORED TO BE RELEASED TO DRIVE THE HYDROELECTRIC GENERATORS WHEN NEEDED FOR A STEADY ENERGY SUPPLY. COSTS AND BENEFITS ARE EXAMINED IN A GENERALIZED MANNER FOR SIX PRELIMINARY DESIGNS; THEN IN DETAIL FOR A WIND-HYDRO SYSTEM LOCATED ON SLIDE MOUNTAIN IN NEVADA.

1980-0088 FRAGA E, CRESPO A
SPANISH WIND ENERGY PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 471-482.
CONF-791097

THIS IS A FIVE YEAR PROGRAM THAT INCLUDES AS ITS MAIN PART THE FABRICATION, INSTALLATION AND OPERATION OF A 100 KW POWER PLANT; THIS PART WOULD SERVE AS A BASIS FOR THE STUDY AND DESIGN OF LARGER TURBINES, AND FOR A GENERAL STUDY OF WIND ENERGY UTILIZATION IN SPAIN.

1980-0089 GOETHALS R
WIND ENERGY.
RECHERCHE 11(109): 262-271, MARCH 1980. (IN FRENCH)

WIND ENERGY SEEMS TODAY TO BE ONE OF THE MOST PROMISING SOURCES FOR THE PRODUCTION OF ELECTRICITY. THE ORIGIN AND NATURE OF WIND ENERGY ARE EXPLAINED AND THE WORK WHICH HAS BEEN DONE IN HARNESSING IT, TOGETHER WITH THE PRINCIPLES AND DISADVANTAGES OF ITS USE, IS OUTLINED. THE DIFFERENT TYPES OF WINDMILLS WHICH HAVE BEEN DEVELOPED IN FRANCE BETWEEN 1930 AND 1970 ARE DESCRIBED. THE AMERICAN PROGRAMME SINCE 1970 IS DEALT WITH. THIS HAS USED AEROSPACE TECHNIQUES IN THE CONSTRUCTION OF LARGE WINDMILLS CAPABLE OF PRODUCING SEVERAL MEGAWATTS OF ELECTRICAL POWER. THE APPLICATION OF SUCH A PROGRAMME TO THE PRODUCTION OF ELECTRICITY IN FRANCE IS DISCUSSED.

1980-0090 GOODMAN F R
WORKING GROUP REPORT ON LARGE SCALE SYSTEMS: ECONOMICS & OPERATIONS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 507-512.
CONF-791097

1980-0091 GRASTRUP H
DESIGN AND CONSTRUCTION OF TWO 630 KW WIND TURBINES.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 419-436.
CONF-791097

THIS PAPER DESCRIBES THE MAIN EFFORTS OF A DEVELOPMENT PROGRAMME FOR LARGE, ELECTRICITY PRODUCING WIND TURBINES, UNDERTAKEN BY THE DANISH ELECTRICAL UTILITIES IN COOPERATION WITH THE GOVERNMENT.

1980-0092 GREENE G C, HUBBARD H H
SOME CALCULATED EFFECTS OF NON-UNIFORM INFLOW ON THE RADIATED NOISE OF A LARGE WIND TURBINE.
NTIS, MAY 1980. 14 P.
NASA-TM-81813, N80-25104/4

FAR FIELD COMPUTATIONS WERE PERFORMED FOR A LARGE WIND TURBINE TO EVALUATE THE EFFECTS OF NON-UNIFORM AERODYNAMIC LOADING OVER THE ROTOR DISK. A MODIFIED VERSION OF THE FARASSAT/NYSTROM PROPELLER NOISE PREDICTION PROGRAM WAS APPLIED TO ACCOUNT FOR THE VARIATIONS IN LOADING DUE TO INFLOW INTERRUPTION BY THE UPSTREAM SUPPORT TOWER. THE COMPUTATIONS INDICATE THAT FOR THE UNIFORM INFLOW CASE, RELATIVELY LOW NOISE LEVELS ARE GENERATED AND THE FIRST ROTATIONAL HARMONIC DOMINATED THE SPECTRUM. FOR CASES REPRESENTING WAKE FLOW DEFICIENCIES DUE TO THE TOWER STRUCTURE, SUBSTANTIALLY INCREASED NOISE LEVELS FOR ALL HARMONICS ARE INDICATED, THE GREATEST INCREASES BEING ASSOCIATED WITH THE HIGHER ORDER HARMONICS.

1980-0093 HUGOSSON S
SWEDISH LARGE-SCALE PROTOTYPES--DESIGN AND SITING.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 461-470.
CONF-791097

THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT (NE) WANTS TO STUDY DIFFERENT LARGE-SCALE DESIGN CONCEPTS TO ACHIEVE--IF POSSIBLE--AN EVALUATION OF THE PROTOTYPES THAT COVERS A WIDE TECHNOLOGICAL SPAN OF POSSIBLE (REASONABLE) DESIGN CONCEPTS. WE ARE CONFIDENT THAT WE HAVE FOUND VERY WINDY SITES, AND THE GEOTECHNICAL CONDITIONS HAVE PROVED TO BE VERY GOOD, EVEN THOUGH WE ARE NOT FOUNDING THE UNITS ON GRANITE BEDROCK.

1980-0094 HUNDEMANN A S
WIND POWER. 1978-MAY, 1980. (CITATIONS FROM THE ENGINEERING INDEX DATA BASE.)
NTIS, JUNE 1980. 305 P.
PB80-811441

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR. WINDMILL AND WIND POWER FEASIBILITY, USE, AND ENGINEERING ARE DISCUSSED IN THESE CITATIONS OF WORLDWIDE RESEARCH. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH THE USE OF WIND POWER IN DEVELOPING COUNTRIES AND COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE STUDIES ON ENERGY STORAGE SYSTEMS.

1980-0095 HUNDEMANN A S
WIND POWER. 1977-1978. (CITATIONS FROM THE NTIS DATA BASE.)
NTIS, JUNE 1980. 263 P.
PB80-811433

THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

1980-0096 HUNDEMANN A S
WIND POWER. 1979-MAY, 1980. (CITATIONS FROM THE NTIS DATA BASE.)
NTIS, JUNE 1980. 145 P.
PB80-811458

THE FEASIBILITY, USE, AND ENGINEERING ASPECTS OF WIND POWER AND WINDMILLS ARE DISCUSSED IN THESE CITATIONS OF FEDERALLY-FUNDED RESEARCH REPORTS. ABSTRACTS PRIMARILY COVER THE USE OF WIND POWER FOR ELECTRIC POWER GENERATION AND WIND TURBINE DESIGN AND PERFORMANCE. GENERAL STUDIES DEALING WITH COMPARATIVE ANALYSES OF WIND POWER AND ALTERNATIVE ENERGY SOURCES ARE INCLUDED, AS ARE ENERGY STORAGE DEVICES WHICH CAN BE USED IN THESE SYSTEMS.

1980-0097 IMAIZUMI S
A BRIEF SURVEY OF THE PAST AND FUTURE PROGRAM OF WECS R&D IN JAPAN.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 451-456.
CONF-791097

SINCE THE PRODUCTION FROM DOMESTIC ENERGY SOURCES HAS BEEN VERY LIMITED, THE PERCENTILE FRACTION OF IMPORTED ENERGY REACHED ABOUT 89% IN 1974. THE DEMAND GROWTH OF THE CONVENTIONAL ENERGY HAS ALSO BROUGHT ENVIRONMENTAL PROBLEMS. THEREFORE, IT IS VITALLY IMPORTANT FOR JAPAN TO INSURE THE DEVELOPMENT OF DEPENDABLE ENERGY RESOURCES AND USE THEM IN AN ENVIRONMENTALLY ACCEPTABLE MANNER. IN THIS CONTEXT, THE R & D FOR NEW ENERGY SOURCES SUCH AS SOLAR ENERGY, GEOTHERMAL ENERGY IS CONSIDERED TO BE ESSENTIAL TO MEET THE INCREASING DEMANDS.

1980-0098 ANDERSEN T S, BODENSCHATZ C A, EGGERS A G, HUGHES P S, LAMPE R F
MOD-0A 200 KW WIND TURBINE GENERATOR ENGINEERING.
NTIS, AUGUST 1980. 246 P.
N81-23598, NASA-CR-165129, DOE/NASA/0163-3

ENGINEERING DRAWINGS AND THE DETAILED MECHANICAL AND ELECTRICAL DESIGN OF A HORIZONTAL-AXIS WIND TURBINE DESIGNED FOR DOE AT THE NASA LEWIS RESEARCH CENTER AND INSTALLED IN CLAYTON, NEW MEXICO ARE DISCUSSED. THE DRAWINGS SHOW THE HUB, PITCH CHANGE MECHANISM, DRIVE TRAIN, NACELLE EQUIPMENT, YAW DRIVE SYSTEM, TOWER, FOUNDATION, ELECTRICAL POWER SYSTEMS, AND THE CONTROL AND SAFETY SYSTEMS.

1980-0099 JOHANSON E E
SYNTHESIS OF WECS/UTILITY INTEGRATION STUDIES: CENTRALIZED AND DISPERSED.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 173-196.

CONF-791097

THIS PAPER PRESENTS THE RESULTS OF A SYNTHESIS OF WIND ENERGY SYSTEMS' VALUE TO UTILITIES, BASED UPON SEVERAL STUDIES THAT HAVE BEEN CONDUCTED IN THE PAST THREE YEARS. THE STUDIES, FUNDED BY DOE AND EPRI, WERE CONDUCTED BY SEVERAL DIFFERENT COMPANIES, EACH USING DIFFERENT ANALYTICAL MODELS. THE VALUES ASSUMED FOR MODEL INPUTS ALSO VARIED FROM STUDY TO STUDY, AS DID THE YEAR IN WHICH THE ANALYSES WERE DONE AND THE WIND SYSTEM CHARACTERISTICS.

1980-0100 KLEIN W E
MODIFIED AEROSPACE SR&QA METHOD FOR WIND TURBINES.
ANNUAL RELIABILITY MAINTAINABILITY SYMPOSIUM, SAN FRANCISCO, CALIFORNIA, JANUARY 22-24, 1980. PROCEEDINGS. NEW YORK, IEEE, NO. 80CH1513-IR, 1980. P. 254-258. ALSO: NTIS, 1980. 6 P.
DOE/NASA/20370-79/18, NASA-TM-79284

THIS PAPER DESCRIBES THE SAFETY, RELIABILTIY AND QUALITY ASSURANCE (SR&QA) APPROACH DEVELOPED FOR THE FIRST LARGE WIND TURBINE GENERATOR PROJECT, MOD-OA.

1980-0101 AUER F
FULL ELECTRICAL SUPPLY OF SMALL LOADS AT REMOTE SITES WITH WIND AND SOLAR ENERGY.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 481-490.

THE COMBINED USE OF WIND AND SOLAR ENERGY TO SUPPLY SMALL ELECTRICAL LOADS AT REMOTE SITES WILL BECOME OF INCREASING IMPORTANCE IN THE NEAR FUTURE. THE MINIMIZATION OF COSTS OF SUCH A PLANT IS OF WHICH CAN CALCULATE FOR EVERY SITE AND FOR ARBITRARILY GIVEN LOADS A COST MINIMUM FOR THE WIND ENERGY CONVERTER AND THE SOLAR CELLS IN CONNECTION WITH BATTERIES. A PLANT THUS OPTIMIZED CAN PROVIDE A FULL ELECTRICAL SUPPLY, FOR EXAMPLE TO TELEVISION TRANSMITTERS OR WEEKEND HOUSES. THREE EXAMPLES ARE GIVEN.

1980-0102 DRAKE W, CLEWS H, CORDES J, JOHNSON B, MURPHY P
DEVELOPMENT OF A 2 KILOWATT HIGH RELIABILITY WIND MACHINE. PHASE I. DESIGN AND ANALYSIS. VOLUME I. EXECUTIVE SUMMARY.
NTIS, JANUARY 1980. 24 P.
RFP-3025/64410/3533/79/16-1

A HIGH RELIABILITY WIND MACHINE RATED FOR 2 KW AT 9 M/S HAS BEEN DESIGNED TO BE COST-EFFECTIVE FOR REMOTE SITE USE. TO MEET OR EXCEED ENVIRONMENTAL CONDITIONS AS SPECIFIED IN THE CONTRACT, THE RESULTING DESIGN DEFINES A RUGGED, RELATIVELY SIMPLE WIND MACHINE. RIGOROUS FATIGUE ANALYSIS FOR STRUCTURAL COMPONENTS AND DEVELOPMENT OF REDUNDANT SYSTEMS FOR ELECTRICAL COMPONENTS LED TO AN EXPECTED MEAN TIME BETWEEN FAILURES OF 12.35 YEARS. THE DESIGN IS FOR A HORIZONTAL AXIS, DOWN-WIND MACHINE WITH TWO WOODEN BLADES SPANNING 5 METERS DIAMETER. POSITIVE ROTOR CONTROL IS ACCOMPLISHED THROUGH A CENTRIFUGALLY GOVERNED VARIABLE PITCH, STALLING ROTOR.

1980-0103 DRAKE W, CLEWS H, CORDES J, JOHNSON B, MURPHY P
DEVELOPMENT OF A 2 KILOWATT HIGH RELIABILITY WIND MACHINE. PHASE I. DESIGN AND ANALYSIS. VOLUME II. TECHNICAL REPORT.
NTIS, JANUARY 1980. 89 P.
RFP-3025/64410/3533/79/16-2

SEE ABSTRACT FOR VOLUME I.

1980-0104 HIESTER T R
PRELIMINARY EVALUATION OF WIND ENERGY POTENTIAL: COOK INLET AREA, ALASKA.
NTIS, JUNE 1980. 103 P.
PNL-3408

THIS REPORT SUMMARIZES WORK ON A PROJECT PERFORMED UNDER CONTRACT TO THE ALASKA POWER ADMINISTRATION (APA). THE OBJECTIVE OF THIS RESEARCH WAS TO MAKE A PRELIMINARY ASSESSMENT OF THE WIND ENERGY POTENTIAL FOR INTERCONNECTION WITH THE COOK INLET AREA ELECTRIC POWER TRANSMISSION AND DISTRIBUTION SYSTEMS, TO IDENTIFY THE MOST LIKELY CANDIDATE REGIONS (25 TO 100 SQUARE MILES EACH) FOR ENERGY POTENTIAL, AND TO RECOMMEND A MONITORING PROGRAM SUFFICIENT TO QUANTIFY THE POTENTIAL.

1980-0105 MUKHOPADHYAY V
A LOW COST TILTING BLADE VERTICAL AXIS WINDMILL FOR RURAL IRRIGATION.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1891-1900.

A LOW COST VERTICAL AXIS TILTING BLADE TYPE WINDMILL SUITABLE FOR RURAL IRRIGATION IS DEVELOPED ALONG WITH A WORKING MODEL TO DEMONSTRATE THE FEASIBILITY OF THE WORKING CONCEPT. THE POWER COEFFICIENT VARIATION WITH TIP SPEED RATIO IS CALCULATED BASED ON A SIMPLE ANALYTICAL MODEL AND COMPARED WITH OTHER TYPES OF WINDMILLS. THIS TYPE OF WINDMILL IS THOUGHT TO BE SUITABLE AND COST EFFECTIVE FOR USE IN SMALL IRRIGATION, LIFTING WATER FROM WELL, AND TUBEWELLS ETC., IN RURAL AREAS BECAUSE OF ITS INHERENT SIMPLICITY AND ABILITY TO RESPOND TO GUSTY WINDS WITHOUT A STEERING MECHANISM.

1980-0106 TONKS P E
WIND ELECTRIC SYSTEMS FOR REMOTE POWER REQUIREMENTS.
TELECOMMUNICATIONS 14(7): 22, 24, 72, JULY 1980.

THIS PAPER DESCRIBES THE HR2, A HIGH RELIABILITY 2-KW WIND ELECTRIC SYSTEM FOR BATTERY CHARGING APPLICATIONS. THIS SYSTEM WAS DESIGNED AND ENGINEERED TO SUPPLY POWER AT REMOTE SITES UNDER HARSH ENVIRONMENTAL CONDITIONS.

1980-0107 ADLER F M, ANGELOFF L G, HENTON P, KING P W
DEVELOPMENT OF AN 8 KILOWATT WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE I. DESIGN AND ANALYSIS. VOLUME 1 - EXECUTIVE SUMMARY.
NTIS, MARCH 1980. 15 P.
RFP-3007(VOL.1)

1980-0108 ADLER F M, ANGELOFF L G, HENTON P, KING P W
DEVELOPMENT OF AN 8 KILOWATT WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE I. DESIGN AND ANALYSIS. VOLUME II - TECHNICAL REPORT.
NTIS, MARCH 1980. 92 P.
RFP-3007(VOL.2)

1980-0109 AERODYNAMIC CHARACTERISTICS OF THE TOROIDAL ACCELERATOR PLATFORM (TARP) WIND ENERGY CONVERSION SYSTEM.
ALBANY, NEW YORK, NYSERDA, FEBRUARY 1980. 69 P.
NYSERDA-80-7

THIS REPORT DESCRIBES AN ANALYTICAL AND EXPERIMENTAL RESEARCH PROGRAM THAT HAS BEEN CONDUCTED AT RENSSELAER POLYTECHNIC INSTITUTE FOR THE PURPOSE OF EVALUATING THE AERODYNAMIC CHARACTERISTICS OF THE TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) WIND ENERGY CONVERSION SYSTEM. THE TARP IS AN OBSTRUCTION TYPE FLOW CONCENTRATOR AND ACCELERATOR WHICH CONVERTS AMBIENT WINDS INTO LOW PRESSURE, HIGH KINETIC ENERGY ZONES IN THE IMMEDIATE PROXIMITY OF A WIND ENERGY CONVERSION UNIT. A TARP MAY BE DESCRIBED AS BEING SUBSTANTIALLY THE SHAPE OF AN INNER SECTION OF A HOLLOW TOROID. A TWIN ROTOR SYSTEM OF ANY KIND MAY BE MOUNTED WITHIN THE PERIPHERAL FLOW CHANNEL ABOUT A TARP STRUCTURE SUCH THAT EACH ROTOR IS SITUATED IN THE OPTIMUM ACCELERATED FLOW VELOCITY REGION FOR BEST ENERGY RECOVERY.

1980-0110 AHMADI G
PERFORMANCE OF A LOW COST CROSS-WIND-AXIS SAIL-WIND TURBINE.
ENERGY 5(10): 1045-1052, OCTOBER 1980.

THE PERFORMANCE OF A MODEL OF A CROSS-WIND AXIS SAIL ROTOR IS INVESTIGATED. SEVERAL DIFFERENT TYPES OF SAIL BLADES ARE EMPLOYED AND THE EFFECTS OF WIND VELOCITY, BLADE PITCH ANGLES, AND EXTERNAL LOAD ON THE EFFICIENCY OF THE ROTOR ARE STUDIED.

1980-0111 ALBARRAN J F, CHAVEZ C, LEZAMA J A
PORTABLE, SELF-CONTAINED WIND-GENERATOR STATISTICAL ANALYZER.
INTERNATIONAL IECI CONFERENCE, PHILADELPHIA, MARCH 17, 1980. PROCEEDINGS. N.Y. IEEE, CAT. NO. 80CHI551-1, 1980. P. 264-269.

BASED ON A SINGLE CHIP MICROPROCESSOR--(MCS 8748), A PORTABLE WIND GENERATOR-ANALYZER WAS BUILT. IT CONTAINS THREE INPUTS: WIND-SPEED, GENERATOR SPEED AND GENERATOR OUTPUT. THE INPUTS ARE CORRELATED WITH THE WIND-SPEED EVENT INTO STATISTICAL BINS. AT THE END OF A TEST (TYPICALLY OF THE ORDER OF 10 HOURS), THE ANALYZER WILL DISPLAY THE AVERAGE AND CORRELATED BINS CORRESPONDING TO ITS THREE INPUTS.

1980-0112 ALBRIGHT S, LECHNER M, SENTER R, SPANOS E
PUBLIC SERVICE COMPANY OF NEW MEXICO: VEST AN INTEREST IN ALTERNATE ENERGY.
SOUTHWEST BULL. N.M. SOL. ENERGY ASSOC. 5(2): 9-12, FEBRUARY 1980.

A MODIFIED RATE CHARGE DESIGN FOR ELECTRICAL POWER USAGE HAS BEEN PROPOSED BY THE PUBLIC SERVICE COMPANY OF NEW MEXICO (PNM) TO ACCOMMODATE THE USE OF ELECTRICITY FOR BACKUP HEATING BY SOLAR ENERGY USERS. OTHER PROJECTS OF THE COMPANY, INCLUDING WIND POWER, ARE REVIEWED.

1980-0113 ALEXANDER J H
FIELD EVALUATION PROGRAM FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, 1980. 2 P.
CONF-800406-6, RFP-3086

THE FIELD EVALUATION PROGRAM (FEP) SOLICITS THE COOPERATION OF STATE ENERGY OFFICES (SEO) TO UNDERTAKE THE SELECTION OF USERS AND THE SITING OF APPROXIMATELY 120 SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS), IN COOPERATION WITH ELECTRIC UTILITIES, THROUGHOUT MOST OF THE FIFTY STATES AND SIX TERRITORIES OF THE U.S. SWECS RATED WITHIN THE TWO TO FORTY KW RANGE WILL BE PURCHASED FROM ABOUT TWELVE MANUFACTURERS. THESE SWECS WILL BE INTERCONNECTED TO A UTILITY LINE. DATA WILL BE COLLECTED AT EACH SITE ON THE LOAD PROFILE, ENERGY OUTPUT OF SWECS, THE TECHNICAL AND INSTITUTIONAL PROCEDURES FOR SITING AND INSTALLATION, AVAILABLE WIND ENERGY, AND PERFORMANCE AND FAILURE MODES OF THE SWECS. THE PROGRAM STATUS AS OF MID-FEBRUARY 1980 IS REVIEWED.

1980-0114 ALFREDSSON P H, DAHLBERG J A, BARK F H
SOME PROPERTIES OF THE WAKE BEHIND HORIZONTAL AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J5, P. 469-484.

THE DEVELOPMENT OF THE NEAR WAKE BEHIND A MODEL OF A WIND TURBINE WITH A HORIZONTAL AXIS OF ROTATION HAS BEEN STUDIED IN A WIND TUNNEL. TO ISOLATE THE EFFECT ON THE INCREASED DOWNSTREAM GROWTH OF THE WIDTH OF THE WAKE CAUSED BY AMBIENT TURBULENCE, THE MODEL WAS PLACED IN A CONSTANT VELOCITY FIELD WITH AND WITHOUT GRID GENERATED TURBULENCE. MEASUREMENTS WERE ALSO MADE IN A SIMULATED ATMOSPHERIC BOUNDARY LAYER. BOTH THE AXIAL MEAN VELOCITY FIELD AND THE RMS VALUE OF THE FLUCTUATING AXIAL VELOCITY WERE MEASURED. THE BREAK-DOWN OF THE TIP VORTICES WAS STUDIED VISUALLY BY USING SMOKE INJECTION UPSTREAM OF THE TURBINE. FOR THE CASES WHEN THE MEAN VELOCITY UPSTREAM OF THE ROTOR IS CONSTANT, THE EXPERIMENTAL RESULTS FOR THE MEAN VELOCITY IN THE WAKE ARE COMPARED WITH THEORETICAL PREDICTIONS FROM A SLIGHTLY MODIFIED VERSION OF A COMPUTATIONAL MODEL PROPOSED BY P.B.S. LISSAMAN. IF AMBIENT TURBULENCE IS PRESENT IN THE UPSTREAM FLOW, THE THEORETICAL RESULTS ARE IN GOOD AGREEMENT WITH THE EXPERIMENTAL RESULTS IN THE FAR WAKE. IN THE REMAINING CASES, THE AGREEMENT IS NOT SATISFACTORY.

1980-0115 ANDERSON M B
A VORTEX-WAKE ANALYSIS OF A HORIZONTAL-AXIS WIND TURBINE AND A COMPARISON WITH A MODIFIED BLADE-ELEMENT THEORY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER H1, P. 357-374.

A THEORETICAL METHOD IS DEVELOPED FOR DETERMINING THE GEOMETRY AND STRENGTH DISTRIBUTION OF THE VORTEX-WAKE GENERATED BY A HORIZONTAL-AXIS WIND TURBINE. THE ANGLE OF RELATIVE FLOW AND INDUCED VELOCITIES ARE COMPARED WITH THOSE FROM A MODIFIED BLADE-ELEMENT THEORY. THE BLADE-ELEMENT THEORY INCLUDES TIP LOSSES WHICH ARE EVALUATED FROM EITHER THE GOLDSTEIN OR PRANDTL SOLUTION OF THE POTENTIAL FLOW ABOUT A HELICAL VORTEX SHEET.

1980-0116 ANKRUM T
WIND ENERGY CONVERSION.
ALTERNATE SOURCES OF ENERGY. ALTERNATE SOURCES OF ENERGY CONFERENCE, NEW YORK, SEPTEMBER 29, 1980. NTIS, 1980. P. 81-91.
CONF-8009108

THE ECONOMICS AND MARKET POTENTIAL IN THE U.S. FOR LARGE AND SMALL WIND TURBINES ARE ANALYZED.

1980-0117 ARE E
WIND ENERGY CONVERSION DEVICE.

U.S. PATENT NO. 4,213,057, JULY 15, 1980.

THIS REPORT DESCRIBES A WIND ENERGY CONVERSION DEVICE THAT CONVERTS THE WIND ENERGY TO ELECTRICAL ENERGY COMPRISED OF A MAIN ELONGATED GENERALLY HORIZONTALLY DISPOSED HOUSING, A GENERATOR, INCLUDING INNER AND OUTER ROTORS; AND A FRONT END MULTI-BLADED PROPELLER, JOURNALED THROUGH A FRONT END FORTION, DIRECTLY COUPLED TO THE INNER AND OUTER ROTORS. BLADES OF THE FRONT END PROPELLER ARE PITCHED TO ROTATE THE ROTOR IN A DIRECTION WHEN THE FRONT PROPELLER IS EXPOSED TO AND ROTATED BY WIND PRESSURES. THE REAR END MULTI-BLADED PROPELLER IS JOURNALED THROUGH THE REAR OF THE HOUSING AND IS DIRECTLY COUPLED TO INNER AND OUTER ROTORS IN TURN, WHEN EXPOSED TO AND ROTATED BY THE WIND, WILL TRANSMIT ELECTRICAL ENERGY GENERATED BY THE ROTATION OF THE FIRST AND SECOND ROTORS. THE HOUSING IS SET AT A PREDETERMINED ELEVATION ABOVE GROUND FOR PROPER EXPOSURE TO PREVAILING WIND FORCES.

1980-0118 ARGO W H
SOLAR THERMAL AND WIND ENERGY POWER SOURCE.
U.S. PATENT NO. 4,224,528, SEPTEMBER 23, 1980.

THIS THERMAL AIR AND WIND POWERED ELECTRIC CURRENT GENERATING SYSTEM IS COMPRISED OF A TOWER HAVING A PLURALITY OF UPWARDLY CONVERGING LEGS AND A CENTRALLY OPEN PLATFORM SECURED TO THE UPPER END PORTION OF THE LEGS AND A PLURALITY OF LIGHT ADMITTING WALL FORMING PANELS ENCLOSING THE TOWER FOR FORMING A THERMAL AIR PASSAGEWAY. THE LOWERMOST EDGE OF THE PANELS ARE SPACED ABOVE THE SURFACE OF THE EARTH. A THERMAL AIR AND WIND DRIVEN TURBINE IS MOUNTED ON THE PLATFORM IN COMMUNICATION WITH THE INTERIOR OF THE TOWER, AND THE DRIVE SHAFT PROJECTS DOWNWARDLY THROUGH THE PLATFORM COEXTENSIVE WITH THE TOWER. A SECTION OF HELICALLY WOUND SHEET MATERIAL EXTENDS RADIALLY INWARD FROM THE TOWER WALLS COEXTENSIVE WITH THE TOWER FOR INDUCING A CYCLONIC ACTION ON THERMAL AIR MOVING TOWARD THE TURBINE. THE GENERATOR IS OPERATIVELY CONNECTED WITH THE DRIVE SHAFT.

1980-0119 ATTITUDES OF THE VDEW.
ELEKTRIZITAETSWIRTSCHAFT 79(20): 760-765, SEPTEMBER 29, 1980. (IN GERMAN)

THE VDEW HAS GIVEN INFORMATION ON THE ADVANTAGES AND DISADVANTAGES, AND THE EXPECTED USE OF DECENTRALISED ELECTRICITY-GENERATING INSTALLATIONS. THE AUTHORS GIVE AN ASSESSMENT OF "COAL-FIRED MINIATURE POWER STATIONS--AN ALTERNATIVE TO LARGE POWER-STATION UNITS?" AND "THE USE OF DOMESTIC ELECTRICITY GENERATION INSTALLATIONS (ENERGY BOXES)". FOR THE FIRST INVESTIGATION THERE IS ALSO AVAILABLE A MORE COMPREHENSIVE VERSION. ALSO PREPARED WERE COMMENTARIES ON BLOCK-UNIT POWER STATIONS AND ON THE POSSIBILITIES OF UTILISING WIND ENERGY.

1980-0120 AXELL R A, HELMS P W
THE MOD-2 WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1159-1163.

THIS PAPER PRESENTS A DESCRIPTION OF THE DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM, CURRENT STATUS OF THE PROGRAM, ITS PLANS FOR PERFORMANCE EVALUATION, AND THE OUTLOOK FOR ITS FUTURE COMMERCIAL APPLICATION.

1980-0121 BAIN D
HOOKING UP ALA PURPA.
ALTERN. SOURCES ENERGY NO. 46: 12-13, NOVEMBER/DECEMBER 1980.

1980-0122 BAKER T L
TURBINE-TYPE WINDMILLS OF THE GREAT PLAINS AND MIDWEST.
AGRIC. HIST. 54(1): 38-61, JANUARY 1980.

1980-0123 BALCERAK J C
CONTROLLED VELOCITY TESTING OF SMALL WIND ENERGY CONVERSION SYSTEMS. AN EVALUATION OF A TECHNIQUE.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, NOVEMBER 1980. 50 P.
RFP-3189

TESTS OF A SMALL WIND ENERGY CONVERSION SYSTEM (SWECS) WERE CONDUCTED AT THE DEPARTMENT OF TRANSPORTATION TEST CENTER IN PUEBLO, COLORADO. THE TEST MACHINE WAS MOUNTED ON A RAIL FLATCAR WHICH WAS PUSHED BY A LOCOMOTIVE. THE PRIMARY OBJECTIVE OF THE TEST WAS TO DETERMINE THE USEFULNESS OF SWECS CONTROLLED VELOCITY TESTING (CVT) USING THIS METHOD. WIND VELOCITY PROFILES, ACCELERATION/DECELERATION FORCES, ROTOR YAW, POWER OUTPUT, ROTOR RPM, POWER COEFFICIENT, WAKE MEASUREMENTS, AND FLOW VISUALIZATION WERE EXAMINED IN THESE TESTS. THE RESULTS CONFIRM THE POTENTIAL BENEFIT OF THIS METHOD AS AN ADDITION TO THE NATURAL ATMOSPHERIC TESTING DONE AT ROCKY FLATS WIND SYSTEMS TEST CENTER.

1980-0124 BARCHET W R, WENDELL L L, HIESTER T R, ELLIOTT D L, PENNELL W T
WIND RESOURCE ASSESSMENT AND SITING.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 165-170.

THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE), MANAGED FOR THE U.S. DEPARTMENT OF ENERGY (DOE) BY PACIFIC NORTHWEST LABORATORY, HAS THE SPECIFIC RESPONSIBILITY FOR PROVIDING THE APPROPRIATE INFORMATION ON WIND CHARACTERISTICS. APPLIED RESEARCH AND DEVELOPMENT ACTIVITIES WITHIN THE WCPE ARE DISCUSSED WITH REGARD TO: (1) DEFINING THE WIND ENERGY RESOURCE; AND (2) DEVELOPING EFFECTIVE SITING TECHNOLOGIES.

1980-0125 BARCHET W R
WIND RESOURCE ASSESSMENT IN THE NORTHWEST UNITED STATES.
NATIONAL CONFERENCE ON RENEWABLE ENERGY TECHNOLOGIES, HONOLULU, DECEMBER 7, 1980. NTIS, AUGUST 1980. 3 P.
PNL-SA-8875

THE NORTHWEST UNITED STATES INCLUDES THREE OF THE WIND RESOURCE ASSESSMENT REGIONS DELINEATED BY THE PACIFIC NORTHWEST LABORATORY (PNL): THE NORTHWEST REGION (IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING), THE ALASKA REGION, AND THE HAWAII REGION (HAWAII AND THE TRUST TERRITORIES OF THE PACIFIC). DETAILED WIND ENERGY RESOURCE ASSESSMENT ATLASES HAVE BEEN PREPARED FOR EACH OF THESE REGIONS (ELLIOTT AND BARCHET, 1980, WISE, ET AL., 1980, SCHROEDER AND HORI, 1980); ONLY THE HIGHLIGHTS ARE PRESENTED HERE.

1980-0126 BARDSLEY W E
NOTE ON THE USE OF THE INVERSE GAUSSIAN DISTRIBUTION FOR WIND ENERGY APPLICATIONS.
J. APPL. METEOROL. 19(9): 1126-1130, SEPTEMBER 1980.

THE INVERSE GAUSSIAN DISTRIBUTION IS SUGGESTED AS AN ALTERNATIVE TO THE THREE-PARAMETER WEIBULL DISTRIBUTION

FOR THE DESCRIPTION OF WIND SPEED DATA WITH LOW FREQUENCIES OF LOW SPEEDS. MAXIMUM LIKELIHOOD ESTIMATION OF THE INVERSE GAUSSIAN PARAMETERS IS MUCH SIMPLER THAN THE ITERATIVE TECHNIQUE REQUIRED FOR THE THREE-PARAMETER WEIBULL DISTRIBUTION. IN ADDITION, THE INVERSE GAUSSIAN DISTRIBUTION FEATURES THE MEAN WIND SPEED AS A PARAMETER, A DESIRABLE PROPERTY FOR WIND ENERGY INVESTIGATIONS. A SUMMATION-REPRODUCTIVE PROPERTY OF THE DISTRIBUTION PERMITS ESTIMATION OF THE MEAN WIND ENERGY FLUX FROM A SEQUENCE OF SPEED AVERAGES.

1980-0127 BARLOW T M, CROTHERS W T, KING D M, RINDE J A, CHIAO T T, KULKARNI S V, FRANK D N
MECHANICAL ENERGY STORAGE TECHNOLOGY PROJECT. ANNUAL REPORT FOR CALENDAR YEAR 1979.
NTIS, MAY 1, 1980. 153 P.
UCRL-50056-79

THE AIM OF THE MECHANICAL ENERGY STORAGE TECHNOLOGY (MEST) PROJECT AT LLL IS TO DEMONSTRATE ITS POTENTIAL FOR ENERGY SAVINGS IN VEHICULAR AND STATIONARY SYSTEMS. PRIMARY EMPHASIS IS ON FLYWHEEL ENERGY STORAGE SYSTEMS. IN-HOUSE RESEARCH AND DEVELOPMENT WORK INCLUDES DEVELOPMENT AND EVALUATION OF THE TAPERED-THICKNESS FLYWHEEL ROTOR CONCEPT AND CHARACTERIZATION OF FIBER-COMPOSITE MATERIALS FOR APPLICATION TO FLYWHEEL SYSTEMS. THE PROJECT'S CY 1979 ACTIVITIES WERE ORGANIZED INTO THE FOLLOWING TASKS: TRANSPORTATION APPLICATIONS; PHOTOVOLTAIC AND WIND APPLICATIONS; FIBER-COMPOSITE MATERIALS TECHNOLOGY; FLYWHEEL ROTOR AND CONTAINMENT TECHNOLOGY; ADVANCED COMPONENT TECHNOLOGY; AND PROJECT MANAGEMENT AND DOE SUPPORT. STATUS OF THE PROJECTS IS SUMMARIZED.

1980-0128 BASS L, WYNHOLDS H, BLOEDORN J, HODGSON F, HERZOG F
STUDY OF PRODUCT LIABILITY INSURANCE ISSUES RELATED TO SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, NOVEMBER 1980. 163 P.
RFP-3178-80/21

PRODUCTS LIABILITY INSURANCE IS AVAILABLE FOR ALL BUT THE SMALLEST AND NEWEST SWECS MANUFACTURERS. LARGE COMPANIES SIMPLY INSURE SWECS AS PART OF THEIR TOTAL RISK MANAGEMENT (INSURANCE) PROGRAM. FOR OTHER COMPANIES, HOWEVER, PURCHASE OF PRODUCTS LIABILITY INSURANCE USUALLY REQUIRES A KNOWLEDGEABLE AND AGGRESSIVE INSURANCE BROKER, AND AN EFFECTIVE PRODUCT LIABILITY PREVENTION PROGRAM. COSTS OF PRODUCTS LIABILITY INSURANCE VARIES CONSIDERABLY, DEPENDING ON BOTH THE MANUFACTURER'S PERFORMANCE AND THE INSURER'S PERCEPTION OF EXPOSURE. THIS STUDY WAS SPONSORED BY THE DOE TO ANALYZE THE PARTICULAR PRODUCTS SAFETY AND LIABILITY STATUS OF THE SWECS INDUSTRY AND TO PROPOSE STRATEGIES FOR ADDRESSING THEIR NEEDS. EIGHT STRATEGIES WERE IDENTIFIED WHICH WOULD REDUCE THE MANUFACTURERS' RISK, REDISTRIBUTE THE ECONOMIC BURDEN OF PRODUCTS LIABILITY, AND REDEFINE THE CONCEPT OF ACCEPTABLE RISK.

1980-0129 BASTIANON R A
WIND ENERGY IN ARGENTINA.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER X1, P. 565-570.

THIS PAPER SHOWS THE HIGH LEVELS OF WIND SPEED IN SOUTHERN ARGENTINA TOGETHER WITH THE POSSIBILITY OF AN ADVANTAGEOUS USE OF THE WIND ENERGY. THE AVAILABILITY OF THIS RESOURCE AND THE TOTAL CONSUMPTION OF OUR OIL IN THE NEAR FUTURE, HAVE CAUSED THE SCIENCE AND TECHNOLOGY SECRETARIAT OF STATE TO INCLUDE WIND ENERGY IN THE NON-CONVENTIONAL ENERGY NATIONAL PROGRAM. THIS PROGRAM IS DESCRIBED TOGETHER WITH THE WORKS WHICH IT SUPPORTS. THE SOUTHERN REGION OF ARGENTINA, KNOWN AS PATAGONIA, IS CONSIDERED POTENTIALLY GOOD FOR THE INSTALLATION OF LARGE AND SMALL WIND TURBINES. THE HIGH POWERED TURBINES CONNECTED TO THE NATIONAL GRID CAN PROVIDE ENERGY AT A VERY LOW COST DUE TO THE EXISTING HIGH WINDS WHILE NUMEROUS LOW POWERED WIND GENERATORS, BETWEEN 10 AND 20 KW, CAN BE INSTALLED TO PROVIDE ENERGY TO SMALL COMMUNITIES IN ISOLATED AREAS, WITH NO POSSIBILITIES OF BEING CONNECTED TO THE DISTRIBUTION GRID. FINALLY, THIS PAPER DESCRIBES THE FIRST ATTEMPT MADE IN 1961, TO CONSTRUCT A HIGH PERFORMANCE TURBINE.

1980-0130 BAUMAN B, FIMREITE D
PARALLEL GENERATION IN SOUTHERN WISCONSIN.
ASAE PAPER 80-3041, 1980. 10 P.

THE PAPER DESCRIBES EXPERIENCES IN DEVELOPING A PARALLEL GENERATION RATE TO ACCOMMODATE FOR INTERFACING OF WIND ENERGY SYSTEMS IN SOUTHERN WISCONSIN. IT DISCUSSES SAFETY CONSIDERATIONS, SERVICE AGREEMENTS, THE PARALLEL GENERATION RATE, METERING, AND ALTERNATE ENERGY CREDITS.

1980-0131 BAWN W E, GUERRERO J V
UTILITY CONCERNS ABOUT INTERCONNECTED SMALL WIND ENERGY CONVERSION SYSTEMS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, NOVEMBER 1980. 43 P.
TM-IP-81-2

1980-0132 BERGER G J, ROYCE R, FARLEY R C
A HANDBOOK ON THE SALE OF EXCESS ELECTRICITY BY INDUSTRIAL AND INDIVIDUAL POWER PRODUCERS UNDER THE PUBLIC UTILITY REGULATORY POLICIES ACT. FINAL REPORT.
NTIS, MAY 1980. 31 P.
SERI/TR-98125-1

THIS HANDBOOK IS INTENDED TO HELP INDUSTRIAL FIRMS OR INDIVIDUALS CONSIDERING A DECISION TO GENERATE THEIR OWN ELECTRICITY. A DESCRIPTION OF FEDERAL REGULATION OF PUBLIC UTILITIES AND THE PROCEDURE FOR OBTAINING CONTRACTS FOR THE PURCHASE AND SALE OF ELECTRICITY ARE INCLUDED. THE APPLICABLE SECTIONS OF THE PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978 (PURPA) ARE EXAMINED AS THEY AFFECT THE ABILITY OF A FIRM TO SELL AND DELIVER EXCESS ELECTRICITY TO A CUSTOMER.

1980-0133 BERRY E X
WIND RESOURCE ASSESSMENT IN CALIFORNIA.
NTIS, MAY 1980. 77 P. ALSO: SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, MAY 1980. 74 P.
PB80-195167

THIS REPORT PROVIDES A STRATEGY FOR WIND-ENERGY PROSPECTING, A DESIGN FOR A WIND PROSPECTING INSTRUMENT, AND A METHOD OF ANALYSIS OF WIND-ENERGY DATA. THE FORMULATION ALSO PRODUCES AN IMPROVED BASIS FOR THE CALCULATION OF WIND MACHINE PERFORMANCE USING ONLY A FEW WIND PARAMETER MEASUREMENTS.

1980-0134 BEURSKENS H J M, HAGEMAN A J F K, HOSPERS G D, KRAGTEN A, LYSEN E A
LOW SPEED WATER PUMPING WINDMILLS: ROTOR TESTS AND OVERALL PERFORMANCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER K2, P. 501-520.

IN THE PROCESS OF DEVELOPING LOW SPEED WATER PUMPING WINDMILLS THE AERODYNAMIC PROPERTIES OF FOUR DIFFERENT ROTORS OF 1.5 M DIAMETER WERE TESTED IN AN OPEN WIND-TUNNEL. THE INFLUENCE OF A NUMBER OF DESIGN PARAMETERS ON THE POWER OUTPUT HAS BEEN STUDIED. THESE INCLUDE LINEARIZATION OF THE BLADE SETTING ANGLE AND BLADE CHORD, BLADE TIP GEOMETRY, THE EFFECT OF GUY RODS AND OTHER STRUCTURAL ELEMENTS TO STRENGTHEN THE BLADES, AND THE EFFECTS OF OBSTACLES IN THE ROTOR WAKE. OTHER EXPERIMENTS INCLUDE THE EFFECT OF CHANGING THE GEOMETRY OF THE LEADING EDGE TO INCREASE THE STARTING TORQUE OF THE ROTOR. THE RESULTS OF THESE EXPERIMENTS ARE REPORTED AND COMPARED WITH THEORETICAL PREDICTIONS. THE FIELD PERFORMANCE OF A WATER PUMPING WINDMILL HAS BEEN MEASURED AT A TEST FIELD. THE THEORETICAL PERFORMANCE OF THE WINDMILL COULD BE PREDICTED BY MEASURING THE CHARACTERISTICS OF THE PUMP AND COUPLING THIS TO THE MEASURED PERFORMANCE OF THE ROTOR. THE DISCREPANCIES BETWEEN FIELD DATA AND THEORETICAL PREDICTIONS WILL BE DISCUSSED.

1980-0135 BHUMRALKAR C M, MANCUSO R L, LUDWIG F L
A PRACTICAL AND ECONOMIC METHOD FOR ESTIMATING WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
SOL. ENERGY 25(1): 55-65, 1980.

IN ORDER TO ASSESS THE ECONOMIC VIABILITY OF INSTALLING A WIND ENERGY CONVERSION SYSTEM (WECS) AT A SITE, IT IS NECESSARY TO KNOW THE WIND CHARACTERISTICS AT THAT SITE. A PHYSICALLY BASED, THREE-DIMENSIONAL MODEL HAS BEEN DEVELOPED THAT INCORPORATES THE EFFECT OF UNDERLYING TERRAIN AND USES AVAILABLE, CONVENTIONAL WIND INFORMATION FROM SELECTED NEARBY WEATHER STATIONS. THIS MODEL--CALLED COMPLEX--IS ESSENTIALLY AN OBJECTIVE ANALYSIS COMPUTER PROGRAM THAT INTERPOLATES VALUES OF WIND FROM OBSERVATIONS AT IRREGULARLY SPACED STATIONS. THE REQUIRED STATISTICAL WIND CHARACTERISTICS ARE ESTIMATED FROM THE SYNTHESIZED HOURLY WINDS, WHICH ARE OBTAINED BY USING THE COMPLEX MODEL. THE LINEAR CHARACTERISTICS OF THE COMPLEX MODEL HAVE BEEN USED TO OBTAIN SOLUTIONS DIRECTLY FOR ONLY THE FEW EIGENVECTORS OF THE INPUT FOR ANY ARBITRARY SET OF OBSERVATIONS FROM LINEAR COMBINATIONS OF THOSE SOLUTIONS.

1980-0136 BLACK T
PUTTING THE WIND TO WORK.
DES. ENG. 51(1): 48-51, JANUARY 1980.

AN ASSESSMENT IS MADE OF THE WORLD'S LARGEST WIND TURBINE GENERATOR EMPLOYING HORIZONTAL AXIS AND 100-FT LONG BLADES WITH VARIABLE PITCH. THE NACELLE IS MOUNTED ON A 140-FT-HIGH TOWER. PITCH OF THE BLADES IS AUTOMATICALLY VARIED TO MAINTAIN A CONSTANT 35 RPM AT WIND SPEEDS BETWEEN 11 MPH (CUT-IN-SPEED) AND 35 MPH (CUT-OUT SPEED). THE ROTOR DRIVES AN ALTERNATOR THROUGH A STEP-UP GEAR.

1980-0137 BOEHMAN L I, ANDERSON L A, CRISP J N, PINSON J D, BISHOP W S
ANALYSIS OF SMALL, NONCONVENTIONAL ELECTRIC POWER SYSTEMS FOR REMOTE SITE APPLICATIONS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.
PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 828-834.

ELECTRIC POWER SYSTEMS WITH ENERGY CONVERSION BY WIND, SOLAR, AND HYBRID WIND-SOLAR CONFIGURATIONS AND ENERGY STORAGE IN FLYWHEELS, HYDROGEN, BATTERIES AND THERMAL DEVICES ARE CONSIDERED. RELATIVE PERFORMANCE, COST, AVAILABILITY, AND RELIABILITY ARE COMPARED FOR THE CONCEPTUAL SYSTEMS. A MODULAR CONFIGURATION WITH TWO 8 KW WIND ENERGY CONVERTERS AND SEALED LEAD ACID BATTERIES IS ANALYZED IN DETAIL FOR A REMOTE SITE MILITARY APPLICATION IN NORTHERN ALASKA. THE SYSTEM ANALYZED CAN PROVIDE 5 KW ON A CONTINUOUS BASIS WITH 5.6 METERS PER SEC AVERAGE WIND VELOCITY AND HAVE 12 HOURS OF RESERVE CAPACITY STORED IN THE BATTERY ENERGY STORAGE SYSTEM.

1980-0138 BOLAND J F
COR-TEN STEEL--ITS APPLICATION AND LIMITATIONS IN WIND SYSTEMS STRUCTURES.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, AUGUST 1980.
TM-TD/80-4

THE PROPERTIES OF COR-TEN STEELS ARE DISCUSSED IN LIGHT OF THEIR POSSIBLE APPLICATION IN SMALL WIND SYSTEMS. THE PRECAUTIONS AND LIMITATIONS TO BE CONSIDERED BY DESIGNERS IN USING THESE ALLOYS ARE ALSO DISCUSSED.

1980-0139 BOLLMEIER W S, BUTTERFIELD C P, CINGO R P, DODGE D M, HANSEN A C, SHEPHERD D C, TANGLER J L
SMALL WIND SYSTEMS TECHNOLOGY ASSESSMENT. STATE OF THE ART AND NEAR TERM GOALS.
NTIS, FEBRUARY 1980. 97 P.
RFP-3136/3533/80/18

COMMERCIALLY AVAILABLE SMALL WIND CONVERSION SYSTEMS (SWECS), DOE-FUNDED PROTOTYPE SWECS, AND POSSIBLE SECOND GENERATION ADVANCED CONCEPTS ARE ASSESSED FROM THE STANDPOINT OF SEVERAL KEY FIGURES-OF-MERIT INCLUDING COST OF ENERGY, DOLLARS PER POUND, KILOWATT HOURS PER YEAR PER POUND, AND KILOWATT HOURS PER YEAR PER SQUARE METER OF ROTOR AREA. THE RELIABILITY, PERFORMANCE, AND INSTALLATION AND MAINTENANCE COSTS OF THESE SYSTEMS ARE ALSO ASSESSED. IT IS CONCLUDED THAT CURRENT SWECS, WHILE NEARING THE THRESHOLD OF COMPETITIVENESS WITH CONVENTIONAL ENERGY SOURCES, ARE INHIBITED FROM REACHING THEIR LOWEST COST POTENTIAL BY THE USE OF OFF-THE-SHELF COMPONENTS, LESS THAN OPTIMUM ROTOR DESIGNS, AND (IN SOME CASES) OVERLY COMPLICATED CONTROL SYSTEMS. THE COMPARISON OF IMPROVED DOE PROTOTYPES AND POSSIBLE ADVANCED CONCEPT SWECS SHOWS THAT, IN MANY SIZE RANGES, CONSIDERABLE REDUCTIONS IN ENERGY COST CAN BE ACHIEVED.

1980-0140 BONTIUS G H, KOENRAADS A J T M, OFFRINGA L J J, VALTER G P, DE ZEEUW W J
WIND TURBINES FOR POWER GENERATION.
ENERGIESPECTRUM 4(11): 264-269, NOVEMBER 1980. (IN DUTCH)

THIS PAPER DISCUSSES THE SUITABILITY OF THE ASYNCHRONOUS GENERATORS NORMALLY COUPLED TO WIND TURBINES, WHERE THEY RUN IN OVERSYNCHRONOUS OPERATION. IT RECOMMENDS A SYSTEM COMPRISING A SYNCHRONOUS GENERATOR, RECTIFIER, INVERTER, AND A SECOND SYNCHRONOUS GENERATOR (OF LOW RATED OUTPUT) FOR REACTIVE CURRENT COMPENSATION. THIS SYSTEM SUPPLIES POWER AT A BETTER POWER FACTOR THAN THE ASYNCHRONOUS GENERATOR AND CAN OPERATE WITHIN A WIDER RANGE OF SPEEDS. FOR GREAT DISTANCES BETWEEN THE WIND TURBINE PARK AND THE NATIONAL GRID DC TRANSMISSION IS MOST CONVENIENT.

1980-0141 BOSSANYI E A, MACLEAN C, WHITTLE G E, DUNN P D
THE EFFICIENCY OF WIND TURBINE CLUSTERS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J1, P. 401-416.

A NUMBER OF AUTHORS HAVE DEVELOPED THEORETICAL MODELS TO DESCRIBE THE WIND DEPLETION EFFECTS IN WIND TURBINE CLUSTERS. THIS PAPER COMPARES THE ASSUMPTIONS, SOME OF WHICH ARE QUITE ARBITRARY, MADE IN THE DIFFERENT MODELS AND DEMONSTRATES THE WIDE RANGE OF ANSWERS THAT CAN BE OBTAINED BY CHOOSING DIFFERENT SETS OF ASSUMPTIONS. SOME NEW MODIFICATIONS ARE ALSO SUGGESTED, INCLUDING A PHYSICALLY MORE REALISTIC WAY OF ESTIMATING THE RATE AT WHICH MOMENTUM IS REPLENISHED FROM ABOVE. THEORETICAL RESULTS ARE COMPARED WITH THE LIMITED EXPERIMENTAL DATA

THAT IS AVAILABLE, BUT THERE IS OBVIOUSLY A NEED FOR MORE PRACTICAL EXPERIMENTS, BOTH IN WIND TUNNELS AND IN THE FIELD. A FLEXIBLE COMPUTER PROGRAM HAS BEEN WRITTEN WHICH ENABLES SOME OF THE DIFFERENT OPTIONS TO BE COMPARED, AND ALLOWS ONE TO DISCOVER THE SENSITIVITY OF THE RESULTS TO THE DIFFERENT ASSUMPTIONS WHICH CAN BE MADE. THE PROGRAM CAN ALSO ACCEPT ANY REAL WIND TURBINE CHARACTERISTICS, SO THAT POWER AND DRAG COEFFICIENTS MAY VARY WITH WIND SPEED AND HENCE WITH POSITION IN THE CLUSTER. FURTHERMORE, CLUSTER EFFICIENCY WILL VARY WITH THE INCIDENT WIND SPEED. THE AVERAGE CLUSTER EFFICIENCY OVER A WHOLE YEAR IS CALCULATED, FOR PARTICULAR WIND SPEED DISTRIBUTION, AND FROM THIS IT CAN BE SHOWN THAT, FOR EXAMPLE, THE OPTIMUM RATED WIND SPEED OF A WIND TURBINE CLUSTER IS LOWER THAN FOR AN ISOLATED MACHINE, AND THIS EFFECT BECOMES MORE SIGNIFICANT FOR LARGER CLUSTERS.

1980-0142 BOTTRELL G, SULLIVAN L J
DEVELOPMENT OF A 4 KW WIND TURBINE GENERATOR.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 810-814.

STRUCTURAL COMPOSITES INDUSTRIES HAS BEEN AWARDED A ROCKWELL INTERNATIONAL ENERGY SYSTEMS GROUP CONTRACT (PF 07420C), FUNDED BY THE U.S. DEPARTMENT OF ENERGY, TO DEVELOP A SMALL WIND ENERGY CONVERSION SYSTEM (SWECS). THE SYSTEM IS TO BE RATED AT 4 KW AND OPERATED IN A 10 MILE PER HOUR MEAN WIND SPEED. IT WILL BE USED FOR REMOTE RESIDENTIAL APPLICATIONS. VENTUS ENERGY CORP. IS ASSISTING SCI WITH THE SWECS DEVELOPMENT. RESULTS TO DATE ARE PRESENTED IN THIS PAPER.

1980-0143 BOTTRELL G W
TORQUE CONTROL SYSTEM FOR WIND ENERGY CONVERSION DEVICES.
U.S. PATENT NO. 4,219,308, AUGUST 26, 1980.

AUTOMATIC TORQUE CONTROL OF WIND ENERGY CONVERSION DEVICES IS PROVIDED THROUGH THE UTILIZATION OF TURBINE REACTION TORQUE. IN THE PREFERRED EMBODIMENT, THE FRAME OF THE DRIVEN MACHINE IS ARRANGED TO BE ROTATABLE THROUGH A LIMITED ANGLE. AS RATED TORQUE OF THE SYSTEM IS EXCEEDED, A FORCE PROPORTIONAL TO THE TURBINE REACTION TORQUE IS EXERTED BY SAID FRAME TO ADJUST THE TURBINE AERODYNAMIC CONFIGURATION IN SUCH A MANNER AS TO REDUCE THE TORQUE ERROR TO SUBSTANTIALLY ZERO.

1980-0144 BRAY R E
SITE INSOLATION AND WIND POWER CHARACTERISTICS. SUMMARY REPORT.
NTIS, AUGUST 1980. 155 P.
DOE/CS/20160-1(VOL.1)

DESIGN AND OPERATION OF EITHER LARGE OR SMALL SCALE SOLAR AND WIND ENERGY CONVERSION SYSTEMS SHOULD BE BASED, IN PART, ON KNOWLEDGE OF EXPECTED SOLAR AND WIND POWER TRENDS. FOR THIS PURPOSE, HISTORIC SOLAR AND WIND DATA AVAILABLE AT 101 NATIONAL WEATHER SERVICE STATIONS WERE PROCESSED STATISTICALLY. PRELIMINARY PLANNING DATA ARE PROVIDED FOR SELECTED DAILY AVERAGE SOLAR AND WIND POWER CONDITIONS OCCURRING AND PERSISTING FOR TIME PERIODS OF INTEREST. SOLAR DATA ARE GLOBAL RADIATION INCIDENT ON A HORIZONTAL SURFACE, AND WIND DATA REPRESENT WIND POWER NORMAL TO THE AIR FLOW. EMPIRICAL PROBABILITIES WERE CONSTRUCTED FROM THE HISTORIC DATA TO PROVIDE A REASONABLE INFERENCE OF THE CHANCE OF SIMILAR CLIMATOLOGICAL CONDITIONS OCCURRING AT ANY GIVEN TIME IN THE FUTURE. (DIURNAL WIND POWER VARIATIONS WERE ALSO CONSIDERED.) RATIOS WERE ALSO GENERATED AT EACH STATION TO RELATE THE GLOBAL RADIATION DATA TO INSOLATION ON A SOUTH-FACING SURFACE INCLINED AT VARIOUS ANGLES. IN ADDITION, JOINT PROBABILITY DISTRIBUTIONS WERE DERIVED TO SHOW THE PROPORTION OF DAYS WITH SOLAR AND WIND POWER WITHIN SELECTED INTERVALS.

1980-0145 BRENNECKE P, EWE H, JUSTI E
STATUS AND NEAR TERM DEVELOPMENT GOALS OF A HYDROGEN ECONOMY.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 4: WASSERSTOFFTECHNOLOGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 297-306.

"HYDROGEN ENERGY" IS DEFINED AS AN ENERGY REGIME, IN WHICH ALL AVAILABLE SOURCES OF PRIMARY ENERGY ARE USED TO PRODUCE HYDROGEN. THEREAFTER THE INEXHAUSTIBLE MULTIPURPOSE CARRIER OF SECONDARY ENERGY MAY BE STORED, TRANSPORTED, AND DISTRIBUTED SIMPLY AND INEXPENSIVELY AND THE OXIDATION PRODUCT (PURE WATER VAPOUR) WILL BE RECYCLED AUTOMATICALLY BY THE BIOSPHERE TO RIVERS AND OCEANS. DEPENDING ON WHETHER SOLAR OR NUCLEAR ENERGY IS PREFERRED AS THE SOURCE OF PRIMARY INEXHAUSTIBLE ENERGY, THE SYSTEM IS CALLED "SOLAR HYDROGEN ECONOMY" OR "NUCLEAR HYDROGEN ECONOMY". IT IS SHOWN HOW ONE CAN CONSTRUCT A STABLE LONG TERM SOLUTION OF THE PRESENT ENERGY PROBLEMS. SOME FIRST PRACTICAL STEPS ARE PROPOSED.

1980-0146 BRIDSEN D W, WORTHINGTON P J
STRUCTURAL DESIGN AND MAINTENANCE POLICIES FOR LARGE WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F4, P. 307-321.

MAJOR STRUCTURAL FAILURES OF LARGE WIND TURBINE (WT) BLADES CAN HAVE VERY SERIOUS ECONOMIC AND PUBLIC SAFETY CONSEQUENCES: ASSURANCE OF STRUCTURAL INTEGRITY WILL BE REQUIRED THROUGHOUT THEIR WORKING LIVES. MAINTENANCE COSTS WILL ALSO HAVE TO BE GIVEN GREAT CONSIDERATION IF WT ARE TO BE ECONOMICALLY VIABLE. STRUCTURAL MAINTENANCE WILL BE VERY EXPENSIVE BECAUSE OF SITING OF WT IN REMOTE AREAS AND THE DIFFICULTY OF GAINING ACCESS TO THE MAIN ROTATING STRUCTURAL COMPONENTS WHEN THEY ARE MOUNTED ON HIGH TOWERS. ACCEPTABLE ASSURANCE OF STRUCTURAL INTEGRITY MUST BE PROVIDED AT MINIMUM COST. THE DESIGN OF LARGE WT BLADES MAY DRAW ON AEROSPACE EXPERIENCE BOTH IN METHODS OF CONSTRUCTION AND IN CHOICE OF MATERIALS, AND THEY WILL SHARE COMMON HAZARDS SUCH AS METAL FATIGUE AND CORROSION. AIRCRAFT STRUCTURAL DESIGN AND INSPECTION POLICIES, WHICH ARE NOW INSEPARABLY LINKED, HAVE BEEN DEVELOPED OVER MANY YEARS OF EXPERIENCE. DESIGN PRINCIPLES WHICH GIVE GOOD FATIGUE LIFE AND CORROSION PROTECTION, AND THUS LOW FAILURE RATES AND LOW INSPECTION COSTS, ARE NOW WIDELY ACCEPTED. INTEGRITY MONITORING USING VISUAL AND NON-DESTRUCTIVE INSPECTION IS IN WIDESPREAD USE. THIS DISCUSSION PAPER WILL DRAW ON THIS EXPERIENCE TO COMPARE POSSIBLE STRUCTURAL DESIGN AND INSPECTION POLICIES FOR LARGE WT BLADES. A BRIEF DISCUSSION OF INSPECTION METHODS, SUCH AS NON-DESTRUCTIVE INSPECTION AND INTEGRITY MONITORING, AND THEIR COST-EFFECTIVENESS IS INCLUDED. TO BE EFFECTIVE AND ECONOMICAL THESE TECHNIQUES MUST BE CONSIDERED IN THE DESIGN PROCESS.

1980-0147 BRIGGS W R
SWECS COST OF ENERGY BASED ON LIFE CYCLE COSTING.
NTIS, MAY 1980. 57 P.
RFP-3120/3533/80-13

VARIOUS SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BEING DEVELOPED UNDER CONTRACT TO ROCKY FLATS WERE SUBJECTED TO A LIFE CYCLE COSTING (LCC) ANALYSIS TO PROJECT THE COST OF ENERGY AVAILABLE FROM THESE SYSTEMS. SWECS SIZES CONSIDERED WERE 1-2 KW, 8 KW, AND 40 KW UNITS. SYSTEMS COSTS WERE BASED ON AN ASSUMED SALES VOLUME

OF 1,000 UNITS OF EACH SWECS PER YEAR. THE RESULTS OF THE LCC ANALYSIS SHOW SWECS COST OF ENERGY TO BE COMPETITIVE WITH GRID ELECTRICITY COSTS OF ENERGY OVER THE PROJECTED LIFETIMES OF THE SWECS DEPENDING ON COMPETING ENERGY COST AT THE SWECS LOCATION, AVERAGE WIND VELOCITY, AND EFFICIENCY OF UTILIZATION OF SWECS-GENERATED ENERGY.

1980-0148 BRODE R, STONER R, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 5: THE EAST CENTRAL REGION.
NTIS, 1980. 214 P.
PNL-3195(WERA-5)

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH STATE OF THE REGION. BACKGROUND IS PRESENTED ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED. A DESCRIPTION OF THE WIND RESOURCE ON A REGIONAL SCALE IS THEN GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH STATE ARE ASSEMBLED INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE REGIONAL WIND ENERGY RESOURCE. ASSESSMENTS FOR INDIVIDUAL STATES ARE PRESENTED AS SEPARATE CHAPTERS. THE STATE WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE REGIONAL WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED. THIS PREFACE OUTLINES THE USE AND INTERPRETATION OF THE INFORMATION FOUND IN THE STATE CHAPTERS. STATES INCLUDE DELAWARE, MARYLAND, KENTUCKY, NORTH CAROLINA, TENNESSEE, VIRGINIA, AND WEST VIRGINIA.

1980-0149 BUCH A
THE WIND IS BLOWING. SEA WATER DESALINATION BY WAY OF WIND POWER.
ENERGY DEV. NO. 2: 49-51, JUNE 1980.

1980-0150 BUEHRING I K, FRERIS L L
SOME ASPECTS OF SMALL AEROGENERATOR DESIGN AND TESTING.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F3, P. 297-305.

AT IMPERIAL COLLEGE A SYSTEM IS UNDER STUDY IN WHICH AN AEROGENERATOR FEEDS ELECTRIC ENERGY TO RESISTIVE LOADS FOR SPACE AND WATER HEATING. FOR THIS PURPOSE, A FAMILY OF PERMANENT MAGNET ALTERNATORS WERE DEVELOPED FOR EITHER DIRECT OR THROUGH GEARBOX COUPLING TO THE WINDROTOR. THESE MACHINES HAVE EXCEPTIONALLY HIGH "ALL YEAR" EFFICIENCY. THE OUTPUT FROM THE ALTERNATOR CAN BE FED DIRECTLY TO A RESISTIVE LOAD OR CAN BE MODULATED ON THE BASIS OF A CONTROL STRATEGY THE PURPOSE OF WHICH IS MAXIMUM ENERGY EXTRACTION. A THYRISTOR RECTIFIER HAS BEEN USED FOR POWER CONDITIONING AS THIS GIVES CONSIDERABLE FLEXIBILITY IN IMPLEMENTING CONTROL STRATEGIES. TO COMPARE THE PERFORMANCE OF THREE ROTORS UNDER DEVELOPMENT, NAMELY A 2.5 DIAMETER CAMBERED PLATE BLADE, 3 M DIAMETER SAILWING AND 3.5 M DIAMETER VARIABLE PITCH SINGLE BLADE ROTOR, A TEST PROCEDURE WAS DEVELOPED IN WHICH THE ROTATIONAL SPEED OF THE ROTOR WAS KEPT CONSTANT. THIS PREVENTS CONTINUOUS TRANSFER OF KINETIC ENERGY TO AND FROM THE ROTOR. CONSTANT SPEED OPERATION WAS ENFORCED THROUGH A FEEDBACK LOOP ROUND THE THYRISTOR RECTIFIER. TEST RESULTS FOR THE CAMBERED PLATE ROTOR ARE SHOWN. FINALLY, A STUDY TO COMPARE THE EFFECTIVENESS OF A NUMBER OF CONTROL POLICIES IS DESCRIBED. THE AEROGENERATOR PLUS CONTROL SYSTEM DYNAMICS WERE SIMULATED ON AN ANALOGUE COMPUTER, THE INPUT TO WHICH WAS A PRERECORDED SAMPLE OF WIND SPEED. THE SIMULATION PROVIDED AN OUTPUT, IN TERMS OF ENERGY, PRODUCED BY THE SYSTEM FOR EACH OF THE CONTROL POLICIES. THE RESULTS INDICATE THAT THERE IS LITTLE DIFFERENCE IN PERFORMANCE AMONGST THE POLICIES TESTED.

1980-0151 BUILTJES P J H, MILBORROW D J
MODELLING OF WIND TURBINE ARRAYS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J2, P. 417-430.

THE FEASIBILITY OF CONSTRUCTING ARRAYS, OR CLUSTERS, OF WIND TURBINES FOR POWER GENERATION IS BEING STUDIED IN DENMARK, THE NETHERLANDS, SWEDEN, THE UNITED STATES AND THE UNITED KINGDOM. THE CONCEPT IS ATTRACTIVE SINCE THE CONCENTRATION OF A NUMBER OF MACHINES ON ONE SITE OFFERS ECONOMIES DURING CONSTRUCTION AND OPERATION AND IN POWER MARSHALLING AND CONTROL. STUDIES OF THE INTERACTIVE EFFECTS WHICH REDUCE THE OUTPUT OF WIND TURBINES IN AN ARRAY DEPEND HEAVILY ON WIND TUNNEL TESTS. THE RESULTS DERIVED FROM TWO SETS--AT THE NETHERLANDS ORGANISATION FOR INDUSTRIAL RESEARCH (T.N.O.) AND AT CENTRAL ELECTRICITY RESEARCH LABORATORIES, ENGLAND (C.E.R.L.) ARE REVIEWED AND COMPARED, WITH PARTICULAR EMPHASIS ON THE ACCURACY OF THE MODELLING TECHNIQUES AND THE EFFECTS OF SCALE.

1980-0152 BULLO P
WIND ENERGY: CURRENT SITUATION AND FUTURE PROSPECTS.
ELETTRIFICAZIONE NO. 10: 461-469, OCTOBER 1980. (IN ITALIAN)

THE ARTICLE BEGINS WITH THE PRESENT MARKET SITUATION OF WIND MACHINES AND THEN REVIEWS THE PROJECTS IN HAND IN DIFFERENT COUNTRIES. THE PROSPECTS FOR THE PENETRATION OF WIND ENERGY INTO THE WORLD ENERGY CONSUMPTION FRAMEWORK ARE EXAMINED; THESE ARE DERIVED FROM PREDICTIONS FROM THE U.S., JAPAN AND THE EEC.

1980-0153 BULLO P
WIND-POWER GENERATING UNITS AND THEIR IMPACT ON THE ENVIRONMENT.
ELETTRIFICAZIONE NO. 5: 220-223, MAY 1980. (IN ITALIAN)

THE SITING OF WIND POWER GENERATING UNITS TO OVERCOME PROBLEMS OF ACCEPTABILITY, VISUAL EFFECTS ON THE LANDSCAPE AND POSSIBLE ECOLOGICAL DIFFICULTIES IS BRIEFLY DISCUSSED. THE TECHNICAL PROBLEMS OF MECHANICAL IMBALANCE DUE TO ICE FORMATION, ICE DISLODGMENT AND POSSIBLE DANGER, NOISE AND ELECTROMAGNETIC INTERFERENCE ARE DETAILED AND THEIR SIGNIFICANCE ASSESSED. IN THE CONTEXT OF GOVERNMENT MEASURES ADOPTED IN ITALY TO ENCOURAGE THE RATIONAL USE OF RENEWABLE ENERGY SOURCES REFERENCE IS MADE TO CERTIFICATION OF PROTOTYPE EQUIPMENT AND THE SIMPLIFICATION OF PLANNING PERMISSION PROCEDURES FOR SMALL UNITS.

1980-0154 BULLO P
WIND ENERGY--SYSTEMS OF CONVERSION AND RELATED PROBLEMS.
ELETTRIFICAZIONE NO. 6: 266-272, JUNE 1980. (IN ITALIAN)

THREE SYSTEMS OF WIND GENERATED POWER ARE CONSIDERED. FIRSTLY FOR STAND ALONE INSTALLATIONS THE PROVISION OF STORAGE BATTERIES IS UNAVOIDABLE. ON A LARGER SCALE PARALLEL RUNNING WITH A LARGE INTERCONNECTED SYSTEM IS POSSIBLE. FINALLY, FOR VERY LARGE SCALE WIND POWER THE USE OF PUMPED STORAGE OR THE GENERATION OF HYDROGEN MAY BE CONSIDERED. THE USE OF ALTERNATORS IS CONSIDERED, AND THE ALTERNATIVE OF DC GENERATORS WITH INVERTORS DISCUSSED.

1980-0155 BULLO P

WIND-DRIVEN GENERATORS--ANALYSIS OF SITES FAVOURABLE TO THEIR INSTALLATION.
ELETTRIFICAZIONE NO. 4: 171-178, APRIL 1980. (IN ITALIAN)

THIS ARTICLE EXAMINES THE VARIOUS PARAMETERS TO BE EVALUATED IN RESPECT TO A RATIONAL AND ECONOMIC INSTALLATION OF A WINDMILL GENERATOR, AND PRESENTS A NUMBER OF MEAN WIND "ISOWIND" MAPS FOR MANY AREAS OF THE WORLD, INCLUDING BRITAIN, BASED UPON MEASURED WIND VELOCITIES AT GROUND LEVEL.

1980-0156 BULLO P
CONVERSION OF WIND ENERGY INTO ELECTRICITY.
ELETTRIFICAZIONE NO. 8: 349-355, AUGUST 1980. (IN ITALIAN)

THE GENERATOR IS AN IMPORTANT PART OF THIS FORM OF ENERGY CONVERSION. FOR ECONOMY, THE GENERATOR CHARACTERISTICS SHOULD MATCH PROPERLY THE WINDMILL (OR OTHER CHARACTERISTICS). A TABLE IS GIVEN OF THE VARIOUS POSSIBLE COMBINATIONS OF "WINDMILL" ROTOR, TRANSMISSION AND ELECTRICIAL GENERATOR. A BAR DIAGRAM SHOWS THE RELATIVE CAPITAL AND ENERGY COSTS OF THESE COMBINATIONS. THERE IS A DESCRIPTION OF THE CONTROL OF MODERN WINDMILLS. A BLOCK DIAGRAM OF SUCH A SCHEME IS GIVEN, TOGETHER WITH SOME RESULTING PERFORMANCE CURVES OF A NASA 230, 1500 KW EQUIPMENT. PRIMARY ROTOR CONTROL IS DISCUSSED IN FAIR DETAIL. THIS INCLUDES ORIENTATION AND STABILITY AND VIBRATION PROBLEMS. A SPEED/POWER CURVE IS GIVEN FOR A 500 KW UNIT. THE LAST SECTION GIVES A GOOD DESCRIPTION OF A WTG ENERGY SYSTEMS "AEROMOTOR" CONTROL SYSTEM, WITH SEVERAL DIAGRAMS.

1980-0157 BUTTERFIELD C P, PYKKONEN K R, SEXTON J H
EFFECTS OF GUY-WIRES ON SWECS TOWER DYNAMICS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, JULY 1980. 17 P.
TM-TD-81-1

THE ROCKY FLATS (RF) SUPPORTING RESEARCH AND TECHNOLOGY (SRT) STUDY FOR TOWER TESTING/ANALYSIS HAS LED TO SOME USEFUL INFORMATION CONCERNING THE EFFECT OF TOWER GUY PRETENSION ON SMALL WIND SYSTEM TOWER DYNAMICS. THE EFFECT OF GUY-WIRE PRETENSION ON TOWER NATURAL FREQUENCIES IS USUALLY CONSIDERED NEGLIGIBLE IF THE GUY: 1) HAS NO SAG CAUSED BY GRAVITY, AND 2) THE TENSION IS NOT APPROACHING THE TOWER BUCKLING LOAD. AT THE RF TEST CENTER IT WAS FOUND THAT, FOR THE TEST TOWER EVEN WHEN THESE CONDITIONS WERE AVOIDED, THE GUY FUNDAMENTAL FREQUENCY MUST BE 30% GREATER THAN THE TOWER FUNDAMENTAL FREQUENCY TO MAINTAIN THE FUNDAMENTAL'S CHARACTERISTICS.

1980-0158 BYGGETH N G, HALLSTEN K-E, THORESON L
DRIVE TRAIN ASSEMBLY OF THE SWEDISH WTS 3.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER E3, P. 253-267.

THE PAPER GIVES IN A SHORT INTRODUCTION A GENERAL OVERVIEW OF THE SWEDISH WTS 3 (WIND TURBINE SYSTEM 3 MW). AN ELABORATED DESCRIPTION OF THE COMPLETE DRIVE TRAIN ASSEMBLY OF THE WTS 3 IS THEN GIVEN.

1980-0159 CANDIDATE WIND TURBINE GENERATOR SITE, CULEBRA, PUERTO RICO. ANNUAL DATA SUMMARY, JANUARY - DECEMBER 1979.
NTIS, JUNE 1980. 13 P.
DOE/RL/01830-T1

THIS REPORT SUMMARIZES WIND SPEED AND DIRECTION DATA COLLECTED ON METEOROLOGICAL TOWERS AT 14 CANDIDATE AND WIND TURBINE GENERATOR INSTALLATION SITES FROM JANUARY 1979 THROUGH DECEMBER 1979. THE BASIC METHOD OF DATA COLLECTION IS BY DIGITAL DATA CASSETTE RECORDING SYSTEMS. FOR THE DIGITAL DATA REPORTED, AN INSTANTANEOUS SAMPLE IS RECORDED EVERY 2 MINUTES. AN EXPLANATION IS INCLUDED FOR EACH DATA SUMMARY TABLE AS WELL AS INFORMATION ON HOW SPECIFIC VALUES WERE COMPUTED. THE REST OF THE REPORT PRESENTS THE ANNUAL SUMMARIZED DATA FOR EACH SITE.

1980-0160 CANDIDATE WIND TURBINE GENERATOR SITE, CULEBRA, PUERTO RICO. ANNUAL DATA SUMMARY, OCTOBER 1978 - SEPTEMBER 1979.
NTIS, JULY 1980. 12 P.
DOE/RL/01830-T2

THIS REPORT SUMMARIZES WIND SPEED AND DIRECTION DATA COLLECTED ON METEOROLOGICAL TOWERS AT 14 CANDIDATE AND WIND TURBINE GENERATOR INSTALLATION SITES FROM OCTOBER 1978 THROUGH SEPTEMBER 1979. THE BASIC METHOD OF DATA COLLECTION IS BY DIGITAL DATA CASSETTE RECORDING SYSTEMS. FOR THE DIGITAL DATA REPORTED, AN INSTANTANEOUS SAMPLE IS RECORDED EVERY 2 MINUTES. AN EXPLANATION IS PROVIDED FOR EACH DATA SUMMARY TABLE AS WELL AS INFORMATION ON HOW SPECIFIC VALUES WERE COMPUTED. THE REST OF THE REPORT PRESENTS THE ANNUAL SUMMARIZED DATA FOR EACH SITE.

1980-0161 CARPENTER R D
WIND TURBINE.
U.S. PATENT NO. 4,218,175, AUGUST 19, 1980.

THIS PATENT DESCRIBES A WIND TURBINE CONSISTING OF A CONE WITH A PLURALITY OF VANES EXTENDING OUTWARDLY MORE OR LESS PERPENDICULAR TO THE SURFACE OF THE CONE AND WINDING IN A HELICAL FASHION FROM A SMALLER DIAMETER OF THE CONE, BUT WITH A CHANGING PITCH ANGLE AND TERMINATING ON OR NEAR THE LARGE DIAMETER. THE SHAFT COMMUNICATES WITH THE CONE AT THE CENTER LINE AND A WIND TUNNEL SURROUNDS THE CONE COMPRISED OF A CONVERGING INLET, A DIVERGING OUTLET AND A THROAT AREA. THE TIP OF THE CONE IS LOCATED AT APPROXIMATELY THROAT AREA AND THE LARGER DIAMETER OF THE CONE IS LOCATED AT OR NEAR THE OUTLET OF THE TUNNEL.

1980-0162 CARR M J, GROTZKY V K, SEXTON J H
PINSON C2E WIND TURBINE GENERATOR FAILURE ANALYSIS AND CORRECTIVE DESIGN MODIFICATION.
NTIS, MARCH 1980. 27 P.
RFP-3128/3533/80-16

ON DECEMBER 4, 1978 WIND SPEEDS AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER REACHED 42 M/S (94 MPH). DURING A ROUTINE INSPECTION OF ALL WIND MACHINES FOLLOWING THIS WINDSTORM, TWO FAILURES WERE OBSERVED ON THE PINSON C2E WIND TURBINE GENERATOR. ONE FAILURE WAS FATIGUE CRACKS WHICH FORMED ON PLATES WELDED TO THE ROTOR SHAFT. THE SECOND FAILURE WAS A NUMBER OF CRACKS IN THE SKIN OF ALL THREE BLADES. ALTHOUGH THE POSSIBILITY EXISTS THAT THE HIGH WINDS OF DECEMBER 4, 1978 CONTRIBUTED TO THESE FAILURES, NO CONCLUSIVE DATA EXIST SUBSTANTIATING THIS THEORY. IN FACT, THE C2E'S FEATHERING MECHANISM FUNCTIONED NORMALLY DURING THE WINDSTORM; THEREBY, CONTROLLING ROTOR OVERSPEED, A POTENTIAL CAUSE OF DAMAGE.

1980-0163 CARROLL D P, KRAUSE P C
SECURITY ASSESSMENT OF POWER SYSTEMS INCLUDING ENERGY STORAGE AND WITH THE INTEGRATION OF WIND ENERGY.
PROGRESS REPORT, OCTOBER 1, 1979-DECEMBER 31, 1979.

NTIS, JANUARY 1980. 23 P.
DOE/ET/29100-11

PROGRESS IN WIND ENERGY STUDIES IS REPORTED. DURING THIS QUARTER TWO AREAS WERE PURSUED: WIND TURBULENCE MODELS AND THEIR EFFECT ON UNSTEADY SHAFT TORQUE OF HORIZONTAL MACHINES; AND REDUCED ORDER AERODYNAMIC MODELS OF WIND MACHINES.

1980-0164 CASKEY B C, SCHILDKNECHT H E
MECHANICAL ENERGY STORAGE FOR PHOTOVOLTAIC/WIND PROJECT. FINAL REPORT.
NTIS, JUNE 1980. 66 P.
SAND-79-2259

THIS REPORT DESCRIBES THE SOLAR MECHANICAL ENERGY STORAGE PROGRAM AT THE TIME THAT LAWRENCE LIVERMORE LABORATORY ASSUMED THE RESPONSIBILITY FOR IT. IT ALSO PRESENTS CONTRACTOR AND SYSTEM ANALYSES RESULTS FOR RESIDENTIAL FLYWHEEL ENERGY-STORAGE SYSTEMS (FESS). VARIOUS PHASES OF THE PROGRAM HAVE ADDRESSED SMALL-TO-INTERMEDIATE APPLICATIONS OF PHOTOVOLTAIC/WIND-ENERGY STORAGE USING FLYWHEELS, COMPRESSED AIR, AND LOW-HEAD, UNDERGROUND PUMPED-HYDRO TECHNOLOGIES. SANDIA NATIONAL LABORATORIES' RECOMMENDATIONS FOR CONTINUED WORK IN SPECIFIC AREAS ARE INCLUDED.

1980-0165 CHENEY M C
UTRC 8 KW WIND TURBINE TESTS.
NTIS, 1980. 9 P.
CONF-800406-5, RFP-3085

THE UNITED TECHNOLOGIES RESEARCH CENTER (UTRC) 8 KW PROTOTYPE WIND TURBINE BECAME OPERATIONAL IN JULY 1979 AND UNDERWENT TESTING IN EAST HARTFORD, CT UNTIL DELIVERY TO ROCKWELL INTERNATIONAL, THE PRIME CONTRACTOR, IN FEBRUARY 1980. THE PROGRAM WILL CONTINUE WITH THE FIELD EVALUATION BY ROCKWELL AT THEIR ROCKY FLATS SITE DURING 1980. THE PROTOTYPE TESTING DEMONSTRATED THE BASIC OPERATION OF THE UNIQUE CONTROL CONCEPT OF THE UTRC COMPOSITE BEARINGLESS WIND TURBINE WHICH UTILIZES A HUB-MOUNTED PENDULUM EMPLOYED TO TWIST THE GRAPHITE COMPOSITE INBOARD REGION OF THE BLADE PRODUCING BLADE PITCH VARIATIONS. THE TESTS ALSO DEMONSTRATED THE PREDICTED PERFORMANCE OF 9 KW AT 20 MPH, AND THE HIGH SPEED STALL CONTROL FEATURE.

1980-0166 CHIEH C F, FROST W
TETHER ANALYSIS FOR A KITE ANEMOMETER.
WIND ENG. 4(2): 80-86, 1980.

AN ANALYSIS TO DETERMINE THE EFFECT OF VERTICALLY VARYING WIND ON KITE ANEMOMETER MEASUREMENTS IS PROVIDED. THE RESULTS OF THE ANALYSIS DEMONSTRATE THAT THE INFLUENCE OF WIND SHEAR HAS A SMALL EFFECT ON CALIBRATION CURVES WHICH WERE ESTABLISHED IN A UNIFORM FLOW FIELD. IF AN EMPIRICALLY DETERMINED CONSTANT OF 0.9 IS CHANGED TO 0.995, THE CORRECTION FOR HEIGHT IS ONE PERCENT OR LESS. THIS FINDING IS OF SIGNIFICANCE IN THAT IT DEMONSTRATES THE KITE ANEMOMETER CAN BE EMPLOYED AT SITES OF VARYING TERRAIN SURFACE ROUGHNESS WITHOUT SPECIFIC CALIBRATION FOR THAT SITE.

1980-0167 CHIEN H C, MERONEY R N, SANDBORN V A
SITES FOR WIND-POWER INSTALLATIONS: PHYSICAL MODELLING OF THE WIND FIELD OVER KAHUKU POINT, OAHU, HAWAII.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER B1, P. 75-90.

OAHU ISLAND, HAWAII, U.S.A., IS KNOWN TO POSSESS A RICH WIND POWER RESOURCE DUE TO THE PREVAILING TRADE WIND BOUNDARY LAYER. A CONTOURED MODEL OF THE KAHUKU POINT AREA WAS PREPARED TO AN UNDISTORTED SCALE OF 1:3840. MEASUREMENTS OF WIND SPEED AND TURBULENCE WERE MADE OVER THE KAHUKU POINT MODEL IN A METEOROLOGICAL WIND TUNNEL. MEASUREMENTS HAVE BEEN COMPARED WITH THE RESULTS OF A FIELD PROGRAM. THE LINEAR CORRELATION BETWEEN FIELD AND LABORATORY MEASUREMENTS WAS FOUND TO BE 0.80. A CORRELATION BY RANK OF RELATIVE WIND SPEEDS FOR THESE DATA PAIRS REVEALED A SIMULATION AT A LEVEL OF 0.97. LABORATORY DATA WERE ALSO USED TO EVALUATE PROPOSED ANALYTIC METHODS TO ESTIMATE SPEED-UP OF FLOW OVER HILLS. METHODS EXAMINED PREDICT VALUES WHICH BRACKET MEASURED MAGNITUDES.

1980-0168 CHRISTIANSON M M
ALTERNATIVE TECHNOLOGY IN LOW INCOME NEW YORK: ENERGY TASK FORCE'S FIRST FOUR YEARS.
COMMUNITY ENERGY SELF-RELIANCE. PROCEEDINGS OF THE FIRST CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS, BOULDER, COLORADO, AUGUST 20-21, 1979. NTIS, JULY 1980. P. 80-90. ALSO: WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JULY 1980. P. 80-90.

AN APARTMENT BUILDING IN NEW YORK CITY, WITH SOLAR, WIND, AND ENERGY CONSERVATION SYSTEMS, IS DESCRIBED, ALONG WITH OTHER PROJECTS AND PLANS OF THE ENERGY TASK FORCE.

1980-0169 CINGO R P
WIND ENERGY CONVERSION, IS IT ENVIRONMENTALLY ACCEPTABLE?
NTIS, 1980. 10 P.
CONF-800517-6, RFP-3072

THE WIDESPREAD IMPLEMENTATION OF WIND ENERGY CONVERSION SYSTEMS PRESENTS A NUMBER OF ENVIRONMENTAL CONCERNS THAT MUST BE ASSESSED AND, IF FOUND TO BE SIGNIFICANT, MUST BE SOLVED BEFORE COMMERCIALIZATION OF THESE SYSTEMS CAN BE ACCOMPLISHED. THIS PAPER PROVIDES AN OVERVIEW OF THE CURRENT STATE OF KNOWLEDGE RELATING TO THE ASSESSMENT OF THE ENVIRONMENTAL IMPACTS OF WIND ENERGY CONVERSION SYSTEMS. THE TEXT IDENTIFIES FIVE GENERIC AREAS THAT HAVE BEEN INVESTIGATED AND SUMMARIZES THE CONLUSION OF STUDIES CONDUCTED IN EACH AREA.

1980-0170 CINGO R P, BUTTERFIELD C P, HANSEN A C
STATE-OF-THE-ART OF SMALL WIND SYSTEMS.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 160-164.

WIND ENERGY CONVERSION SYSTEMS (WECS) OFFER SEVERAL ADVANTAGES IN THE PRESENT WORLD ENERGY, ECONOMIC AND SOCIAL CLIMATE. THE NEED IS FOR DECREASED DEPENDENCE UPON NON-RENEWABLE ENERGY SOURCES, AND WIND ENERGY IS SUGGESTED AS A COST-EFFECTIVE FORM OF SOLAR/ELECTRIC CONVERSION. IN THE PAST, SWECS HAVE BEEN USED PRIMARILY FOR WATER PUMPING AND GENERATING DIRECT CURRENT ELECTRICAL POWER FOR BATTERY CHARGING. MORE RECENTLY, THERE HAS BEEN INCREASED EFFORT TO DEVELOP AND MARKET SYSTEMS FOR GENERATION OF 60 HERTZ ALTERNATING CURRENT POWER EITHER INTERTIED WITH A CENTRAL UTILITY OR IN A STAND-ALONE MODE.

1980-0171 CINGO R P

WIND ENERGY CONVERSION: IS IT ENVIRONMENTALLY ACCEPTABLE?
J. ENVIRON. SCI. 23(6): 11-15, NOVEMBER 1980.

AN OVERVIEW OF THE CURRENT STATUS OF THE KNOWLEDGE REGARDING POTENTIAL ENVIRONMENTAL IMPEDIMENTS TO THE COMMERCIALIZATION OF WIND ENERGY CONVERSION SYSTEMS (WECS) IS PRESENTED. THE TEXT ALSO IDENTIFIES PERTINENT STUDIES CONDUCTED IN EACH AREA AND SUMMARIZES THE CONCLUSIONS OF THE STUDIES.

1980-0172 COMMUNITY ENERGY SELF-RELIANCE. PROCEEDINGS OF THE FIRST CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS.
NTIS, JULY 1980. 598 P. ALSO: WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JULY 1980. 598 P.
CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS, BOULDER, COLORADO, AUGUST 20-21, 1979.
SERI/CP-354-421

THE PROCEEDINGS OF A WORKSHOP/CONFERENCE ON COMMUNITY RENEWABLE ENERGY SYSTEMS ARE PRESENTED. THIS MEETING WAS SPONSORED BY DOE AND SERI TO ENCOURAGE DECENTRALIZATION IN ATTACKING ENERGY PROBLEMS, TO SHOW HOW RENEWABLE ENERGY CAN MEET COMMUNITY GOALS, TO PRESENT EXAMPLES OF SUCCESSFUL PROJECTS, TO DISCUSS THE PLANNING AND MANAGEMENT OF RENEWABLE ENERGY SYSTEMS, TO IDENTIFY SOURCES OF FINANCIAL SUPPORT, TO SHARE LEGAL STRATEGIES, AND TO EXAMINE UTILITY ROLES. PRESENTED PAPERS AND WORKSHOP SUMMARIES ARE INCLUDED.

1980-0173 COMPARATIVE EVALUATION OF NONTRADITIONAL ENERGY RESOURCES.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, FEBRUARY 1980. 131 P.
P-500-80-006

THIS REPORT DISCUSSES A METHOD FOR EXPANDING ENERGY-SUPPLY PLANNING TO CONSIDER ENERGY RESOURCES NOT TRADITIONALLY INCLUDED, SUCH AS GEOTHERMAL, SOLAR, AND WIND ENERGY, BIOMASS, SMALL HYDROELECTRIC PROJECTS, AND COGENERATION. TO ILLUMINATE THEIR COMPARATIVE CHARACTERISTICS, THE STAFF EMPLOYED A RATHER SIMPLE METHOD APPLICABLE TO ALL THE TECHNOLOGIES. A COMPOSITE PROFILE OF COSTS, RELATIVE PROBABILITY OF IMPLEMENTATION, POTENTIAL FOR USE, TIMING OF IMPLEMENTATION, AND IMPEDIMENTS TO USE WAS COMPILED. THE ANALYSIS IS DIVIDED INTO TIME HORIZONS OF 1979, 1985, 1991, AND 2000. THE ANALYSIS OF IMPLEMENTATION PROBABILITY IS BASED ON AN EXPLICIT SET OF CRITERIA. THE SCORING SYSTEM IS PRESENTED IN A FORMAT THAT ALLOWS REVIEWERS BOTH TO UNDERSTAND THE BASIS OF THE RATINGS, AND TO TEST THE SENSITIVITY OF CONCLUSIONS TO ALTERNATIVE ASSUMPTIONS. THE REPORT IS NOT INTENDED TO SERVE THE PURPOSES OF A UTILITY-SUPPLY-PLANNING EXERCISE, BUT RATHER SEEKS TO ILLUMINATE POLICY OPTIONS AND FACILITATE CHOICES AMONG THEM. INSIGHTS FROM THIS ANALYSIS DO, HOWEVER, CONTRIBUTE TO THE ABILITY TO COMPARE NONTRADITIONAL OPTIONS TO CONVENTIONAL UTILITY RESOURCES FOR MEETING ENERGY-DEMAND GROWTH. A FIRST APPLICATION OF THE METHOD HAS SHOWN THAT ALTERNATIVE ENERGY SOURCES CAN MAKE A MAJOR CONTRIBUTION TO MEETING CALIFORNIA'S ENERGY NEEDS BY THE YEAR 2000. TO REALIZE THE ACHIEVABLE POTENTIAL OF THESE NEW ENERGY SOURCES, HOWEVER, ADDITIONAL ACTIONS ARE REQUIRED FROM MANY GROUPS PROCEEDING ON MULTIPLE FRONTS. KEY ACTIONS REQUIRED TO ACCELERATE USE OF THE TECHNOLOGIES OF GREATEST NEAR-TERM INTEREST ARE DESCRIBED.

1980-0174 CONNELL J R
TURBULENCE AS EXPERIENCED BY A MOVING ROTOR OF A WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.
PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1149-1153.

THIS PAPER REPORTS SOME OF THE EARLY RESULTS FROM PACIFIC NORTHWEST LABORATORY STUDIES THAT ARE AIMED AT CHARACTERIZING THE WIND AS IT WOULD BE SEEN BY ROTATING BLADES OF LARGE WIND TURBINES. THE FIRST PART OF THE PAPER DISCUSSES TRANSFER FUNCTIONS BETWEEN WIND INPUT AND MACHINE RESPONSE. THE SHAPE OF A TRANSFER FUNCTION MAY BE DISTINCTLY DIFFERENT DEPENDING UPON WHETHER THE MACHINE IS LARGE OR SMALL; OR IF LARGE, WHETHER THE INPUT WIND USED TO DERIVE IT IS MEASURED AT A STATIONARY POINT OR AT A POINT FOLLOWING THE ROTATION OF A WIND TURBINE BLADE. THE SECOND PART OF THE PAPER DESCRIBES SPECTRA OF TURBULENCE FROM WINDS MEASURED BY PNL IN SUCH A WAY THAT THEY CORRESPOND TO WIND SEEN BY A ROTATING BLADE. IN PART THREE SOME IMPLICATIONS FOR POWER EXTRACTION AND FOR FATIGUE ARE DESCRIBED. THE FOURTH PART PRESENTS SEVERAL EXAMPLES OF THE RESPONSE SPECTRA OF LARGE WIND TURBINES TAKEN FROM RESEARCH REPORTS. THE MACHINE RESPONSE SPECTRA ARE COMPARED TO THE PNL SPECTRUM OF ROTATIONALLY SAMPLED WIND SPEED.

1980-0175 CONNELL J R
TURBULENCE SPECTRUM OBSERVED BY A FAST-ROTATING WIND-TURBINE BLADE.
NTIS, JUNE 1980. 35 P.
PNL-3426

THE SPECTRUM OF TURBULENCE ENCOUNTERED BY A POINT ON A FAST-ROTATING WIND TURBINE BLADE IS SHOWN TO BE POSSIBLY QUITE DIFFERENT FROM THAT MEASURED BY A STATIONARY ANEMOMETER. THE PHYSICALLY REASONABLE EXPECTATIONS ARE SUPPORTED QUANTITATIVELY BY EXPERIMENTS USING PACIFIC NORTHWEST LABORATORY'S VERTICAL-PLANE ANEMOMETER ARRAY. THE MEASUREMENTS INDICATE THAT THE BLADE ENCOUNTERS ENERGY DENSITIES IN TWO REGIONS OF THE TURBULENCE SPECTRUM MUCH DIFFERENT THAN THOSE SEEN BY STATIONARY ANEMOMETERS. FOR TYPICAL TURBINE TYPES AND WIND CONDITIONS, THE SPECTRAL ENERGY REDISTRIBUTION PHENOMENON MAY BE SIGNIFICANT ONLY FOR TURBINE BLADE DIAMETERS LARGER THAN 10 M. THE SPECTRAL SHIFT SHOULD ALSO AFFECT GUST STATISTICS FOR ROTATING BLADES; THE DURATION OF GUSTS THAT ARE SMALLER THAN THE DIAMETER OF THE DISK OF BLADE ROTATION WILL DECREASE. CORRESPONDINGLY, THE RISE RATE WILL INCREASE BY A FACTOR OF ABOUT TEN.

1980-0176 CONSERVATION AND SOLAR ENERGY PROGRAMS OF THE DEPARTMENT OF ENERGY: A CRITIQUE.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1980. 88 P.
OTA-E-120

THIS STUDY EVALUATES THE PROGRESS AND DIRECTION OF A NUMBER OF CONSERVATION AND SOLAR ENERGY PROGRAMS IN ORDER (1) TO PROVIDE AN OVERVIEW OF THE BALANCE AND LONG-RANGE CONTRIBUTION OF THESE EFFORTS, AND (2) TO DISCOVER IF THE PROGRAMS ARE COHERENTLY LINKED TO GOALS SET BY CONGRESS AND THE ADMINISTRATION. THE BASIS OF THE WORK WAS GENERATED BY TWO ADVISORY PANELS, WHOSE MEMBERS IDENTIFIED AND DISCUSSED CRITICAL ISSUES. THE STUDY IS QUITE CRITICAL OF C AND SE, ESPECIALLY ITS OBJECTIVES AND THE LACK OF CLEAR DIRECTION FROM DOE MANAGEMENT. SOME OF THE ISSUES IDENTIFIED SUGGEST HOW CONGRESS AND THE SECRETARY OF ENERGY CAN SET THE STAGE FOR C AND SE TO BECOME MORE EFFECTIVE. IT IS POINTED OUT WHERE PROGRAMS THEMSELVES ARE FUNCTIONING INEFFICIENTLY, AND WHAT MIGHT BE DONE TO IMPROVE THEM. A SERIES OF ISSUES RELATED TO SPECIFIC PROGRAMS ARE IDENTIFIED FOR: WIND, PHOTOVOLTAICS, SOLAR THERMAL, OCEAN SYSTEMS, BIOMASS, TRANSPORTATION CONSERVATION, SOLAR ACTIVE AND PASSIVE, AND BUILDINGS AND COMMUNITY SYSTEMS.

1980-0177 COOPER N
NEW GEAR, INCENTIVES SPIN WIND ENERGY INTO FAVOR.
ENERGY USER NEWS 5(3): 12, JANUARY 21, 1980.

A COMBINATION OF ECONOMIC INCENTIVES AND IMPROVED TECHNOLOGY MAY SPEED THE COMMERCIALIZATION OF WIND ENERGY TO A SIGNIFICANT MARKET SHARE DURING THE NEXT TEN YEARS. UNTIL PENDING LEGISLATION THAT WILL INCREASE TAX CREDITS

FOR COMMERCIAL INVESTORS IN ALTERNATIVE ENERGY SOURCES IS PASSED, THE PER-KILOWATT-HOUR COST BARRIER REMAINS TOO HIGH IN SOME AREAS. GUARANTEES TO PURCHASE SURPLUS POWER FROM WIND MACHINES WERE INCLUDED IN THE PUBLIC UTILITY REGULATORY ACT OF 1978, TO IMPROVE THE ECONOMICS. OTHER COST FACTORS ARE WIND SPEED, THE NEED TO FIND FAVORABLE INSTALLATION SITES, AND PUBLIC RELUCTANCE TO RISK UNPROVEN TECHNOLOGIES. EXPERIMENTS WITH VERTICAL-AXIS WIND TURBINES, WHICH CAN ACCEPT WIND FROM ANY DIRECTION AND ARE SELF-REGULATING, ARE EXPECTED TO PROVIDE A PERSUASIVE DEMONSTRATION. OTHER COMPANIES ARE DEVELOPING HORIZONTAL DOWNWIND MACHINES AND SYNCHRONOUS INVERTERS TO TIE IN WITH A UTILITY GRID. MODELS OF SEVERAL MANUFACTURERS ARE DESCRIBED, AND NAMES AND ADDRESSES OF MANUFACTURERS ARE LISTED BY WINDMILL TYPE.

1980-0178 COROTIS R B
APPLICATION OF STATISTICAL TECHNIQUES TO WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES. FINAL REPORT FOR THE PERIOD OCTOBER 1, 1978--SEPTEMBER 30, 1979.
NTIS, MAY 1980. 171 P.
DOE/ET/20283-2

IN THIS REPORT A NUMBER OF NEW STATISTICAL TECHNIQUES AND MATHEMATICAL MODELS ARE DEVELOPED TO ANALYZE WIND DATA COLLECTED AT A POTENTIAL WIND ENERGY CONVERSION SITE.

1980-0179 COROTIS R B
CONFIDENCE INTERVAL PROCEDURES FOR WIND TURBINE CANDIDATE SITES.
SOL. ENERGY 24(5): 427-433, 1980.

THREE DIFFERENT ASPECTS OF CONFIDENCE INTERVALS FOR SEASONAL MEAN WIND SPEEDS ARE INVESTIGATED. VARIOUS TECHNIQUES OF ESTABLISHING CONFIDENCE INTERVALS AT A CANDIDATE SITE ARE DISCUSSED FIRST AND THE CONSISTENCY OF RESULTS DEMONSTRATED FOR 20 SITES. NEXT, A PROCEDURE IS DERIVED FOR THE ENHANCEMENT OF CANDIDATE SITE CONFIDENCE INTERVALS THROUGH THE USE OF A NEARBY REFERENCE SITE WITH LONG-TERM DATA. PROPER INCORPORATION OF THE SPATIAL CORRELATION BETWEEN SITES AND THE UNCERTAINTY IN THE CORRELATION ARE ESSENTIAL TO EFFECTIVE USE OF THE REFERENCE SITE DATA. FINALLY, A TECHNIQUE IS PRESENTED THAT PERMITS THE USE OF LONG-TERM REGIONAL DATA PLUS SINGLE-SEASON DATA AT A CANDIDATE SITE TO ESTABLISH CONFIDENCE INTERVALS FOR DIFFERENT SEASONS OF THE YEAR.

1980-0180 COROTIS R B
HANDBOOK FOR THE APPLICATION OF STATISTICAL TECHNIQUES TO WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES. FINAL REPORT FOR THE PERIOD OCTOBER 1, 1978--SEPTEMBER 30, 1979
NTIS, MAY 1980. 26 P.
DOE/ET/20283-3

PROCEDURES ARE PRESENTED FOR THE USE OF STATISTICAL TECHNIQUES TO ANALYZE WIND DATA COLLECTED AT CANDIDATE SITES FOR WIND TURBINE INSTALLATIONS. EFFECTIVE UTILIZATION OF DATA IN DETERMINING THE WIND REGIME IS IMPORTANT IN GAINING THE MOST RELIABLE INFORMATION NECESSARY TO ASSESS TURBINE PERFORMANCE AND GENERATED POWER IN A RELATIVELY SHORT PERIOD OF ON-SITE COLLECTION. THIS HANDBOOK SPECIFICALLY DISCUSSES ADJUSTMENT PROCEDURES AND RELIABILITY MEASURES FOR THE MEAN WIND SPEED AT A SITE; SELECTION OF A PROBABILITY DISTRIBUTION FOR THE HOURLY WIND SPEED AND CALIBRATION FROM OBSERVED DATA; EMPLOYMENT OF A PROBABILITY MODEL FOR WIND SPEED PERSISTENCE; AND SIMPLIFIED TECHNIQUES FOR THE TIME SERIES SIMULATION OF HOURLY WIND SPEED AT A SITE AND ARRAY POWER FROM A REGION. A BRIEF DISCUSSION OF THE LIMITATIONS IMPLICIT IN NATIONAL WEATHER SERVICE DATA IS ALSO INCLUDED.

1980-0181 CRAMER G, DREWS P, HEIER S, KLEINKAUF W, WETTLAUFER R
DIFFERENCES IN THE CONTROL OF WIND POWER CONVERTERS IN GRID AND ISOLATED OPERATION.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 416-428.

FOR HORIZONTAL AXIS CONVERTERS WITH ADJUSTABLE ROTOR BLADES THE DIFFERENT REQUIREMENTS ON THE CONTROL SYSTEM ARE SHOWN FOR VARIOUS MODES OF OPERATION. THE APPROPRIATE REGULATION STRUCTURES ARE DEVELOPED AND THE DYNAMIC BEHAVIOR OF COMPLETE PLANTS IS EXPLAINED USING THE RESULTS OF DIGITAL SIMULATIONS.

1980-0182 CRIMI P
PERFORMANCE ASSESSMENT OF A FLETTNER WIND TURBINE.
J. ENERGY 4(6): 281-283, NOVEMBER-DECEMBER 1980.

1980-0183 CROMACK D E, MCGOWAN J G, HERONEMUS W E
THE STATUS OF WIND POWER RESEARCH AND DEVELOPMENT FOR SPACE AND WATER HEATING IN THE UNITED STATES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER K1, P. 485-498.

THE PAPER SUMMARIZES THE LATEST DEVELOPMENTS IN WIND POWERED HEATING SYSTEMS FOR RESIDENTIAL AND RURAL APPLICATIONS IN THE UNITED STATES. INCLUDED ARE DETAILS OF THE PIONEERING WORK DONE AT THE UNIVERSITY OF MASSACHUSETTS AS WELL AS THE WORK DONE BY OTHER ORGANISATIONS. IN ADDITION TO A DESCRIPTION OF THE VARIOUS TYPES OF HEATING SYSTEMS AND COMPONENTS DEVELOPED FOR SUCH SYSTEMS, DETAILS OF CURRENTLY AVAILABLE COMPONENTS ARE DISCUSSED. DESIGNS COVERED UNDER THIS TOPIC INCLUDE ELECTRIC RESISTANCE HOT WATER HEATING SYSTEMS AND THE SO CALLED MECHANICAL CHURN SYSTEMS. ALSO DISCUSSED ARE CONCEPTUAL DESIGNS THAT PROVIDE BOTH THERMAL AND ELECTRICAL POWER. A SUMMARY OF EXPERIMENTAL DATA FOR A FULL SCALE RESIDENTIAL FACILITY, THE UNIVERSITY OF MASSACHUSETTS SOLAR HABITAT-I IS PRESENTED ALONG WITH OTHER AVAILABLE EXPERIMENTAL DATA ON KEY SYSTEM COMPONENTS. CURRENT ANALYTICAL MODELLING TECHNIQUES ARE DISCUSSED WHICH INLCUDE DETAILED HOUR-BY-HOUR DIGITAL COMPUTER MODELS AND SIMPLIFIED MODELS THAT CAN BE READILY USED BY DESIGN ENGINEERS. BASED ON THE RESULTS OF ANALYTICAL MODELLING AND EXPERIMENTAL TESTING OF SUCH SYSTEMS, THE ECONOMIC FEASIBILITY OF WIND HEATING SYSTEMS IS PRESENTED. THIS WORK IS BASED ON LIFE-CYCLE COSTING TECHNIQUES, AND THE RESULTS ARE COMPARED TO CONVENTIONAL AND FLAT-PLATE SOLAR HEATING SYSTEMS. THIS PAPER GIVES THE LATEST RESULTS OF THESE STUDIES WHICH POINT OUT THE SIZE OF THE POTENTIAL MARKET FOR WIND HEATING SYSTEMS.

1980-0184 CROMIE W J
WHICH IS RISKIER: WINDMILLS OR REACTORS?
SCIQUEST 53(3): 6-10, MARCH 1980.

IN 1978, DR. HERBERT INHABER, A SCIENTIST EMPLOYED BY THE ATOMIC ENERGY BOARD OF CANADA, PUBLISHED AN EVALUATION OF THE HEALTH HAZARDS OF DIFFERENT ENERGY SYSTEMS ENTITLED "RISK OF ENERGY PRODUCTION". HE CONCLUDED THAT NATURAL GAS AND NUCLEAR SYSTEMS ARE SAFER THAN COAL- AND OIL-FIRED POWER PLANTS, HYDROELECTRICITY, VARIOUS FORMS OF SOLAR ENERGY, WINDMILLS, METHANOL (WOOD ALCOHOL), AND OTHER NONCONVENTIONAL ENERGY SOURCES. THE REPORT AND ITS CONCLUSIONS DREW WIDESPREAD CRITICISM, PARTICULARLY FROM DR. JONH P. HOLDREN, PROFESSOR OF ENERGY AND RESOURCES, UNIVERSITY OF CALIFORNIA AT BERKELEY. HOLDREN AND FIVE COLLEAGUES

WROTE A STINGING 232-PAGE CRITIQUE OF THE INHABER REPORT. THE COUNCIL FOR THE ADVANCEMENT OF SCIENCE WRITING, A NONPROFIT EDUCATIONAL ORGANIZATION OF WRITERS AND SCIENTISTS, INVITED THE TWO TO DEBATE THE ISSUE IN FRONT OF AN AUDIENCE OF SCIENCE REPORTERS. THE CONFRONTATION TOOK PLACE AT CASW'S 17TH ANNUAL NEW HORIZONS IN SCIENCE BRIEFING IN PALO ALTO, CALIF., ON NOV. 5, 1979. AN EDITED TRANSCRIPT OF THE DEBATE IS PRESENTED HERE.

1980-0185 CURTICE D, PATTON J, BOHN J, SECHAN N
STUDY OF DISPERSED SMALL WIND SYSTEMS INTERCONNECTED WITH A UTILITY DISTRIBUTION SYSTEM. INTERIM REPORT: PRELIMINARY HARDWARE ASSESSMENT.
NTIS, MARCH 1980. 111 P.
RFP-3093/94445/3533/80/7

OPERATING PROBLEMS FOR VARIOUS PENETRATIONS OF SMALL WIND SYSTEMS CONNECTED TO THE DISTRIBUTION SYSTEM OF A UTILITY ARE DEFINED. PROTECTION EQUIPMENT, SAFETY HAZARDS, FEEDER VOLTAGE, REGULATION, LINE LOSSES, AND VOLTAGE FLICKER PROBLEMS ARE STUDIED, ASSUMING DIFFERENT SMALL WIND SYSTEMS CONNECTED TO AN EXISTING DISTRIBUTION SYSTEM. TO IDENTIFY HARDWARE DEFICIENCIES, POSSIBLE SOLUTIONS PROVIDED BY OFF-THE-SHELF HARDWARE AND EQUIPMENT ARE ASSESSED. RESULTS OF THE STUDY INDICATE THAT EXISTING TECHNIQUES ARE INADEQUATE FOR DETECTING ISOLATED OPERATION OF A SMALL WIND SYSTEM. POTENTIAL SAFETY HAZARDS POSED BY SMALL WIND SYSTEMS ARE ADEQUATELY HANDLED BY PRESENT WORK PROCEDURES ALTHOUGH THESE PROCEDURES REQUIRE A DISCONNECT DEVICE AT SYNCHRONOUS GENERATOR AND SELF-COMMUTATED INVERTER SMALL WIND SYSTEMS.

1980-0186 CURTIS E H
NATIONAL WIND ENERGY CONSTRUCTION PROGRAM: ITS ENERGY AND ECONOMIC IMPACT.
AMERICAN PUBLIC POWER ASSOCIATION ANNUAL ENGINEERING AND OPERATIONS WORKSHOP, 24TH, PHOENIX, FEBRUARY 25, 1980. WASHINGTON, D.C., U.S. DEPARTMENT OF THE INTERIOR, 1980. P. 25.

DEVELOPING THE 1.7 QUAD WIND ENERGY PORTION OF THE 18.5 QUAD (20 PERCENT) NATIONAL RENEWABLE ENERGY GOAL TRANSLATES INTO 500,000 MILLION KWH/YEAR OF ELECTRICAL POWER GENERATION. IF, FOR EXAMPLE, WIND DYNAMOS THAT PRODUCED 10 MILLION KWH/YEAR WERE USED, 50,000 LARGE WIND MACHINES WOULD BE REQUIRED. A NEAR-TERM GOAL OF 5000 MW BY 1989 IS NEEDED TO DEVELOP THE MANUFACTURING INDUSTRY AND IS APPROPRIATE AS A START TOWARD 500,000 KWH/YEAR BY THE YEAR 2000. ANALYSES OF WIND ENERGY DEVELOPMENT AT THIS LEVEL WERE FOUND TO BE FEASIBLE. A 20 YEAR CONSTRUCTION SCHEDULE FOR 24,000 WIND DYNAMOS WHICH WOULD HAVE A 60,000 MW CAPACITY AND PRODUCE ABOUT 200,000 MILLION KWH/YEAR IS PRESENTED AND ECONOMIC ANALYSES WERE PERFORMED. THE ANALYSES SHOWED THAT DEVELOPMENT WAS COST EFFECTIVE AND WOULD SHOW A PROFIT, WITHOUT INCLUDING THE VALUE OF DISPLACED ENERGY COSTS.

1980-0187 CURTO P A, BJUSTROM R C, COLUZZI M E, MANLEY R N, CHERDAK A S, ELDRIDGE F R, JACOBSEN W E
PERFORMANCE OF DISTRIBUTED ACTIVE SOLAR POWER SYSTEMS.
SYSTEMS SIMULATION AND ECONOMICS ANALYSIS CONFERENCE, SAN DIEGO, CALIFORNIA, JANUARY 23, 1980. NTIS, 1980. P. 221-228.
SERI/TP-351-431

THE PERFORMANCE OF AN ACTIVE SOLAR POWER SYSTEM DEPENDS UPON THE AVAILABLE SOLAR RESOURCE, EQUIPMENT CHARACTERISTICS AND LOAD PROFILE. A DISTRIBUTED SOLAR POWER SYSTEMS PERFORMANCE SIMULATION MODEL IS DEVELOPED THAT CAN HANDLE ALL CLASSES OF WINDPOWER, SOLAR THERMAL PROCESS HEAT AND ELECTRICITY, AND PHOTOVOLTAICS SYSTEMS. THIS MODEL UTILIZES HOURLY INSOLATION, WINDSPEED, TEMPERATURE AND PRESSURE DATA (DERIVED FROM SOLMET TAPES, AVAILABLE FROM THE NATIONAL CLIMATIC CENTER), CHARACTERIZATIONS OF OVER 200 CLASSES OF SOLAR EQUIPMENT COMPONENTS AND SUBSYSTEMS, AND HOURLY ELECTRICAL AND THERMAL LOAD DATA FOR SELECTED INDUSTRIAL, COMMERCIAL, INSTITUTIONAL, AGRICULTURAL AND RESIDENTIAL APPLICATIONS (INCLUDING SEASONAL VARIATIONS). MODEL OUTPUTS INCLUDE PEAK ARRAY POWER, ANNUAL COLLECTED ENERGY, SOLAR FRACTION, BACKUP ENERGY REQUIREMENTS, PEAK BACKUP LOAD POWER, EXCESS GENERATED ENERGY AVAILABLE FOR SALE OR WASTE, AVERAGE HOURLY GENERATION PROFILES, AND OTHER RELATED DATA. SYSTEM PERFORMANCE CAN BE DETERMINED FOR UP TO 72 DIFFERENT APPLICATIONS AND 26 LOCATIONS FOR VARIOUS ARRAY SIZES AND STORAGE CAPACITIES.

1980-0188 DALL-WINTHER D P
WINDMILL.
U.S. PATENT NO. 4,218,183, AUGUST 19, 1980.

A MULTI-VANE WINDMILL ROTATING IN A HORIZONTAL PLANE ON A VERTICAL SHAFT INCLUDES FRAME SUPPORTED FABRIC TYPE VANES WITH THE FRAME HINGEDLY ATTACHED AT ONE END TO SUPPORT ARMS TO SWING CLOSED AND CATCH THE WIND IN ONE POSITION AND TO SWING OPEN UNDER CENTRIFUGAL AND WIND FORCES IN ANOTHER POSITION WHEN COMING INTO THE WIND TO REDUCE AIR RESISTANCE. VANES ARE RELEASABLY ATTACHED IN PART TO THE FRAME FOR SUPPORT IN OPERATING POSITION AND OTHERWISE SLIDABLY SECURED THERETO SO AS TO RELEASE AND COLLAPSE ON THE FRAME UNDER EXTREME WIND PRESSURES WHEN THE FRAME IS CLOSED AND THUS SPILL THE WIND. STOPS ON THE SUPPORT ARMS PROVIDE A LIMIT OF MOVEMENT OF THE VANE FRAMES. A SECOND EMBODIMENT OF THE VANES INCLUDES TWO OVERLAPPING SECTIONS NORMALLY HELD IN OVERLAPPED OR CLOSED POSITION BY YIELDING MEANS THAT PERMIT THE SECTIONS TO SEPARATE UNDER HIGH WINDS TO PROVIDE AN AIR PASSAGEWAY THROUGH THE VANE.

1980-0189 DEBONTRIDDER J, VANDENPUT A, GEYSEN W
VERTICAL WIND TURBINE.
REV. E. 9(9): 181-188, 1980. (IN DUTCH)

THIS PAPER DESCRIBES A VERTICAL WIND TURBINE DEVELOPED AT THE K.U. LEUVEN. AS COMPARED WITH THE CLASSIC WIND TURBINES, THE VERTICAL WIND TURBINE HAS SOME REAL ADVANTAGES: THE MOST SIGNIFICANT ONE IS ITS GOOD ECONOMICAL EFFICIENCY. THE CHARACTERISTICS OF THE SYSTEM CONSISTING OF A VERTICAL WIND TURBINE WITH A DIAMETER OF 5 M AND A DC GENERATOR ARE DISCUSSED.

1980-0190 DE MAY G
CHARACTERISTICS OF ELECTRO-GAS-DYNAMIC WIND ENERGY DEVICES.
ENERGY CONVERS. MANAGE. 20(3): 201-203, 1980.

RECENTLY, A NEW PRINCIPLE HAS BEEN PRESENTED TO CONVERT WIND ENERGY DIRECTLY INTO ELECTRICAL POWER. THE BASIC IDEA IS THAT THE WIND CARRIES CHARGED PARTICLES AND HENCE BEARS AN ELECTRIC CURRENT. IN THIS CONTRIBUTION THE IV CHARACTERISTICS OF SUCH A DEVICE WILL BE CALCULATED STARTING FROM A CONDUCTION MODEL FOR THE CHARGED PARTICLES. FROM THE IV CHARACTERISTICS, THE MAXIMUM ATTAINABLE POWER AND THE INFLUENCE OF SEVERAL DEVICE PARAMETERS WILL BE INVESTIGATED.

1980-0191 DEIBERT D D
NEW WECS DESIGN: THE UNIFIED WIND DYNAMO.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 35-46.
SERI/CP-635-938

A RADICALLY NEW WIND ENERGY CONVERSION SYSTEM HAS BEEN DESIGNED, MANUFACTURED AND SUCCESSFULLY TESTED. THE SYSTEM, CALLED THE UNIFIED WIND DYNAMO, IS THE PRODUCT OF UNIVERSAL ENERGY TECHNOLOGIES CORPORATION AND JOHN G. REUTTER ASSOCIATES. EMPLOYING A SPECIFICALLY DESIGNED, ULTRA LOW RPM ALTERNATOR, THE UWD ATTAINS EFFICIENCIES OF BETWEEN .66 AND .80 OF THE BETZ THEORETICAL LIMIT, WHILE OPERATING ATOP THE EIGHT STORY REUTTER ASSOCIATES' BUILDING IN CAMDEN, NEW JERSEY. THE NEW SYSTEM IS ABLE TO ADAPT TO VARIED BLADE STRUCTURAL CONSTRAINTS. AS A RESULT, THE UWD CAN BE COMPLETELY INSURED WITH REASONABLE PREMIUMS FOR DAMAGE AND LIABILITY, IF SO DESIRED. OTHER FEATURES OF THE UWD INCLUDE THE SIMPLICITY INHERENT IN THE ONE MOVING PART DESIGN, AND ADAPTABILITY IN BEING ABLE TO ECONOMICALLY INCORPORATE AUGMENTER TECHNOLOGIES.

1980-0192 DE LAGARDE J M
EVOLUTION OF THE FLEXIBLE BLADE CONCEPT (VERTICAL AXIS WINDMILLS).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER C3, P. 159-168.

STARTING FROM THE "FLEXIBLE BLADE CONCEPT" A TWO YEAR DEVELOPMENT WORK, SPONSORED BY A FRENCH UNIVERSITY AND GOVERNMENT, HAS EVOLVED INTO A VERTICAL AXIS SOLUTION UNDER THE NAME OF WREB (WIND ROTOR ELASTICALLY BLADED). ELASTIC FITTING OF BLADES PERMITS "LINEARIZATION" OF LIFT CURVE UP TO ANGLES OF ATTACK OF 30 DEGREES BOTH SIDES, THUS BRINGING WREB FORMULA NEARER THEORETICAL "INVISCID" MODELS GOVERNED BY VERY SIMPLE LAWS. SUCH A FEATURE, COUPLED WITH BLADE OSCILLATION PHASING EFFECTS, GIVES TO WREB MILLS VERY ORIGINAL PROPERTIES OF EASY SELF START AND SELF SPEED LIMITATION IN STRONG WINDS. WITH SOLIDITIES (NC/D) OF 0.3 TO 0.5 WREB WOULD ROTATE AT A SPEED COMPRISED BETWEEN HALF AND TWO THIRDS OF DARRIEUS ROTORS AND GIVE COMPARABLE CP MAX (ALREADY DEMONSTRATED BY TUNNEL TESTS) AND A VERY FLAT CP CURVE. ITS ADAPTATION TO REQUIRED POWER IS VERY EASY BY VARYING EITHER THE NUMBER OF BLADES OR THE LENGTH OF THEM. FROM SIMPLE TWO OR THREE BLADED MILLS, WELL ADAPTED FOR SMALL SIZES, ONE CAN DERIVE BY MODULAR CONSTRUCTION MULTIBLADED VERTICAL AXIS MACHINES OF THE SAME SOLIDITY. WREB FORMULA COULD PROVE TO BE ONE OF THE CHAPEST TO BUILD.

1980-0193 DELIONBACK L M, WILHOLD G A
EXTRACTING ENERGY FROM NATURAL FLOW.
NASA TECH. BRIEFS 5(1): 37, SPRING 1980.

THREE CONCEPTS ARE PROPOSED FOR EXTRACTING THE ENERGY FROM WIND, WATERFLOW AND TIDES. THE FLOW-ENERGY-CONVERTOR GEOMETRIES UTILIZE FLOW INSTABILITY TO GENERATE USABLE ENERGY. THEY WOULD RESPOND TO ONE OF THREE INSTABILITY MODES: VORTEX EXCITATION MOTION, GALLOPING OR PLUNGING MOTION, AND FLUTTER. THE FIRST CONVERTOR IS A SPRING-MOUNTED CYLINDER THAT WOULD OSCILLATE AT EXTREMELY HIGH AMPLITUDES IN RESPONSE TO VORTEX EXCITATION. A SIMILAR SYSTEM HAVING A D-SHAPED CYLINDRICAL BODY WOULD RESPOND TO GALLOPING INSTABILITY. A THIRD CONVERTOR RESPONDING TO FLUTTER WOULD BE MORE COMPLEX TO DESIGN, AND IT WOULD BE DIFFICULT TO MAINTAIN THE UNSTABLE CONDITIONS.

1980-0194 DEPARTMENT OF ENERGY SOLAR ENERGY OBJECTIVES, CALENDAR YEAR 1980.
NTIS, APRIL 1980. 33 P.
DOE/CS/0155

THIS PAPER SETS OUT THE GOALS OF THE DEPARTMENT OF ENERGY FOR CALENDAR YEAR 1980 WITH RESPECT TO THE OUTPUT OF EACH OF THE SOLAR ENERGY PROGRAMS AUTHORIZED BY CONGRESS. THE PAPER COVERS FIVE CATEGORIES OF SOLAR ENERGY SOURCES: (1) BIOMASS; (2) SOLAR THERMAL SYSTEMS, INCLUDING ACTIVE AND PASSIVE SYSTEMS USED FOR HEATING OR COOLING; (3) PHOTOVOLTAIC SYSTEMS; (4) WIND-POWERED SYSTEMS; AND (5) OCEAN SYSTEMS.

1980-0195 DESSERT R
ENERGY EFFICIENT PASSENGER VEHICLE.
U.S. PATENT NO. 4,181,188, JANUARY 1, 1980. 6 P.

AN ENERGY EFFICIENT PASSENGER CARRYING VEHICLE FOR ROAD USE COMPRISED OF A LONG, NARROW BODY CARRYING TWO PASSENGERS IN A BACK-TO-BACK RELATIONSHIP IS DESCRIBED. THE VEHICLE IS BASICALLY A BATTERY POWERED ELECTRIC VEHICLE THAT CAN BE CHARGED BY ALL FREE ENERGY SOURCES; NAMELY, THE SUN, THE WIND, HUMAN MUSCLES AND MOMENTUM. THE VEHICLE COMPRISES FOUR MODULES: BODY, SOLAR, AND TWO POWER MODULES. AN ELECTRIC POWER MODULE IS LOCATED WITHIN EACH END OF THE BODY MODULE. THIS MODULE INCLUDES ELECTRIC MOTORS DRIVING THE VEHICLE, SUPPORTING WHEELS AND RECHARGEABLE BATTERIES TO POWER THE MOTORS. PEDALS, SIMILAR TO THOSE ON A BICYCLE, LOCATED AT EACH POWER MODULE, DRIVE GENERATORS TO HELP RECHARGE THE BATTERIES DURING OPERATION OF THE VEHICLE, OR DIRECTLY HELP THE VEHICLE WHEELS. A SOLAR MODULE COMPRISING A LARGE ELECTRICITY GENERATING SOLAR CELL PANEL COVERS MOST OF THE VEHICLE ROOF TO AID IN CHARGING THE BATTERIES. MEANS ARE PROVIDED TO TILT THE SOLAR CELL PANEL TOWARD THE SUN ABOUT A LONGITUDINAL AXIS. A UNIQUE FLEXIBLE DUCT BELOW THE SOLAR PANEL SERVES TO COOL THE CELLS AND, IF DESIRED, HEAT THE PASSENGER COMPARTMENT. FURTHER ENERGY SAVINGS ARE OBTAINED BY CANTING THE REAR WHEELS WHILE STEERING WITH THE FRONT WHEELS, SO THAT THE VEHICLE MOVES DOWN THE ROAD AT A CRAB ANGLE WHICH PROVIDES A SAIL EFFECT WHEN WIND IS FROM THE VEHICLE BEAM OR AFT OF THE BEAM. REGENERATIVE BRAKING MEANS CAN BE USED WHEN SLOWING DOWN, ON A LONG DOWN GRADE, WHEN SAILING SPEED IS GREATER THAN REQUIRED, OR ANY OTHER TIME WHEN VEHICLE MOMENTUM IS GREATER THAN NECESSARY FOR VEHICLE OPERATION, TO USE EXCESS FORWARD MOMENTUM TO DRIVE GENERATORS TO CHARGE THE BATTERIES. THUS, A SINGLE BATTERY CHARGE WILL BE CONSERVED AND VEHICLE OPERATION WILL BE ASSISTED IN A MANNER GIVING MAXIMUM VEHICLE RANGE AND SPEED.

1980-0196 DIRECTORY OF SOLAR ENERGY RESEARCH ACTIVITIES IN THE UNITED STATES: FIRST EDITION, MAY 1980.
NTIS, MAY 1980. 243 P.
SERI/SP-644-690

INFORMATION COVERING 1220, FY 1978 AND FY 1979 SOLAR ENERGY RESEARCH PROJECTS IS INCLUDED. IN ADDITION TO THE TITLE AND TEXT OF PROJECT SUMMARIES, THE DIRECTORY CONTAINS THE FOLLOWING INDEXES: SUBJECT INDEX, INVESTIGATOR INDEX, PERFORMING ORGANIZATION INDEX, AND SUPPORTING ORGANIZATION INDEX. THIS INFORMATION WAS REGISTERED WITH THE SMITHSONIAN SCIENCE INFORMATION EXCHANGE BY FEDERAL, STATE, AND OTHER SUPPORTING ORGANIZATIONS. THE PROJECT SUMMARIES ARE CATEGORIZED IN THE FOLLOWING AREAS: BIOMASS, OCEAN ENERGY, WIND ENERGY, PHOTOVOLTAICS, PHOTOCHEMICAL ENERGY CONVERSION, PHOTOBIOLOGICAL ENERGY CONVERSION, SOLAR HEATING AND COOLING, SOLAR PROCESS HEAT, SOLAR COLLECTORS AND CONCENTRATORS, SOLAR THERMAL ELECTRIC GENERATION, AND OTHER SOLAR ENERGY CONVERSION.

1980-0197 DIVONE L V
THE CURRENT PERSPECTIVE ON WIND POWER BASED ON RECENT U.S. RESULTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A1, P. 1-16.

A BRIEF OVERVIEW OF THE FEDERAL WIND ENERGY PROGRAM WILL BE PRESENTED. TEST RESULTS OF BOTH LARGE AND SMALL WIND SYSTEMS THAT HAVE BEEN OPERATING ON AN EXPERIMENTAL BASIS AT RESIDENCES, FARMS AND UTILITIES WILL BE DISCUSSED. PLANS FOR IMPLEMENTATION OF MORE ADVANCED WIND SYSTEMS WILL BE HIGHLIGHTED. COMMERCIALIZATION

STRATEGIES WILL BE OUTLINED. WHILE THE INDUSTRY AND THE MACHINES ARE STILL IN THE DEVELOPMENTAL STAGE, WE ARE BEGINNING TO SEE THE TREND TOWARD COMMERCIALIZATION. BY 1983, THE TECHNOLOGY AND THE INDUSTRY SHOULD HAVE REACHED THE POINT WHERE WIND POWER WILL BE COST-EFFECTIVE OVER THE WINDIER REGIONS OF THE UNITED STATES. WE ANTICIPATE THAT WITHIN A FEW YEARS, RELIABLE, PRACTICAL WIND SYSTEMS, BOTH LARGE AND SMALL, WILL BECOME AVAILABLE AND WILL RAPIDLY APPROACH COST-EFFECTIVENESS FOR WINDIER LOCATIONS, WITH ONLY MODERATE FINANCIAL INCENTIVES NEEDED TO ASSIST THEIR EARLY UTILIZATION.

1980-0198 DONOHUE K
NEW BRUNSWICK UTILITY BUILDS FOR ENERGY EFFICIENCY.
ELECTR. COMF. COND. NEWS 7(1): 14-15, JANUARY 1980.

THE NEW BRUNSWICK ELECTRIC POWER COMMISSION HAS COMBINED AN ENERGY-SAVING BUILDING DESIGN AND A SOLAR-HEAT PUMP SYSTEM IN ONE OF ITS DISTRICT OFFICES AS PART OF ITS CONTINUING STUDY OF ENERGY CONSERVATION. HEAT PUMPS INTEGRATED WITH SOLAR COLLECTORS USE 25% LESS ELECTRICITY THAN THE TARGET CONSUMPTION RATE SET BY THE POWER COMMISSION. THE ENERGY-SAVING DESIGN FEATURES HIGH VOLUME TO SURFACE RATIO, MINIMAL WINDOW AREA, AND EARTHEN WINDBREAKS. A WIND-POWERED GENERATING SYSTEM IS USED FOR WATER HEATING AND CHARGING BATTERIES USED FOR EMERGENCY COMMUNICATION.

1980-0199 DORAN J C, POWELL D C
GUST CHARACTERISTICS FOR WECS DESIGN AND PERFORMANCE ANALYSIS.
NTIS, MAY 1980. 76 P.
PNL-3421

THIS DOCUMENT PROVIDES A DESCRIPTION OF SOME GUST CHARACTERISTICS WHICH ARE USEFUL IN THE STUDY OF WIND TURBINE FATIGUE CAUSED BY A FLUCTUATING WIND ENVIRONMENT. THE PARTICULAR GUST FORM CHOSEN CAN ALSO BE USED IN THE ANALYSIS OF THE DYNAMIC RESPONSE OF A TURBINE. THE STATISTICAL BEHAVIOR OF SUCH GUST CHARACTERISTICS IS NOT IDENTICAL TO THAT DETERMINED SIMPLY FROM THE WIND RECORDED BY AN ANEMOMETER. THESE MODES OF BEHAVIOR MAY BE RELATED, HOWEVER, BY THE APPLICATION OF APPROPRIATE DIGITAL FILTERS TO THE ANEMOMETER DATA. THIS PROCEDURE HAS BEEN CARRIED OUT FOR A NUMBER OF SAMPLE CASES, AND THE VARIATIONS OF THE RESULTANT GUST FEATURES ARE PRESENTED. A NUMBER OF SUGGESTIONS ON SPECIFIC APPLICATIONS AND INTERPRETATIONS OF THE DATA ARE INCLUDED.

1980-0200 DRAKE R L, HUANG C H
MASS-CONSISTENT, INTERPOLATED WIND FIELDS FOR COMPLEX TERRAIN.
SYMPOSIUM ON INTERMEDIATE RANGE ATMOSPHERIC TRANSPORT PROCESSES AND TECHNOLOGY ASSESSMENT, GATLINBURG, TENNESSEE, OCTOBER 1, 1980. NTIS, SEPTEMBER 1980. 8 P.
PNL-SA-8678

MASS-CONSISTENT MODELING IS AN ATTEMPT TO DERIVE SNAPSHOTS OF THE MEAN WIND FIELD OVER A SECTION OF TERRAIN FROM GIVEN SETS OF MEASURED WIND FIELDS. THE MODELING SCHEME PRESENTED IS BASED ON THE ASSUMPTION THAT THE BEST MASS-CONSERVING WIND FIELD IS A STRONG FUNCTION OF THE INTERPOLATION TECHNIQUE FOR THE MEASURED WINDS AND A WEAK FUNCTION OF THE MASS CONSERVATION SCHEME. THE PROPOSED SCHEME INCLUDES THE FOLLOWING SPECIAL FEATURES: A TERRAIN-FOLLOWING COORDINATE SYSTEM, AN ARBITRARILY DEFINED UPPER BOUNDARY, AND A PROVISION FOR DENSITY STRATIFICATION. THE ACCURACY AND UTILITY OF THE SCHEME WAS TESTED AGAINST AN ANALYTICALLY DERIVED WIND FIELD FLOWING OVER AN ANALYTICALLY DEFINED TERRAIN.

1980-0201 DUBEY M, COTY U, BAIN D, DONHAM R, VAUGHN L, DICKINSON R
IMPACT OF LARGE WIND ENERGY SYSTEMS IN CALIFORNIA. FINAL REPORT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, JUNE 1980. 200 P.
P-500-80-031

THE GOAL OF THIS CONTRACT IS TO EVALUATE THE POTENTIAL IMPACT OF LARGE WIND ENERGY SYSTEMS IN CALIFORNIA. TO ACCOMPLISH THIS A NUMBER OF ISSUES ARE ADDRESSED TO GIVE AN OVERVIEW OF WIND ENERGY AS IT MIGHT DEVELOP IN CALIFORNIA. THESE ISSUES INCLUDE: CALIFORNIA WIND RESOURCES; UTILITY APPLICATIONS; ENVIRONMENTAL IMPACTS; ECONOMIC IMPACTS; INSTITUTIONAL FACTORS; AND EQUIPMENT AVAILABILITY.

1980-0202 DUENSING G
WINDS PREVAILING IN GERMAN COASTAL REGIONS.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 441-449.

THE DATA AVAILABLE AT THE DEUTSCHER WETTERDIENST PERMIT THE WIND ENERGY POTENTIAL OF THE GERMAN COAST TO BE EVALUATED. FROM THE MEDIUM WIND VELOCITY CHART MARKED REDUCTION OF THE STRONG WINDS PREVAILING OVER THE SEA IS OBVIOUS AS THEY MOVE INLAND. THIS FOLLOWS THAT THE IMMEDIATE COASTAL AREAS OF THE NORTH SEA AND THE ISLE OF FEHMARN ONLY WILL ALLOW AN OPTIMAL UTILIZATION OF WIND FORCES. THE DIRECT CORRELATION BETWEEN WIND VALUE AND AREA SUGGESTS THAT AN EFFICIENT COMPOUND SYSTEM OF WIND CONVERTERS SHOULD BE INSTALLED, WIDELY SPACED, IN THAT PARTICULAR AREA. CONSTRUCTIONS SHOULD BE ABLE TO TAKE GUSTY WIND LOADS OF AT LEAST 50 M/S IN COASTAL AREAS.

1980-0203 DUFFY R E, JARAN C, UNGERMANN C
AERODYNAMIC CHARACTERISTICS OF THE TARP (TOROIDAL ACCELERATOR ROTOR PLATFORM) WIND ENERGY CONVERSION SYSTEM.
FINAL REPORT 1978-1979.
NTIS, FEBRUARY 1980. 72 P.
PB81-140675

AUGMENTED WIND ENERGY CONVERSION SYSTEMS ARE DESIGNED TO INCREASE THE AMBIENT WIND VELOCITY AT THE TURBINE BLADES. THE TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) IS AN INNOVATIVE, AUGMENTING STRUCTURE FOR USE WITH HORIZONTAL AXIS WECS. ITS SHAPE RESEMBLES THAT OF A HORIZONTALLY-ORIENTED WHEEL RIM AND IS INTENDED TO BE BUILT INTO OR RETROFITTED ONTO STRUCTURES BUILT FOR OTHER PURPOSES, WHICH COULD INCREASE THE USE OF WECS IN URBAN AREAS. THIS REPORT DETAILS HOW VARIATIONS OF THE BASIC TARP STRUCTURE, ABOUT THREE FEET IN DIAMETER, WERE TESTED IN A WIND TUNNEL TO DETERMINE THE OPTIMUM DESIGN. THE MODEL SYSTEM PRODUCED UP TO 4.5 TIMES THE POWER WHICH THE ROTOR AND GENERATOR EXTRACTED WITHOUT THE TARP.

1980-0204 DULIKRAVICH D S
WIND: COMPUTER PROGRAM FOR CALCULATION OF THREE DIMENSIONAL POTENTIAL COMPRESSIBLE FLOW ABOUT WIND TURBINE ROTOR BLADES.
NTIS, OCTOBER 1980. 20 P.
NASA-TP-1729, N80-33357

A COMPUTER PROGRAM IS PRESENTED WHICH NUMERICALLY SOLVES AN EXACT, FULL POTENTIAL EQUATION (FPE) FOR THREE DIMENSIONAL, STEADY, INVISCID FLOW THROUGH AN ISOLATED WIND TURBINE ROTOR. THE PROGRAM AUTOMATICALLY GENERATES A THREE DIMENSIONAL, BOUNDARY CONFORMING GRID AND ITERATIVELY SOLVES THE FPE WHILE FULLY ACCOUNTING FOR BOTH

THE ROTATING CASCADE AND CORIOLIS EFFECTS. THE PROGRAM IS CAPABLE OF ACCURATELY ANALYZING INCOMPRESSIBLE AND COMPRESSIBLE FLOWS, INCLUDING THOSE THAT ARE LOCALLY TRANSONIC AND TERMINATED BY WEAK SHOCKS.

1980-0205 ECONOMIC ANALYSIS OF OCEAN THERMAL AND WIND POWER PLANTS AND POWER GENERATION. JANUARY, 1972-DECEMBER, 1980.
NTIS, DECEMBER 1980. 70 P.
PB81-856478, NERACIAANT2679

THIS RETROSPECTIVE BIBLIOGRAPHY CONTAINS CITATIONS CONCERNING ECONOMIC ANALYSIS AND EVALUATION OF THE TECHNIQUES AND TECHNOLOGY FOR OCEAN THERMAL ENERGY CONVERSION SYSTEMS AND SMALL AND LARGE WIND ENERGY CONVERSION SYSTEMS. GOVERNMENT POLICIES AND ECONOMIC INCENTIVES TO COMMERCIALIZATION WORLDWIDE ARE INCLUDED ALONG WITH CONSIDERATIONS OF ECONOMIC PROSPECTS AND FEASIBILITY.

1980-0206 EDESESS M
ECONOMICS OF ON-SITE WIND POWER.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 156-159.

WIND-ELECTRIC POWER RAPIDLY IS BECOMING ECONOMICAL FOR ON-SITE APPLICATIONS. IT WILL SOON BE HIGHLY COMPETITIVE WITH GRID ELECTRICITY OR ON-SITE DIESEL-ELECTRIC POWER. THE ECONOMIC COMPARISONS PRESENTED HERE ARE BASED ON CONVENTIONAL, CONSERVATIVE ASSUMPTIONS ABOUT FUTURE INCREASES IN MATERIALS AND ENERGY COSTS. THESE COMPARISONS INDICATE THAT WIND POWER IS WORTH SERIOUS CONSIDERATION FOR ON-SITE POWER GENERATION.

1980-0207 EDRIS A-A
DYNAMIC CHARACTERISTICS OF A WIND DRIVEN INDUCTION GENERATOR EQUIPPED WITH THYRISTOR CONTROLLED INDUCTANCES ON THE STATOR SIDE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F2, P. 279-296.

THE PAPER PRESENTS AN APPROACH TO STUDY THE INFLUENCE OF THYRISTOR CONTROLLED INDUCTANCES IN SERIES WITH THE STATOR WINDING OF AN INDUCTION GENERATOR ON ITS DYNAMIC CHARACTERISTICS IN WIND POWER PLANTS. A MATHEMATICAL MODEL FOR DIGITAL COMPUTER SIMULATION IS DEVELOPED. THE MODEL IS FORMULATED IN A STATE-SPACE FORM IN WHICH THE GENERATOR IS REPRESENTED BY A PHASE CO-ORDINATE MODEL (THREE-AXIS MODEL). THE RESULTS OF THE COMPUTER SIMULATION OF THE MODEL HAVE SHOWN THAT CONTROLLED INDUCTANCES IN SERIES WITH THE GENERATOR STATOR WINDING CAN BE USED TO PARRY THE GENERATOR TRANSIENTS CAUSED BY IMPACTS IN ITS DRIVING TORQUE. THE IMPACT TORQUE CONSIDERED IN THIS ANALYSIS HAS AN IMPULSE FORM, WHICH IS A TYPICAL REPRESENTATION FOR WIND GUSTS.

1980-0208 EGGWERTZ S
STUDY OF WIND ENERGY CONVERSION SYSTEMS (WECS) IN A FARM AREA AND WECS SAFETY LIMIT REQUIREMENTS. MINUTES FROM EXPERT MEETING IEA, RESEARCH AND DEVELOPMENT WECS, ANNEX ONE, SUBTASK A1.
NTIS, JUNE 1980. 114 P. (IN DUTCH)
IEA WECS SUB-TASK A1 MEETING, STOCKHOLM, FEBRUARY 25, 1980.
N81-19636

THE PROCEEDINGS INCLUDE THE DESCRIPTION OF TWO 2500 KW WINDMILL PROTOTYPES, SAFETY STUDIES PERFORMED IN SEVERAL COUNTRIES, AND A CONTRIBUTION CONCERNING FAULT TREE ANALYSIS AND LOAD CASE RECOMMENDATIONS. THE INTRODUCTION OF SAFE ZONE, THE CRACK DETECTION SYSTEM, AND OPERATION DURING ICING CONDITIONS ARE DISCUSSED.

1980-0209 EGUCHI N, OGASAWARA M
WIND TURBINE GENERATORS FOR TELECOMMUNICATIONS.
JPN. TELECOMMUN. REV. 22(3): 275-281, JULY 1980.

TWO GENERATING SYSTEMS, ONE USING A PROPELLER AND THE OTHER A DARRIEUS UNIT, WERE MANUFACTURED AND HAVE BEEN UNDER FIELD TESTS IN ORDER TO DETERMINE THEIR DURABILITY, WEATHERABILITY AND OTHER CHARACTERISTICS UNDER NATURAL OPERATING CONDITIONS.

1980-0210 ELLIOTT D L, BARCHET W R
WIND ENERGY RESOURCE ATLAS. VOLUME 1. NORTHWEST REGION.
NTIS, APRIL 1980. 192 P.
PNL-3195-WERA-1

INFORMATION IS PRESENTED CONCERNING REGIONAL WIND ENERGY RESOURCE ASSESSMENT; REGIONAL FEATURES; AND STATE FEATURES FOR IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING.

1980-0211 EMERSON G
A HISTORY OF INNOVATION IN WIND POWER.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 1-8.
SERI/CP-635-938

HISTORICALLY, THE NEED FOR CHEAP, SIMPLE MOTIVE POWER HAS BROUGHT ABOUT INNOVATIONS IN THE USE OF WIND AS A SOURCE OF ENERGY. THESE INNOVATIONS TEND TO COME IN DISCRETE ERAS AND NOT AS A CONTINUOUS PROGRESSION. AN ERA USUALLY DRAWS TO A CLOSE WITH A CHEAPER, MORE CONVENIENT SOURCE OF ENERGY BEING MADE READILY AVAILABLE. THUS, THE PRESENT ERA MAY END IF A MAJOR BREAKTHROUGH IN ENERGY TECHNOLOGY SHOULD OCCUR SUCH AS DEVELOPMENT OF A WORKABLE NUCLEAR FUSION POWER PLANT. THE NUMBER OF INNOVATIONS PER ERA HAS INCREASED EXPONENTIALLY; THEREFORE, WITH THE CURRENT RESURGENCE WE FIND THE GREATEST NUMBER OF INNOVATIONS IN THE USE OF WIND ENERGY IN HISTORY.

1980-0212 ESCHER W J D, FOSTER R W, TISON R R, HANSON J A
SOLAR/HYDROGEN SYSTEMS TECHNOLOGIES. VOLUME II. SOLAR/HYDROGEN SYSTEMS ASSESSMENT. FINAL REPORT.
NTIS, JUNE 2, 1980. 2 PARTS: PART 1, 279 P.; PART 2, 237 P.
DOE/JPL-955492(VOL.2)(PTS. 1 AND 2)

SEE ENTRY FOR VOLUME 1, 1980-0225.

1980-0213 ETHELFELD J, JENSEN F, KJOLLER J, LYSTRUP A
ARBEJDSRAPPORT OG VEJLEDNING VEDRORENDE REPARATION AF TRE STK. VINGER TIL 30 KW RIISAGERMOLLE. (WORKING REPORT AND INSTRUCTION FOR REPAIRING OF THRE E PIECES OF WINGS FROM A 30 KW RIISAGERMILL).
RISO NATL. LAB. REP. NO. 2207: JANUARY 1980. 21 P. (IN DUTCH) ALSO: NTIS, JANUARY 1980. 21 P.
PB81-174021, RISO-M-2207

THIS REPORT IS MADE TO GIVE THE OWNERS OF RIISAGER WINDMILLS INSTRUCTIONS TO SERVICE AND REPAIR THE FIBERGLASS

BLADES.

1980-0214 ETHELFELD J
STATUSRAPPORT VEDRORENDE BREMSEAKTIVERINGSSYSTEM--CENTRIFUGALUDLOSER--AF 30 KW RIISAGERMOLLE. (STATUS REPORT ON ACTIVATIONS SYSTEM, CENTRIFUGAL SWITCH, OF A 30 KW RIISAGER MOLLE WITH 10 M WING SPAN).
RISO NATL. LAB. REP. NO. 2220: APRIL 1980. 21 P. (IN DUTCH) ALSO: NTIS, APRIL 1980. 21 P.
PB81-174039, RISO-M-2220

THE REPORT IS MADE TO HELP THE OWNERS AND THE TECHNICAL PERSONNEL OF OLD WINDMILLS: TO MAKE A NEW INDUCTION SENSOR WHICH GIVES A QUICK ACTIVATION OF THE ORIGINAL BRAKE ACTIVATION SYSTEM; TO BUILD A NEW BRAKE ACTIVATION SYSTEM, WITH ITS OWN NEW INDEPENDENT INDUCTION SENSOR SYSTEM; AND TO CHANGE THE (ORIGINAL) CENTRIFUGAL SWITCH FOR THE BRAKE SO THAT A QUICKER ACTIVATION IS OBTAINED.

1980-0215 EXPERIMENTAL WIND TURBINE TO START UP IN JANUARY, 1981.
INGENIEUR 92(47): 20-21, NOVEMBER 20, 1980. (IN DUTCH)

THE PAPER DESCRIBES THE FIRST LARGE DUTCH EXPERIMENTAL WIND TURBINE, WHICH WILL COME INTO SERVICE IN MID-JANUARY 1981. THE 25 M DIAMETER HORIZONTAL SHAFT TURBINE IS ABOUT 22 M ABOVE GROUND LEVEL AND PRODUCES 300 KW AT 13 M/S WIND SPEED. THE ROTOR IS CARBON FIBRE REINFORCED PLASTIC. THE INSTRUMENTATION OF THIS EXPERIMENTAL TURBINE INCLUDES INSTRUMENTS FOR MEASURING VIBRATION OF VARIOUS PARTS. THE TURBINE OPERATES BETWEEN 6 AND 17 M/S WIND SPEED (12-23 KNOTS), UTILIZING 13 % OF THE TOTAL WIND ENERGY AT THE SITE. THE TURBINE IS DESIGNED FOR 120 RPM BUT RUNS NORMALLY AT 30-80 RPM. AT THE MAXIMUM OUTPUT SETTING THE TURBINE WILL GENERATE 500,000 KWH PER YEAR. COMMERCIAL WIND TURBINES COULD BE AVAILABLE IN 1983 (FROM 10 TO 50 M ROTOR DIAMETER).

1980-0216 EXTRACTING ENERGY FROM WIND.
NYSERDA REV.: 1-6, JANUARY 1980.

SUCCESSFUL IMPLEMENTATION OF WIND POWER WILL REQUIRE RESOLUTION OF A NUMBER OF INSTITUTIONAL AND TECHNICAL PROBLEMS. THIS PAPER OUTLINES SOME OF THE MAJOR BARRIERS TO WIND USE. THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA) IS SUPPORTING RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS AIMED AT IMPROVING THE EFFICIENCY OF WIND SYSTEMS. THE ARTICLE HIGHLIGHTS SOME OLD WIND MACHINES AS WELL AS MODERN WIND PROJECTS. WIND-USE STUDIES AND PROJECTS UNDERTAKEN BY THE NYSERDA INCLUDE AUGMENTATION WIND ENERGY SYSTEMS, WIND TURBINES WITHOUT TOWERS, CONVERSION OF WIND ENERGY TO HEAT OR ELECTRICITY, AND STUDIES OF LAWS AND CODES THAT ARE BARRIERS TO WIND USE. STUDIES ARE ALSO BEING CORRELATED TO IDENTIFY AREAS THAT HAVE HIGH WIND ENERGY AVAILABLE.

1980-0217 FANSTEN M
FINANCING OF RENEWABLE ENERGY SOURCES (SOLAR, WIND AND BIOMASS ENERGY SOURCES).
REV. ENERG. 31(327): 32-43, AUGUST-SEPTEMBER, 1980.

THIS PAPER CONSIDERS THE UTILISATION OF RENEWABLE ENERGY SOURCES AS ALTERNATIVES TO THE CONVENTIONALLY USED FOSSIL AND NUCLEAR ENERGY SOURCES. PROBLEMS OF INVESTMENT INTO RESEARCH AND EXPERIMENTATION ARE DISCUSSED QUITE EXHAUSTIVELY AND THE ATTITUDES PREVAILING KEEPING THIS PROGRAMME ON A LOW BUDGET ARE POINTED OUT.

1980-0218 FARMER E D, NEWMAN V G, ASHMOLE P H
ECONOMIC AND OPERATIONAL IMPLICATIONS OF A COMPLEX OF WIND DRIVEN GENERATORS ON A POWER SYSTEM.
INST. ELECTR. ENG. PROC. PT. A 127(5): 289-295, JUNE 1980.

AN ASSESSMENT IS PRESENTED OF THE TECHNICAL AND ECONOMIC IMPLICATIONS OF INTEGRATING A SIZEABLE COMPLEX OF AEROGENERATORS INTO A POWER SYSTEM. AN IMPORTANT ECONOMIC AND OPERATIONAL FACTOR IS THE VARIABLE AND UNCERTAIN NATURE OF THE WIND. HOWEVER, IT IS SHOWN THAT THE EFFECTS OF THE MORE RAPID FLUCTUATIONS ARE LARGELY MITIGATED BY THE INCOHERENCY OF DIFFERENT MACHINE OUTPUTS; A DIVERSITY FACTOR IS DEFINED IN TERMS OF THE SPACING OF AN ARRAY OF MACHINES AND THE TURBULENCE LENGTH SCALE. IN CONTRAST, THE SLOWER VARIATIONS ARE SHOWN TO REQUIRE A SIGNIFICANT ENHANCEMENT OF THE OPERATIONAL RESERVE CAPACITY BUT NOT TO NECESSITATE THE ADDITION OF DEDICATED STORAGE, TO ACCOMODATE WIND-POWER PENETRATION UP TO ABOUT 20 PERCENT OF MAXIMUM DEMAND. THE INCREASED UNCERTAINTY OF THE RESIDUAL GENERATION, OVER THE SCHEDULING PERIOD, SIGNIFICANTLY AFFECTS THE ECONOMICS OF UTILISATION OF PUMPED-STORAGE AND GAS-TURBINES AS STANDBY PLANT. THE RESULTS OF AN ANALYSIS OF A YEAR'S DATA, PERTAINING TO DEMAND AND WIND SPEED AT 4 WELL SEPARATED SITES, ARE PRESENTED. FINALLY, THOSE PRINCIPAL SYSTEM ASPECTS, THAT REQUIRE DETAILED EVALUATION, ARE IDENTIFIED AND DISCUSSED.

1980-0219 FEGAN G R, PERCIVAL C D
PLANNING FOR ELECTRIC UTILITY SOLAR APPLICATIONS: THE EFFECTS ON RELIABILITY AND PRODUCTION COST ESTIMATES OF THE VARIABILITY IN DEMAND.
ASME CENTURY 2 EMERGING TECHNOLOGY CONFERENCE, SAN FRANCISCO, CALIFORNIA, AUGUST 10, 1980. NTIS, JANUARY 1980. 14 P.
CONF-800804-18, SERI/TP-351-545

PREVIOUS STUDIES HAVE SHOWN THE NECESSITY OF THE CONSIDERATION OF HOURLY VARIABILITY IN THE OUTPUT FROM THE INTERMITTENT GENERATION SOURCE. HOWEVER, THE STUDIES DID NOT TAKE INTO ACCOUNT THE VARIABILITY IN THE DEMAND. A RESULT IS PRESENTED WHICH SHOWS THAT UNDER GENERAL CONDITIONS THE VARIABILITY DUE TO RANDOMNESS CAN BE IGNORED EXCEPT IN THE NEIGHBORHOOD OF THE PEAK AND MINIMUM DEMANDS.

1980-0220 FEUSTEL J E, HELM S, KOERBER F
LARGE WIND ENERGY CONVERTER: GROWIAN 3 MW.
GROSSE WINDENERGIEANLAGE GROWIAN 3 MW. BAUREIFE UNTERLAGER FUER GROSSE WINDENERGIEANLAGE, REPT. ET 40884, NUREMBERG, MASCHINENFABRIK AUGSBURG-NUERNBERG A.G., 1979. 92 P. TRANSL.: NTIS, NOVEMBER 1980. 90 P.
N81-20543/7, NASA-TM-75404

THE FINAL REPORT ON THE PROJECTED APPLICATION OF LARGE-SCALE WIND TURBINE ON THE NORTHERN GERMAN COAST IS SUMMARIZED. THE DESIGNS OF THE TOWER, MACHINERY HOUSING, ROTOR, AND ROTOR BLADES ARE DESCRIBED. ROTOR BLADE ADJUSTMENT DEVICES, AUXILIARY AND ACCESSORY EQUIPMENT ARE EXAMINED.

1980-0221 FEUSTEL J E, STOY B
SOLAR ENERGY AND WIND ENERGY--A CONTRIBUTION TO COVERING FUTURE ENERGY DEMAND.
BRENNST.-WAERME-KRAFT 32(9): 360-366, SEPTEMBER 1980. (IN GERMAN)

THE VARIOUS FORMS AND CHARACTERISTIC FEATURES OF SOLAR ENERGY ARE SHOWN. AN OVERVIEW IS GIVEN FOR THE DIRECT POSSIBILITIES OF USING IT. SOLAR COLLECTORS AND THEIR MOST IMPORTANT DEVELOPMENTS IN THE LOWER, MEDIUM AND HIGH TEMPERATURE RANGE ARE DESCRIBED, AS WELL AS DEVELOPMENT ACTIVITIES IN THE FIELD OF THE PHOTOELECTRIC

TRANSFORMATION OF LIGHT INTO ELECTRIC CURRENT, WITH THE HELP OF SOLAR CELLS. THE INDIRECT UTILISATION OF SOLAR ENERGY BY USING HEAT PUMPS IS ALSO PRESENTED. THE AUTHORS DEAL WITH APPLICATIONS OF WIND AS A FURTHER FORM OF INDIRECT SOLAR ENERGY UTILISATION. THE PRESENT INTERNATIONAL STATE OF WIND ENERGY CONVERTORS, FUTURE POSSIBILITIES AS WELL AS LIMITS OF THE ENERGY UTILISATION ARE CONSIDERED.

1980-0222 MAHRT L, HEALD R C
ANALYSIS OF STRONG NOCTURNAL SHEARS FOR WIND MACHINE DESIGN.
NTIS, NOVEMBER 1980. 77 P.
DOE/ET/23116-80/1, PNL-3781

WIND SHEAR DATA AT WIND TURBINE HEIGHTS FROM SEVERAL SITES IS REVIEWED AND NEW DATA IS DOCUMENTED IN TERMS OF TOTAL AND COMPONENT SHEAR. A VARIETY OF ATMOSPHERIC SCENARIOS MAY COMBINE TO GIVE LARGE PERSISTENT SHEAR. AMONG THESE, STRONG BOUNDARY LAYER STABILITY IS FOREMOST. IT OCCURS WITH STRONG NOCTURNAL SURFACE COOLING, IN LOW LEVEL FRONTAL AND SUBSIDENCE INVERSIONS, AND IN THUNDERSTORM OUTFLOWS. STRONG SHEARS RESULTING FROM SURFACE RADIATION INVERSIONS ARE PARTICULARLY EVIDENT OVER THE HIGH PLAINS WHERE DRY AIR AND HIGH ALTITUDE COMBINE TO RESULT IN STRONG RADIATIONAL COOLING. TERRAIN IS ALSO AN IMPORTANT INFLUENCE ON SHEAR BUT IT IS NOT WELL UNDERSTOOD AND IS VERY SITE SPECIFIC.

1980-0223 FINAL ENVIRONMENTAL IMPACT REPORT FOR THE CALIFORNIA ENERGY COMMISSION SOLAR ENERGY COMMISSION SOLAR PROGRAM AND WIND PROGRAM.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, MAY 1980. 195 P.
P-700-80-005

THIS FINAL ENVIRONMENTAL IMPACT REPORT ANALYZES THE CALIFORNIA ENERGY COMMISSION'S SOLAR PROGRAM AND WIND PROGRAM. THE WIND PROGRAM HAS A NEAR-TERM GOAL OF 500 MEGAWATTS OF WIND GENERATED ELECTRICITY ON LINE IN CALIFORNIA BY 1985. POTENTIAL SITES FOR WIND DEVELOPMENT FROM A WIND RESOURCE STANDPOINT OCCUR IN THE DESERT AND MOUNTAINS WHERE STRONG, PERSISTENT WINDS OCCUR. THE SITING OF A SPECIFIED NUMBER OF WIND TURBINES MAY POSE POTENTIAL ENVIRONMENTAL IMPACTS, BUT THESE EFFECTS ARE MITIGABLE. THE MOST SUBSTANTIAL CONCERN IS THE NEED FOR SCATTERED WIND TURBINES OVER A GIVEN AREA. CONSTRUCTION IMPACTS FROM TURBINE PAD LEVELING, ACCESS ROADS AND TRANSMISSION CORRIDORS COULD BE CONSIDERABLE. CONFLICTS WITH EXISTING AND FUTURE LAND USE MAY ALSO OCCUR. OPERATIONAL EFFECTS INCLUDE MINOR CHANGES IN MICROCLIMATE, BIRD COLLISIONS WITH THE TURBINE BLADES, NOISE, INCREASED OFF-ROAD VEHICLE USE, AESTHETICS AND RADIO AND TELEVISION WAVE INTERFERENCE.

1980-0224 FLOWERDEW HUNDRED.
WIND POWER DIG. NO. 20: 32-33, SUMMER 1980.

1980-0225 FOSTER R W, TISON R R, ESCHER W J D, HANSON J A
SOLAR/HYDROGEN SYSTEMS FOR THE 1985 TO 2000 TIME FRAME. VOLUME I. SOLAR/HYDROGEN SYSTEMS ASSESSMENT. FINAL REPORT.
NTIS, JUNE 1, 1980. 147 P.
DOE/JPL-955492(VOL.1)

THE FINDINGS OF A STUDY OF OPPORTUNITIES FOR COMMERCIALIZATION OF SYSTEMS CAPABLE OF PRODUCING HYDROGEN FROM SOLAR ENERGY ARE PRESENTED IN TWO VOLUMES. VOLUME I FIRST REVIEWS THE BACKGROUND OF THE WORK AND THE METHODS USED. THEN AN EVALUATION OF THE HYDROGEN PRODUCT COSTS THAT MIGHT BE ACHIEVED BY THE FOUR SELECTED CANDIDATE SYSTEMS (PHOTOVOLTAIC/WATER ELECTROLYSIS, THERMAL-HEAT ENGINE/WATER ELECTROLYSIS, WIND ENERGY/WATER ELECTROLYSIS, SMALL HYDROGEN/WATER ELECTROLYSIS) IS COMPARED WITH THE PRICING STRUCTURE AND PRACTICES OF THE COMMODITY GAS MARKET. SUBSEQUENTLY, PRODUCT COST AND MARKET PRICE MATCH IS NOTED TO EXIST IN THE SMALL USER SECTOR OF THE HYDROGEN MARKETPLACE. BARRIERS TO AND HISTORICAL TIME LAGS IN COMMERCIALIZATION OF NEW TECHNOLOGIES ARE THEN REVIEWED. FINALLY, RECOMMENDATIONS FOR DEVELOPMENT AND DEMONSTRATION PROGRAMS DESIGNED TO ACCELERATE THE COMMERCIALIZATION OF THE CANDIDATE SYSTEMS ARE PRESENTED.

1980-0226 FRANDSEN S, CHRISTENSEN C J
ON WIND TURBINE POWER MEASUREMENTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D4, P. 207-222.

A STATISTICAL TREATMENT OF THE WIND TURBINE POWER CURVE IS PRESENTED. IT IS SHOWN THAT VARIATIONS IN U AND P CAN BE HANDLED MORE CONVENTIONALLY BY MEANS OF TWO PARAMETERS: THE COHERENT VARIATION ALONG THE POWER CURVE AND THE INCOHERENT ACROSS THE CURVE. THE AVERAGING TIME PROBLEM IS DISCUSSED. THE RESPONSE OF THE POWER TRAIN TO TURBULENCE IN THE WIND AND TO GRID FREQUENCY VARIATIONS IS DISCUSSED IN A SPECTRAL LANGUAGE. A SPECTRAL RESPONSE FUNCTION FOR THE POWER TRAIN IS DERIVED.

1980-0227 FREEMAN P A
HARNESS THE WIND FOR AERATION.
WATER WASTES ENG. 17(9): 25-26, 29, 56, SEPTEMBER 1980.

THE NEW WASTEWATER AERATION SYSTEM DESCRIBED PUSHES OXYGEN-RICH SURFACE WATER TO THE LAGOON BOTTOM--AN APPROACH THAT IS REPORTED TO REQUIRE LESS ENERGY THAN CONVENTIONAL AERATION. THE AUTHOR SHOWS THAT WINDS AS LOW AS 1 MPH CAN TURN THE TURBINES THAT POWER THIS NEW, ENERGY-EFFICIENT AERATION SYSTEM.

1980-0228 FREER R
WIND POWER GENERATION FOR NATIONAL AND REGIONAL GRID SYSTEMS; DESIGN PROPOSALS FOR GENERATION AND TRANSMISSION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A3, P. 43-60.

ONE PROBLEM WITH ALL RENEWABLE ENERGY SOURCES IS TO CONVERT THE ENERGY INTO A COMMERCIALLY USEFUL FORM. THIS PAPER DEMONSTRATES HOW WIND ENERGY CAN BE CONVERTED INTO ELECTRICITY AT CONSTANT VOLTAGE AND CONSTANT FREQUENCY ON A COMMERCIAL SCALE BY USING A HYDRAULIC POWER CONVERSION SYSTEM, AND CONNECTED TO NATIONAL AND REGIONAL GRID SYSTEMS. FOR AN OFFSHORE ARRAY OF TOWERS IN SHALLOW WATER UP TO ABOUT 12 M DEEP THE MOST ECONOMICAL FOUNDATION APPEARS TO BE AN ARTIFICIAL ISLAND WHICH COULD BE BUILT UP PARTLY FROM DREDGED MATERIAL. WE BELIEVE THE CORRECT METHOD OF EVALUATING THE FINANCIAL BENEFIT FROM A WIND ENERGY SOURCE IS TO ASSESS IT IN TERMS OF THE SAVING OF CONVENTIONAL FUELS, INSTEAD OF IN TERMS OF HYPOTHETICAL UNIT GENERATION COST. THE FUEL SAVING WOULD START AS SOON AS THE FIRST MACHINES WERE COMMISSIONED WHICH WOULD MINIMISE THE PERIOD OF TIME FOR WHICH CAPITAL WOULD BE REQUIRED FOR THE CONSTRUCTION OF A LARGE ARRAY. THE EQUIPMENT DESCRIBED IN THIS DESIGN IS WITHIN THE PRESENT AND PROPOSED RANGE OF DEVELOPMENT OF COMMERCIAL MACHINERY AND PROTOTYPE DESIGN COULD BE STARTED AS SOON AS FINANCE WAS AVAILABLE.

1980-0229 FRIEDMANN P P
AEROELASTIC STABILITY AND RESPONSE ANALYSIS OF LARGE HORIZONTAL-AXIS WIND TURBINES.

J. IND. AERODYN. 5(3-4): 373-401, MAY 1980.

THE PAPER PRESENTS A REVIEW OF RECENT RESEARCH ON AEROELASTIC AND STRUCTURAL DYNAMIC ASPECTS OF LARGE HORIZONTAL-AXIS WIND TURBINES. THE LITERATURE AVAILABLE IN THE FIELD IS REVIEWED WITH CONSIDERABLE DETAIL AND THE FUNDAMENTAL DIFFERENCES BETWEEN HELICOPTER ROTOR AEROELASTIC PROBLEMS AND THE WIND TURBINE AEROELASTIC PROBLEM ARE CAREFULLY OUTLINED. FORMULATION OF THE ISOLATED BLADE AEROELASTIC PROBLEM AS WELL AS THE COUPLED ROTOR/TOWER SYSTEM, ARE TREATED IN CONSIDERABLE DETAIL. RESULTS ILLUSTRATING THE CHARACTERISTICS OF THE ISOLATED BLADE BEHAVIOR ARE PRESENTED. COUPLED ROTOR/TOWER BEHAVIOR IS ALSO ILLUSTRATED WITH AN EMPHASIS ON ROTOR-TOWER-YAW DRIVE INTERACTION AND ROTOR/TOWER INTERACTION. VARIOUS OTHER STRUCTURAL DYNAMIC AND AEROELASTIC PROBLEMS OCCURRING IN WIND TURBINES ARE ALSO BRIEFLY DISCUSSED.

1980-0230 FRIEDMAN P A
SOLAR AND WIND ENERGY TAX INCENTIVES: STATE STATUTES.
ENERGY LAW SERVICE. VOLUME 3. MONOGRAPHS. WILMETTE, ILLINOIS, CALLAGHAN AND COMPANY, 1980. P. 1-59.

FORTY STATES PROVIDE TAX INCENTIVES FOR THE PURCHASE AND INSTALLATION OF SOLAR OR WIND EQUIPMENT. THIS MONOGRAPH PROVIDES A CONCISE REFERENCE TO STATE TAX INCENTIVES AVAILABLE TO RESIDENTIAL AND COMMERCIAL INVESTORS IN SOLAR AND WIND EQUIPMENT. WHILE FEDERAL INCENTIVES CONSIST STRICTLY OF INCOME TAX CREDITS, THE STATE INCENTIVES REFLECT VARIOUS FORMS OF REVENUE-RAISING AVAILABLE TO STATES AND LOCALITIES. DEPENDING UPON THE STATE, QUALIFYING EXPENDITURES CAN EARN INDIVIDUAL AND CORPORATE INCOME TAX CREDITS, DEDUCTIONS AND RAPID DEPRECIATION, SALES AND USE TAX EXEMPTIONS, PROPERTY-TAX EXEMPTIONS AS WELL AS LIMITED ASSESSMENT, AND REDUCED CORPORATE FRANCHISE TAXES. CERTAIN STATES HAVE EXPRESSLY GRANTED LOCAL GOVERNMENTS POWER TO ENACT THEIR OWN TAX INCENTIVES.

1980-0231 FROST W
STANDARD DEVIATIONS AND CONFIDENCE INTERVALS FOR ATMOSPHERIC DESIGN CRITERIA USED IN WECS DEVELOPMENT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER B3, P. 107-131.

AN ENGINEERING HANDBOOK ENTITLED "ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT" WAS PREPARED UNDER A NASA CONTRACT TO PROVIDE DESIGN CRITERIA RECOMMENDED FOR USE IN BOTH SMALL AND LARGE-SCALE WECS. THIS PAPER SUPPLEMENTS THE DESIGN CRITERIA BY CARRYING OUT A DETAILED COMPARISON OF THE RECOMMENDED DESIGN CURVES WITH EXPERIMENTAL DATA FOR 1) VERTICAL SHEAR HORIZONTAL WIND AND 2) ATMOSPHERIC WIND SPEED TURBULENCE SPECTRA AND INTENSITIES. THESE DATA ARE DIRECTLY USED IN ANALYSIS OF THE VIBRATION AND FATIGUE LOADING OF WIND TURBINE ROTOR BLADES.

1980-0232 FROST W, KAUFMAN J W
WIND WHEEL TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 131-156.
SERI/CP-635-938

AN ANALYTICAL AND EXPERIMENTAL STUDY OF AN INNOVATIVE WIND WHEEL TURBINE (WWT) IS REPORTED. EVALUATION OF THE PROBABLE PERFORMANCE, POSSIBLE PRACTICAL APPLICATIONS, AND ECONOMIC VIABILITY AS COMPARED TO OTHER CONVENTIONAL WIND ENERGY SYSTEMS IS DISCUSSED. THE WWT APPARATUS IS ESSENTIALLY A BLADED WHEEL WHICH IS DIRECTLY EXPOSED TO THE WIND ON THE UPPER HALF AND EXPOSED TO WIND THROUGH MULTIPLE DUCTING ON THE LOWER HALF. THE MULTIPLE DUCTS CONSIST OF A FORWARD DUCT (FRONT CONCENTRATOR) AND TWO SIDE DUCTS (SIDE CONCENTRATORS). THE FORCED ROTATION OF THE WHEEL IS THEN CONVERTED TO POWER THROUGH APPROPRIATE SUBSYSTEMS. RESULTS OF A SERIES OF PRELIMINARY TESTS ON TWO SIMPLE MODELS, A PAPER MODEL (MODEL NO. 1) AND A STAINLESS STEEL MODEL (MODEL NO. 2) ARE REPORTED. MEASURED VALUES OF POWER COEFFICIENTS OVER WIND SPEEDS RANGING FROM 4 TO 16 M/S ARE GIVEN. A SIMPLE ANALYTICAL MODEL OF A FOUR-BLADED WHEEL IS ALSO DEVELOPED.

1980-0233 FUNG T K, SCHEFFLER R L, STOLPE J
WIND ENERGY--A UTILITY PERSPECTIVE.
IEEE POWER ENGINEERING SOCIETY, SUMMER MEETING, MINNEAPOLIS, MINNESOTA, JULY 13-18, 1980. PAPERS. PISCATAWAY, N.J., IEEE POWER ENGINEERING SOCIETY, 1980. PAPER NO. 80 SM 564-5, 7 P.

OF ALL THE RENEWABLE ENERGY SYSTEMS, WIND TURBINE GENERATORS (WTG'S) ARE LIKELY TO MAKE THE EARLIEST SIGNIFICANT COST-EFFECTIVE CONTRIBUTION TO THE UTILITY GRID. IN ORDER TO ACCELERATE THE COMMERCIAL DEPLOYMENT OF WTG'S, SEVERAL ISSUES MUST BE ADDRESSED IN A TIMELY MANNER. THIS PAPER PRESENTS SOME OF THE ISSUES FACING THE UTILITY INDUSTRY AS THEY RELATE TO IMPLEMENTATION OF AN EFFECTIVE WIND ENERGY PROGRAM. IN ADDITION, THE SOUTHERN CALIFORNIA EDISON COMPANY'S WIND ENERGY PROGRAM IS PRESENTED, WHICH IS DESIGNED TO PROVIDE PERTINENT ANSWERS TO THE TECHNICAL, ECONOMIC AND ENVIRONMENTAL ISSUES CONCERNING WTG INSTALLATIONS AND THEIR COMMERCIAL VIABILITY AS A FUTURE GENERATION RESOURCE.

1980-0234 GARG H P, SHISHODIA K A, RANI U
REVIEW ON RENEWABLE ENERGIES IN INDIA.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 5: SOLARENERGIE IN SUEDLAENDERN. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 343-353.

THE ENERGY CRISIS IS A MAJOR TOPIC OF THE WHOLE WORLD. THE RENEWABLE ENERGY SOURCES LIKE SOCIAL FORESTRY, BIO-GAS, WIND-POWER, AND SOLAR ENERGY CAN BE EFFECTIVELY USED FOR MEETING THE ENERGY REQUIREMENT OF INDIA. THE POTENTIAL OF THESE ENERGY SOURCES, THE WORK DONE IN THESE AREAS IN INDIA, AND THEIR LIMITATIONS ARE DESCRIBED IN THIS PAPER. PER CAPITA ENERGY CONSUMPTION IN INDIAN VILLAGES IS VERY LOW. SINCE MOST OF THE VILLAGES ARE REMOTELY LOCATED, CONNECTING THEM WITH ELECTRIC POWER GRID IS VERY UNECONOMICAL DUE TO HEAVY COST OF LAYING TRANSMISSION LINES AND ASSOCIATED HEAVY POWER LOSS. FOSSIL FUELS ARE ALREADY IN SHORT SUPPLY. UNDER THESE CONDITIONS MORE ENERGY CAN BE SUPPLIED BY TAPPING RENEWABLE SOURCES OF ENERGY.

1980-0235 GARSTANG M, NNAJI S, PIELKE R A, GUSDORF J, LINDSEY C, SNOW J W
COASTAL ZONE WIND ENERGY. PART 1. SYNOPTIC AND MESOSCALE CONTROLS AND DISTRIBUTIONS OF COASTAL WIND WIND ENERGY. FINAL REPORT.
NTIS, MARCH 1980. 190 P.
DOE/ET/20274-7

THIS REPORT DESCRIBES A METHOD OF DETERMINING COASTAL WIND ENERGY RESOURCES. CLIMATOLOGICAL DATA AND A MESOSCALE NUMERICAL MODEL ARE USED TO DELINEATE THE AVAILABLE WIND ENERGY ALONG THE ATLANTIC AND GULF COASTS OF THE UNITED STATES. IT IS FOUND THAT THE SPATIAL DISTRIBUTION OF THIS ENERGY IS DEPENDENT ON THE LOCATIONS OF THE OBSERVING SITES IN RELATION TO THE MAJOR SYNOPTIC WEATHER FEATURES AS WELL AS THE PARTICULAR ORIENTATION OF THE COASTLINE WITH RESPECT TO THE LARGE-SCALE WIND.

1980-0236 GARTON J E, GHERMAZIEN T, ROBINSON K
WINTER ICE REMOVAL FROM STOCK PONDS.
NTIS, 1980. 42 P.
PB81-167207

THE PURPOSE OF THIS STUDY WAS TO FIND A PRACTICAL, RELIABLE, AND INEXPENSIVE METHOD FOR MELTING ICE ON FARM PONDS DURING THE WINTER TO ALLOW LIVESTOCK ACCESSIBILITY TO WATER. AN ALTERNATIVE MEANS OF REMOVING ICE FROM THE NEAR-SHORE SURFACE OF PONDS WAS FOUND, RATHER THAN REQUIRING THAT FARMERS/RANCHERS ROUTINELY CHIP HOLES IN THE ICE. THE PERFORMANCES OF TWO METHODS WERE TESTED: (1) USE OF AN ELECTRICALLY-OPERATED SUBMERSIBLE PUMP; AND (2) A WIND ELECTRIC GENERATOR DIRECTLY CONNECTED TO AN ELECTRIC TROLLING MOTOR, TO STIMULATE CONDITIONS IN REMOTE LOCATIONS LACKING ELECTRICITY. BY EITHER TECHNIQUE, WARMER WATER FROM GREATER DEPTHS WAS CIRCULATED TO THE SURFACE OF THE POND.

1980-0237 GERHARDT K
WIND ENGINE.
U.S. PATENT NO. 4,213,737, JULY 22, 1980. 5 P.

WINDMILL APPARATUS FOR USE IN CAPTURING THE ENERGY OF THE WIND AND CONVERTING IT TO POWER COMPRISING A PLURALITY OF RELATIVELY NARROW RING-LIKE BANDS JOINED TOGETHER IN A GENERALLY CONCENTRIC RADIALLY SPACED RELATION TO FORM A WHEEL ADAPTED TO ROTATE ABOUT MEANS DEFINING THEREFOR A CENTRAL AXIS, SAID WHEEL IN USE NORMALLY ORIENTING GENERALLY PERPENDICULAR TO A GROUND SURFACE, A PLURALITY OF AIR FOILS POSITIONED BETWEEN SUCCESSIVELY ADJACENT BANDS, IN A CIRCULARLY SPACED RELATION, EACH SAID AIR FOIL HAVING MEANS PIVOTALLY MOUNTING IT FOR ADJUSTMENT ABOUT AN AXIS WHICH IS RADIAL TO THE WHEEL AXIS, THE SURFACES OF SAID FOILS AT THEIR RADIAL EXTREMITIES BEING SUBSTANTIALLY FLAT, EACH SAID FOIL BETWEEN ITS RADIAL EXTREMITIES BEING PROVIDED WITH AN OUTER PERIPHERAL SURFACE A SUBSTANTIAL PORTION OF WHICH IS FLATTENED TO DEFINE ITS OPERATING FACE WHICH IN USE OF THE FOIL IS GENERALLY FACED INTO THE PREVAILING WINDS, THE BALANCE OF THE SAID PERIPHERAL SURFACE BEING GENERALLY ACCURATE AND DEPARTING SHARPLY FROM SAID FLATTED PORTION TO GIVE THE FOIL A GENERALLY BULBOUS CONFIGURATION AT ITS SIDE OPPOSITE THAT DEFINED BY SAID FLATTED PORTION THE PEAK OF WHICH HAS A SUBSTANTIAL DEPARTURE FROM SAID FLATTED PORTION AND THERE BEING RELATIVELY LOW RATIO OF THE LENGTH OF SAID FLATTED PORTION TO THE DEPTH OF SAID FOIL AT THE LOCATION OF SAID PEAK IN A SENSE TRANSVERSE TO THE PIVOT AXIS OF THE FOIL IS DESCRIBED.

1980-0238 GEWEHR H W
DEVELOPMENT OF COMPOSITE BLADES FOR LARGE WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER C1, P. 133-140.

THE FIRST PORTION OF THIS PAPER DESCRIBES A NASA/DOE-FUNDED RESEARCH PROGRAM INVOLVING THE DESIGN, CONSTRUCTION, AND TESTING OF A LARGE, LOW COST, COMPOSITE WIND TURBINE BLADE. THE ALL-FIBREGLASS BLADE IS 150 FEET (47.5 M) LONG, REPRESENTATIVE OF A BLADE FOR A 300 FOOT (91 M) DIAMETER WIND TURBINE ROTOR. THE PRIMARY OBJECTIVE OF THE PROGRAM WAS TO DEVELOP THE ENGINEERING AND FABRICATION TECHNOLOGY FOR LARGE COMPOSITE BLADES HAVING THE POTENTIAL FOR LOW COST MANUFACTURE IN PRODUCTION QUANTITIES. A KEY ELEMENT IN DESIGN AND CONSTRUCTION OF THE BLADE WAS THE USE OF TRANSVERSE FILAMENT TAPE (TFT), WHICH IS A COMMERCIAL WOVEN ROVING HAVING ALL STRUCTURAL FIBRES TRANSVERSE TO THE LENGTHWISE DIMENSION OF THE TAPE. DEVELOPMENT OF MECHANICAL PROPERTIES OF TFT USEFUL FOR DESIGN WAS ONE OF THE PRIMARY PROGRAM TASKS. THE FABRICATION COST OF THE COMPLETE PROTOTYPE BLADE WAS $22/KG; PRODUCTION COSTS PROJECT TO LESS THAN $9/KG. SUCCESSFUL COMPLETION OF THE 150 FT (45.7 M) BLADE PROGRAM LED TO A FOLLOW-ON PROGRAM, ALSO DESCRIBED IN THIS PAPER, TO DESIGN AND BUILD TWO 100 FOOT (30.5 M) COMPOSITE BLADES FOR THE NASA/DOE MOD-1 WIND TURBINE IN BOONE, NORTH CAROLINA, USING THE TACHNOLOGY BASE DEVELOPED UNDER THE 150 FOOT (47.5 M) BLADE PROGRAM. IN VIEW OF THE PLANNED OPERATIONAL EMPLOYMENT OF THE MOD-1 COMPOSITE BLADES, A LIGHTNING TEST WAS CONDUCTED ON A SECTION OF THE PROTOTYPE BLADE WHICH DEMONSTRATED THAT A LIMITED NUMBER OF ELECTRICAL CONDUCTORS MUST BE ADDED TO COMPOSITE BLADES FOR PROTECTION AGAINST DAMAGE BY LIGHTNING STROKES.

1980-0239 GILHAUS A
STATIONAERE SCHWUNGRAD-ENERGIESPEICHER. (STATIONARY FLYWHEEL ENERGY ACCUMULATORS).
NEW WAYS TO SAVE ENERGY. PROCEEDINGS OF THE INTERNATIONAL SEMINAR, BRUSSELS, OCTOBER 23-25, 1979. DORDRECHT, HOLLAND, BOSTON, MASSACHUSETTS, REIDEL PUBL. CO., 1980. P. 546-554. (IN GERMAN)

THE AIM OF THE SYSTEM STUDY IS TO EXAMINE INDUSTRIAL APPLICATIONS OF STATIONARY FLYWHEEL ENERGY ACCUMULATORS. THE ECONOMIC VALUE FOR THE CONSUMER AND THE EFFECTS ON THE POWER SUPPLY GRID ARE INVESTIGATED. THE BENEFITS OF USING STATIONARY FLYWHEEL ENERGY ACCUMULATORS TO LOWER THE DEMANDED MAXIMUM OUTPUT OF A POWER SUPPLY TO RECOVER INVESTMENT COSTS. COMPENSATION OF SHORT-TIME MAXIMUM POWER OUTPUT SEEMS TO BE MORE FAVORABLE AT POWER PLANTS. APPLICATIONS, SUCH AS BRAKING ENERGY STORAGE IN VEHICLES, AND THE USE OF FLYWHEELS IN WIND POWER PLANTS, SEEM TO BE PROMISING. ATTRACTIVE SAVINGS OF ENERGY CAN BE OBTAINED BY INTRODUCING MODERN FLYWHEEL TECHNOLOGY FOR EMERGENCY POWER SUPPLY UNITS WHICH ARE EMPLOYED FOR INSTANCE IN TELECOMMUNICATION SYSTEMS.

1980-0240 GILLI P V
NEW TECHNOLOGIES FOR COVERING THE FUTURE ENERGY DEMAND OF AUSTRIA.
OESTERR. Z. ELEKTRIZITAETSWIRTSCH. 33(5): 141-148, MAY 1980. (IN GERMAN)

AUSTRIA DEPENDS TO A HIGH DEGREE ON PRIMARY ENERGY IMPORTS. NEW TECHNOLOGIES WILL THEREFORE PLAY AN INCREASING ROLE IN THE FUTURE ENERGY SUPPLY AND DEMAND PATTERN. IN ELECTRICITY GENERATION, NEW TECHNOLOGIES WILL BE IN THE FIELD OF COAL COMBUSTION, COMBINED PROCESSES, SOLAR AND WIND POWER--FOR WHICH THE CONDITIONS IN AUSTRIA ARE NOT VERY FAVOURABLE--AND IMPROVED SYSTEMS OF COMBINED HEAT AND POWER GENERATION. ALSO FOR STORAGE, TRANSMISSION AND UTILISATION OF ELECTRIC ENERGY, NEW TECHNOLOGIES WILL BE IMPORTANT. IN OIL SUBSTITUTION--WHICH PROVES TO BE THE CRITICAL ITEM IN THE ENERGY PROBLEM--ELECTRIC ENERGY WILL PLAY AN IMPORTANT ROLE, E.G., BY MEANS OF THE HEAT PUMP AND THE ELECTRIC CAR.

1980-0241 GINOSAR M
PROPOSED LARGE-SCALE WIND ENERGY PROGRAM FOR CALIFORNIA.
ENERGY SOURCES 5(2): 141-169, 1980.

THE GOAL OF THIS PROPOSED PROGRAM IS THE GENERATION OF AT LEAST 10 PERCENT (30 BILLION KWH/YEAR) OF THE STATE'S ELECTRICITY BY WIND-ELECTRIC SYSTEMS BY THE YEAR 2000. THIS COULD BE GENERATED BY APPROXIMATELY 3300 THREE-MEGAWATT WIND-ELECTRIC CONVERSION SYSTEMS (WECS) LOCATED ON 100 UTILITY-OWNED, WIND-ELECTRIC FARMS. THE AUTHOR PROPOSES THAT A $105 MILLION, SIX-YEAR PROGRAM BE INITIATED TO BRING WIND ENERGY TO THE POINT OF COMMERCIAL OPERATION IN CALIFORNIA.

1980-0242 GIPE P

CLOCKING THE WIND.
SOLAR AGE 5(10): 30-34, OCTOBER 1980.

THIS ARTICLE REVIEWS WIND MEASUREMENT TECHNIQUES AND CONCLUDES WITH A LIST OF ANEMOMETER/WIND DATA COLLECTION SYSTEM SUPPLIERS.

1980-0243 GIPE P
WIND AND THE GRID.
ALTERN. SOURCES ENERGY NO. 46: 11-15, NOVEMBER/DECEMBER 1980.

1980-0244 WISE J L, WENTINK T, BECKER R, COMISKEY A L, ELLIOTT D L
WIND ENERGY RESOURCE ATLAS. VOLUME 10. ALASKA REGION.
NTIS, DECEMBER 1980. 181 P.
PNL-3195-WERA-10

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH SUBREGION OF ALASKA. BACKGROUND IS PRESENTED ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED. A DESCRIPTION OF THE WIND RESOURCE ON A STATE SCALE IS GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH SUBREGION ARE ASSEMBLED INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE ALASKA WIND ENERGY RESOURCE. AN OUTLINE TO THE DESCRIPTIONS OF THE WIND RESOURCE GIVEN FOR EACH SUBREGION IS INCLUDED. ASSESSMENTS FOR INDIVIDUAL SUBREGIONS ARE PRESENTED AS SEPARATE CHAPTERS. THE SUBREGION WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE ALASKA WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED. THIS PREFACE OUTLINES THE USE AND INTERPRETATION OF THE INFORMATION FOUND IN THE SUBREGION CHAPTERS.

1980-0245 GOEDKOOP J A
A STROLL THROUGH ECN MARKET (ENERGY R AND D WORK).
ENERGIESPECTRUM 4(10): 238-249, OCTOBER, 1980. (IN DUTCH)

THIS PAPER BRIEFLY DESCRIBES INDUSTRY ORIENTED RESEARCH AND DEVELOPMENT WORK IN PROGRESS AT THE ECN (NETHERLANDS ENERGY CENTER): NUCLEAR FISSION AND FUSION, SUPERCONDUCTIVITY, ENERGY CONVERSION, RADIOBIOLOGY, WITH SPECIAL REFERENCE TO THE HIGH FLUX REACTOR AT PETTEN, NEUTRON ACTIVATION ANALYSIS, FLUIDISED BED CONBUSTION, WIND TURBINES (EXPERIMENTAL UNIT, HORIZONTAL AXIS, 25 M DIAMETER).

1980-0246 ZAININGER H W, BELL D J
WIND POWER GENERATION DYNAMIC IMPACTS ON ELECTRIC UTILITY SYSTEMS. FINAL REPORT.
NTIS, NOVEMBER 1980. 88 P.
EPRI-AP-1614

A PRIMARY APPLICATION OF WIND POWER GENERATION ON UTILITY SYSTEMS IS EXPECTED TO BE LARGE CLUSTERS OF MEGAWATT-SCALE WIND TURBINE (WT) UNITS, CONNECTED TO THE UTILITY TRANSMISSION NETWORK AND OPERATED AS PART OF THE OVERALL UTILITY GENERATION MIX. WIND FLUCTUATIONS WILL RESULT IN MINUTE-TO-MINUTE WT OUTPUT VARIATIONS. LARGE PENETRATIONS OF WIND TURBINES MAY CAUSE DYNAMIC IMPACTS SUCH AS SEVERE SYSTEM SWINGS, EXCESSIVE FREQUENCY EXCURSIONS, OR SYSTEM INSTABILITY. THESE POTENTIAL DYNAMIC IMPACTS, CONSIDERING THE INTEGRATED WIND POWER PLANTS, UTILITY CONVENTIONAL GENERATION, AND TRANSMISSION SYSTEM, MAY LIMIT THE POTENTIAL WT PENETRATION AND/OR CAUSE SIGNIFICANT SYSTEM OPERATING RESTRICTIONS. AN INITIAL ASSESSMENT OF POTENTIAL WIND POWER GENERATION DYNAMIC IMPACTS ON UTILITY SYSTEMS FROM A GLOBAL UTILITY PERSPECTIVE WAS MADE. DYNAMIC STUDY OF MINUTE-TO-MINUTE RAMPING, FREQUENCY EXCURSION, AND SHORT-TERM TRANSIENT STABILITY WAS PERFORMED USING THE HAWAIIAN ELECTRIC COMPANY SYSTEM AS AN ILLUSTRATIVE EXAMPLE.

1980-0247 GOLDBERG T, BJERGBAEK B
CO-GENERATIVE ENERGY SYSTEM FOR AGRICULTURE AND FARMING AND AN ANAEROBIC DIGESTOR FOR HIGH SOLID LOADING: (THE EXPANDING RADIAL-OVERFLOW DIGESTOR).
BIO-ENERGY WORLD CONGRESS AND EXPOSITION, ATLANTA, GEORGIA, APRIL 21, 1980. PROCEEDINGS. NTIS, 1980. P. 455-456.
CONF-800482

A DEMONSTRATION PROJECT TO SHOW THAT THE ENERGY POTENTIAL FROM FARM AND AGRICULTURAL WASTE PRODUCTS COMBINED WITH SOLAR AND WIND ENERGY SOURCES CAN GENERATE A SURPLUS OF ENERGY ADAPTABLE TO RURAL COMMUNITIES IS UNDER CONSTRUCTION IN DENMARK. A NEW TYPE OF ANAEROBIC DIGESTOR WAS DEVELOPED TO HANDLE SOLID MANURE WITH STRAW BEDDING CONTINOUSLY, AT 20 TO 30% D.S.

1980-0248 GOSLICH H D, VALETT J, KUNSTMANN W H
DEVELOPMENT OF FAST ROTORS WITH FLAPPING HINGE AND GEOMETRICAL PITCH ANGLE SETTING IN EXTREME LENGTH CONSTRUCTION.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 429-440.

THEORETICAL EXAMINATION LED TO REDUCTIONS IN FORCE AND WEIGHT OF ALREADY CONSTRUCTED FLAPPING HINGE ROTORS. BEING A VERY SIMPLE CONSTRUCTION, AND THUS EASY TO MAINTAIN, THE HINGE GEOMETRY ENABLES THE ROTOR TO OPERATE AT ANY POSSIBLE MODE WHILE COST- AND WEIGHT-/POWER RATIO IS EXCELLENT. MAXIMUM POWER-SUPPLY AT ALMOST UNLIMITED HIGH WIND-SPEEDS (THEORETICALLY 55 M/S) AS WELL AS IDLING UNDER THE SAME CONDITIONS. THE THEORY OF GEOMETRY IS EXPLAINED AND PRACTICAL COMPARISON IS SHOWN. FIELD OF OPERATION IS UP TO VERY LARGE ROTOR DIMENSIONS.

1980-0249 GRANNEMANN W W, YANG C E, SEO P H
VARIABLE SPEED CONSTANT FREQUENCY CONSTANT VOLTAGE ALTERNATOR.
NTIS, JULY 1980. 41 P.
DOE/ET/29246-T1

A TEST ALTERNATOR IS OPERATED WITH DIGITAL CONTROL OF ITS OUTPUT FREQUENCY FOR VARIABLE SHAFT SPEED. THE MACHINE IS A TWO-POLE ALTERNATOR WITH POWER REMOVED THROUGH SLIP RINGS. THE OUTPUT FREQUENCY OF THE ALTERNATOR IS CONTROLLED BY ROTATING THE FIELD BY STEPPING THROUGH SIXTEEN COILS AROUND THE ROTOR. USUALLY FOUR COILS ARE ACTIVE AT ONE TIME. THE ROTATING FIELD IN THE STATIONARY COILS OF THE STATOR IS CONTROLLED BY MICROCIRCUITS. THE CONTROL CIRCUITS ARE CONSTRUCTED WITH AVAILABLE LOW-COST, LOW-POWER INTEGRATED CIRCUITS (ICS). THE TEST RESULTS FROM THE FIRST TEST ALTERNATOR INDICATE THE FEASIBILITY OF USING THIS TYPE OF ALTERNATOR TO CONVERT AVAILABLE WIND POWER DIRECTLY TO USABLE 60 HERTZ POWER.

1980-0250 GREAVER V W, FARRINGTON R B, LEBOEUF C M
APPLICATIONS OF SOLAR ENERGY IN INDUSTRIAL PARKS.

NTIS, MAY 1980. 8 P.
CONF-800706-2, SERI/TP-733-693

THE FOUR PHASES OF ONGOING WORK AT SERI THAT EXAMINES MANY UNRESOLVED QUESTIONS REGARDING THE PURPOSE, SOLAR APPLICABILITY, ECONOMICS, AND ENERGY MODELING OF INDUSTRIAL PARKS ARE PRESENTED. THE FIRST PHASE INVOLVED SITE VISITS TO APPROXIMATELY 300 PARKS IN 12 MAJOR METROPOLITAN AREAS OF 9 STATES. PHASE 2 ENTAILS AN ANALYSIS OF FOUR PARKS SELECTED FROM THOSE PARKS SURVEYED. PHASE 3 NARROWS THE FOCUS TO TWO PARKS TO BE EXAMINED FOR DETAILED TECHNICAL AND ENGINEERING ANALYSIS. PHASE 4 INCORPORATES ALL OF THE WORK OF THE EARLIER PHASES WITH ECONOMIC CRITERIA TO PRODUCE AN ENERGY ALLOCATION MODEL DESCRIBING ENERGY DELIVERY AND CONSUMPTION WITHIN THE PARK.

1980-0251 GREET R J
MAXIMUM WINDMILL EFFICIENCY.
J. APPL. PHYS. 51(9): 4680-4681, SEPTEMBER 1980.

A RESULT FREQUENTLY QUOTED IN ENGINEERING HANDBOOKS IS THAT ONE-DIMENSIONAL FLUID FLOW THEORY PLACES AN UPPER LIMIT ON WINDMILL EFFICIENCY AT 16/27 OR 59.3 PERCENT. AN ERROR IN THE DEVELOPMENT INVALIDATES THIS CONCLUSION. ONE-DIMENSIONAL FLOW ANALYSIS PLACES NO RESTRICTIONS ON REALIZABLE WINDMILL OUTPUT.

1980-0252 GROSS G E
QUALITY-ASSURANCE NEEDS AND GOALS IN SOLAR ENERGY CONVERSION.
NTIS, JULY 1980. 9 P.
SERI/TP-641-773, CONF-800927-2

A DISCUSSION OF THE STATUS OF QUALITY ASSURANCE ACTIVITIES IN SOLAR ENERGY CONVERSION TECHNOLOGIES AND OF THE NEEDS FOR FURTHER EFFORTS IN THIS AREA IS PRESENTED. THE IMPORTANCE OF RELIABILITY AND QUALITY ASSURANCE ACTIVITIES TO VARIOUS END USERS IS BRIEFLY DISCUSSED. SOME DETAILS OF SUCH ACTIVITIES IN WIND, ACTIVE HEATING AND COOLING, AND PHOTOVOLTAIC TECHNOLOGIES ARE GIVEN. SUGGESTIONS FOR AN INTEGRATED RELIABILITY, QUALITY ASSURANCE PROGRAM ARE PRESENTED AND THEIR IMPORTANCE TO THE GROWTH OF SOLAR ENERGY APPLICATION IS DISCUSSED.

1980-0253 GROSS G
RELIABILITY ENGINEERING IN SOLAR ENERGY: WORKSHOP PROCEEDINGS.
NTIS, MARCH 1980. 46 P.
SERI/TP-334-489

A WORKSHOP TO REVEAL THE SCOPE OF RELIABILITY-RELATED ACTIVITIES IN SOLAR ENERGY CONVERSION PROJECTS AND IN NONSOLAR SEGMENTS OF INDUSTRY IS DESCRIBED. TWO RELIABILITY PROGRAMS, ONE IN HEATING AND COOLING AND ONE IN PHOTOVOLTAICS, ARE EXPLICATED. THIS DOCUMENT ALSO PRESENTS GENERAL SUGGESTIONS FOR THE ESTABLISHMENT OF A UNIFIED PROGRAM FOR RELIABILITY, DURABILITY, MAINTAINABILITY, AND SAFETY (RDM AND S) IN PRESENT AND FUTURE SOLAR PROJECTS.

1980-0254 GROWIAN WIND POWER PLANT SERVES RESEARCH PURPOSES.
ELEKTRIZITAETSWIRTSCHAFT 79(7): 255-256, MARCH 1980. (IN GERMAN)

1980-0255 GUERRERO J V, ALFORD C
SWECS QUALIFICATIONS CRITERIA FOR STATE TAX INCENTIVE PROGRAM.
WIND ENERGY CONFERENCE, BOULDER, COLORADO, APRIL 9, 1980. NTIS, 1980. 9 P.
RFP-3087, CONF-800406-7

ALTERNATIVE ENERGY SYSTEMS WILL PLAY A SIGNIFICANT ROLE IN PROVIDING ENERGY SUPPLIES TO THE UNITED STATES; ESTIMATES RANGE FROM 7 TO 23 PERCENT OF THE NATION'S NEEDS BY 2000. SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TOGETHER WITH LARGE WIND TURBINE GENERATORS WILL SUPPLY A PORTION OF THESE ENERGY SUPPLIES. THE LEVEL OF DISBURSED SWECS CONTRIBUTION WILL DEPEND NOT ONLY ON RESOLVING TECHNICAL PROBLEMS BUT THE RESOLUTION OF INSTITUTIONAL ISSUES AS WELL. ONE OF THE MAJOR INSTITUTIONAL BARRIERS IS THE HIGH INITIAL COST OF SWECS COMPARED TO CONVENTIONAL ENERGY COSTS. STATE AND FEDERAL FINANCIAL INCENTIVE PROGRAMS SUCH AS INCOME TAX DEDUCTIONS AND CREDITS CAN PROMOTE PUBLIC ACCEPTANCE OF SWECS. SEVERAL PROTOTYPE QUALIFICATION DOCUMENTS ARE BEING PREPARED BY THE ROCKWELL INTERNATIONAL WIND SYSTEMS PROGRAM AT ROCKY FLATS, COLORADO (UNDER CONTRACT TO THE DEPARTMENT OF ENERGY) TO GUIDE THE STATES IN FORMULATING THEIR OWN SPECIFIC SET OF CRITERIA THAT WOULD BE MOST APPROPRIATE FOR THEIR OWN SITUATION.

1980-0256 GUPTA Y, KNOWLES R, MERRILL O, YOUNG S
ECONOMIC WORTH OF ON-SITE SOLAR ELECTRIC GENERATION IN A UTILITY GRID.
SYSTEMS SIMULATION AND ECONOMICS ANALYSIS CONFERENCE, SAN DIEGO, CALIFORNIA, JANUARY 23, 1980. NTIS, 1980. P. 193-198.
SERI/TP-351-431

WIDESPREAD UTILIZATION OF SOLAR ELECTRIC TECHNOLOGIES IN PARALLEL, OR AS SUPPLEMENTS TO THE EXISTING UTILITY NECESSITATE A DETAILED EVALUATION OF THEIR ECONOMIC WORTH AND UTILITY IMPACTS. SUCH AN ASSESSMENT MUST BE PERFORMED WITHIN THE CONTEXT OF THE OVERALL UTILITY/SOLAR ELECTRIC SYSTEM INTERACTION SYSTEM DESIGN-COST RELATIONS, FUTURE ELECTRIC ENERGY COSTS, RATE STRUCTURES, AND OWNERSHIP OPTIONS. SAI HAS DEVELOPED A METHODOLOGY TO EVALUATE IN DETAIL THE UTILITY IMPACTS AND ECONOMICS OF GRID-CONNECTED SOLAR ELECTRIC TECHNOLOGIES. THE VALUE OF UTILITY INTEGRATED SOLAR PLANTS CONSISTS OF BOTH ELECTRIC GENERATION COSTS AND CAPACITY COSTS TO MEET A SPECIFIED RELIABILITY LEVEL AND DEPENDS ON A NUMBER OF COMPLEX VARIABLES. THE METHODOLOGY AND RESULTS PRESENTED INCORPORATE THESE COMPLEX VARIABLES THROUGH INTEGRATION OF DIVERSE SIMULATION TECHNIQUES, INCLUDING HOURLY SOLAR ELECTRIC SYSTEM PERFORMANCE EVALUATION, PROBABILISTIC SOLAR-SUBTRACTED LOAD DETERMINATION BASED ON SOLAR PLANT OUTAGE PROBABILITIES, MIXED-INTEGER LINEAR PROGRAMMING FORMULATION OF THE CAPACITY EXPANSION AND PROBABILISTIC DETERMINATION OF GENERATION COST AND LOSS OF LOAD PROBABILITIES.

1980-0257 GUSTAFSSON A L, LUNDGREN S, FRISK B
APPLICATION OF A METHOD FOR AERODYNAMIC ANALYSIS AND DESIGN OF HORIZONTAL AXIS WIND TURBINES, PART 1.
NTIS, FEBRUARY 26, 1980. 74 P.
N81-12633,FFA-TN-AU-1499-PT.1

THE APPLICATION OF A MOMENTUM THEORY METHOD IS PRESENTED FOR STATIC PERFORMANCE ANALYSIS AND FOR DESIGN OF BLADES FOR HORIZONTAL AXIS WIND TURBINES. THE METHOD IS BASED ON A COMBINATION OF BLADE ELEMENT AND MOMENTUM THEORY. THE PERFORMANCE RESULTS ARE PRESENTED AS POWER COEFFICIENT OR SHAFT POWER VERSUS WINDSPEED AND STATIC BLADE AND TURBINE LOADS TO BE USED FOR STRUCTURAL DESIGN. THE COMBINATION OF TURBINE PERFORMANCE AND WIND CHARACTERISTICS TO OBTAIN ANNUAL ENERGY PRODUCTION IS TREATED. THE PROCEDURE TO OBTAIN THE CHORD AND TWIST DISTRIBUTION THAT MAXIMIZES BLADE PERFORMANCE AT A SPECIFIED WIND IS DESCRIBED. NUMERICAL RESULTS FOR THE SWEDISH WIND POWER TEST UNIT KALKUGNEN ARE PRESENTED.

1980-0258 HAACK B N
SIMULATION MODEL FOR WIND ELECTRIC SYSTEMS.
WIND ENG. 4(2): 64-75, 1980.

A COMPUTER OPERATED SIMULATION MODEL FOR THE EXAMINATION OF WIND ELECTRIC SYSTEMS IS DESCRIBED. COMPONENTS INCLUDED IN THIS MODEL ARE WIND SPEED OBSERVATIONS COLLECTED AT FIRST ORDER METEOROLOGICAL STATIONS, RESIDENTIAL ELECTRICAL CONSUMPTION DATA FROM SAMPLED HOUSEHOLDS, AND CHARACTERISTICS OF WIND ELECTRIC EQUIPMENT. THE MODEL SIMULATES WIND ELECTRIC SYSTEM PERFORMANCE FOR ONE YEAR USING WIND SPEED AND RESIDENTIAL DEMAND OBSERVATIONS AT THREE HOUR INTERVALS. PRIMARY OUTPUTS FROM THE MODEL INCLUDE AVAILABLE WIND ENERGY, GENERATOR OUTPUT, BACK-UP UTILIZATION, ENERGY LOSS DUE TO THE INEFFICIENCIES OF THE BATTERY AND INVERTER, AND PERCENT OF CONSUMER DEMAND SATISFIED BY THE WIND.

1980-0259 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS. SEPTEMBER, 1978-OCTOBER, 1980 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, NOVEMBER 1980. 173 P.
PB81-800476

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES AND INERTIA OR FRICTION WELDING ARE REVIEWED.

1980-0260 HACKLEMAN M
AT HOME WITH ALTERNATIVE ENERGY; A COMPREHENSIVE GUIDE TO CREATING YOUR OWN SYSTEMS.
CULVER CITY, CALIFORNIA, PEACE PRESS, 1980. 150 P.

THIS BOOK TAKES A COMPREHENSIVE LOOK AT THE FIVE MAJOR ALTERNATIVE SOURCES: SUN, WIND, WATER, WOOD, AND METHANE, AND THE CHOICES TO BE MADE IN BUILDING SYSTEMS TO UTILIZE THEM. HACKLEMAN HAS IMPLEMENTED THE DESIGNS HIMSELF. WHILE OTHER BOOKS WALK THE READER THROUGH PLANS, THIS ONE TAKES THE READER THROUGH THE REASONING TO DETERMINE WHICH FACTORS ARE ESSENTIAL TO AN ALTERNATIVE ENERGY SYSTEM, AND WHICH ARE A MATTER OF CHOICE. HE PRESENTS EACH SYSTEM IN TERMS OF A MULTITUDE OF CONTINGENCIES, IN LIGHT OF THE OVERALL ECOLOGY OF THE PLANET.

1980-0261 HACKLEMAN M
LOW VOLTAGE ENERGY SYSTEMS.
WIND POWER DIG. NO. 20: 6-10, 12-14, SUMMER 1980.

1980-0262 HAGEDORN N H, THALLER L H
REDOX STORAGE SYSTEMS FOR SOLAR APPLICATIONS.
POWER SOURCES CONFERENCE, 12TH, BRIGHTON, U.K., SEPTEMBER 15, 1980. NTIS, 1980. 30 P.
DOE/NASA/1002-80-5

THE WORLD-WIDE DEVELOPMENT OF SOLAR PHOTOVOLTAIC AND WIND TURBINE SYSTEMS TO MEET A RANGE OF TERRESTRIAL ELECTRICAL ENERGY REQUIREMENTS HAS UNDERSCORED THE NEED FOR INEXPENSIVE AND RELIABLE ELECTRICAL ENERGY STORAGE. THE NASA REDOX ENERGY STORAGE SYSTEM BASED ON SOLUBLE AQUEOUS IRON AND CHROMIUM CHLORIDE REDOX COUPLES HAS DISPLAYED MANY SYSTEM-RELATED FEATURES WHICH FOR THE MOST PART ARE UNIQUE TO THIS STORAGE SYSTEM. THE NEEDED TECHNOLOGY ADVANCES IN THE TWO ELEMENTS (ELECTRODES AND MEMBRANES) THAT ARE THE KEY TO ITS TECHNOLOGICAL FEASIBILITY HAVE BEEN ACHIEVED AND SYSTEM DEVELOPMENT HAS BEGUN. THE DESIGN, CONSTRUCTION, AND TEST OF A ONE-KILOWATT SYSTEM INTEGRATED WITH A SOLAR PHOTOVOLTAIC ARRAY IS UNDERWAY TO PROVIDE EARLY DEMONSTRATION OF THE ATTRACTIVE SYSTEM-RELATED FEATURES OF THE NASA REDOX STORAGE SYSTEM, ITS VERSATILITY AND ITS COMPATIBILITY WITH A TERRESTRIAL SOLAR PHOTOVOLTAIC ELECTRIC POWER SYSTEM.

1980-0263 HAHN M, WACKERLE P
DEVELOPMENT AND DESIGN OF A LARGE "WIND-TURBINE BLADE".
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER C2, P. 141-158.

A SHORT SCHEDULE OF THE DEVELOPMENT GROUP AND THE DESIGN-BASIS DEVELOPED IN THE PAST WILL BE GIVEN. THE MOULD-CONCEPT IS THE KEY FOR DESIGN AND MANUFACTURING OF LARGE BLADE-STRUCTURES, WHICH NEEDS A SPECIAL SURFACE-DEFINITION AND STRUCTURAL DESIGN. THE BLADES DESIGN AND THE ASSEMBLY WILL BE DESCRIBED WITH ALL CONSEQUENCES FOR SURFACE DEFINITION, MATERIAL SELECTION, LAMINATE DESIGN, CURING PROCEDURE AND TOOL DESIGN. A COMPLETE SURVEY ABOUT THE TOOLING WILL BE GIVEN, INCLUDING MOULD AND HEATING SYSTEM, CUTTING AND MILLING DEVICES. A SHORT REPORT ABOUT THE MANUFACTURING OF AN 11 METRE-TEST SECTION COMPLETES THE PRESENTATION.

1980-0264 HALACY D S
SOLAR ENERGY AND THE BIOSPHERE.
SOLAR ENERGY TECHNOLOGY HANDBOOK. PART A. ENGINEERING FUNDAMENTALS. NEW YORK, MARCEL DEKKER, INC., 1980. P. 3-13.

THE INTERACTION OF THE SUN WITH THE EARTH'S BIOSPHERE IS DISCUSSED. THE RELATION OF SOLAR RADIATION TO PHOTOBIOLOGICAL PROCESSES IS CONSIDERED. SPECIFIC PROCESSES DESCRIBED INCLUDE THE ENERGETICS OF PHOTOCHEMISTRY, VISION, PHOTOTROPISM AND PHOTOSYNTHESIS. THE VARIOUS FORMS IN WHICH ENERGY APPEARS AND IS STORED IN THE BIOSPHERE ARE REVIEWED, INCLUDING SOLAR, OCEAN THERMAL, WIND, HYDROPOWER, FOSSIL FUELS, INTERNAL HEAT IN THE EARTH, TIDAL POWER, NUCLEAR AND FUSION ENERGY.

1980-0265 HAMILTON L D
COMPARATIVE RISKS FROM DIFFERENT ENERGY SYSTEMS: EVOLUTION OF THE METHODS OF STUDIES.
INT. AT. ENERGY AGENCY BULL. 22(5/6): 35-71, OCTOBER 1980.

THE RISKS OF DEATH, DISEASE AND INJURY FROM THE COAL FUEL CYCLE, THE NUCLEAR FUEL CYCLE, AND WIND ENERGY ARE ESTIMATED.

1980-0266 HANSEN A C
ADJUSTMENT OF SWECS POWER CURVES FOR AIR DENSITY VARIATIONS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, MARCH 1980. 8 P.
TM-TO/80-2

PAST METHODS FOR CORRECTING SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) POWER CURVES TO STANDARD SEA LEVEL CONDITIONS HAVE CONSISTED SIMPLY OF MULTIPLYING THE POWER BY THE DENSITY RATIO. THESE METHODS ARE LIMITED IN THEIR ACCURACY IN THAT THEY IGNORE TWO FACTS: 1) CUT-IN SPEED IS A FUNCTION OF DENSITY, AND 2) THE MAXIMUM OUTPUT OF MANY SWECS IS LIMITED BY CONTROLS OR GENERATOR CAPACITY RATHER THAN AERODYNAMIC LIMITS. THIS MEMO

DESCRIBES A NEW METHOD WHICH CONSISTS OF ADJUSTMENT TO WIND SPEED NEAR CUT-IN AND ADJUSTMENT TO POWER OUTPUT AT ALL OTHER WIND SPEEDS. REYNOLDS NUMBER AND ROTOR/LOAD MATCHING EFFECTS, THOUGH POSSIBLY OF SIGNIFICANCE IN SPECIAL LIMITED SITUATIONS, ARE NOT TREATED IN THIS METHOD.

1980-0267 HANSEN A C
EARLY RESULTS FROM THE SWECS ROTOR WAKE MEASUREMENT PROJECT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, SEPTEMBER 1980. 21 P.
TM-TD/81-4

MEASUREMENTS WERE TAKEN IN AUGUST, 1980 AT THE DEPARTMENT OF TRANSPORTATION RAIL TEST FACILITY IN PUEBLO, COLORADO USING CONTROLLED VELOCITY TESTS TO QUANTITATIVELY MEASURE THE NATURE AND EXTENT OF THE WAKE AROUND A HORIZONTAL-AXIS WIND MACHINE AND TO PROVIDE DATA NECESSARY TO VALIDATE ROTOR WAKE MODELS. EARLY RESULTS ARE PRESENTED IN THIS TECHNICAL MEMO AND SHOW THAT THE MEAN VELOCITY WAKE AT THE CENTER LINE IS DETECTABLE 14 DIAMETERS FROM THE ROTOR. THE INTERDEPENDENCE OF THE WAKE STRENGTH AND SWECS POWER COEFFICIENT WAS ALSO MEASURED. COMPLETE RESULTS WILL BE REPORTED IN A LATER FINAL REPORT.

1980-0268 HANSEN A C
NOISE MEASUREMENTS OF TWO SMALL WIND ENERGY CONVERSION SYSTEMS.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, APRIL 1980. 6 P.
TM-II-80-1

NOISE MEASUREMENTS PRESENTED IN THIS MEMO INDICATE THAT NOISE LEVELS NEAR THE DUNLITE AND GRUMMAN SWECS ARE COMPLETELY ACCEPTABLE AND SHOULD CAUSE NO DISTURBANCE TO PERSONS NEAR THE SYSTEMS. THE SOUND PRESSURE LEVELS OF THE TWO WIND MACHINES WERE CONSISTENTLY IN THE 40 TO 60 DBA RANGE. BY USING CHARTS DEPICTING TYPICAL SOUND LEVELS OF DIFFERENT SOURCES, IT CAN BE CONCLUDED THAT THE NOISE LEVELS OF THE TWO SWECS AS MEASURED AT THE ROCKY FLATS WIND SYSTEMS TEST CENTER ARE LESS THAN OR EQUIVALENT TO THE LEVELS ENCOUNTERED IN AN OFFICE ENVIRONMENT. IT SHOULD BE NOTED THAT BACKGROUND WIND NOISE COULD MASK SWECS NOISE AT HIGHER WIND SPEEDS. IT SHOULD ALSO BE NOTED THAT CONCLUSIONS IN THIS MEMO ARE PRELIMINARY IN NATURE AND CANNOT BE CONSIDERED DEFINITIVE.

1980-0269 HANSEN A C
TURBULENCE AND WIND-TURBINE PERFORMANCE.
ASCE TRANSP. ENG. J. 106(6): 675-683, NOVEMBER 1980.

ACTIVITIES MANAGED BY ROCKWELL INTERNATIONAL FOR THE DEPARTMENT OF ENERGY HAVE BEGUN TO DETERMINE THE QUANTITATIVE SIGNIFICANCE OF TURBULENCE TO WIND TURBINE UTILIZATION. AT THE WIND SYSTEMS TEST CENTER THREE METHODS ARE AVAILABLE FOR ANALYSIS OF PERFORMANCE DATA TAKEN IN TURBULENT WINDS. FREQUENCY-MATCHING, THE METHOD-OF-BINS AND MOST-PROBABLE-POWER METHODS ARE DESCRIBED AND IT IS SHOWN THAT THE METHOD-OF-BINS IS THE MOST ACCURATE METHOD FOR CALCULATING A SYSTEM POWER CURVE FOR USE IN ENERGY YIELD PREDICTIONS. LIMITATIONS AND ADVANTAGES OF THE ANALYSIS METHODS ARE HIGHLIGHTED. WIND ENERGY CONVERSION SYSTEM DEVELOPMENT SUBCONTRACTS HAVE RESULTED IN IMPROVED UNDERSTANDING OF THE IMPORTANCE OF TURBULENCE IN SYSTEM DESIGN. IN NINE DESIGNS, TURBULENCE (GUST) CONSIDERATIONS HAVE BEEN SECOND ONLY TO MAXIMUM SURVIVAL WIND SPEED, IN IMPORTANCE TO STRUCTURAL DESIGN. THE EXPERIENCES TO DATE OF THE NINE DESIGN EFFORTS ARE SUMMARIZED.

1980-0270 HANSEN A C, BUTTERFIELD C P
CURRENT DEVELOPMENTS IN SMALL WIND ENERGY CONVERSION SYSTEMS.
J. IND. AERODYN. 5(3-4): 337-356, MAY 1980.

A SURVEY AND REVIEW OF THE CURRENT STATE-OF-THE-ART RESEARCH AND DEVELOPMENT IS PRESENTED FOR SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). CURRENT TECHNICAL AND ECONOMIC STATUS OF SWECS IS GIVEN INCLUDING SOME ADVANTAGES AND DISADVANTAGES OF VARIOUS TECHNICAL APPROACHES TO WIND ENERGY CONVERSION. PROGRAMS ARE DESCRIBED WHICH ARE DESIGNED TO ADVANCE THE COMMERCIALIZATION OF SWECS.

1980-0271 HIGASHI K K
DUNLITE MODEL 81/002550 WIND TURBINE GENERATOR. FINAL TEST REPORT.
NTIS, FEBRUARY 1980. 25 P.
RFP-3149/3533/80-17

THE DUNLITE MODEL 81/002550 WIND TURBINE GENERATOR HAS MET ALL MANUFACTURER CLAIMS OF PERFORMANCE AND RELIABILITY. THE MACHINE OPERATED SATISFACTORILY IN WINDS UP TO THE MANUFACTURER RATED SURVIVAL SPEED OF 36 M/S (80 MPH). IN ADDITION, THE DUNLITE OPERATED IN WINDS EXCEEDING 22.5 M/S (50 MPH) FOR EIGHT HOURS WITHOUT INCURRING DAMAGE. MAJOR DAMAGE TO THIS MACHINE OCCURRED WHEN WIND SPEEDS EXCEEDED 40.3 M/S (90 MPH). IF WINDS OF THIS VELOCITY ARE EXPECTED, THE MANUFACTURER OFFERS A HIGH SPEED MODEL OF THIS WIND TURBINE DESIGNED TO WITHSTAND WINDS OF 49.5 M/S (110 MPH). TESTING OF THE DUNLITE INDICATED THAT THE MACHINE IS CAPABLE OF PRODUCING ITS RATED OUTPUT OF 2 KW AT 11 M/S (25 MPH).

1980-0272 HIMMELMAN W A
POWER FROM THE WIND.
SOLAR ENGINEERING FOR DOMESTIC BUILDINGS. NEW YORK, MARCEL DEKKER, 1980. P. 242-262.

INFORMATION IS PRESENTED CONCERNING DOMESTIC POWER SYSTEMS; AVAILABLE WIND ENERGY; TYPES OF WIND TURBINES; ESTIMATION OF SHAFT POWER; SYSTEM EFFICIENCY; DOMESTIC POWER REQUIREMENTS; WIND SYSTEM COMPONENTS; WIND TURBINE MANUFACTURERS; AND ENERGY STORAGE BY WATER RESERVOIRS AND COMPRESSED AIR.

1980-0273 HINRICHSEN E N, NOLAN P J
MOD-2 WIND TURBINE FARM STABILITY STUDY.
NTIS, JUNE 1980. 171 P.
DOE/NASA/0134-1, NASA-CR-165156, N80-33862

THE DEVELOPMENT OF LARGE WIND TURBINE GENERATORS (WTGS) FOR OPERATION IN UTILITY POWER SYSTEMS IS ACCELERATING. THIS REPORT CONTAINS THE RESULTS OF AN INVESTIGATION OF THE DYNAMICS OF SINGLE AND MULTIPLE 2.5 MW, BOEING MOD-2 WTGS CONNECTED TO UTILITY POWER SYSTEMS, INCLUDING THE FIRST THREE-MACHINE CLUSTER CONNECTED TO THE GRID OF THE BONNEVILLE POWER ADMINISTRATION. THE ANALYSIS IS BASED ON DIGITAL SIMULATION OF THE COMPLETE ELECTROMECHANICAL SYSTEM OF SINGLE AND MULTIPLE WTGS, INCLUDING WIND TURBINE, WIND TURBINE CONTROL, DRIVE TRAIN, GENERATOR, GENERATOR EXCITATION CONTROL, ELECTRICAL NETWORK AND EQUIVALENT UTILITY SOURCE. BOTH TIME RESPONSE AND FREQUENCY RESPONSE METHODS WERE USED. THE RESULTS SHOW THAT THE DYNAMICS OF WTGS ARE CHARACTERIZED BY TWO TORSIONAL MODES, THE LIGHTLY DAMPED SHAFT MODE AT FREQUENCIES WELL BELOW 1 HZ, AND THE ELECTRICAL MODE AT 3-5 HZ. THE FORMER IS PRIMARILY EXCITED BY WIND SPEED DISTURBANCES, THE LATTER BY ELECTRICAL DISTURBANCES. SINCE THE SHAFT MODE FALLS WITHIN THE BANDWIDTH OF BLADE PITCH CONTROL, ADDITIONAL DAMPING FOR THIS MODE IS A PREREQUISITE FOR GOOD TURBINE CONTROL.

1980-0274 HIRSCHBEIN M S, YOUNG M I
STABILITY OF LARGE HORIZONTAL-AXIS AXISYMMETRIC WIND TURBINES.
NTIS, 1980. 37 P.
NASA-TM-81623, E-633, N81-12446

THE STABILITY OF LARGE HORIZONTAL AXIS, AXI-SYMMETRIC, POWER PRODUCING WIND TURBINES WAS EXAMINED. THE ANALYTICAL MODEL USED INCLUDED THE DYNAMIC COUPLING OF THE ROTOR, TOWER AND POWER GENERATING SYSTEM. THE AERODYNAMIC LOADING WAS DERIVED FROM BLADE ELEMENT THEORY. EACH ROTOR BLADE WAS PERMITTED TWO PRINCIPAL ELASTIC BENDING DEGREES OF FREEDOM, ONE DEGREE OF FREEDOM IN TORSION AND CONTROLLED PITCH AS A RIGID BODY. THE ROTOR HUB WAS MOUNTED IN A RIGID NACELLE WHICH MAY YAW FREELY OR IN A CONTROLLED MANNER. THE TOWER CAN BEND IN TWO PRINCIPAL DIRECTIONS AND MAY TWIST. ALSO, THE ROTOR SPEED CAN VARY AND MAY INDUCE PERTURBATION REACTIONS WITHIN THE POWER GENERATING EQUIPMENT. STABILITY WAS DETERMINED BY THE EIGENVALUES OF A SET OF LINEARIZED CONSTANT COEFFICIENT DIFFERENTIAL EQUATIONS. ALL RESULTS PRESENTED ARE BASED ON A 3-BLADED, 300 FT. DIAMETER, 2.5 MEGAWATT WIND TURBINE. SOME OF THE PARAMETERS VARIED WERE: WIND SPEED, ROTOR SPEED, STRUCTURAL STIFFNESS AND DAMPING, THE EFFECTIVE STIFFNESS AND DAMPING OF THE POWER GENERATING SYSTEM AND THE PRINCIPAL BENDING DIRECTIONS OF THE ROTOR BLADES. UNSTABLE OR WEAKLY STABLE BEHAVIOR CAN BE CAUSED BY AERODYNAMIC FORCES DUE TO MOTION OF THE ROTOR BLADES AND TOWER IN THE PLANE OF ROTATION OR BY MECHANICAL COUPLING BETWEEN THE ROTOR SYSTEM AND THE TOWER.

1980-0275 HOHENEMSER K H, SWIFT A H P
THE YAWING OF WIND TURBINES WITH BLADE CYCLIC PITCH VARIATION.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 207-224.
SERI/CP-635-938

A NEW TYPE OF HORIZONTAL AXIS WIND TURBINE HAS BEEN DESIGNED, ANALYZED, BUILT AND BRIEFLY TESTED IN THE ATMOSPHERE. THE 7.6 METER DIAMETER UPWIND ROTOR IS TAIL VANE STABILIZED. IT HAS PASSIVE CYCLIC PITCH VARIATION OBTAINED BY A SMALL BUILT-IN BLADE PRELAG ANGLE IN RELATION TO THE CYCLIC PITCH AXIS. THE USUAL COMPLEX BLADE FEATHERING MECHANISM IS OMITTED. INSTEAD, THE ROTOR FURL ANGLE CAN BE VARIED BY A HIGH SPEED ACTUATOR. THE TWO-BLADED ROTOR STARTS EASILY, IT RUNS SMOOTHLY, IT CAN BE RAPIDLY YAWED WITHOUT PRODUCING GYROSCOPIC HUB MOMENTS OR NOTICEABLE OUT-OF-PLANE BLADE EXCURSIONS, AND IT IS OF VERY SIMPLE DESIGN.

1980-0276 HOLDREN J P, MORRIS G, MINTZER I
ENVIRONMENTAL ASPECTS OF RENEWABLE ENERGY SOURCES.
NTIS, FEBRUARY 1980. 102 P.
UCB/ERG-80-1

THE LITERATURE TREATING ENVIRONMENTAL CHARACTERISTICS OF RENEWABLE ENERGY SOURCES IS SURVEYED AND REVIEWED. THE INFORMATION REQUIRED FOR COMPREHENSIVE, COMPARATIVE ASSESSMENT OF THE ENVIRONMENTAL EFFECTS OF ENERGY ALTERNATIVES IS DETERMINED, AND THE COVERAGE OF THE EXTANT LITERATURE IS EVALUATED AGAINST THIS STANDARD. THE TECHNICAL CHARACTERISTICS OF RELEVANT ENERGY TECHNOLOGIES ARE SUMMARIZED, EMPHASIZING ENVIRONMENTAL ASPECTS. THE MOST PROMISING RENEWABLES ARE COMPARED TO EACH OTHER AND TO NONRENEWABLE ENERGY TECHNOLOGIES. SUGGESTIONS CONCERNING IMPLICATIONS FOR ENERGY CHOICES ARE MADE.

1980-0277 HOLUB G
WIND POWER STATIONS.
ELEKTROTECHNIK 35(10): 297-299, NOVEMBER 1980. (IN CZECHOSLOVAKIAN)

THE PAPER SURVEYS THE 1980 STATE AND DEVELOPMENT TRENDS OF HIGH-POWER WIND STATIONS (ABOVE 100 KW) TAKING INTO ACCOUNT BOTH THE TECHNICAL AND ECONOMIC FACTORS. THE CONSTRUCTION OF TURBINES, TRANSMISSION GEAR AND GENERATORS IS DISCUSSED.

1980-0278 HOOVER L J, SANTINI D J, SMELTZER K K, STENEHJEM E J
CONCENTRATED VS. DISTRIBUTED ENERGY: EMPLOYMENT BASED COMMUNITY LEVEL DIFFERENCES.
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, ANNUAL CONFERENCE, SAN FRANCISCO, CALIFORNIA, JANUARY 4, 1980. NTIS, 1980. 14 P.
CONF-800111-4

CONSIDERATION IS GIVEN TO THE DIFFERENCES BETWEEN CONCENTRATED OPTIONS (CENTRAL STATION ELECTRIC, SYNFUELS) AND DISTRIBUTED OPTIONS (SHACOB) FOR RESIDENTIAL SPACE CONDITIONING. EMPLOYMENT, GEOGRAPHIC LOCATION, COMMUNITY STABILITY, AND LOCATIONAL EQUITY ARE THE FACTORS DISCUSSED.

1980-0279 HUGOSSON S
SWEDEN TO BUILD LARGE-SCALE WIND TURBINE PROTOTYPES.
INT. POWER GENERATION 3(8): 37, 39, NOVEMBER 1980.

THIS ARTICLE DISCUSSES THE CONSTRUCTION OF TWO MEDIUM SIZE WIND TURBINES WHICH WILL BE USED TO OBTAIN DATA AND EXPERIENCE TO FORM THE BASIS FOR A MORE EXTENSIVE WIND POWER PROGRAMME TO BE IMPLEMENTED IN THE MID 1980S.

1980-0280 HUGOSSON S
SWEDISH WIND ENERGY PROGRAM.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 399-405.

THE SWEDISH GOVERNMENTAL PROGRAM FOR WIND ENERGY RESEARCH AND DEVELOPMENT IS PLANNED AND IMPLEMENTED BY THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT (NE), ESTABLISHED IN 1975. THE BOARD'S PURPOSE AND RESPONSIBILITIES INVOLVE SETTING UP PROGRAMS, DISTRIBUTING GRANTS AND LOANS FOR RESEARCH AND DEVELOPMENT IN ENERGY MATTERS. THE WIND ENERGY PROGRAM IS ONE OF 15 PROGRAMS.

1980-0281 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. 1964-1978 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, JULY 1980. 290 P.
PB80-812886

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR.

1980-0282 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. 1979-JUNE, 1980 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, JULY 1980. 117 P.

PB80-812894

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR.

1980-0283 HUNT V D
WINDPOWER: A HANDBOOK ON WIND ENERGY CONVERSION SYSTEMS.
NEW YORK, VAN NOSTRAND REINHOLD, 1980. 640 P.

THIS BOOK IS A COLLECTION OF FUNDAMENTAL INFORMATION ON WINDPOWER, COVERING EVERY ASPECT FROM AERODYNAMICS TO STORAGE. AN INTERESTING SECTION CONTAINING "VIEWS ON THE FUTURE OF WIND POWER" BY VARIOUS WIND SPOKESPEOPLE IS INCLUDED. THE BOOK RELIES HEAVILY ON INFORMATION FROM PARK AND SCHWIND'S "WIND POWER FOR FARMS, HOMES AND SMALL INDUSTRY" AS WELL AS OTHER GOVERNMENT REPORTS AND DOCUMENTS. AS SUCH IT IS A HANDY COMPENDIUM OF ALL THESE SOURCES BUT NOT A TRUE ENGINEERING MANUAL IN WHICH ALL THE BASIC ENGINEERING EQUATIONS AND DESIGN SPECS INVOLVED IN WIND DESIGN ARE COVERED.

1980-0284 HUSAIN S A
COMFORTABLE HEATING AND COOLING BY SOLAR REFLECTORS AND WIND.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1850-1861.

THIS PAPER EXAMINES THE USE OF SOLAR AND WIND ENERGY FOR DOMESTIC SPACE HEATING AND COOLING, WATER HEATING AND COOKING.

1980-0285 HUSS G, PERNPEITNER R
AERODYNAMIC ROTOR DESIGN OF THE "GROWIAN" LARGE-SCALE WIND ENERGY CONVERTER.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 406-415.

THE AERODYNAMIC DESIGN OF THE ROTOR ESTABLISHES TO A LARGE EXTENT THE PERFORMANCE CHARACTERISTICS AND ENERGY DELIVERY OF WIND ENERGY CONVERTERS. WITHIN THIS FRAMEWORK, THERE ARISE THE QUESTIONS AS TO ROTOR BLADE GEOMETRY, NUMBER OF ROTOR BLADES, DESIGN TOP-SPEED RATIO, NOMINAL ROTOR SPEED, HUB HEIGHT AND INSTALLED GENERATOR RATING PER ROTOR CIRCLE. TAKING REPRESENTATIVE WIND DATA FROM THE NORTH-GERMAN COASTAL AREA (LIST ON THE ISLAND OF SYLT) AS A BASIS, THE SELECTION AND OPTIMIZATION OF THESE PARAMETERS FOR THE GROWIAN LARGE-SCALE WIND ENERGY CONVERTER IS DISCUSSED. MORE DETAIL IS GIVEN IN PARTICULAR ON THE RELATIONSHIP WITH THE EXPECTED ANNUAL ENERGY PRODUCTION OF THE SYSTEM.

1980-0286 IGRA O
PRELIMINARY RESULTS FROM THE SHROUDED WIND-TURBINE PILOT PLANT.
J. ENERGY 4(4): 190-192, JULY-AUGUST 1980.

THIS ARTICLE PRESENTS SOME PRELIMINARY RESULTS OF WORK BEING DONE ON THE DEVELOPMENT OF A SHROUDED WIND-TURBINE PILOT PLANT IN ISRAEL.

1980-0287 INALL E K
LOW-SPEED VERTICAL-AIROFOIL, VERTICAL-AXIS WIND TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 195-201.
SERI/CP-635-938

MOST DESIGNS FOR WIND DRIVEN TURBINES BUILT TO PRODUCE ELECTRIC POWER OPERATE, FOR HIGH EFFICIENCY, WITH BETA > 4 (BETA = ROTOR TIP SPEED/WIND SPEED). CONSEQUENTLY THE CENTRIFUGAL FORCES ON THE ROTORS ARE HIGH AND COMBINED WITH OTHER FLUCTUATING FORCES IN EXPENSIVE ROTORS OF SOPHISTICATED DESIGN MADE FROM SPECIAL MATERIALS. AN ALTERNATIVE IS TO USE A LESS EFFICIENT, SLOW MOVING, LARGE ROTOR WITH LOWER STRESS IN CHEAPER MATERIAL. SUCH ROTORS ALSO HAVE MUCH HIGHER STARTING TORQUE, WHICH IS MAINTAINED OVER A RANGE OF SPEED, PROVIDING ADEQUATE OUTPUT AND SIMPLE LOAD CONTROL WITHOUT SPECIAL PROVISION TO PREVENT STALLING. TESTS ARE REPORTED ON A MODEL WITH BLADES WHICH AUTOMATICALLY ASSUME TWO SET POSITIONS DURING ROTATION AND ONE POSITION GOVERNED BY CENTRIFUGAL FORCES ON THE BLADE. EFFICIENCIES UP TO 15% HAVE BEEN OBTAINED.

1980-0288 JACOB A, RAJAGOPALAN V, VEILLETTE D
STRATEGIE DE COMMANDE POUR UN SYSTEME DE CONVERSION DE L'ENERGIE EOLIENNE A VITESSE VARIABLE. (CONTROL STRATEGY OF A SYSTEM FOR THE CONVERSION OF VARIABLE SPEED WINDMILL POWER.)
CAN. ELECTR. ENG. J. 5(1): 16-20, JANUARY 1980. (IN FRENCH)

A METHOD OF CALCULATING AN OPTIMAL CONTROL STRATEGY FOR A VARIABLE SPEED WIND POWER GENERATION SCHEME, INCORPORATING A SQUIRREL CAGE INDUCTION MACHINE, OPERATING IN A SELF EXCITED INDUCTION GENERATOR MODEL IS PRESENTED. THE SYSTEM INCORPORATES A CONVENTIONAL THREE-PHASE THYRISTOR RECTIFIER, A LINE COMMUTATED INVERTER AND AN ECONOMICAL AUXILIARY COMMUTATED VOLTAGE SOURCE INVERTER. THE THREE REGULATED VARIABLES ARE: DRIVE SPEED AS A FUNCTION OF AVAILABLE MECHANICAL ENERGY BY MANIPULATING THE RESISTIVE TORQUE DEVELOPED BY AN INDUCTION GENERATOR; INDUCTION MOTOR POWER CONSUMPTION DURING START-UP OF THE WINDMILL WHICH IS OF VERTICAL AXIS TYPE; OPERATING SLIP OF THE INDUCTION MACHINES, THEREBY LIMITING START-UP AND BRAKING CURRENTS. THE STRATEGY IS SUITABLE FOR ANY OTHER VARIABLE SPEED DRIVE SYSTEM INCORPORATING AN INDUCTION MACHINE.

1980-0289 JAGADISH B S
WIND ENERGY.
NONCONVENTIONAL SOURCES OF ENERGY: NOTES ON SHORT-TERM COURSE. NTIS, 1980. PAPER 11, 19 P.
NP-25005

INFORMATION IS PRESENTED CONCERNING WIND POWER KINETICS; WIND POWER AVAILABILITY IN INDIA; AND DESIGN CHARACTERISTICS OF VARIOUS TYPES OF WIND TURBINES.

1980-0290 JAIN B C
RESEARCH IN THE AREA OF RENEWABLE SOURCES OF ENERGY AT JYOTI.
NONCONVENTIONAL SOURCES OF ENERGY: NOTES ON SHORT-TERM COURSE. NTIS, 1980. PAPER 8, 5 P.
NP-25005

RESEARCH ACTIVITIES IN THE FOLLOWING AREAS ARE DESCRIBED BRIEFLY: SOLAR HOT WATER SYSTEMS, SOLAR HOT AIR SYSTEMS, SOLAR LOW PRESSURE STEAM SYSTEMS, SOLAR-POWERED COLD STORAGE, SOLAR THERMAL POWER GENERATION, WIND POWER, BIO-GAS PLANTS, RURAL ENERGY CENTERS, AND PHOTOVOLTAIC SYSTEMS. THE FACILITIES AT JYOTI ARE LISTED.

1980-0291 JANCZEWSKI J

THE USE OF WIND ENERGY IN ELECTRICAL ENERGY PRODUCTION.
ENERGETYKA 34(5): 171-175, MAY 1980. (IN POLISH)

THE PAPER PRESENTS A REVIEW OF RESEARCH WORKS IN THE FIELD OF WIND ENERGY USE FOR POWER GENERATION. IT ALSO PRESENTS A SCHEME OF TECHNICAL AND ECONOMIC CALCULATIONS FOR THE CHOICE OF A PARTICULAR TYPE OF WINDPOWER TURBINE SET. POSSIBILITIES FOR BUILDING WIND-POWER STATIONS ARE CONSIDERED.

1980-0292 JENSEN S A, BJERREGAARD E T D
TESTS PERFORMED ON THE 2 MW TVIND WECS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER H3, P. 391-400.

MEASUREMENTS ON THE 2 MW WECS, BUILT BY THE TVIND SCHOOLS IN JUTLAND, HAVE BEEN CARRIED OUT IN CONNECTION WITH THE DEVELOPMENT OF GENERAL TEST METHODS AND MEASURING OF EQUIPMENT FOR LARGE WECS. A BRIEF DESCRIPTION IS GIVEN OF THE INSTRUMENTATION. MEASUREMENTS WERE MADE WITH STRAIN GAUGES MOUNTED AT VARIOUS POSITIONS ALONG THE ROTOR BLADES. THE ROTOR SHAFT TORQUE AND RPM WERE MEASURED, ENABLING THE MECHANICAL POWER EFFICIENCY TO BE INVESTIGATED. THE REPORTED RESULTS COVER THE WIND VELOCITY RANGE 5-12 M/S, WHICH CORRESPONDS ROUGHLY TO THE POWER RANGE THAT, AT THE TIME OF TESTING, COULD BE ABSORBED BY THE ELECTRICAL GRID. THE SIGNALS FROM THE ROTATING PARTS WERE TRANSMITTED TO A TAPERECORDER VIA A 16 CHANNEL TELEMETRI SYSTEM DESIGNED AND BUILT FOR THE PURPOSE. THE RESULTS PRESENTED DEAL MAINLY WITH THE INFLUENCE FROM THE TOWER SHADOW ON THE ROTOR WHICH IS LOCATED ON THE DOWN-WIND SIDE OF THE TOWER.

1980-0293 JESCH L F
LINEARISED BLADE DESIGN FOR HORIZONTAL AXIS WIND TURBINES.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FURUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY DGS-SONNENENERGIE VERL., 1980. P. 491.

1980-0294 JESCH L F, CROSSLAND R T
DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINE BLADES.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 450-457.

ANGLE OF ATTACK, THRUST COEFFICIENT AND REYNOLDS NUMBER VARIATIONS FOR EACH ELEMENT OF THE BLADE IN EVERY ROTATIONAL POSITION OF THE VERTICAL AXIS ROTOR IS ANALYSED BY A COMPUTER MODEL, USING FINITE ELEMENT TECHNIQUE. THE THRUST COEFFICIENT IS FOUND TO HAVE FOUR DISTINCT PEAKS WHEN PLOTTED AGAINST THE ANGULAR POSITION OF THE SHAFT. IN A COMPLETE CYCLE THESE VALUES OSCILLATE RAPIDLY BETWEEN POSITIVE MAXIMA AND NEGATIVE MINIMA. THE AMPLITUDE AND FREQUENCY OF THESE VARIATIONS IN THRUST, CAUSED BY THE CHANGES IN AERODYNAMIC LIFT OF THE ROTATING BLADE, IS DIFFERENT FOR ENERGY ELEMENTAL POSITION AND IT IS DEPENDENT ON OPERATING CONDITIONS. AT HIGH SPEEDS POSITIVE TORQUE IS PRODUCED EVEN AT STALL CONDITIONS.

1980-0295 JESCH L F, WALTON D
REYNOLDS NUMBER EFFECTS ON THE AERODYNAMIC PERFORMANCE OF A VERTICAL AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER G1, P. 323-332.

THE IMPORTANCE OF REYNOLDS NUMBER ON THE DARRIEUS TYPE VERTICAL AXIS WIND TURBINES (VAWT) HAS BEEN RECOGNISED BEFORE BUT HAS NOT BEEN INVESTIGATED IN DETAIL. ROTOR PERFORMANCE HAS USUALLY BEEN CALCULATED ON THE BASIS OF A SINGLE REYNOLDS NUMBER OPERATING OVER THE ENTIRE LENGTH OF THE BLADE. A NEW COMPUTER MODEL CALCULATES THE LOCAL REYNOLDS NUMBER FOR EACH ELEMENT ALONG THE BLADE AND AS IT ROTATES. THE ACTUAL LOCAL LIFT AND DRAG COEFFICIENTS ARE THEN OBTAINED THROUGH DATA DERIVED FROM NACA TESTS. COMPARISON OF THE OVERALL TURBINE PERFORMANCE, OBTAINED BY USING THIS MODEL, WITH PREVIOUS THEORIES AND WITH WIND TUNNEL TEST RESULTS SHOWS A CONSIDERABLE IMPROVEMENT IN PREDICTION ACCURACY. USING THIS IMPROVED MODEL AN AERODYNAMIC ANALYSIS OF THE VAWT WAS PERFORMED. THE EFFECTS OF BLADE NUMBERS, BLADE GEOMETRY, CHORD LENGTH AND ROTOR SOLIDITY ARE INVESTIGATED SINGLY AND IN COMBINATIONS. THE RESULTS SHOW THAT WHEN A VARIABLE RE IS INCLUDED AND FOR A GIVEN SOLIDITY, IT IS NECESSARY TO CALCULATE THE EFFECT OF BLADE CHORD AND ROTOR RADIUS INDEPENDENTLY.

1980-0296 JOHANSSON B C A
THE VELOCITY INDUCED BY THE WAKE OF A WIND TURBINE IN A SHEAR LAYER, INCLUDING GROUND EFFECT.
NTIS, JUNE 1980. 42 P.
N81-20037, FFA-133, PB81-142184, N81-13471

A THEORY FOR THE CALCULATION OF THE VELOCITY FIELD INDUCED BY THE WAKE OF A HORIZONTAL AXIS WIND TURBINE IN A WIND SHEAR LAYER AND IN THE VICINITY OF PLANE GROUND SURFACE, WHEN THE FORCE DISTRIBUTION OF THE TURBINE IS KNOWN, IS DEVELOPED. THE TURBINE IS APPROXIMATED BY A DISK AREA OF CONTINUOUS DISTRIBUTIONS OF THRUST AND FORCE PARALLEL TO THE CYLINDER OF DISTRIBUTED VORTICITY. A NUMERICAL EXAMPLE IS CALCULATED AND DISTRIBUTIONS OF VELOCITY NORMAL TO THE DISK PLANE AND GROUND EFFECT INFLUENCES ARE SHOWN. THE THEORY IS BASED ON ASSUMPTIONS STRICTLY VALID ONLY FOR SMALL PERTURBATIONS OF THE UNDISTURBED FLOW.

1980-0297 JOHANSSON B C A
THE VELOCITY INDUCED BY THE WAKE OF A WIND TURBINE IN A SHEAR LAYER, INCLUDING GROUND EFFECT.
NTIS, SEPTEMBER 17, 1980. 51 P.
N81-14985, FFA-TN-HU-2198-PT.3

THE TURBINE WAS APPROXIMATED BY A DISK AREA OF CONTINUOUS DISTRIBUTIONS OF THRUST AND FORCE PARALLEL TO THE DISK PLANE. ITS WAKE WAS REPRESENTED BY A SEMI-INFINITE CYLINDER OF DISTRIBUTED VORTICITY. A NUMERICAL EXAMPLE WAS CALCULATED. THE THEORY IS BASED UPON ASSUMPTIONS STRICTLY VALID ONLY FOR SMALL PERTURBATIONS OF THE UNDISTURBED FLOW. HOWEVER, THE RESULTS MAY HAVE A WIDER RANGE OF APPLICABILITY.

1980-0298 JOHANSSON T B, STEEN P
SOLAR SWEDEN: AN OUTLINE TO A RENEWABLE ENERGY SYSTEM.
BIO-ENERGY WORLD CONGRESS AND EXPOSITION, ATLANTA, GEORGIA, APRIL 21, 1980. PROCEEDINGS. NTIS, 1980. P. 336-338.
CONF-800482

SOLAR SWEDEN IS AN OUTLINE OF A RENEWABLE ENERGY SYSTEM FOR SWEDEN IN THE YEAR 2015 USING BIOMASS, SOLAR HEATING, HYDROPOWER, WINDPOWER AND SOLAR CELLS. IT IS TAKEN AS AN ASSUMPTION THAT THE PRODUCTION OF GOODS AND SERVICES IS DOUBLED IN THE YEAR 2015 AS COMPARED WITH TODAY, WHICH MEANS THAT THE STANDARD OF LIVING IS DOUBLED. THE TOTAL ENERGY DEMAND IS ASSUMED TO BE ABOUT 25% ABOVE TODAY'S LEVEL DUE TO MODERATELY INCREASED ENERGY EFFICIENCY. THE AIM OF THE STUDY IS TO GIVE A BASIS FOR DISCUSSIONS OF THE ADVANTAGES AND DISADVANTAGES OF A RENEWABLE ENERGY SYSTEM. IT ALSO GIVES A BASIS FOR DIRECTING NEAR TERM DECISIONS IN ORDER TO MAKE SUCH AN

ENERGY SYSTEM A REALITY. THE TOTAL COST OF THE SYSTEM IS CALCULATED BASED ON FORECASTS OF COSTS TO BE ACHIEVED WITHIN TEN YEARS. IT IS FOUND THAT THE COSTS OF THE ENERGY SYSTEM ARE NOT IN CONFLICT WITH THE INCREASED PRODUCTION LEVELS ASSUMED IN THE WHOLE ECONOMY.

1980-0299 KAUFMAN J W
WIND WHEEL ELECTRIC POWER GENERATOR.
U.S. PATENT NO. 4,191,505, MARCH 4, 1980. 8 P.

THIS WIND WHEEL ELECTRIC POWER GENERATOR APPARATUS INCLUDES A HOUSING ROTATABLY MOUNTED UPON A VERTICAL SUPPORT COLUMN. PRIMARY AND AUXILIARY FUNNEL-TYPE, VENTURI DUCTS ARE FIXED ONTO THE HOUSING FOR CAPTURING WIND CURRENTS AND CONDUCTING TO A BLADED WHEEL ADAPTED TO BE OPERATIVELY CONNECTED WITH THE GENERATOR APPARATUS. ADDITIONAL AIR FLOWS ARE ALSO CONDUCTED ONTO THE BLADED WHEEL; ALL OF THE AIR FLOWS POSITIVELY EFFECTING ROTATION OF THE WHEEL IN A CUMULATIVE MANNER. THE AUXILIARY DUCTS ARE DISPOSED AT AN ACUTE ANGLE WITH RESPECT TO THE LONGITUDINAL AXIS OF THE HOUSING, AND THIS FEATURE, TOGETHER WITH THE ROTATABILITY OF THE HOUSING AND THE DUCTS, PERMITS CAPTURE OF WIND CURRENTS WITHIN A VARIBLE DIRECTIONAL RANGE.

1980-0300 KAZA K R V
NONLINEAR AEROELASTIC EQUATIONS OF MOTION OF TWISTED, NONUNIFORM, FLEXIBLE HORIZONTAL-AXIS TURBINE BLADES.
NTIS, JULY 1980. 70 P.
NASA-CR-159502, DOE/NASA/3139-1, N80-26774/3

THE SECOND-DEGREE NONLINEAR EQUATIONS OF MOTION FOR A FLEXIBLE, TWISTED, NONUNIFORM, HORIZONTAL AXIS WIND TURBINE BLADE WERE DEVELOPED USING HAMILTON'S PRINCIPLE. A MATHEMATICAL ORDERING SCHEME WHICH WAS CONSISTENT WITH THE ASSUMPTION OF A SLENDER BEAM WAS USED TO DISCARD SOME HIGHER-ORDER ELASTIC AND INERTIAL TERMS IN THE SECOND-DEGREE NONLINEAR EQUATIONS. THE BLADE AERODYNAMIC LOADING WHICH WAS EMPLOYED ACCOUNTED FOR BOTH WIND SHEAR AND TOWER SHADOW AND WAS OBTAINED FROM STRIP THEORY BASED ON A QUASI-STEADY APPROXIMATION OF TWO-DIMENSIONAL, INCOMPRESSIBLE, UNSTEADY, AIRFOIL THEORY. THE RESULTING EQUATIONS HAD PERIODIC COEFFICIENTS AND WERE SUITABLE FOR DETERMINING THE AEROELASTIC STABILITY AND RESPONSE OF LARGE HORIZONTAL-AXIS WIND TURBINE BLADES.

1980-0301 KAZA K R V, JANETZKE D C
MOSTAS COMPUTER CODE EVALUATION FOR DYNAMIC ANALYSIS OF TWO-BLADED WIND TURBINES.
J. ENERGY 4(4): 162-169, JULY-AUGUST 1980.

CALCULATED DYNAMIC BLADE LOADS ARE COMPARED WITH MEASURED LOADS OVER A RANGE OF YAW STIFFNESSES OF THE DOE/NASA MOD-0 WIND TURBINE TO EVALUATE THE PERFORMANCE OF TWO VERSIONS OF THE MOSTAS COMPUTER CODE. THE RESULTS OF THE FIRST VERSION DO NOT AGREE WITH DYNAMIC BLADE LOAD AMPLIFICATIONS AT OR CLOSE TO RESONANCE CONDITIONS. THE RESULTS OF THE SECOND VERSION COMPARE WELL WITH THE MEASURED DATA. TO EXPLAIN THE DEFICIENCIES OF THE FIRST VERSION, AN INVESTIGATION WAS MADE WITH THE AID OF A HYPOTHETICAL THREE-DEGREE-OF-FREEDOM DYNAMIC MODEL. THE EXACT EQUATIONS OF MOTION OF THIS MODEL WERE SOLVED USING THE FLOQUET-LIAPUNOV METHOD.

1980-0302 KEAST D N, POTTER R C
PRELIMINARY ANALYSIS OF THE AUDIBLE NOISE OF CONSTANT-SPEED, HORIZONTAL-AXIS WIND-TURBINE GENERATORS.
NTIS, JULY 1980. 72 P.
DOE/EV-0089

AN ANALYTICAL PROCEDURE HAS BEEN DEVELOPED FOR CALCULATING CERTAIN AERODYNAMIC SOUND LEVELS PRODUCED BY LARGE, HORIZONTAL-AXIS WIND-TURBINE GENERATORS (WTG'S) SUCH AS THE DOE/NASA MODS-0, -0A, -1, AND -2. THIS PRELIMINARY PROCEDURE IS BASED UPON VERY LIMITED FIELD DATA FROM THE MOD-0. IT POSTULATES A NOISE COMPONENT DUE TO THE (CONSTANT) ROTATION OF THE BLADES OF THE WTG, PLUS A WAKE-NOISE COMPONENT THAT INCREASES WITH THE SQUARE OF THE POWER PRODUCED BY THE WTG. MECHANICAL SOUND FROM MACHINERY, AND LOW-FREQUENCY IMPULSIVE SOUNDS PRODUCED BY BLADE INTERACTION WITH THE WAKE OF THE SUPPORT TOWER ARE NOT CONSIDERED.

1980-0303 KEITH T G
PERFORMANCE OF A STEEL SPAR WIND TURBINE BLADE ON THE MOD-0 100 KW EXPERIMENTAL TURBINE.
NTIS, SEPTEMBER 1980. 25 P.
DOE/NASA/1028-27, NASA-TM-81588, N81-11448

THE PERFORMANCE AND LOADING OF A LARGE WIND TURBINE ROTOR, 38.4 M IN DIAMETER AND COMPOSED OF TWO-COST STEEL SPAR BLADES HAS BEEN EXAMINED. TWO BLADES WERE FABRICATED AT LEWIS RESEARCH CENTER AND SUCCESSFULLY OPERATED ON THE MOD-0 WIND TURBINE AT PLUM BROOK. THE BLADES WERE OPERATED ON A TOWER ON WHICH THE NATURAL BENDING FREQUENCY HAD BEEN ALTERED BY PLACING THE TOWER ON A LEAF-SPRING APPARATUS. IT WAS FOUND THAT NEITHER BLADE PERFORMANCE NOR LOADING WERE AFFECTED SIGNIFICANTLY BY THIS TOWER SOFTENING TECHNIQUE. ROTOR PERFORMANCE EXCEEDED PREDICTION WHILE BLADE LOADS WERE FOUND TO BE IN REASONABLE AGREEMENT WITH THOSE PREDICTED. SEVENTY-FIVE HOURS OF OPERATION OVER A FIVE MONTH PERIOD RESULTED IN NO DETERIORATION IN THE BLADE.

1980-0304 KELLY D A
WIND CONVERSION LATTICE ARRAY, WITH MULTIPLE MINI-TURBO-GENERATOR MODULES.
U.S. PATENT NO. 4,220,870, SPETEMBER 2, 1980.

THIS REPORT DESCRIBES AN ARRAY OF IDENTICAL MINIATURE WIND TURBINE/GENERATOR MODULES. THE COMBINATION IS COMPRISED OF AN OPEN FRAMEWORK LATTICE SUPPORT STRUCTURE; A PLURALITY OF MINIATURE VANED TURBINE IMPELLERS OF CONCAVE LINEAR VANES VERTICALLY DISPOSED AND SECURED TO AN UPPER AND LOWER DISC ADJACENT TO THE OUTER PERIPHERY OF DISCS; A CENTRALLY DISPOSED SHAFT FIXED TO EACH OF THE DISCS PROTRUDING FROM AN END OF ONE OF THE DISCS; A COUPLING HALF SECURED TO THE SHAFT END WITH PROTECTIVE HOUSINGS DISPOSED OVER THE GENERATORS AND MOUNTED TO THEM; A CONNECTION OF ALL ELECTRICAL WIRES FROM THE GENERATORS INTO USEFUL SERIES AND PARALLEL CIRCUITRY FOR CONNECTION TO THE HOUSEHOLD LOAD; AND A HINGE AT THE BASE OF THE FRAMEWORK STRUCTURE, DIAGONAL PIVOTING SUPPORT STRUTS FOR MAINTAINING IT IN AN UPRIGHT POSITION.

1980-0305 KENDALL H W, NADIS S J
ENERGY STRATEGIES: TOWARD A SOLAR FUTURE.
CAMBRIDGE, MASSACHUSETTS, BALLINGER PUBLISHING CO., 1980. 320 P.

THE RESULTS OF A RESEARCH PROJECT CONDUCTED BY A TEAM FROM THE UNION OF CONCERNED SCIENTISTS ARE PRESENTED, IN WHICH IT IS SHOWN HOW A BLEND OF ALREADY DEMONSTRATED SOLAR ENERGY TECHNOLOGIES COULD, BY THE YEAR 2050, PROVIDE ALL OF THE U.S. ENERGY NEEDS.

1980-0306 KENTFIELD J A C
BENEFITS ARISING FROM THE USE OF PNEUMATIC ENERGY TRANSMITTAL IN WIND-POWER SYSTEMS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.

PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 821-827.

A BRIEF DESCRIPTION IS GIVEN OF A NEW FORM OF SIMPLE, FIXED PITCH, HORIZONTAL AXIS WIND TURBINE SUITABLE FOR THE DIRECT DRIVE OF MECHANICAL DEVICES SUCH AS PUMPS, COMPRESSORS, ETC. EXPERIMENTALLY OBTAINED PERFORMANCE CHARACTERISTICS OF THE TURBINE ARE PRESENTED WHICH SHOW THAT A RELATIVELY GOOD PERFORMANCE IS ACHIEVABLE. A PNEUMATIC TRANSMISSION SYSTEM SUITABLE FOR USE IN CONJUNCTION WITH THE NEW TURBINE IS ALSO DESCRIBED. PREDICTIONS OF THE PERFORMANCE OF THE PNEUMATIC TRANSMISSION SHOW THAT IT HAS PARTICULAR ADVANTAGES WHEN USED IN COMBINED WIND AND SOLAR-ENERGY CONVERSION SYSTEMS FOR ELECTRICAL POWER GENERATION. THE ENERGY CONVERSION EFFECTIVENESS OF AN OPTIMIZED CONFIGURATION IS 54% WHEN INTERNAL LOSSES ARE TAKEN INTO ACCOUNT AND APPROXIMATELY 60% OF THE TOTAL ENERGY INPUT IS THERMAL, THE REMAINDER BEING SHAFT-POWER PROVIDED BY THE WIND-TURBINES INCORPORATED IN THE SYSTEM. ADVANTAGES OF PNEUMATIC TRANSMISSIONS ARE DISCUSSED. THESE INCLUDE, APART FROM OVERALL SYSTEM SIMPLICITY, THE USE OF A NON-TOXIC WORKING FLUID AND THE COMPARATIVE EASE WITH WHICH ENERGY STORAGE CAN BE PROVIDED BOTH IN THE FORM OF STORED COMPRESSED AIR AND, WITH SOLAR ASSISTED SYSTEMS, THERMALLY.

1980-0307 KESSLER D L
WIND: A LOOK TO THE FUTURE.
WESTERN SUN 1980 SOLAR UPDATE CONFERENCE, SALT LAKE CITY, UTAH, SEPTEMBER 24, 1980. PROCEEDINGS. NTIS, 1980. P. 185-190.
CONF-800995

INFORMATION ON WIND TURBINES IS PRESENTED CONCERNING WIND POWER AVAILABILITY, SITE SELECTION, TURBINE CHARACTERISTICS, AND COST.

1980-0308 KILICKAYA M S
EFFECT OF AN EMBANKMENT ON THE WIND STRUCTURE.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 493.

1980-0309 KINLOCH D H, WICKS F E, BECKER M, YERAZUNIS S, PARMELEE J M
POTENTIAL AND IMPACTS OF WIND ELECTRIC GENERATORS UPON ELECTRIC POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY MEETING. NEW YORK, NY, FEBRUARY 3-8, 1980. NEW YORK, IEEE, NO. CH1523-4/80, 1980. 10 P.

WIND GENERATION RESEARCH MUST BE INTERFACED WITH THE CAPABILITY OF ANALYZING GENERATION EXPANSION AND ELECTRIC DEMAND OVER A REALISTIC PLANNING PERIOD. METHODS OF INCORPORATING WIND ELECTRIC GENERATION INTO GENERATION PLANNING RESEARCH HAVE BEEN DEVELOPED AT RENSSELAER POLYTECHNIC INSTITUTE. THE GENERATION OUTPUT FROM AN HOUR-BY-HOUR SIMULATION OF WIND TURBINES USING ACTUAL WIND DATA IS COUPLED WITH HOURLY DATA FROM THE NEW YORK STATE ELECTRIC POWER LOAD FOR CORRESPONDING HOURS. THIS INFORMATION IS THEN PROCESSED WITH A GENERATION PLANNING MODEL THAT UTILIZES LINEAR PROGRAMMING TO CALCULATE THE CORRESPONDING OPTIMUM GENERATION AND OPERATING STRATEGY. THESE DATA ARE THEN POST-PROCESSED TO DETERMINE THE POTENTIAL AND IMPACTS OF WIND GENERATION ON POWER GENERATION AND PRIMARY FUEL REQUIREMENTS. BY COMBINING ACTUAL WIND AND ELECTRIC DEMAND DATA WITH FORECASTS OF FUTURE ELECTRIC DEMANDS, A REALISTIC PROJECTION OF WIND GENERATION'S IMPACT ON THE NEW YORK STATE UTILITIES IS EVALUATED OVER THE 1985 TO 2005 PLANNING PERIOD.

1980-0310 KLIMAS P C, FRENCH R E
USER'S MANUAL FOR THE VERTICAL AXIS WIND TURBINE PERFORMANCE COMPUTER CODE DARTER.
NTIS, MAY 1980. 48 P.
SAND-80-1155

THE COMPUTER CODE DARTER (DARRIEUS, TURBINE, ELEMENTAL REYNOLDS NUMBER) IS AN AERODYNAMIC PERFORMANCE/LOADS PREDICTION SCHEME BASED UPON THE CONSERVATION OF MOMENTUM PRINCIPLE. IT IS THE LATEST EVOLUTION IN A SEQUENCE WHICH BEGAN WITH A MODEL DEVELOPED BY TEMPLIN OF NRC, CANADA AND PROGRESSED THROUGH THE SANDIA NATIONAL LABORATORIES-DEVELOPED SIMOSS (SIMPLE MOMENTUM, SINGLE STREAMTUBE) AND DART (DARRIEUS TURBINE) TO DARTER.

1980-0311 KLUETER H
WORKING GROUP ON APPLICATIONS IN AGRICULTURE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 519-522.
CONF-791097

1980-0312 KLUETER H H
WORKSHOP SUMMARY. WIND ENERGY APPLICATIONS IN AGRICULTURE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 569-576.
CONF-791097

1980-0313 KNOX J B
WIND RESOURCE AND SITING REQUIREMENTS.
SOLAR ENERGY TECHNOLOGY HANDBOOK. PART A. ENGINEERING FUNDAMENTALS. NEW YORK, MARCEL DEKKER, INC., 1980. P. 617-664.

INFORMATION IS PRESENTED CONCERNING WIND ENERGY RESOURCE; THE U.S. WIND ENERGY CONVERSION PROGRAM; SITING REQUIREMENTS; METHODOLOGIES FOR SITE REQUIREMENTS; AND FUTURE RESEARCH DIRECTIONS.

1980-0314 KORNREICH T R, DEVINE D
CURRENT STATE INCENTIVE PROGRAMS FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, JULY 1980. 81 P.
RFP-3128/05480/3533/80-0

THE OBJECTIVE OF THIS STUDY IS TO PREPARE A SUMMARY REPORT DESCRIBING THE STATE INCENTIVE PROGRAMS FOR SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) AS OF DECEMBER 31, 1979. WRITTEN PRIMARILY FOR THE USE OF STATE GOVERNMENTS, THIS REPORT FOCUSES ON THE CURRENT STATUS OF STATE INCENTIVE PROGRAMS AND REGULATIONS THROUGHOUT THE UNITED STATES. TO MAXIMIZE THE UTILITY OF THIS DOCUMENT TO THE STATES, AN UP-TO-DATE DESCRIPTION OF CURRENT PROGRAMS IS PROVIDED. BASED ON THE EXAMINATION OF ALL STATE INCENTIVE PROGRAMS IN EFFECT DURING THIS REPORTING PERIOD, THE PROGRAMS ARE DIVIDED INTO SIX CATEGORIES: 1) INCOME TAXES, 2) PROPERTY TAXES, 3) SALES AND USE TAXES, 4) LOANS, 5) GRANTS, 6) OTHER. THE EFFECT OF THE STATE PROGRAMS ON SWECS USAGE IS ALSO EXAMINED.

1980-0315 KORNREICH T R, DEVINE D
SWECS QUALIFICATIONS FOR STATE PROGRAMS. FINAL REPORT.
NTIS, JULY 1980. 35 P.

THIS REPORT IS INTENDED TO ASSIST IN ESTABLISHING THE NEEDED BASIS TO BE USED BY STATES TO EVALUATE SWECS INCLUSION IN TAX INCENTIVE PROGRAMS TO ENCOURAGE THE USE OF RENEWABLE ENERGY SYSTEMS. THREE PROTOTYPICAL QUALIFICATIONS DOCUMENTS ARE INCLUDED IN THIS REPORT REFLECTING THREE LEVELS OF STRINGENCY: VERY DEMANDING, MODERATELY DEMANDING, AND RELATIVELY RELAXED SETS OF REQUIREMENTS THAT MAY BE PLACED UPON SWECS BY THE STATES. QUALIFICATIONS REQUIREMENTS ALREADY IN EFFECT IN CERTAIN STATES AS WELL AS INFORMATION OBTAINED FROM INTERVIEWS WITH RESPONSIBLE OFFICIALS IN A SAMPLE OF TEN STATES WERE USED IN THIS STUDY. THIS INFORMATION WAS ANALYZED AND A RANGE OF OPTIONS FOR DEFINING SWECS QUALIFICATIONS WAS ESTABLISHED. IT IS ANTICIPATED THAT THE THREE QUALIFICATIONS DOCUMENTS DEVELOPED IN THIS REPORT WILL SERVE AS MODELS FOR STATES TO FOLLOW IN STRUCTURING THEIR OWN QUALIFICATIONS REQUIREMENTS FOR INCORPORATING RESIDENTIAL SWECS IN TAX INCENTIVE PROGRAMS.

1980-0316 KORNREICH T R, KOTTLER R J, JENNINGS D M
PRELIMINARY TECHNICAL AND ECONOMIC EVALUATION OF VORTEX EXTRACTION DEVICES. SUMMARY REPORT.
NTIS, APRIL 1980. 29 P.
SERI/TR-8003-2

THE ROTOR SUBSYSTEM REPRESENTS ONE OF THE MAJOR COST DRIVERS IN CONVENTIONAL WIND ENERGY SYSTEMS. DESPITE THE FACT THAT THE TWO VORTEX EXTRACTION SYSTEMS EVALUATED HAVE THE POTENTIAL FOR SUBSTANTIALLY REDUCING ROTOR COSTS, THESE COST SAVINGS ARE MORE THAN OFFSET BY THE ADDITIONAL COSTS REQUIRED FOR THE AUGMENTATION DEVICES. BASED ON A PRELIMINARY ANALYSIS OF THE PRESENTLY ENVISIONED CONCEPTUAL DESIGNS OF THE TORNADO WIND ENERGY SYSTEM AND THE VORTEX AUGMENTOR SYSTEM, IT DOES NOT APPEAR THAT EITHER SYSTEM COULD ACHIEVE ECONOMIC PARITY WITH CONVENTIONAL HORIZONTAL AXIS WIND SYSTEMS EVEN IF ALL OF THE TECHNICAL UNCERTAINTIES SURROUNDING THESE INNOVATIVE CONCEPTS ARE FAVORABLY RESOLVED.

1980-0317 KORNREICH T R, KOTTLER R J, JENNINGS D M
PRELIMINARY TECHNICAL AND ECONOMIC EVALUATION OF VORTEX EXTRACTION DEVICES. FINAL REPORT.
NTIS, APRIL 1980. 90 P.
SERI/TR-8003-1

TWO INNOVATIVE VORTEX EXTRACTION DEVICES--THE TORNADO WIND ENERGY SYSTEM (TWES) AND THE VORTEX AUGMENTOR CONCEPT (VAC)--ARE CRITICALLY EVALUATED TO PROVIDE A PRELIMINARY ASSESSMENT OF THEIR TECHNICAL AND ECONOMIC VIABILITY AS COMPARED TO CONVENTIONAL HORIZONTAL AXIS WIND ENERGY SYSTEMS. THIS ASSESSMENT WAS CARRIED OUT OVER A WIDE RANGE OF POWER OUTPUT LEVELS AND AUGMENTATION RATIOS APPROPRIATE TO EACH OF THE CONCEPTS.

1980-0318 KOTTLER R J
PROCEEDINGS OF THE FOURTH BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS.
ARLINGTON, VIRGINIA, JFB SCIENTIFIC CORPORATION, JUNE 1980. 639 P.
BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH, WASHINGTON, D.C., OCTOBER 28, 1979.
CONF-791097

1980-0319 KOVARIK T, PIPHER C, HURST J
WIND ENERGY. THE GENERATION, STORAGE AND CONVERSION OF WIND POWER FOR PRACTICAL USE TODAY.
DORCHESTER, U.K., PRISM PRESS, 1980. 150 P.

THE HISTORY OF WIND POWER UTILISATION IS DESCRIBED BRIEFLY, CONCENTRATING ON RECENT PROJECTS IN THE USA. THE PARAMETERS OF THE WIND ARE DISCUSSED, AND THE CONSTRUCTION OF AEROGENERATORS EXPLAINED. ENERGY STORAGE BY WATER PUMPING, COMPRESSED AIR, INERTIAL ENERGY AND BATTERIES IS REVIEWED. A LIST OF WIND EQUIPMENT SUPPLIERS AND A BIBLIOGRAPHY ARE INCLUDED.

1980-0320 KRAWIEC S
ECONOMICS OF SELECTED WECS DISPERSED APPLICATIONS.
NTIS, FEBRUARY 1980. 7 P.
CONF-800406-1, SERI/TP-431-580

AN ECONOMIC ANALYSIS FOR DISTRIBUTED WIND ENERGY CONVERSION SYSTEMS (WECS) WAS CONDUCTED FOR THE DEPARTMENT OF ENERGY (DOE) AS PART OF THE SOLAR COMMERCIAL READINESS ASSESSMENT TASK AT THE SOLAR ENERGY RESEARCH INSTITUTE (SERI). THE MAJOR OBJECTIVE OF THE STUDY IS TO ANALYZE: THE COST OF ELECTRICITY GENERATED BY SELECTED WIND ENERGY SYSTEMS IN RESIDENTIAL AND AGRICULTURAL APPLICATIONS; THE BREAKEVEN COST OF WIND SYSTEMS ABLE TO COMPETE ECONOMICALLY WITH CONVENTIONAL POWER SOURCES IN DISPERSED APPLICATIONS; AND THE IMPACT OF MAJOR ECONOMIC FACTORS ON THE COST PERFORMANCE INDEX.

1980-0321 KRISTOFERSON L
SOLAR ENERGY RESEARCH IN SWEDEN.
AMBIO 9(1): 40-43, 1980.

1980-0322 LACOSTE J
ENERGY: WHAT RESTRICTIONS?
REV. FR. ELECTR. 53(268): 16-23, 72, MARCH 1980. (IN FRENCH)

THE PRESENT RESTRICTED SUPPLY OF OIL AND ITS INCREASE IN PRICE IS DISCUSSED. THE FUTURE DEVELOPMENT, AVAILABILITY, RENEWABILITY, AND STORAGE POSSIBILITIES OF ENERGY RESOURCES INCLUDING GEOTHERMAL, BIOMASS, WAVE ENERGY, SOLAR ENERGY, WIND POWER, AND THERMAL ENERGY FROM THE SEA, ARE OUTLINED.

1980-0323 LAITNER S
MIDWEST: LOCKED IN A HOLDING PATTERN.
SOL. AGE 5(1): 36, JANUARY 1980.

THE POTENTIAL APPLICATIONS OF SOLAR ENERGY AND THE DEVELOPMENT OF OTHER ENERGY SOURCES IN THE MIDWEST ARE DISCUSSED. SOLAR HEATING APPLICATIONS ARE CONSIDERED ECONOMICAL IN THE MIDWEST BECAUSE OF THE LONG AND COLD WINTERS. WIND POWER AND BIOMASS CONVERSION ARE ALSO CONSIDERED FEASIBLE SOURCES OF ENERGY. THE DOE HAS FUNDED THE MID-AMERICAN SOLAR ENERGY COMPLEX TO SERVE THE 12 STATE REGION. SO FAR, THE AGENCY HAS NOT BEEN CONSIDERED A SUCCESS. APPLICATIONS OF SOLAR ENERGY AND OTHER TECHNOLOGIES IN THE MIDWEST ARE CITED AND INCLUDE A SALT-GRADIENT SOLAR POND, SOLAR SPACE HEATING IN A ZOO, SWIMMING POOL HEATING, PASSIVE SOLAR HEATED HOUSES, THE BUSINESS DISTRICT OF A TOWN, A SUMMER CAMP, AGRICULTURAL APPLICATIONS OF SOLAR ENERGY, AND BIOMASS SYSTEMS.

1980-0324 LAWRENCE K, STROJAN C, O'DONNELL D
ENVIRONMENTAL ASSESSMENT OF SMALL WIND SYSTEMS. PROGRESS REPORT.
NTIS, FEBRUARY 1980. 37 P.
SERI/PR-354-420

THIS PROGRESS REPORT IS THE FIRST FORMAL PRODUCT OF THE ENVIRONMENTAL ASSESSMENT OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) STUDY. IT PRESENTS AN OVERVIEW OF THE STUDY'S STRUCTURE, PLANNED ACTIVITIES, AND A SYNOPSIS OF TASK PROGRESS TO DATE. THIS REPORT WAS PREPARED AS PART OF TASK NO. 5322 IN THE INSTITUTIONAL AND ENVIRONMENTAL ASSESSMENT BRANCH OF THE SOLAR ENERGY RESEARCH INSTITUTE.

1980-0325 LAWRENCE K A, STROJAN C L
ENVIRONMENTAL EFFECTS OF SMALL WIND ENERGY CONVERSION SYSTEMS.
DOE ENVIRONMENTAL CONTROL SYMPOSIUM, 2ND, RESTON, VIRGINIA, MARCH 17, 1980. PROCEEDINGS. NTIS, JUNE 1980. VOLUME 2. P. 228-241.
CONF-800334-(VOL.2)

AS PART OF THE ENVIRONMENTAL RESEARCH PROGRAM, THE SOLAR ENERGY RESEARCH INSTITUTE (SERI) ASSESSED THE POTENTIAL ENVIRONMENTAL EFFECTS OF SWECS. THE ENVIRONMENTAL ASSESSMENT FOCUSED ON SWECS IN THREE POWER RATING CATEGORIES: 2, 8, AND 40 KW. ENVIRONMENTAL EFFECTS CAN OCCUR THROUGHOUT A TECHNOLOGY'S LIFE CYCLE. FOR THE PURPOSES OF THIS ANALYSIS, THE LIFE CYCLE OF SWECS WAS DIVIDED INTO THREE PHASES: SYSTEM MANUFACTURE AND INSTALLATION; OPERATION AND MAINTENANCE; AND DECOMMISSION. POTENTIAL ENVIRONMENTAL EFFECTS ASSOCIATED WITH EACH PHASE ARE REVIEWED.

1980-0326 LEE S T, YAMAYEE Z A
LOAD-FOLLOWING AND SPINNING-RESERVE PENALTIES FOR INTERMITTENT GENERATION.
IEEE POWER ENGINEERING SOCIETY, SUMMER MEETING, MINNEAPOLIS, MINNESOTA, JULY 13-18, 1980. PAPERS. PISCATAWAY, N.J., IEEE POWER ENGINEERING SOCIETY, 1980. PAPER NO. 80 SM 582-7, 9 P.

THERE HAS BEEN INCREASING INTEREST IN INTERMITTENT GENERATION SUCH AS SOLAR AND WIND POWER INTERCONNECTED WITH UTILITY SYSTEMS. THIS PAPER PRESENTS A SIMPLE METHOD FOR ESTIMATING THE SPINNING-RESERVE AND LOAD-FOLLOWING REQUIREMENTS FOR A POWER SYSTEM CONTAINING INTERMITTENT GENERATION. IT IS INCORPORATED IN AN OPTIMAL GENERATION EXPANSION PLANNING MODEL WHICH CAN EVALUATE THE EFFECT OF SUCH REQUIREMENTS ON THE GENERATION MIX AND THE PRODUCTION COST. A CASE STUDY DEMONSTRATES THAT UNDER SOME ASSUMPTIONS, THESE PENALTIES CAN COMPLETELY ELIMINATE THE USUAL ENERGY AND CAPACITY CREDITS FOR THE INTERMITTENT GENERATION.

1980-0327 LEGOURIERES D
WIND ENERGY IN SENEGAL: GEOGRAPHIC REPARTITION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER X2, P. 571-579.

1980-0328 LIEBST B S
OPTIMIZED PITCH CONTROLLER FOR LOAD ALLEVIATION ON WIND TURBINES.
NTIS, AUGUST 19, 1980. 195 P.
FFA-TN-HU-2189-PT.1, N81-12634

AN OPTIMUM FEEDBACK CONTROL LAW FOR LOAD ALLEVIATION UTILIZING A PITCHING BLADE SEGMENT ON A WIND TURBINE IS DEVELOPED. THE ANALYSIS IS MADE FOR AN ISOLATED BLADE ON A COMPLETELY RIGID TOWER. THE BLADE IS ASSUMED TO BE COMPLETELY RIGID AND CONSTRAINED BY THREE FLEXIBLE SPRINGS. PITCH, FLAP, AND LAG BLADE DEGREES OF FREEDOM ARE INCLUDED AS WELL AS SHAFT TORSION AND GENERATOR DYNAMICS. A QUASI-STEADY ANALYSIS IS USED IN PREDICTING AERODYNAMIC LOADS. GRAVITY LOADS ARE INCLUDED, AS WELL AS WIND SHEAR AND TOWER SHADOW EFFECTS. THE NONLINEAR EQUATIONS OF MOTION ARE LINEARIZED BY PERTURBATION METHODS. THE CONTROLLER DETERMINED MINIMIZES A PENALTY INTEGRAL THAT IS THE SUM OF A QUADRATIC IN STATE PERTURBATIONS AND A QUADRATIC IN THE CONTROL. A FORTRAN PROGRAM IS PRESENTED WHICH SOLVES THE RESULTING RICCATI EQUATIONS FOR THE FEEDBACK GAINS. THE PROGRAM DEVELOPED IS USED TO DETERMINE THE CONTROL LAW FOR THE NASA ERDA 100 KW WIND TURBINE CONSIDERING ONLY THE FLAPPING DEGREES OF FREEDOM.

1980-0329 LILJEDAHL L A
KEY ISSUES ASSOCIATED WITH WIND ENERGY APPLICATIONS IN AGRICULTURE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 335-338.
CONF-791097

AS THE OTHER WIND WORKSHOPS, OUR WORKSHOP ON AGRICULTURAL USE OF WIND POWER HELD SOME SPIRITED DISCUSSIONS ON VARIOUS ASPECTS OF THE AGRICULTURAL USE OF WIND POWER. THESE WERE ADDRESSED TO: (1) THE FARMERS' INTEREST; (2) THE UTILITIES' INTEREST; AND (3) THE MANUFACTURERS' INTEREST.

1980-0330 LILJEDAHL L A
OVERVIEW OF THE USDA WIND PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 321-334.
CONF-791097

ANY RESEARCH AND DEVELOPMENT PLANNING MUST BE BASED UPON SOME VISION OF FUTURE PRACTICES AND THE EQUIPMENT AND INFORMATION NEEDED TO UNDERTAKE THESE PRACTICES. THE PROGRAM OF RESEARCH ON AGRICULTURAL USE OF WIND POWER IS BASED UPON TWO MAJOR SCENARIOS. THESE ARE: (1) GENERAL PURPOSE FARMSTEAD POWER AND (2) DEDICATED OR SEMI-DEDICATED SPECIAL PURPOSE APPLICATIONS, I.E. IRRIGATION PUMPING, BUILDING HEATING, AND PRODUCT PROCESSING AND STORAGE.

1980-0331 LINDLEY D
THE ADOLESCENCE OF TWENTIETH CENTURY WIND ENERGY SYSTEMS TECHNOLOGY.
J. IND. AERODYN. 5(3-4): 207-221, MAY 1980.

THIS PAPER REVIEWS WIND ENERGY RESEARCH AND DEVELOPMENT WITH PARTICULAR EMPHASIS ON OPTIMUM SPACING, RELIABILITY, ELECTRICAL GRID INTERFACE, MACHINE RATING AND MACHINE CHARACTERISTICS. R AND D PROGRAMS OF THE U.K., GERMANY, SWEDEN AND THE USA ARE DESCRIBED.

1980-0332 LINDLEY D, SIMPSON P B, HASSAN U, MILBORROW D
ASSESSMENT OF OFFSHORE SITING OF WIND TURBINE GENERATORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A2, P. 17-42.

A TECHNICAL AND ECONOMIC ASSESSMENT HAS BEEN MADE OF THE GENERATION OF ELECTRICITY USING WIND TURBINE GENERATORS LOCATED IN SHALLOW WATERS OFF THE COAST OF THE UNITED KINGDOM. THIS ASSESSMENT ENTAILED STUDIES OF SITING CRITERIA, METEOROLOGY, SEA SURFACE CONDITIONS, ENGINEERING GEOLOGY, CONSTRUCTION MATERIALS, SUPPORT STRUCTURES, MARINISATION OF COMPLETE WTG INSTALLATIONS, EFFECT OF CLUSTER CONFIGURATION ON PERFORMANCE, ELECTRICAL TRANSMISSION AND CONTROL, AVAILABILITY AND ENVIRONMENTAL ISSUES. ON THE BASIS OF THESE STUDIES, AN

ANALYSIS HAS BEEN MADE TO DETERMINE ECONOMIC AND PERFORMANCE TRENDS OF CLUSTERS OF UP TO 200 MACHINES OF A MAXIMUM OF 10 MW INDIVIDUAL GENERATING CAPACITY. GENERATING COSTS BASED ON CENTRAL VALUES IN THE RANGES OF THE DESIGN PARAMETERS ARE FOUND TO EXCEED PREDICTED ECONOMIC VALUE IN THE YEAR 2000 BY A FACTOR OF ABOUT 3, WHILST WITH LARGE DIAMETER TURBINES AND AVERAGE WIND SPEEDS EXCEEDING THE CENTRAL VALUE THIS FACTOR IS REDUCED TO ABOUT 2.

1980-0333 LIPMAN N H, BOSSANYI E A, DUNN P D, MUSGROVE P J, WHITTLE G E, MACLEAN C
FLUCTUATIONS IN OUTPUT FROM WIND TURBINE CLUSTERS.
WIND ENG. 4(1): 1-7, 1980.

THIS PAPER INVESTIGATES THE EFFECT ON THE POWER OUTPUT OF WIND TURBINE CLUSTERS OF WIND SPEED FLUCTUATIONS OF SHORT PERIOD (I.E., LESS THAN AN HOUR). THE AUTHORS ARE DEALING WITH RAPID, UNPREDICTABLE VARIATIONS, AND THIS PROBLEM IS TREATED STATISTICALLY. THE CALCULATIONS DEPEND ON THE ASSUMPTION OF A PROBABILITY DISTRIBUTION FUNCTION FOR THE WIND SPEED FLUCTUATIONS. THE AUTHORS ASSUME THAT ALL THE WIND TURBINES IN THE CLUSTER ARE EXPERIENCING THE SAME WIND REGIME, AND ARE CONSIDERING A PERIOD OF TIME SHORT ENOUGH FOR THE GAUSSIAN DISTRIBUTION TO BE A REASONABLE APPROXIMATION, I.E., NO WEATHER FRONTS OR OTHER METEOROLOGICAL CHANGES.

1980-0334 LIPPERT S
ENERGY BECOMES A CLASSROOM SUBJECT.
MECH. ILLUS. 76(624): 50-51, 127, MAY 1980.

OVER 700 SCHOOLS IN THE U.S. ARE NOW OFFERING COURSES AND PROGRAMS IN SOLAR, WIND AND GEOTHERMAL ENERGY, BIOMASS CONVERSION, AND THE BASICS OF METHANE AND HYDROGEN POWER. SOME SPECIFIC COURSES BEING TAUGHT AT COLLEGES AND ADULT EDUCATION FACILITIES ARE IDENTIFIED.

1980-0335 LISSAMAN P B S, ZAMBRANO T G, WALKER S N
WIND ENERGY ASSESSMENT OF THE PALM SPRINGS-WHITEWATER REGION, CALIFORNIA, U.S.A.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER B2, P. 91-106.

IN 1978 AND 1979, SPONSORED BY THE CALIFORNIA STATE ENERGY COMMISSION AND THE SOUTHERN CALIFORNIAN EDISON COMPANY, AEROVIRONMENT INC. CONDUCTED A MAJOR SURVEY OF THE WIND ENERGY IN THE PALM SPRINGS-WHITEWATER REGION, AN AREA DOMINATED BY THE SAN GORGONIO PASS. THE METHODOLOGY DESCRIBED REPRESENTS A RELIABLE AND COST-EFFECTIVE METHOD OF ASSESSING THE WIND POTENTIAL OF A REGION. FROM INSIGHTS DEVELOPED IN PALM SPRINGS-WHITEWATER STUDY, NEW TECHNIQUES FOR RAPID INITIAL SCREENING USING READILY AVAILABLE SHORT-TERM DATA WERE DEVELOPED.

1980-0336 SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE.
NTIS, 1980. 225 P.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, 2ND, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980.
SERI/CP-635-938

FOR VOLUME II SEE 1980-0459.

1980-0337 LJUNGSTROM O
"L-180 POSEIDON"--A NEW SYSTEM CONCEPT IN VERTICAL AXIS WIND TURBINE TECHNOLOGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER G3, P. 333-355.

RECENT STUDIES FOR THE SWEDISH GOVERNMENT ON POTENTIAL ALTERNATIVE WIND ENERGY CONVERSION SYSTEMS (ALTERNATIVES TO CONVENTIONAL HORIZONTAL AXIS TURBINES), INCLUDING OFF-SHORE SYSTEMS, HAVE FOCUSSED ON NEW AND INNOVATIVE VERTICAL AXIS WIND SYSTEMS (VAWT). THIS WORK HAS RESULTED IN A PROMISING COMBINATION OF NEW, SUBSYSTEMS CONCEPTS, THREE OF WHICH HAVE BEEN INTEGRATED IN A PROPOSED DESIGN OF A MULTI-MW TURBINE, TYPE "L-180 POSEIDON", MAX RATED POWER 20 MW IN OFF-SHORE VERSION, ROTOR DIAMETER 180 M, WHICH IS PRESENTED IN THIS PAPER.

1980-0338 LOAD RESEARCH MANUAL. VOLUME 3. LOAD RESEARCH FOR ADVANCED TECHNOLOGIES.
NTIS, NOVEMBER 1980. 75 P.
ANL/SPG-13(VOL.3)

THIS THREE-VOLUME MANUAL PRESENTS TECHNICAL GUIDELINES FOR ELECTRIC UTILITY LOAD RESEARCH. SPECIAL ATTENTION IS GIVEN TO ISSUES RAISED BY THE LOAD DATA REPORTING REQUIREMENTS OF THE PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978 AND TO PROBLEMS FACED BY SMALLER UTILITIES THAT ARE INITIATING LOAD RESEARCH PROGRAMS. THE MANUAL INCLUDES GUIDES TO LOAD RESEARCH LITERATURE AND GLOSSARIES OF LOAD RESEARCH AND STATISTICAL TERMS. IN VOLUME 3, SPECIAL LOAD RESEARCH PROCEDURES ARE PRESENTED FOR SOLAR, WIND, AND COGENERATION TECHNOLOGIES.

1980-0339 LOBITZ D W, SULLIVAN W N
VAWTDYN--A NUMERICAL PACKAGE FOR THE DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES.
ASME PAPER 80-WA/SOL-18, 1980. 7 P.

THE DYNAMIC BEHAVIOR OF WIND TURBINES IS A MAJOR FACTOR GOVERNING THEIR OVERALL FATIGUE LIFE AND RELIABILITY. THIS PAPER DESCRIBES A PACKAGE DEVELOPED FOR THE DYNAMIC ANALYSIS OF THE DARRIEUS VERTICAL AXIS WIND TURBINE. THE MODEL ON WHICH THE PACKAGE IS BASED INCLUDES THE MAJOR ROTOR ELASTIC DEGREES OF FREEDOM, GYROSCOPIC EFFECTS, AND STRUCTURAL DAMPING. THE EQUATIONS OF MOTION ARE DISCUSSED AND SEVERAL EXAMPLE SOLUTIONS ARE PRESENTED. COMPARISONS ARE MADE BETWEEN MODEL PREDICTIONS AND DATA FROM OPERATIONAL ROTORS.

1980-0340 LOBITZ D W, SULLIVAN W N
VAWTDYN--A NUMERICAL PACKAGE FOR THE DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, JULY 1980. 62 P.
SAND-80-0085

IN ORDER TO DESIGN WIND TURBINES WHICH POSSESS LONG LIFE AND AT THE SAME TIME USE A MINIMUM QUANTITY OF LOW-COST MATERIALS, IT IS ESSENTIAL THAT DYNAMIC, IN ADDITION TO STATIC, STRUCTURAL ANALYSES BE PERFORMED TO ELIMINATE UNNECESSARY MARGINS OF SAFETY RESULTING FROM UNDETERMINED DYNAMIC AMPLIFICATIONS. THE VAWTDYN PACKAGE PROVIDES A TOOL FOR ASSESSING THESE AMPLIFICATIONS IN TWO-BLADED VERTICAL AXIS WIND TURBINES. THE DYNAMIC MODEL ON WHICH THE PACKAGE IS BASED CONTAINS TURBINE MOTIONS MOST COMMONLY OBSERVED IN EXISTING RESEARCH SYSTEMS. GYROSCOPIC EFFECTS, STRUCTURAL DAMPING, AERODYNAMIC WIND LOADING, AND POWER GENERATION THROUGH EITHER AN INDUCTION OR SYNCHRONOUS GENERATOR ARE ALSO INCLUDED IN THE MODEL. IN ADDITION TO A COMPREHENSIVE DESCRIPTION OF THE MODEL, THIS REPORT DOCUMENTS THE EFFORTS THAT HAVE GONE INTO THE VERIFICATION, QUALIFICATION, AND DEMONSTRATION OF THE PACKAGE.

1980-0341 LOWE R

EXPECTED ELECTRICITY COSTS FOR THE US MOD 2 WINDMILL.
ENERGY POLICY 8(4): 347-348, DECEMBER 1980.

THIS PAPER PRESENTS AN ANALYSIS OF THE EXPECTED COST OF ELECTRICITY PRODUCTION FROM THE US MOD 2 WINDMILL, USING ACCOUNTING CRITERIA CURRENTLY RECOMMENDED FOR ENERGY TECHNOLOGIES IN THE UK. THE RESULTS SHOW THAT IF EXPECTED COST TARGETS ARE MET, THE MOD 2 DESIGN WILL BE A HIGHLY ECONOMIC MEANS OF GENERATING ELECTRICITY.

1980-0342 LUDDE P F
VERTICAL AXIS WIND TURBINE FOUNDATION PARAMETER STUDY.
NTIS, JULY 1980. 38 P.
SAND-80-7015

THE DYNAMIC FAILURE CRITERION GOVERNING THE DIMENSIONS OF PROTOTYPE VERTICAL AXIS WIND TURBINE FOUNDATIONS IS TREATED AS A VARIABLE PARAMETER. THE RESULTING CHANGE IN FOUNDATION DIMENSIONS AND COSTS IS EXAMINED.

1980-0343 LUDWIG D
ALLGEMEINE LOESUNGSMETHODE ZUR ERMITTLUNG DER DYNAMISCHEN ANTWORT AUF EINE DISKRETE EINZELBOE AM BEISPIEL DES ROTORBLATTES EINES WINDENERGIEKONVERTERS. (GENERAL CALCULATION METHOD FOR THE DYNAMIC RESPONSE TO DISCRETE GUST DISTRIBUTIONS AS EXEMPLIFIED BY THE ROTOR BLADE OF A WIND ENERGY CONVERTER.)
FORSCHUNGSBER. DTSCH FORSCH. VERSUCHSANST. LUFT RAUMFAHRT NO. 80, APRIL 12, 1980. 62 P. (IN GERMAN) ALSO:
NTIS, MARCH 1980. 63 P. (IN GERMAN)

AN ANALYTICAL METHOD IS PRESENTED TO CALCULATE THE DYNAMIC RESPONSE OF ELASTIC STRUCTURES TO DISCRETE GUST DISTRIBUTIONS. THE FORMULATION IS BASED ON THE ASSUMPTION THAT THE MODEL PARAMETERS OF THE STRUCTURE ARE KNOWN AND WHICH CAN BE RECEIVED BY EIGENANALYSIS OR GROUND VIBRATION TEST.

1980-0344 LUDWIG F L, BYRD G
EFFICIENT METHOD FOR DERIVING MASS-CONSISTENT FLOW FIELDS FROM WIND OBSERVATIONS IN ROUGH TERRAIN.
ATMOS. ENVIRON. 14(5): 585-587, 1980.

THIS PAPER DESCRIBES HOW LINEAR COMBINATIONS OF A LIMITED NUMBER OF SOLUTIONS OBTAINED BY THE CONVENTIONAL ITERATIVE RELAXATION METHODS CAN BE USED TO ACHIEVE THE SAME RESULTS WITH GREATLY REDUCED COMPUTATIONAL REQUIREMENTS. THE SOLUTIONS MUST ONLY BE OBTAINED FOR LINEARLY INDEPENDENT DATA SETS. THE APPLICATION DESCRIBED USES EIGENVECTORS OF THE COVARIANCE MATRIX OF THE INPUT WIND COMPONENT DATA AS THE LINEARLY-INDEPENDENT DATA SETS. THE MODEL WITH WHICH THIS TECHNIQUE IS APPLIED USES A RELAXATION SCHEME TO ACHIEVE MASS-CONSERVATIVE FLOW WITH MINIMUM DIFFERENCE BETWEEN THE INITIAL TRIAL WIND FIELD OBTAINED BY INTERPOLATION AND THE RESULTING MASS-CONSERVING FLOW.

1980-0345 LUNDSAGER P, FRANDSEN S, CHRISTENSEN C J
ANALYSIS OF DATA FROM THE GEDSER WIND TURBINE 1977-1979.
RISO NATL. LAB. REP. NO. 2242, AUGUST 1980. 137 P. ALSO: NTIS, AUGUST 1980. 137 P.
RISOE-M-2242, N81-19637

IN THIS REPORT A NUMBER OF TOPICS HAVE BEEN CHOSEN FOR FURTHER ANALYSIS, BASED ON THE DATA FROM THE GEDSER WIND TURBINE MEASUREMENTS, MADE DURING 1977 TO 1979. THE REPORT CONTAINS CHAPTERS DEALING WITH POWER CHARACTERISTICS BASED ON 10 MINUTE AVERAGES, COHERENCE BETWEEN MEASUREMENTS OF WIND AND ELECTRIC POWER BASED ON HIGH SPEED SCANNING, DRIVE TRAIN OSCILLATIONS AND STRUCTURAL RESPONSE OF THE ROTOR.

1980-0346 LUNDSAGER P, GUNNESKOV O
STATIC DEFLECTION AND EIGENFREQUENCY ANALYSIS OF THE NIBE WIND TURBINE ROTORS. THEORETICAL BACKGROUND.
RISO NATL. LAB. REP. NO. 2199, FEBRUARY 1980. 31 P. ALSO: NTIS, FEBRUARY 1980. 31 P.
RISOE-M-2199, N81-19497

THE THEORY OF THIN-WALLED MULTICELL STRUCTURES IS USED TO CALCULATE THE CROSS-SECTIONAL PROPERTIES OF ROTOR BLADES. THE THEORY IS DEVELOPED FOR BEAMS OF INHOMOGENEOUS MATERIALS. THE BLADE IS THEN MODELED USING THE FINITE ELEMENT METHOD. A STAYED AND A CANTILEVERED BLADE, EACH CONSISTING OF A STEEL PART AND A GLASS FIBER PART, WERE ANALYZED. STATIC DEFLECTION CAUSED BY EXTREME WIND LOADING ALONG WITH THE FIVE TO TEN LOWEST EIGENFREQUENCIES WERE CALCULATED. RESULTS DEVIATED LESS THAN 15 PERCENT FROM THEORETICAL PREDICTIONS.

1980-0347 MCCUTCHEON S
WIND POWER. AN INVENTION MATURES.
SCI. DIMENSION 12(1): 10-12, 1980.

EGG-BEATER SHAPED WIND TURBINES, DESIGNED BY DARRIEUS, AT A NUMBER OF SITES ACROSS CANADA ARE BEING USED TO INVESTIGATE WHETHER OR NOT WIND ENERGY CAN ECONOMICALLY SUPPLEMENT CONVENTIONAL ENERGY SOURCES IN REMOTE AND WINDY LOCATIONS. THE LARGEST AND MOST POWERFUL OF THIS TYPE OF WINDMILL, WHICH IS ON THE MAGDALEN ISLANDS, FAILED WHEN ITS MAIN BRAKE WAS DISCONNECTED FOR MAINTENANCE. TECHNICAL DETAILS WERE IMPROVED AND THE MACHINE IS NOW WORKING AGAIN. THE PRESENT UNCERTAINTIES ABOUT WIND ENERGY ARE CONCERNED WITH ECONOMICS RATHER THAN TECHNOLOGY.

1980-0348 MCDERMOTT J
HOW TO MAKE A WIND-SITE ANALYSIS.
POP. SCI. 217(1): 100-102, JULY 1980.

PROCEDURES FOR ACCURATELY MONITORING THE WIND POWER AVAILABILITY AT ANY SITE ARE PRESENTED. EVALUATION GUIDES FOR SELECTING CANDIDATE SITES ARE OUTLINED.

1980-0349 MCEWEN L B, SWAIN J W
INDUSTRIAL COMPRESSED AIR APPLICATIONS FOR SOLAR ENERGY CONVERSION/STORAGE DEVICES. FINAL REPORT.
NTIS, JANUARY 1980. 162 P.
SAND-79-7077

A SURVEY WAS MADE OF INDUSTRIAL COMPRESSED AIR INSTALLATIONS IN THIS COUNTRY WITH EMPHASIS ON AIR USAGE PATTERNS, TYPES OF EQUIPMENT, AND ENERGY/POWER REQUIREMENTS. THIS WAS FOLLOWED BY AN INVESTIGATION INTO THE TECHNICAL FEASIBILITY OF UTILIZING SOLAR ENERGY CONVERSION SYSTEMS TO POWER REPRESENTATIVE INDUSTRIAL COMPRESSED AIR SYSTEMS. THE FINAL TASK WAS TO EVALUATE THE ECONOMIC MERITS OF THREE DIVERSE SCENARIOS OF CONCEPTUAL INDUSTRIAL COMPRESSED-AIR INSTALLATIONS. NONE OF THE THREE WERE FOUND TO BE ECONOMICALLY ATTRACTIVE UNTIL APPROXIMATELY 10 YEARS AFTER COMPLETION OF CONSTRUCTION WITH ONE OF THE PRIMARY REASONS BEING THE HIGH COMPRESSION SYSTEMS. A PROPER COMBINATION OF TECHNOLOGICAL IMPROVEMENTS IN SOLAR ENERGY CONVERSION SYSTEMS, REDUCED CAPITAL COSTS, ACCELERATED RISES IN UTILITY RATES, AND CONTINUED UNCERTAINTY IN FOSSIL FUEL

AVAILABILITY IS REGARDED AS NECESSARY BEFORE FURTHER PURSUIT OF THIS CONCEPT IS WARRANTED.

1980-0350 MCNERNEY G M
FOURIER COEFFICIENTS OF AERODYNAMIC TORQUE FUNCTIONS FOR THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE.
NTIS, FEBRUARY 1980. 28 P.
SAND-79-1508

THE SPECTRAL CHARACTERISTICS OF THE AERODYNAMIC TORQUE ON WIND TURBINES ARE IMPORTANT IN ASSESSING DRIVETRAIN PERFORMANCE. THIS PAPER DESCRIBES A FAST FOURIER TRANSFORM METHOD TO DEDUCE FOURIER COEFFICIENTS FOR THE PERIODIC TORQUE FUNCTIONS PREDICTED BY AERODYNAMIC THEORIES FOR DARRIEUS-TYPE ROTORS. THE METHOD IS APPLIED TO SHOW SPECTRAL CHARACTERISTICS OF THE TORQUE ON THE DOE/SANDIA 17-M DARRIEUS ROTOR PREDICTED BY THE SINGLE AND MULTIPLE STREAMTUBE AERODYNAMIC MODELS.

1980-0351 MCPHERSON W E, ROWE D W
WINDMILL CONSTRUCTION.
U.S. PATENT NO. 4,218,184, AUGUST 19, 1980.

THIS WINDMILL INCLUDES A BASE, A ROTOR JOURNALED FROM THE BASE FOR ROTATION AT THE FIRST AXIS, INCLUDING A PLURALITY OF VANES JOURNALED THERE FOR ROTATION ON SECOND AXES SPACED ABOUT AND RADIALLY OUTWARDLY FROM FIRST AXIS. VANE DISPLACEMENT CONTROL MEANS ARE OPERATIVELY CONNECTED BETWEEN THE BASE AND VANES FOR PROPORTIONALLY ANGULARLY DISPLACING VANES RELATIVE TO THE ROTOR 180 DEG. IN ONE DIRECTION DURING EACH 360 DEG. ROTATION IN THE OPPOSITE DIRECTION. THE VANES ARE ANGULARLY DISPLACED IN OPTIMUM POSITIONS RELATIVE TO THE ROTOR AND EACH OTHER TO DEVELOP MAXIMUM THRUST TO ROTATE IN OPPOSITE DIRECTIONS RESPONSIVE TO FLUID FLOW. THE WINDMILL HAS A SENSING TAIL PIVOTALLY SUPPORTED FOR SWINGING AN AXIS GENERALLY PARALLELING FIRST AXIS AND OPERATIVELY CONNECTED BETWEEN ROTOR AND VANE DISPLACEMENT CONTROL. MEANS FOR MAINTAINING THE OPTIMUM POSITIONS OF THE VANES RELATIVE TO EACH OTHER AND TO THE ROTOR DURING CHANGES IN THE DIRECTION OF FLUID FLOW, RELATIVE TO THE BASE, AGAINST THE VANES, AND WITH ONE OF THE VANES IS SUBSTANTIALLY PARALLING THE TAIL WHEN ONE VANE IS MOVING IN A DIRECTION OPPOSITE TO THE DIRECTION IN WHICH THE TAIL IS SWUNG. THE EXCESS ROTOR ROTATION SPEED OVERRIDE CONTROL IS OPERATIVELY CONNECTED BETWEEN THE VANE DISPLACEMENT CONTROL AND WIND DIRECTION SENSING TAIL OPERATIVE TO CONTROL ANGULAR DISPLACED VANES OTHER THAN ONE VANE FROM OPTIMUM POSITIONS.

1980-0352 MAJOR REDUCTION IN ELECTRIC ENERGY STORAGE COSTS.
IND. RES. DEV. 22(3): 97-98, MARCH 1980.

AN ENERGY-STORAGE SYSTEM CALLED REDOX (FOR REDUCTION OXIDATION), DEVELOPED AT THE NASA LEWIS RESEARCH CENTER, CLEVELAND, OHIO, UNDER A PROGRAM JOINTLY FUNDED BY THE U.S. DEPARTMENT OF ENERGY AND NASA, OFFERS THE PROMISE OF MAJOR COST REDUCTIONS IN THE STORING OF ELECTRICAL ENERGY. REDOX SYSTEMS IN THE KILOWATT RANGE CAN SOON CONTRIBUTE TO THE GROWTH OF SOLAR ELECTRIC (PHOTOVOLTAIC) AND WIND-ENERGY SYSTEMS WHERE THE COST OF ELECTRICAL STORAGE HAS BEEN A MAJOR DRAWBACK. AT A THIRD THE COST OF CONVENTIONAL LEAD-ACID STORAGE BATTERY SYSTEMS NOW IN USE, THE REDOX BATTERY SYSTEM WILL MAKE SOLAR ELECTRIC AND WIND-ENERGY UNITS MUCH MORE PRACTICAL.

1980-0353 MARIER A
WIND POWER: ENERGY ALTERNATIVE FOR THE UPPER MIDWEST. CONFERENCE REPORT.
ALTERN. SOURCES ENERGY NO. 45: 3, SEPTEMBER/OCTOBER 1980.

A CONFERENCE HELD IN ROCHESTER, MINNESOTA IN APRIL 1980, SPONSORED BY ALTERNATIVE SOURCES OF ENERGY, INC. AND THE ROCHESTER ENERGY INFORMATION CENTER, IS REVIEWED.

1980-0354 MARTIN B, DIESENDORF M
THE CAPACITY CREDIT OF WIND POWER: A NUMERICAL MODEL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER L3, P. 555-564.

THE VALUE OF WIND POWER AS FIRM CAPACITY IN A REAL AND A HYPOTHETICAL ELECTRICITY GRID WITHOUT STORAGE IS INVESTIGATED BY MEANS OF A NUMERICAL PROBABILISTIC MODEL. THE MAGNITUDE OF WIND POWER CAPACITY CREDIT IS USUALLY FOUND TO BE GREATER THAN 40 PERCENT OF THE CAPACITY CREDIT OF A TYPICAL CONVENTIONAL UNIT WITH THE SAME AVERAGE POWER OUTPUT. FOR VERY SMALL VALUES OF WIND POWER PENETRATION INTO THE GRID, THE TWO MEASURES OF CAPACITY CREDIT UTILISED ARE EACH APPROXIMATELY EQUAL TO THE AVERAGE WIND POWER, WHILE FOR LARGE PENETRATIONS THE MEASURES APPROACH DIFFERENT CONSTANT VALUES. THE BEHAVIOR AT BOTH LIMITS IS IN GOOD AGREEMENT WITH THE RESULTS OF AN ANALYTIC PROBABILISTIC MODEL. THE RESULTS ARE ALSO COMPARED WITH THOSE FROM AN HOUR BY HOUR COMPUTER SIMULATION. IT IS FOUND THAT WIND POWER CAPACITY CREDIT IS VERY SENSITIVE TO THE PENETRATION OF WIND POWER INTO THE GRID, TO THE UNIT SIZES OF THE CONVENTIONAL PLANT IN THE GRID AND TO THE START UP SPEED OF THE AEROGENERATORS. THE CREDIT IS MODERATELY SENSITIVE TO THE REPLACEMENT OF THE LOAD DISTRIBUTION BY A GAUSSIAN DISTRIBUTION AND TO THE MAGNITUDE OF THE LOSS OF LOAD PROBABILITY IN THE ABSENCE OF WIND POWER PLANT. THE CREDIT IS FOUND TO BE INSENSITIVE TO THE FORCED OUTAGE RATE OF CONVENTIONAL PLANT AND TO THE RATED SPEED OF THE AEROGENERATORS (GIVEN THE SAME AVERAGE WIND POWER OUTPUT).

1980-0355 MARTINSSON J
FUTURE ELECTRIC POWER FROM THE SUN AND WIND?
SAEHKOW 53(5-6): 169-172, MAY-JUNE 1980. (IN SWEDISH)

THE LOW POWER DENSITY AND HIGH VARIATIONS WITH TIME IN THE FLOWING SOLAR AND WIND ENERGY SOURCES HAVE UNFAVOURABLE EFFECTS ON THE ECONOMY OF ELECTRICITY PRODUCTION FROM THESE EARLY STAGES OF DEVELOPMENT. EVEN IF THE COSTS OF SOLAR CELLS DEVELOP FAVOURABLY, IT IS DOUBTFUL WHETHER THIS FORM OF ELECTRICITY PRODUCTION CAN BECOME COMPETITIVE IN THE REASONABLY NEAR FUTURE. WIND POWER IS NOW AT THE DEMONSTRATION STAGE. EXPERIENCE OF LARGE-SCALE WINDMILL POWER PLANTS WILL BE GAINED IN THE 1980S. THE PRODUCTION COSTS OF A RATHER LIMITED ANNUAL AMOUNT OF ELECTRIC ENERGY ARE NOT EXPECTED TO BE VERY HIGH.

1980-0356 MAULE P
OREGON ANEMOMETER LOAN PROGRAM.
WIND POWER DIG. NO. 20: 36, 38, 40-41, SUMMER 1980.

1980-0357 MEEKER L D, OSSENBRUGGEN P J, PREGENT G
TECHNIQUES FOR SPATIAL EXTRAPOLATION OF WIND DATA.
ASCE ENG. MECH. DIV. J. 106(2): 201-212, APRIL 1980.

THE ASSESSMENT OF WIND ENERGY POTENTIAL THROUGHOUT A GIVEN REGION IS USUALLY DIFFICULT BECAUSE OF THE LACK OF A SUITABLE DATA BASE. TYPICALLY, ADEQUATELY LONG WIND HISTORIES EXIST FOR ONLY A RELATIVELY FEW REGULAR WIND MEASUREMENT STATIONS. THIS PAPER IS CONCERNED WITH THE ESTIMATION OF WIND SYSTEM PARAMETERS AT A POSSIBLE WIND GENERATION SITE, Y, BY MEANS OF A SHORT OBSERVED RECORD AT THAT SITE AND EXTRAPOLATION OF A LONG TERM

RECORD AT A REGIONAL WEATHER STATION, X. THE ESTIMATION IS ACCOMPLISHED BY ASSUMING THAT THE WIND SYSTEM AT EACH SITE IS GENERATED BY A COMMON NON-STATIONARY PROCESS MODIFIED BY SITE-SPECIFIC SCALE FACTORS AND STATIONARY NOISE PROCESSES. ELIMINATION OF THE UNKNOWN NON-STATIONARY COMPONENT LEADS TO A REPRESENTATION OF THE WIND RECORD AT Y IN TERMS OF THE RECORD AT X AND A STATIONARY NOISE PROCESS. THE PROCEDURE IS EXEMPLIFIED USING WIND RECORDS FROM BOSTON AIRPORT AND THE BOSTON LIGHT VESSEL.

1980-0358 THE MEHRKAM WIND TURBINE.
MOTHER EARTH NEWS NO. 63: 132-133. MAY/JUNE 1980.

THIS ARTICLE DETAILS THE MEHRKAM SYSTEM (FOUNDED BY TERRY MEHRKAM OF THE MEHRKAM ENERGY DEVELOPMENT COMPANY) AND THE REASONS FOR ITS SUCCESS. THE FIRM DESIGNS AND MARKETS "STATE-OF-THE-ART" WINDPOWER SYSTEMS. THESE WINDPLANTS, POWER INDEPENDENT OR WITH BACKUP SYSTEMS, ARE DESIGNED TO BE LOW-MAINTENANCE, HIGH-RELIABILITY PIECES OF EQUIPMENT.

1980-0359 SENGUPTA D L, SENIOR T B A
TELEVISION RECEPTION NEAR THE WIND TURBINE ON BLOCK ISLAND, RI.
DOE ENVIRONMENTAL CONTROL SYMPOSIUM, 2ND, RESTON, VIRGINIA, MARCH 17, 1980. VOLUME 2. PROCEEDINGS. NTIS, JUNE 1980. VOLUME 2. P.. 209-227.
CONF-800334-(VOL.2)

1980-0360 TOMPKINS D
WIND ENERGY IN MARYLAND.
NTIS, JULY 1980. 37 P.
PB81-199937

THIS REPORT MARKS ONE OF THE FIRST STEPS IN DEFINING THE WIND ENERGY OPTION IN MARYLAND. IN THE FOLLOWING SECTIONS THE STATE-OF-THE-ART IS REVIEWED, APPLICATIONS, ECONOMIC, AND ENVIRONMENTAL ISSUES WERE INTRODUCED, THE RESULTS OF A PRELIMINARY WIND ENERGY RESOURCE ASSESSMENT COMPLETED IN APRIL OF 1979 ARE DISCUSSED, AND RECOMMENDATIONS ARE MADE FOR FURTHER RESOURCE DEFINITION.

1980-0361 MELISS M
RENEWABLE SOURCES OF ENERGY.
BRENNST.-WAERME-KRAFT 32(4): 140-146, APRIL 1980. (IN GERMAN)

THE ARTICLE ESTIMATES THE EXTENT TO WHICH, BY 2000 AD, RENEWABLE SOURCES OF ENERGY CAN BE EXPECTED TO CONTRIBUTE TO THE PRIMARY ENERGY NEEDS OF W. GERMANY AND INDICATES THE AMOUNTS OF MONEY BEING SPENT ON RELEVANT RESEARCH. IT REVIEWS RECENT DEVELOPMENTS INCLUDING PASSIVE SYSTEMS USING SOLAR RADIATION AND HEAT PUMPS FOR SPACE HEATING, HIGH TEMPERATURE COLLECTORS AND SOLAR CELLS, WIND-DRIVEN GENERATORS (INCLUDING THE GROWIAN I OF 3 MW CAPACITY NEAR BRUNSBUTTEL) AND BRIEFLY DESCRIBES CURRENT W. GERMAN DEVELOPMENTS IN USING GEOTHERMAL, WAVE AND BIOMASS ENERGY.

1980-0362 MENZIES R W, MATHUR R M
ALTERNATOR DESIGNS FOR DIRECT COUPLING TO REMOTE WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER F1, P. 269-278.

CONSIDERABLE RESEARCH AND DEVELOPMENT ON THE VERTICAL AXIS WIND TURBINE HAS TAKEN PLACE IN CANADA DURING THE LAST DECADE. THE APPLICABILITY OF SUCH AN ENERGY SOURCE, ESPECIALLY IN THE ARCTIC, HAS BEEN PROVEN BY SUCH INSTALLATIONS AS THE BEAUFORT SEA AUTOMATIC METEOROLOGICAL STATION. THE MAIN APPLICATION OF THESE WIND TURBINES APPEARS TO BE IN THE SUPPLY OF ELECTRICAL ENERGY EITHER FOR STORAGE OR AS THE TRANSMISSION LINK BETWEEN THE TURBINE AND ELECTRIC MOTORS. THE MECHANICAL POWER AVAILABLE FROM THE SHAFT OF THE WIND TURBINE IS NOT SUITABLE FOR DIRECT USE BY CONVENTIONAL ALTERNATORS OR GENERATORS. THE REASONS BEING THAT THE SHAFT SPEED IS VERY LOW, ESPECIALLY AS THE POWER RATING INCREASES, AND THE SHAFT POWER VARIES AS THE CUBE OF THE SHAFT SPEED. IN THE PAST, THIS PROBLEM HAS BEEN SOLVED BY THE USE OF GEARS AND SEVERAL ALTERNATORS AND/OR GENERATORS TO MATCH THE WIDE POWER RANGE OF THE TURBINE. THIS HAS LED TO REDUCED EFFICIENCY AND RELIABILITY OF THE OVERALL SYSTEM. THIS PAPER WILL EXAMINE THE DESIRABLE PERFORMANCE SPECIFICATIONS OF DIRECT-DRIVE ALTERNATORS SUITABLE FOR MEETING DIVERSE LOAD REQUIREMENTS AND COMPARE ADAPTATIONS OF SEVERAL CONVENTIONAL GENERATORS/ALTERNATORS WITH SEVERAL NOVEL DESIGNS.

1980-0363 MERONEY R N
WIND-TUNNEL SIMULATION OF THE FLOW OVER HILLS AND COMPLEX TERRAIN.
J. IND. AERODYN. 5(3-4): 297-321, MAY 1980.

A STUDY HAS BEEN COMPLETED TO EVALUATE THE ACCURACY OF A WIND TUNNEL INVESTIGATION OF FLOW OVER A COMPLEX TERRAIN MODEL. BOTH TERRACED AND CONTOURED MODELS OF THE RAKAIA RIVER GORGE REGION OF NEW ZEALAND WERE PREPARED TO AN UNDISTORTED GEOMETRIC SCALE OF 1'5000. THE CONTOURED MODEL WAS EXAMINED FOR THREE SEPARATE SURFACE ROUGHNESS CONDITIONS, ON TWO SPRING DAYS. SELECTED FOR STRONG ADIABATIC DOWN VALLEY WIND FLOW, THREE TEAMS OF INVESTIGATORS SURVEYED UP TO 27 SITES ON EITHER SIDE AND WITHIN THE RIVER GORGE. MEASUREMENTS CONSISTED OF WIND SPEED AND DIRECTION AT A 10 M HEIGHT. THE LABORATORY SIMULATION RESULTS WERE COMPARED WITH THE AVAILABLE FIELD DATA BY MEANS OF STATISTICAL CORRELATION AND SCATTER DIAGRAMS. THE MODEL AND FIELD RESULTS HAVE BEEN USED TO ASSESS THE VALUE OF LABORATORY EXPERIMENTS AS PART OF A STRATEGY TO DEVELOP AND DEMONSTRATE EFFICIENT AND ECONOMICAL TECHNIQUES FOR IDENTIFYING FAVORABLE WIND ENERGY CONVERSION SITES.

1980-0364 MERRIAM M F
CHARACTERISTICS AND USES OF WIND MACHINES.
SOLAR ENERGY TECHNOLOGY HANDBOOK. PART A. ENGINEERING FUNDAMENTALS. EDITED BY W. C. DICKINSON AND P. N. CHEREMISINOFF. NEW YORK, MARCEL DEKKER, 1980. P. 665-718.

INFORMATION IS PRESENTED CONCERNING CHARACTERISTICS OF WIND MACHINES; TYPES OF HORIZONTAL-AXIS MACHINES; TYPES OF VERTICAL-AXIS MACHINES; USES OF WIND MACHINES; AND ENVIRONMENTAL ASPECTS.

1980-0365 MEYERS C E, WAGNER N K
COASTAL WIND POWER IN AND NEAR CORPUS CHRISTI, TEXAS.
CONFERENCE ON COASTAL METEOROLOGY OF THE AMERICAN METEOROLOGICAL SOCIETY, 2D, LOS ANGELES, JANUARY 30 - FEBRUARY 1, 1980. PREPRINTS. BOSTON, MASSACHUSETTS, AMERICAN METEOROLOGICAL SOCIETY, 1980. P. 220-226.

THIS PAPER SUMMARIZES WIND AND WIND ENERGY CHARACTERISTICS OF SEVERAL LOCATIONS BOTH INLAND AND OFFSHORE FROM THE TEXAS COASTLINE NEAR CORPUS CHRISTI. A WEIBULL DISTRIBUTION IS FITTED TO HOURLY WIND SPEED DATA TO DESCRIBE THE PROBABILITY OF OCCURRENCE OF VARIOUS WIND SPEEDS. DIURNAL, SEASONAL AND HORIZONTAL SPATIAL VARIATIONS OF WIND AND WIND ENERGY ARE EVALUATED. POWER OUTPUT CHARACTERISTICS OF THREE DIFFERENT SIZED

AEROGENERATORS ARE USED IN CONJUNCTION WITH THE OBSERVED AND WEIBULL WIND SPEED DISTRIBUTIONS TO SIMULATE POTENTIAL ELECTRIC WIND ENERGY GENERATION CAPACITY. POTENTIAL WIND GENERATED POWER IS COMPARED WITH POWER DEMAND CURVES FOR THE CORPUS CHRISTI AREA.

1980-0366 MIGLIORE P G, WOLFE W P
THE EFFECTS OF FLOW CURVATURE ON THE AERODYNAMICS OF DARRIEUS WIND TURBINES.
NTIS, JULY 1980. 111 P.
ORO-5135-77/7

A THEORETICAL AND EXPERIMENTAL INVESTIGATION WAS CONDUCTED WHICH CLEARLY SHOWED THE EFFECTS OF FLOW CURVATURE TO BE SIGNIFICANT DETERMINANTS FOF DARRIEUS TURBINE BLADE AERODYNAMICS; QUALITATIVELY, THESE RESULTS APPLY EQUALLY TO STRAIGHT OR CURVED BLADED MACHINES. UNUSUALLY LARGE BOUNDARY LAYER RADIAL PRESSURE GRADIENTS AND VIRTUALLY ALTERED CAMBER AND INCIDENCE ARE THE PHENOMENA OF PRIMARY IMPORTANCE. CONFORMAL MAPPING TECHNIQUES WERE DEVELOPED WHICH TRANSFORM THE GEOMETRIC TURBINE AIRFOILS IN CURVED FLOW TO THEIR VIRTUAL EQUIVALENTS IN RECTILINEAR FLOW, THEREBY PERMITTING THE MORE ACCURATE SELECTION OF AIRFOIL AERODYNAMIC COEFFICIENTS FROM PUBLISHED SECTIONAL DATA. IT IS DEMONSTRATED THAT ONCE THE FLOW IDIOSYNCRACIES ARE FULLY UNDERSTOOD, THEY MAY BE USED TO ADVANTAGE TO IMPROVE THE WIND ENERGY EXTRACTION EFFICIENCY OF THESE MACHINES.

1980-0367 MILBORROW D J
THE PERFORMANCE OF ARRAYS OF WIND TURBINES.
J. IND. AERODYN. 5(3-4): 403-430, MAY 1980.

TO ASSESS THE AMOUNT OF POWER AVAILABLE IN THE WIND, INTERACTIONS BETWEEN WIND TURBINES IN AN ARRAY, OR CLUSTER, HAVE BEEN STUDIED USING A NUMBER OF EXPERIMENTAL TECHNIQUES, AND METHODS OF MATHEMATICAL ANALYSIS. THESE STUDIES HAVE INCLUDED WAKE MEASUREMENTS BEHIND WIND TURBINE ROTORS AND WIND TUNNEL TESTS OF MODEL CLUSTERS, TOGETHER WITH ANALYSIS USING WAKE MIXING AND BOUNDARY-LAYER THEORIES. THE RESULTS FROM THESE STUDIES HAVE BEEN REVIEWED AND COMPARED AND IT IS SHOWN THAT THERE IS REASONABLE AGREEMENT BETWEEN THE ESTIMATES FOR THE POWER LOSS DUE TO INTERACTIVE EFFECTS IN A CLUSTER GENERATING 1000 MW (ABOUT 25 PERCENT IS LOST, IF THE ROTORS ARE SPACED 10 DIAMETERS APART). ESTIMATES OF THE OUTPUT FROM LARGE ARRAYS SHOW SOME VARIATION AND THERE ARE CONFLICTING VIEWS ON THE EFFECTS OF CERTAIN PARAMETERS--SUCH AS ROTOR HEIGHT. OTHER TOPICS REQUIRING FURTHER STUDY--SUCH AS THE INFLUENCE OF MACHINE DESIGN--ARE ALSO IDENTIFIED AND DISCUSSED.

1980-0368 MILLER A H
IMPLICATIONS OF THE EFFECTS OF WIND CHARACTERISTICS ON THE OPERATION OF LARGE WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.
PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1154-1158.

THIS BRIEF PAPER DEALS PRIMARILY WITH THE SUBJECT OF THE WIND CHARACTERISTICS AS THEY AFFECT OVERALL PERFORMANCE OF LARGE WTGS. THE FIRST SIMULATION OF TURBINE OUTPUT INCLUDING THE OPERATING STRATEGY THOUGH FAR FROM COMPLETE, EVIDENCES THE POTENTIAL NEED FOR DEVELOPING SITE SPECIFIC STRATEGIES TO OPTIMIZE ANNUAL OUTPUT OF A TURBINE.

1980-0369 MILLER D E, NORD A R
MODAL TESTING OF THE VERTICAL AXIS WIND TURBINE.
ENGINEERING FOUNDATION CONFERENCE, RINDGE, N.H., JULY 27, 1980. NTIS, 1980. 23 P.
SAND-80-1639C, CONF-800746-1

THE VAWT IS A 17-METER STRUCTURE WHICH HAS BEEN TESTED IN A VARIETY OF CONFIGURATIONS. EARLY IN THE PROGRAM THERE WERE THREE FIBERGLASS BLADES REINFORCED WITH STRUTS. A LATER CONFIGURATION HAD TWO ALUMIMUN BLADES. BOTH OF THESE HAVE BEEN TESTED BY THE MODAL ANALYSIS GROUP. THERE IS ALSO A THREE-BLADED ALUMINUM STRUCTURE WHICH WILL BE TESTED IN THE COMING MONTHS. TEST RESULTS ARE PRESENTED.

1980-0370 MILLER G, HOFFERT M, RUGG B, CORREN D
THE LEBOST WIND TURBINE EXPERIMENTAL PROGRAM. REPORT FOR SEPTEMBER 1978 - MAY 1980.
NTIS, MAY 1980. 55 P.
PB81-141467

THE LEBOST WIND TURBINE IS UNIQUE IN TWO RESPECTS: IT CONSISTS OF A VERTICAL AXIS TURBINE WHICH IS ENCASED IN A PERFORATED HEMISPHERICAL SHROUD WHICH ACTS TO FOCUS OR CONCENTRATE AMBIENT WIND ENERGY ONTO THE TURBINE BLADES; AND THE TURBINE'S SHAFT IS DIRECTLY COUPLED TO A WATER TWISTER/HEAT BRAKE ASSEMBLY WHICH HEATS WATER VIA DIRECT MECHANICAL AGITATION; IN OTHER WORDS, THE TURBINE CAN BE USED TO HEAT WATER WITHOUT ELECTRICAL INTERFACE. THIS REPORT DETAILS THE RESULTS OF AN EXPERIMENTAL FIELD TEST/EVALUATION OF A 20-FOOT DIAMETER LEBOST TURBINE. ONE CONCLUSION OF THE STUDY IS THAT THE TURBINE LENDS ITSELF RATHER WELL TO URBAN APPLICATIONS, AS WELL AS OTHER APPLICATIONS.

1980-0371 MINDER R, GILBY D
SUBSTITUTION OF DIESEL POWER PLANTS BY SOLAR AND WIND ELECTRICITY GENERATORS. A CASE STUDY FOR A TROPICAL ISLAND.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER K3, P. 521-531.

THIS PAPER DESCRIBES THE RESULTS OF A RECENTLY COMPLETED STUDY WHICH EXAMINED THE FEASIBILITY OF ELECTRICITY GENERATION USING WIND AND SOLAR POWER FOR A CARIBBEAN ISLAND. THE STUDY RECOMMENDED THE CONSTRUCTION OF A 100 KW SOLAR THERMAL POWER PLANT AND THE INSTALLATION OF TEN MEDIUM SIZE WIND DRIVEN GENERATORS WITH A TOTAL RATED OUPUT OF 400 KW. THE VIABILITY OF THIS 500 KW FIRST ALTERNATIVE ENERGY PLANT IS EXAMINED AND IT IS SHOWN THAT THE LARGE INITIAL INVESTMENT IS MORE THAN COMPENSATED BY THE DIESEL FUEL SAVINGS. A LONG TERM ALTERNATIVE ENERGY PLANT PROGRAMME, INVOLVING THE INSTALLATION OF SOME 10 MW OF WIND AND SOLAR POWER PLANTS BY 1990, IS ALSO EVALUATED AND IT IS SHOWN THAT SUCH A PROGRAMME WOULD RESULT IN SUBSTANTIALLY REDUCED TOTAL OPERATING COSTS FOR THE ELECTRICITY SUPPLY SYSTEM.

1980-0372 MISKELL J T
EXOTIC ENERGY R & D HAS POTENTIAL.
ENERGY 5(1): 6-7, WINTER 1980.

FUTURE CULTIVATION OF THE OCEAN TO MAKE RAW MATERIAL FOR THE PRODUCTION OF METHANE AND AN INNOVATIVE WIND TUNNEL DESIGN TO PRODUCE ENERGY IN LARGE AMOUNTS FROM LITTLE OR NO WIND ARE POTENTIAL ENERGY RESOURCES. THE TURBINE WIND TOWER, OR THE TORNADO MACHINE, IS THE MOST INTERESTING OF THE NEW WIND-USING ENERGY GENERATORS. IT IS BASED ON A LARGE STATIONARY TOWER WITH A SMALL VERTICAL AXIS TURBINE AT THE BASE. THE LOW PRESSURE OF THE CENTRAL VORTEX ABOVE THE TURBINE CONTINUOUSLY ACCELERATES THE INCREASING AIR BELOW, ALLOWING A GREATER POWER COEFFICIENCY.

1980-0373 MOD 2 WIND TURBINE DEVELOPMENT PROJECT.
NTIS, OCTOBER 1980. 24 P.
SERI/SP-732-728

THE PRIMARY OBJECTIVE IN THE DEVELOPMENT OF MOD 2 WAS TO DESIGN A WIND TURBINE TO PRODUCE ENERGY FOR LESS THAN 5 CENTS/KWH BASED ON 1980 COST FORECASTS. THE PRICING METHOD USED TO PROJECT THE MOD 2 ENERGY COSTS IS THE LEVELIZED FIXED CHARGE RATE APPROACH, GENERALLY ACCEPTED IN THE ELECTRIC UTILITY INDUSTRY AS A BASIS FOR RELATIVE RANKING OF ENERGY ALTERNATIVES. THIS METHOD DERIVES A LEVELIZED ENERGY PRICE NECESSARY TO RECOVER UTILITY'S PURCHASING, INSTALLING, OWNING, OPERATING, AND MAINTENANCE COSTS.

1980-0374 MOMENT R L, TRENKA A R
INTERIM STATUS REPORT ON DOE PROTOTYPE DEVELOPMENT SWECS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 815-820.

DEVELOPMENT OF SEVERAL SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) HAVE BEEN UNDERWAY FOR OVER TWO YEARS AS PART OF THE DOE'S SMALL WIND SYSTEMS PROGRAM. DESIGN AND FABRICATION EFFORTS ARE COMPLETE ON PROTOTYPE SYSTEMS IN THREE SIZES: 1-2 KW FOR REMOTE APPLICATIONS REQUIRING HIGH RELIABILITY, 8 KW AND 40 KW, THESE LATTER TWO FOR INTERTIE WITH UTILITIES. THREE CONTRACTS WERE AWARDED TO DEVELOP EACH OF THE TWO SMALLER SIZE SYSTEMS, AND TWO FOR THE 40 KW ONES. BECAUSE THE 40 KW SYSTEMS WERE DELIVERED MUCH LATER THAN THE 1-2 KW AND 8 KW UNITS, THERE IS PRESENTLY LITTLE TEST DATA COLLECTED FROM THESE UNITS. CONSEQUENTLY, THIS PAPER FOCUSES ON SYSTEMS OF THE TWO SMALLER SIZES. THIS PAPER DISCUSSES THE DESIGN OBJECTIVES FOR THESE DEVELOPMENT PROGRAMS AND OFFERS A GENERIC ASSESSMENT OF HOW WELL THOSE OBJECTIVES HAVE BEEN MET.

1980-0375 MUEHLOECKER H
ELECTRICAL EQUIPMENT FOR A LARGE WIND-POWER PLANT.
SIEMENS POWER ENG. 2(2): 47-51, FEBRUARY 1980.

A DOUBLE-FED ASYNCHRONOUS GENERATOR WITH SLIPRING ROTOR AND WITH VARIABLE FREQUENCY CONVERTER IN THE ROTOR CIRCUIT WAS ADOPTED FOR THE WIND TURBINE OF 100.4 M WITH A TOWER HEIGHT OF 100 M AND ELECTRICAL RATING OF 3 MW. A DESCRIPTION IS GIVEN OF ELECTRICAL EQUIPMENT NEEDED FOR LARGE WIND-POWER PLANTS WHICH DESPITE VARYING SPEEDS OF ROTATION SUPPLY POWER TO THE SYSTEM AT CONSTANT FREQUENCY AND VOLTAGE.

1980-0376 MUSGROVE P J
OFFSHORE WIND ENERGY SYSTEMS.
METEOROL. MAG. 109(1293): 113-119, APRIL 1980.

IT IS SHOWN THAT ARRAYS OF WINDMILLS DEPLOYED IN THE SHALLOW WATERS OF THE SOUTHERN NORTH SEA COULD PRODUCE 20 PERCENT OF THE ELECTRICITY NEEDS OF THE UNITED KINGDOM. COSTINGS BASED ON 1976 PRICES SHOW THAT WIND-GENERATED ELECTRICITY IS ALREADY COMPETITIVE WITH THAT FROM OIL- AND COAL-FIRED POWER STATIONS.

1980-0377 MYERS W N, HEIN L A
AMPLIFIED WIND TURBINE APPARATUS.
NTIS, MARCH 12, 1980. 16 P.
PAT-APPL-6-129 780, NASA-CASE-MFS-23830-1

AN AMPLIFIED WIND TURBINE APPARATUS IS DISCLOSED WHEREIN AMBIENT INLET AIR IS PREROTATED IN AN AIR ROTATION CHAMBER HAVING A HIGH PRESSURE PROFILE. A SECOND ROTATION CHAMBER ADJACENT AND DOWNSTREAM OF THE TURBINE HAS A LOW PRESSURE CORE PROFILE WHEREBY FLOW ACROSS THE TURBINE IS ACCELERATED AND THEREAFTER EXITS THE TURBINE APPARATUS THROUGH A DRAFT ANTI-INTERFERENCE DEVICE. THE DRAFT DEVICE ELIMINATES INTERFERENCE WITH AMBIENT WINDS AT THE OUTLET OF THE TURBINE APPARATUS. PIVOTABLE VANES CONTROLLED IN RESPONSE TO PREVAILING WIND DIRECTION ADMIT AIR TO THE CHAMBERS AND AID IN IMPARTING ROTATION.

1980-0378 THOMAS R L
WORKING GROUP REPORT ON LARGE SCALE SYSTEMS: DESIGN AND R & D.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 493-506.
CONF-791097

1980-0379 TRENKA A R
WORKING GROUP REPORT ON SMALL SCALE SYSTEMS: R&D AND UTILITY INTERFACE.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 483-492.
CONF-791097

1980-0380 VAS I E
ECONOMICS ASSOCIATED WITH WIND POWER SYSTEMS.
AM. NUCL. SOC. TRANS. 34: 9-10, 1980.

1980-0381 NELLUMS R O
POWER PRODUCTION FROM DARRIEUS WIND TURBINES.
INT. POWER GENERATION 3(7): 27, OCTOBER 30, 1980.

D.J.M. DARRIEUS, A FRENCH INVENTOR, ORIGINALLY PATENTED THE WIND ENERGY DEVICE BEARING HIS NAME IN 1929. HOWEVER, THE PATENT DREW LITTLE ATTENTION UNTIL DEVELOPMENT PROGRAMMES WERE LAUNCHED BY THE NATIONAL RESEARCH COUNCIL OF CANADA IN 1966 AND BY SANDIA NATIONAL LABORATORIES, SUPPORTED BY THE US DEPARTMENT OF ENERGY (DOE) IN 1974. RECENT ECONOMIC ASSESSMENT OF THE DARRIEUS TURBINE HAS LED THE US DEPARTMENT OF ENERGY TO CONCLUDE THAT DARRIEUS TECHNOLOGY HAS BECOME ECONOMICALLY COMPETITIVE WITH PROPELLER WIND TURBINES FOR GRID CONNECTED UTILITY POWER GENERATION.

1980-0382 NELSON V
THE DEVELOPMENT OF 'WIND ENERGY.
SOL. ENG. MAG. 5(9): 20-23, AUGUST 1980.

WIND, ONCE A MAJOR POWER SOURCE IN THE UNITED STATES, IS ONCE AGAIN TAKING A PLACE IN THE ENERGY RESOURCE BASE. AT THE PRESENT TIME, OVER 50 MANUFACTURERS ARE PRODUCING WIND ENERGY CONVERSION SYSTEMS WITH RATINGS FROM LESS THAN 1 KILOWATT TO 4000 KILOWATTS. IT IS ESTIMATED THAT THE EXTRACTABLE WIND POWER FOR THE 48 STATES IS TWO MILLION MEGAWATTS. THE MAJOR WIND AREAS ARE THE GREAT PLAINS, ALONG THE COAST AND OFF-SHORE ALASKA AND HAWAII. IN CONTRAST TO THERMAL PROCESSES FOR GENERATING ELECTRICITY, WIND POWER MAKES NO DEMAND ON WATER RESOURCES. WIND ENERGY CONVERSION SYSTEMS (WECS) MAY WELL BE THE BEST NEAR-TERM OPTION, BOTH TECHNOLOGICALLY AND ECONOMICALLY, FOR GENERATING ELECTRICITY FROM RENEWABLE RESOURCES.

1980-0383 NELSON V, MOORING M
PROCEEDINGS OF THE A.W.E.A. NATIONAL CONFERENCE, SUMMER 1980.
WASHINGTON, D.C., AMERICAN WIND ENERGY ASSOCIATION, 1980. 167 P.
AMERICAN WIND ENERGY ASSOCIATION NATIONAL CONFERENCE, PITTSBURGH, PENNSYLVANIA, JUNE 1980.

THIRTY-THREE PAPERS REPRESENTING THE STATE-OF-THE-ART OF WINDPOWER ARE INCLUDED.

1980-0384 NESBIT W
GOING WITH THE WIND.
EPRI J. 5(2): 6-17, MARCH 1980.

EXTRACTING ELECTRIC POWER FROM THE WIND REQUIRES AEROGENERATOR SITES WITH SUITABLE CHARACTERISTICS, RELIABLE MACHINES, AND POWER SYSTEMS WITH SUFFICIENT FLEXIBILITY TO ABSORB THE WIND GENERATED POWER. A MAP OF WIND POWER DENSITY ACROSS THE USA ILLUSTRATING AREAS WITH OVER 500W/SQUARE METER IS GIVEN. IMPROVEMENTS IN AEROGENERATOR DESIGN ARE DISCUSSED, WITH REFERENCE TO THE MOD 2 TURBINE (2.5 MW OUTPUT AND 300 FT DIAMETER) TO BE ERECTED AT GOLDENDALE IN WASHINGTON IN 1980. THE STATISTICAL CONTRIBUTION OF WINDPOWER TO AN ELECTRIC UTILITY IS SHOWN, ILLUSTRATING THAT WINDPOWER AVAILABILITY AND MAXIMUM DEMAND ARE TYPICALLY OUT OF PHASE, REQUIRING CLOSE CONTROL OF POWER SYSTEM CHARACTERISTICS FOR EFFECTIVE WINDPOWER EXPLOITATION.

1980-0385 NEUSTADTER H E
DATA ACQUISITION AND ANALYSIS IN THE DOE/NASA WIND ENERGY PROGRAM.
NTIS, 1980. 19 P.
DOE/NASA/1028-28, NASA-TM-81603, N81-13463, CONF-801059-2

THE FOCUS OF THIS REPORT IS ON THE TECHNOLOGY DATA SYSTEM WHICH CONSISTS OF THE FOLLOWING ELEMENTS: (1) SENSORS WHICH MEASURE CRITICAL PARAMETERS SUCH AS WIND SPEED AND DIRECTION, OUTPUT POWER, BLADE LOADS AND STRAINS, AND TOWER VIBRATIONS; (2) REMOTE MULTIPLEXING UNITS (RMUS) MOUNTED ON EACH WIND TURBINE WHICH FREQUENCY MODULATE, MULTIPLEX AND TRANSMIT SENSOR OUTPUTS; (3) THE INSTRUMENTATION AVAILABLE TO RECORD, PROCESS AND DISPLAY THESE SIGNALS; AND (4) CENTRALIZED COMPUTER ANALYSIS OF DATA AT THE NASA-LEWIS RESEARCH CENTER IN CLEVELAND, OHIO. RMU CHARACTERISTICS AND MULTIPLEXING TECHNIQUES ARE PRESENTED. DATA PROCESSING IS ILLUSTRATED BY FOLLOWING A TYPICAL SIGNAL THROUGH INSTRUMENTS SUCH AS THE ANALOG TAPE RECORDER, ANALOG-TO-DIGITAL CONVERTER, DATA COMPRESSOR, DIGITAL TAPE RECORDER, VIDEO (CRT) DISPLAY, AND STRIP CHART RECORDER. SAMPLE OUTPUT DATA FROM THE 200 KW MOD-0A WIND TURBINE AT CLAYTON, NEW MEXICO, ARE PRESENTED.

1980-0386 NITTEBERG J
THE NORWEGIAN WIND ENERGY PROGRAM: STATUS PER AUGUST 1979.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 307-320.
CONF-791097

THE R&D ON WIND ENERGY IN NORWAY IS SO FAR ENTIRELY AIMED AT ESTABLISHMENT OF DEPENDABLE DATA AND INFORMATION ON WHICH A TECHNICAL AND ECONOMICAL ASSESSMENT OF WIND ENERGY COULD BE BASED. THE FIRST FOUR PROJECTS WILL INVESTIGATE THE WIND RESOURCES AND WIND CHARACTERISTICS AND DEVELOP METHODS FOR THIS PURPOSE. THE FIFTH PROJECT WILL EVALUATE THE TECHNICAL AND ECONOMICAL FEASIBILITY, THE SIXTH PROJECT IS A SAFETY AND ENVIRONMENTAL STUDY AND THE SEVENTH PROJECT ESTABLISHES CRITERIA FOR CONSTRUCTION AND OPERATIONS OF WECS. PROJECT 8 IS A SUMMING UP OF THE OTHER PROJECTS GIVING AN ASSESSMENT OF THE POTENTIAL ROLE OF WIND ENERGY IN NORWAY. FINALLY, PROJECT 9 IS A DETAILED PLANNING OF THE NEXT PHASE, GIVING SPECIFICATIONS OF EXPERIMENTAL WIND GENERATORS AND DETAILS OF THE EXPERIMENTAL PROGRAM.

1980-0387 NOLL R B, HAM N D, ZVARA J
PRELIMINARY PERFORMANCE ANALYSIS FOR A FLEXROTOR INNOVATIVE WIND ENERGY SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 183-192.
SERI/CP-635-938

THE FLEXROTOR IS AN INNOVATIVE THREE-BLADED, VERTICAL-AXIS WIND ENERGY SYSTEM MOUNTED ON AN UNGUYED, FREE-STANDING TOWER THE STRAIGHT, UNTWISTED BLADES AND STRUTS ARE MADE OF COMMERCIALLY-AVAILABLE STANDARD EXTRUSIONS TO SIMPLIFY CONSTRUCTION AND REDUCE COST. HIGH STRENGTH CABLES ARE USED IN THE BLADE TO CARRY LARGE TENSION FORCES AND OFFSET CENTRIFUGAL LOADING. CONTROL OF OVERSPEED IS BY MEANS OF AN AEROELASTICALLY INDUCED PITCH ANGLE PRODUCED THROUGH A CANTED HINGE CALLED THE FLEXHINGE. THIS PAPER PRESENTS A DESCRIPTION OF THE FLEXROTOR DESIGN FEATURES; PRELIMINARY PERFORMANCE ANALYSIS RESULTS SHOWING THE EFFECTS OF SIZE, BLADE SWEPT AREA, ROTOR SOLIDITY, ROTOR SPEED AND WIND SPEED; AND A DESCRIPTION OF THE SYSTEM OPERATION.

1980-0388 NOUN R J
PRODUCT LIABILITY INSURANCE FOR WECS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY CONFERENCE, PHOENIX, ARIZONA, JUNE 2, 1980. NTIS, JUNE 1980. 7 P.
SERI/TP-744-466R, CONF-800604-30

PRELIMINARY FINDINGS FROM A SAMPLING OF MANUFACTURERS INDICATE THAT, IN MANY CASES, PRODUCT LIABILITY INSURANCE FOR WECS IS STILL DIFFICULT TO OBTAIN. ABOUT HALF OF THE 21 WECS MANUFACTURERS CONTACTED SAID THEY DID NOT HAVE PRODUCT LIABILITY INSURANCE. ABOUT ONE MANUFACTURER IN THREE WHO ATTEMPTED TO OBTAIN INSURANCE WAS REJECTED BY AT LEAST ONE INSURANCE COMPANY. IN SOME INSTANCES, ALTHOUGH AN INSURER HAD OFFERED TO PROVIDE COVERAGE, THE MANUFACTURER FOUND THE RATES QUOTED TO BE PROHIBITIVELY EXPENSIVE. FOR EXAMPLE, IN ONE CASE A WECS MANUFACTURER HAD BEEN OFFERED PRODUCT LIABILITY INSURANCE, BUT AT AN ANNUAL RATE OF 30% OF HIS GROSS SALES.

1980-0389 OSBORN W C
NORTHEAST: A TIME OF STARK RECKONING.
SOL. AGE 5(1): 16-17, JANUARY 1980.

THE SHORTAGE OF FUEL SUPPLIES IN THE NORTHEASTERN STATES AND POSSIBLE SOLUTIONS TO THE PROBLEM ARE DISCUSSED. THE NORTHEAST'S RELIANCE ON AND HIGH USE OF OIL HAS LED TO ECONOMIC PROBLEMS; THERE ARE SEVERAL GOVERNMENTAL AGENCIES WHICH HAVE BEEN FORMED REGIONALLY TO ADDRESS THE ENERGY PROBLEM. THE NORTHEAST WILL BE SIGNIFICANTLY AFFECTED BY FEDERAL POLICY DECISIONS ON NUCLEAR PLANT ACCIDENTS, DECONTROL OF DOMESTIC OIL PRICES, SYNFUEL PROGRAMS, SUPPORT OF PHOTOVOLTAIC CELL MARKETING FOR ELECTRICITY GENERATION, AND GOVERNMENT POLICY TOWARD THE TREATMENT OF COGENERATORS AND SMALL POWER PRODUCERS BY THE PUBLIC UTILITY COMPANIES. APPLICATIONS OF SOLAR ENERGY IN HOUSES AND BUILDINGS IN THE NORTHEASTERN U.S. ARE HIGHLIGHTED AND INCLUDE RETROFITTING OF APARTMENTS, A SCHOOL, A MOBILE HOME, A WIND ENERGY CONVERSION PLANT, A SEWAGE TREATMENT PLANT, A PLANNED VILLAGE COMPLEX, HYBRID SYSTEMS, AND GREENHOUSES.

1980-0390 OTAWA T
WIND ENERGY PLANNING: DEVELOPMENT AND APPLICATION OF A SITE SELECTION METHOD FOR WIND ENERGY CONVERSION SYSTEMS (WECS).
INT. J. ENERGY RES. 4(3): 283-306, JULY-SEPTEMBER 1980.

THE USE OF WIND ENERGY BY MEANS OF ITS CONVERSION TO ELECTRICITY INVOLVES A NUMBER OF CONSTRAINTS SUCH AS ECONOMIC, ENVIRONMENTAL, TECHNICAL, LEGAL, SOCIAL AND INSTITUTIONAL REQUIREMENTS. PLANNING FOR WIND ENERGY SHOULD SOLVE THESE ISSUES IN THE PLANNING PROCESS BY ENCOURAGING OPPORTUNITIES AND DISCOURAGING CONSTRAINTS ASSOCIATED WITH THE USE OF WIND ENERGY. THE OPPORTUNITIES AND CONSTRAINTS SIGNIFICANT AT THE REGIONAL LEVEL WERE IDENTIFIED, AND A SYSTEMATIC METHOD WAS DEVELOPED TO SELECT SITES FOR LARGE WECS BY INCORPORATING THE IDENTIFIED FACTORS. THESE FACTORS INCLUDE: WIND RESOURCE, PROXIMITY TO LOAD CENTRES, PROXIMITY TO TIE-IN POINTS, AND EXCLUSIVE LAND-USE AREAS. THE DEVELOPED METHOD WAS APPLIED TO THE WESTERN MASSACHUSETTS REGION, AND THE FIRST RESULTS OF THE STUDY HAVE BEEN ACQUIRED.

1980-0391 PALMGREN D, OTIS D R
WIND ENERGY CAPACITY OF A SINGLE AIRFOIL WITH VERTICAL AXIS ON A CIRCULAR TRACK.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 840-845.

THIS PAPER DESCRIBES A VERTICAL AXIS WIND ENERGY CONVERSION SYSTEM CONSISTING OF A SINGLE VERTICAL AIRFOIL TRAVELING AT CONSTANT SPEED AROUND A HORIZONTAL CIRCULAR TRACK. A COMPUTER SIMULATION DETERMINES THRUST, NORMAL FORCE AND POWER COEFFICIENTS, AND AIRFOIL ANGLE OF ATTACK FOR TWO STANDARD NACA AIRFOILS FOR AIRFOIL SPEEDS UP TO 10 TIMES THE WIND SPEED. THE AIRFOIL IS ARTICULATED FOR OPTIMUM PERFORMANCE. THE SIMULATION SHOWS THAT FOR THE ARTICULATED CASE, MAXIMUM AVERAGE THRUST IS ATTAINED AT AIRFOIL SPEEDS OF SEVEN TIMES THE WIND SPEED, AND AT THIS SPEED THE ARTICULATED AIRFOIL PRODUCES 43% MORE THRUST (AND POWER) THAN THE NONARTICULATED AIRFOIL. ANGLE OF ATTACK, THRUST FORCE AND NORMAL FORCES ARE PRESENTED AS A FUNCTION OF TRACK POSITION.

1980-0392 PATENT PROFILES: SOLAR ENERGY.
NTIS, JANUARY 1980. 195 P.
PB80-190010

THE REPORT PRESENTS PROFILES OF UNITED STATES PATENTING IN FIVE MAJOR AREAS OF SOLAR ENERGY TECHNOLOGY, AND IN RELATED AREAS OF WIND, GEOTHERMAL AND TIDE AND WAVE ENERGY. EACH OF THE PROFILES IS DIVIDED INTO THREE PARTS: PART 1, THE FIRST PAGE OF THE PROFILE, IDENTIFIES THE AREA WHICH IS EXAMINED, LISTS THE PERTINENT U.S. PATENT CLASSIFICATION(S) INVOLVED, AND GRAPHICALLY ILLUSTRATES PATENT ACTIVITY (ACROSS A DESIGNATED 10-YEAR SPAN). IN PART 2A, THE FIRST TABLE SHOWS THE YEARLY DISTRIBUTION OF PATENTS BY THE DATE OF THE PATENT GRANT, WHILE THE SECOND TABLE REDISTRIBUTES THIS DATA BASED ON THE APPLICATION FILING DATE OF THE PATENTS. PART 2B PROVIDFS A LIST OF ASSIGNEES RANKED BY THE NUMBER OF PATENTS, IN THE TECHNOLOGY TO WHICH THEY HELD TITLE AT THE TIME OF THE PATENT GRANT. IN PART 2C, ASSIGNEES ARE LISTED ALPHABETICALLY FOLLOWED BY A NUMERICAL LISTING OF PATENTS TO WHICH THEY HELD TITLE AT THE TIME OF PATENT GRANT. PART 2D PRESENTS AN ALPHABETICAL LISTING OF INVENTORS OF UNASSIGNED PATENTS (1975-1978) TOGETHER WITH THEIR ADDRESSES, THE PATENT NUMBERS AND TITLES. PART 3 UPDATES THE PRECEDING MATERIAL BY LISTING PATENT NUMBERS, ASSIGNEE OR INVENTOR, AND TITLE FOR THOSE PATENTS WHICH ISSUED FROM JANUARY TO OCTOBER, 1979.

1980-0393 PEDERSEN B M
DESCRIPTION OF THE TWO DANISH 630 KW WIND TURBINES, NIBE-A AND NIBE-B, AND SOME PRELIMINARY TEST RESULTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER E1, P. 223-238.

A BRIEF DESCRIPTION OF THE TWO DEMONSTRATION WIND TURBINES, NIBE-A AND NIBE-B, OF THE DANISH WIND ENERGY PROGRAMME IS GIVEN. PRELIMINARY RESULTS OBTAINED DURING COMMISSIONING OF NIBE-A ARE PRESENTED.

1980-0394 PENNELL W T, WEGLEY H L
EFFECT OF SITE WIND CHARACTERISTICS ON ENERGY PRODUCTION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 3D, MIAMI BEACH, FLORIDA, DECEMBER 15, 1980.
NTIS, DECEMBER 1980. 20 P.
PNL-SA-9066

THE EFFECT OF DIFFERENCES IN WIND CHARACTERISTICS ON ESTIMATES OF WIND TURBINE PERFORMANCE HAS BEEN EXAMINED. NET ENERGY PRODUCTION OVER A GIVEN PERIOD CAN BE ESTIMATED IF BOTH THE PERFORMANCE CHARACTERISTICS OF THE TURBINE AND THE WIND SPEED PROBABILITY DENSITY FUNCTION (PDF) ARE KNOWN. SIMULATIONS COVERING A RANGE OF PDFS AND MACHINE PERFORMANCE CHARACTERISTICS SHOWED THAT REASONABLE ESTIMATES OF NET ENERGY PRODUCTION CAN BE MADE USING SIMPLE, ANALYTICAL PDFS. THE ANALYTICAL PDFS ONLY REQUIRE KNOWLEDGE OF THE AVERAGE WIND SPEED AT A SITE. SOME WIND ENERGY APPLICATIONS REQUIRE KNOWLEDGE OF HOW TEMPORAL VARIATIONS IN TURBINE OUTPUT INTERACT WITH TEMPORAL VARIATIONS IN LOAD. THE EFFECT OF VARIATIONS IN THE DIURNAL MODULATION OF WIND SPEED ON LOAD MATCHING WAS EXAMINED BY SIMULATING THE ENERGY TRANSFER BETWEEN A UTILITY AND A RESIDENCE EQUIPPED WITH A SMALL WIND TURBINE GENERATOR. TURBINE PERFORMANCE WAS SIMULATED AT SIX SITES HAVING A WIDE RANGE OF DIURNAL CHARACTERISTICS.

1980-0395 PENNELL W T, BARCHET W R, ELLIOTT D L, WENDELL L L, HIESTER T R
METEOROLOGICAL ASPECTS OF WIND ENERGY: ASSESSING THE RESOURCE AND SELECTING THE SITES.
J. IND. AERODYN. 5(3-4): 223-246, MAY 1980.

RESEARCH ON WIND CHARACTERISTICS WITHIN THE UNITED STATES WIND ENERGY PROGRAM IS ADDRESSING PROBLEMS OF RESOURCE ASSESSMENT, SITE SELECTION, DESIGN AND PERFORMANCE EVALUATION OF WIND MACHINES, AND DAY-TO-DAY OPERATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS) IN UTILITY GRIDS. WORK DESIGNED TO IMPROVE OUR UNDERSTANDING OF THE WIND ENERGY RESOURCE WITHIN THE UNITED STATES IS DISCUSSED. THE TECHNIQUES AND PROCEDURES THAT HAVE BEEN DEVELOPED FOR FINDING WIND MACHINE SITES ARE ALSO EXAMINED.

1980-0396 PETERSEN H
SMALL WINDMILLS IN DENMARK
WIND ENG. 4(2): 87-114, 1980.

THE REPORT DESCRIBES THE PROJECT FOR SMALL WINDMILLS FUNDED BY THE MINISTRY OF ENERGY, AND MANAGED AND CARRIED OUT AT RISO NATIONAL LABORATORY. THE TEST PLANT IS DESCRIBED AND A SURVEY OF DANISH WINDMILLS IS PRESENTED. SOME REQUIREMENTS FOR WINDMILLS ARE MENTIONED AND REGULATIONS GOVERNING THE INTERFACE BETWEEN GRID-CONNECTED WINDMILLS AND THE ELECTRIC UTILITIES ARE EXPLAINED AND DISCUSSED.

1980-0397 PETERSEN H
THE TEST PLANT FOR SMALLER WINDMILLS AND A SURVEY OF SMALL DANISH WINDMILLS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 437-450.
CONF-791097

THE MAIN ACTIVITY FOR THE PROJECT IS TO ESTABLISH AND RUN A TEST PLANT FOR SMALLER WINDMILLS. PLANNING OF THE TEST PLANT WAS INITIATED IN JUNE 1978. SEVEN PLATFORMS FOR WINDMILLS HAVE BEEN ESTABLISHED. BY SEPTEMBER 1979 SIX WINDMILLS HAD BEEN ERECTED AND THE DATA SAMPLING AND -HANDLING SYSTEM HAD BEEN COMPLETED.

1980-0398 PETERSEN H
TEST PLANT FOR AND A SURVEY OF SMALL DANISH WINDMILLS.
RISO NATL. LAB. REP. NO. 2193: FEBRUARY 1980. 52 P.

THE REPORT DESCRIBES THE PROJECT FOR SMALL WINDMILLS. THE TEST PLANT IS DESCRIBED AND A SURVEY OF DANISH WINDMILLS IS PRESENTED. SOME REQUIREMENTS FOR WINDMILLS ARE MENTIONED AND THE INTERFACE WITH THE ELECTRIC UTILITIES IS ALSO GIVEN.

1980-0399 PEXTON A F
A FUELS POLICY FOR THE U.K. INTO THE 21ST CENTURY.
NUCL. ENERGY 19(1): 19-35, FEBRUARY 1980.

BECAUSE OF THE FINITE LIFE OF NORTH SEA OIL AND GAS SUPPLIES A BROAD FUELS POLICY IS NECESSARY IN THE UK. THE AUTHOR CONSIDERS THE ROLE OF CONSERVATION AND CONTRIBUTIONS FROM VARIOUS RENEWABLE SOURCES SUCH AS WIND POWER, TIDAL POWER, SOLAR POWER, GEOTHERMAL ENERGY AND NUCLEAR FUSION. THE MINIMUM RISK POLICY FOR THE UK IS TO PREPARE FOR SELF-SUFFICIENCY IN PRIMARY ENERGY. A POLICY OF CONVERTING COAL TO GAS AND OIL INITIALLY AND A TRANSFER TO NUCLEAR POWER FOR ELECTRICITY GENERATION (SO AS TO LEAVE COAL FOR OTHER PURPOSES) IS SUGGESTED.

1980-0400 PICKERING K E, VILARDO J M, SCHAKENBACH J T, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 4. THE NORTHEAST REGION.
NTIS, SEPTEMBER 1980. 230 P.
PNL-3195-WERA-4

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN EACH STATE OF THE REGION. BACKGROUND IS PRESENTED ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED. A DESCRIPTION OF THE WIND RESOURCE ON A REGIONAL SCALE IS THEN GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH STATE ARE ASSEMBLED IN THIS CHAPTER INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE REGIONAL WIND ENERGY RESOURCE. AN INTRODUCTION AND OUTLINE ARE PROVIDED FOR IN THE DESCRIPTIONS OF THE WIND RESOURCE GIVEN FOR EACH STATE. ASSESSMENTS FOR INDIVIDUAL STATES ARE PRESENTED. THE STATE WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE REGIONAL WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED. THIS PREFACE OUTLINES THE USE AND INTERPRETATION OF THE INFORMATION FOUND IN THE STATE CHAPTERS.

1980-0401 PIEPERS G G
THE NETHERLANDS WIND ENERGY RESEARCH PROGRAMME.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 287-300.
CONF-791097

THE OBJECTIVE OF THE PROGRAMME IS NOT IN THE FIRST PLACE TO COVER THE COUNTRY AGAIN WITH MINDMILLS, BUT TO INVESTIGATE THE FEASIBILITY OF THE UTILISATION OF WIND POWER, BOTH ON A LARGE SCALE, TO PRODUCE ELECTRICITY SUITABLE FOR FEEDING INTO THE NATIONAL GRID (CENTRALISED APPLICATION), AND ON A SMALLER SCALE, FOR ENERGY SUPPLY DIRECT TO INDUSTRIES, GLASSHOUSES, WATER PUMPING STATIONS, SMALL COMMUNITIES, ETC. (DECENTRALISED APPLICATION).

1980-0402 PORCH W M
NUMERICAL WIND FIELD MODEL VALIDATION IN COMPLEX TERRAIN WITH APPLICATION TO POLLUTANT TRANSPORT.
NTIS, MARCH 1980. 7 P.
CONF-800327-3, UCRL-83269

THE INTERACTION OF METEOROLOGICAL DATA TAKEN AT POINTS IN A REGION WITH NUMERICAL MODELS CAN BE DONE SMOOTHLY IN GENTLY VARYING TERRAIN. HOWEVER, IT IS FRAUGHT WITH DIFFICULTIES IN COMPLEX TERRAIN. COMPUTER MEMORY SIZE LIMITS THE RESOLUTION OF THE TOPOGRAPHY AND A POINT MEASUREMENT BECOMES REPRESENTATIVE OF SMALLER SCALES AS THE TOPOGRAPHY BECOMES MORE COMPLEX. THIS PAPER DESCRIBES HOW REMOTELY SENSED SPATIALLY AVERAGED WINDS FROM OPTICAL ANEMOMETERS CAN BE USED TO HELP THE INTERACTION OF WIND MEASUREMENTS MADE AT POINTS WITHIN A REGION AND NUMERICAL REGIONAL WIND FIELD MODELS. IN THIS PAPER, EMPHASIS WILL BE PLACED ON MODEL VALIDATION BOTH AS WIND FIELD ESTIMATES FOR APPLICATIONS SUCH AS WIND ENERGY PROSPECTING, AND AS INPUT TO POLLUTANT DISPERSION MODELS.

1980-0403 PORCH W M, GREEN T J
APPLICATION OF A PHOTODIODE-ARRAY OPTICAL TURBULENCE SENSOR TO WIND STUDIES IN COMPLEX TERRAIN.
NTIS, APRIL 1980. 18 P.
CONF-800480-3, UCRL-84503

A DIGITAL PHOTODIODE-ARRAY OPTICAL TURBULENCE SENSOR WAS USED TO GATHER DATA SIMULTANEOUSLY WITH ANALOG OPTICAL ANEMOMETER MEASUREMENTS DURING THE JULY 1979 ASCOT EXPERIMENT. THIS SYSTEM PROVIDED USEFUL INFORMATION REGARDING THE UNIFORMITY OF OPTICAL TURBULENCE USED BY THE OPTICAL ANEMOMETER TO DERIVE CROSS-PATH WIND SPEEDS. WIND SPEEDS DERIVED FROM DIGITAL ANALYSIS OF THE PHOTODIODE-ARRAY INTENSITIES ALSO PROVIDED AN INDEPENDENT MEASURE OF THE CROSS-PATH WIND SPEED. CLOSE AGREEMENT WAS FOUND BETWEEN THESE TWO MEASURES OF THE WIND.

1980-0404 POWELL W R
OUTPUT POWER OF WIND MACHINES.
SYSTEMS SIMULATION AND ECONOMICS ANALYSIS CONFERENCE, SAN DIEGO, CALIFORNIA, JANUARY 23, 1980. NTIS, 1980. P. 229-232.
SERI/TP-351-431

A NEW MODEL OF WIND MACHINE OUTPUT POWER IS SUGGESTED. THIS MODEL NOT ONLY AVOIDS ERRORS ASSOCIATED WITH PRIOR MODELS, BUT ALSO ALLOWS THE AVERAGE POWER PRODUCED BY A WIND MACHINE TO BE CALCULATED WITHOUT RESORT TO NUMERICAL METHODS. THE AVERAGE POWER IS EXPRESSED AS A FUNCTION OF THE "CUT-IN", "RATED", AND "MAXIMUM" SPEEDS OF THE WIND MACHINE AND THE TWO PARAMETERS USED TO CHARACTERIZE WIND SPEEDS WITH WEIBULL STATISTICS. THE VARIATION OF AVERAGE POWER AND CAPACITY FACTORS WITH CHANGES IN WIND-MACHINE DESIGN IS EXPLORED.

1980-0405 POWELL D C, CONNELL J R
DEFINITION OF GUST MODEL CONCEPTS AND REVIEW OF GUST MODELS.
NTIS, JUNE 1980. 100 P.
PNL-3138

FOUR MODELS ARE EXAMINED WHICH ATTEMPT TO DESCRIBE WIND FLUCTUATIONS IN RELATION TO A WIND ENERGY CONVERSION SYSTEM (WECS) THAT IS SUBJECTED TO THESE FLUCTUATIONS OBSERVED FROM A FIXED LOCATION WITHIN THE ATMOSPHERIC BOUNDARY LAYER. THE PRIMARY PURPOSE OF THIS EXAMINATION IS TO PROVIDE A BASIS FOR UNDERSTANDING PRESENT AND FUTURE DEVELOPMENTS IN GUST AND GUST-RISE MODELS. THE EXAMINATION IS ACCOMPLISHED BY IDENTIFYING THE GUST DEFINITIONS USED IN THE MODELS AND RELATING THEM TO A BASIC DEFINITION GIVEN.

1980-0406 BIELAWA R L
THE USE OF LARGE AMPLITUDE BENDING-TORSION FLUTTER AS A WECS MECHANISM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 67-88.
SERI/CP-635-1601

AN OSCILLATING VANE WIND ENERGY CONVERSION SYSTEM, INCORPORATING THE CLASSIC BENDING-TORSION FLUTTER CHARACTERISTICS OF A CANTILEVERED WING, IS DESCRIBED. THE SYSTEM IS CHARACTERIZED BY RELATIVELY LARGE RESPONSE AMPLITUDES AND UTILIZES A CONSTRUCTION SCHEME BASED ON THE HIGH FATIGUE STRENGTH CHARACTERISTICS OF A COMPOSITE MATERIAL. THE RESULTS OF AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF THE POTENTIAL OF THIS SYSTEM ARE PRESENTED. THE EXPERIMENTAL RESULTS CONSIST OF THE MECHANICAL POWER GENERATION, AND DYNAMIC RESPONSE AND STRESS CHARACTERISTICS FOR A ONE METER SPAN MODEL. TWO COMPLEMENTARY ANALYSES ARE DESCRIBED: A FLUTTER EIGENSOLUTION TO CALCULATE CONDITIONS FOR SELF-START, AND A NONLINEAR TIME-HISTORY ANALYSIS TO CALCULATE OUTPUT POWER CHARACTERISTICS. RESULTS OF THE CORRELATION OF THESE ANALYSES WITH TEST DATA ARE PRESENTED.

1980-0407 FOREMAN K M
THE DIFFUSER AUGMENTED WIND TURBINE (DAWT): A COST-COMPETITIVE INNOVATIVE ENERGY CONVERSION SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 103-111.
SERI/CP-635-1601

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS AN INNOVATIVE APPROACH UNDER INVESTIGATION SINCE 1975. ITS GOAL IS TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION. THROUGH THE USE OF A UNIQUE COMPACT DIFFUSER, THE VOLUMETRIC FLOW PROCESSED BY THE TURBINE IS MUCH GREATER THAN CONVENTIONAL ROTORS OF THE SAME DIAMETER AND MORE NATURAL WIND POWER IS CONVERTED. ADDITIONALLY, BECAUSE THE NATURAL WIND IS ACCELERATED INTO THE ROTOR DISK BY THE DIFFUSER'S ACTION, THE DAWT IS ABLE TO PRODUCE USEFUL POWER AT LOWER CUT-IN WIND SPEEDS THAN A BARE TURBINE AND CAN PRODUCE GREATER ANNUAL ENERGY OUTPUTS. HOWEVER, THE DIFFUSER STRUCTURE IS AN ECONOMIC BURDEN THAT POTENTIALLY CAN OFFSET THE TECHNICAL PERFORMANCE GAINS OF THE CONCEPT. TO PREVENT THIS FROM OCCURRING, CAREFUL ATTENTION MUST BE ACCORDED THE DESIGN AND MANUFACTURING APPROACHES OF THE DIFFUSER AND ITS SUPPORTING STRUCTURE TO ASSURE LOW ENOUGH COSTS TO RETAIN ATTRACTIVE OVERALL SYSTEM PROSPECTS. THIS PAPER REPORTS ON WORK CONDUCTED TO EXPLORE SYSTEM ENGINEERING DESIGN ALTERNATIVES AND TO DETERMINE COST AND ENERGY OUTPUT OF COST EFFECTIVE DAWTS.

1980-0408 FURUYA O, MAEKAWA S
PRELIMINARY REPORT ON AN ASSESSMENT OF A TETHERED WIND ENERGY SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 37-53
SERI/CP-635-1601

IN SEPTEMBER 1980, WE STARTED A STUDY FOR ASSESSING A TETHERED WIND ENERGY SYSTEM AS A POSSIBLE ENERGY SOURCE IN THE NEAR FUTURE UNDER CONTRACT FROM THE SOLAR ENERGY RESEARCH INSTITUTE OF THE DEPARTMENT OF ENERGY OF THE UNITED STATES. THIS IS A PRELIMINARY REPORT WHICH DESCRIBES THE SUBJECTS TO BE STUDIED IN THIS PROJECT AND THUS IDENTIFIES THE PROBLEM AREAS TO BE CLARIFIED. IN THIS STUDY, EMPHASIS WILL BE PLACED UPON SEVERAL KEY ITEMS IN IMPLEMENTING A TETHERED WIND ENERGY SYSTEM (TWES). ALTHOUGH OTHER MINOR TECHNICAL PROBLEMS WILL BE TOUCHED UPON DURING THE COURSE OF STUDY, IT IS BELIEVED THAT IF THE KEY ITEMS ARE JUDGED TO BE NEGATIVE FOR THE SYSTEM IMPLEMENTATION, THE WHOLE CONCEPT WILL BECOME INADEQUATE FOR FURTHER STUDIES. THESE KEY ITEMS INCLUDE THE RELATIONSHIP BETWEEN (1) THE RATED POWER AND ALTITUDE AS A FUNCTION OF THE SEASONAL WIND SPEED, (2) REQUIRED LIFTING FORCE FOR CARRYING THE PLATFORM AND CABLE WEIGHT, AND (3) GENERATED POWER AND CABLE DIAMETER (I.E., POWER TRANSMISSION PROBLEM). SINCE THESE THREE RELATIONSHIPS ARE ALL INTERRELATED, AN ITERATION PROCESS WILL BE EMPLOYED BY WRITING A SIMPLIFIED COMPUTER PROGRAM TO DETERMINE THESE RELATIONSHIPS UNIQUELY. FURTHERMORE, THE SURVIVABILITY OF THE TWES IN A WIND GUST OR OTHER ACCIDENT, AND THE PROBLEM OF MAINTENANCE AND REPAIR WILL BE CAREFULLY STUDIED IN RELATION TO THE ECONOMY OF THE SYSTEM.

1980-0409 LEIGH G G
A CONCEPT FOR AUTOMATIC BLADE PITCH FOR A DARRIEUS VERTICAL AXIS WIND TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 143-163.
SERI/CP-635-1601

A CONCEPT IS REVEALED WHERE THE PITCH ANGLES OF THE BLADES OF A DARRIEUS-TYPE VERTICAL AXIS WIND TURBINE ARE AUTOMATICALLY MODULATED BY AERODYNAMIC FORCES TO PROVIDE IMPROVED ANGLE OF ATTACK AND INCREASED POWER OUTPUT FROM THE TURBINE. THE TURBINE BLADES ARE PIVOTED FORWARD OF THE CENTER OF PRESSURE SO THAT AERODYNAMIC FORCES TEND TO ROTATE THE BLADES, THUS CHANGING THE ANGLE OF ATTACK AND IMPROVING THE AERODYNAMIC PERFORMANCE. COUNTERBALANCE WEIGHTS, LOCATED IN THE BLADE SUPPORT STRUTS, PROVIDE A MASS BALANCE ABOUT THE BLADE PIVOT POINT, THUS ELIMINATING ANY CENTRIFUGAL PITCHING FORCES ON THE BLADES. SPRINGS AND MECHANICAL STOPS, LOCATED IN THE BLADE SUPPORT STRUTS, ARE USED TO CONTROL THE AMOUNT OF BLADE PITCH AND RETURN THE BLADES TO NEUTRAL WHEN THE AERODYNAMIC LIFT FORCES ARE REDUCED. NO MECHANICAL OR ELECTROMECHANICAL MECHANISMS ARE UTILIZED TO ACHIEVE THE IMPROVED PERFORMANCE; HENCE THE COST OF MANUFACTURING AND MAINTENANCE REQUIREMENTS FOR THE TURBINE SHOULD BE SUBSTANTIALLY REDUCED.

1980-0410 LISSAMAN P B S, ZALAY A D, HIBBS B
DEVELOPMENT OF THE DYNAMIC INDUCER WIND TURBINE.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 113-135.
SERI/CP-635-1601

THE PERFORMANCE BENEFITS OF THE DYNAMIC INDUCER TIP VANE SYSTEM HAVE BEEN EXPERIMENTALLY DEMONSTRATED FOR THE FIRST TIME. WIND TUNNEL TESTS CONDUCTED ON A THREE-BLADED 1.2 M DIAMETER ROTOR IN THE CALTECH 10' WIND TUNNEL HAVE NOW SHOWN THAT A DYNAMIC INDUCER CAN ACHIEVE A POWER COEFFICIENT (BASED ON POWER BLADE AREA) OF 0.62 WHICH

EXCEEDS THAT OF THE PLAIN ROTOR BY ABOUT 70%. THE DYNAMIC INDUCER SUBSTANTIALLY IMPROVES THE PERFORMANCE OF CONVENTIONAL ROTORS AND INDICATIONS ARE THAT HIGHER POWER COEFFICIENTS CAN BE ACHIEVED THROUGH ADDITIONAL AERODYNAMIC OPTIMIZATION. THE WIND TUNNEL MEASUREMENTS SUMMARIZED IN THIS PAPER SUGGEST THAT THE DYNAMIC INDUCER CAN PLAY A MAJOR ROLE IN FUTURE TURBINE TECHNOLOGY. A NEW METHOD FOR CALCULATING WIND TUNNEL CORRECTIONS FOR AUGMENTED WIND TURBINES IS DEVELOPED. THIS SHOWS THAT CORRECTIONS ARE VERY SIGNIFICANT. FOR EXAMPLE, WITH A BLOCKAGE OF 16%, THE CORRECTED POWER COEFFICIENT IS ABOUT 20% LOWER THAN THAT ACTUALLY MEASURED.

1980-0411 MINARDI J E, LAWSON M O
RESEARCH PROGRESS ON THE ELECTROFLUID DYNAMIC WIND GENERATOR.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 169-189.
SERI/CP-635-1601

THE OBJECTIVE OF THE PROGRAM IS TO CONDUCT RESEARCH LEADING TO THE SUCCESSFUL DEVELOPMENT OF ELECTROFLUID DYNAMIC (EFD) WIND GENERATORS. APPLICATION OF THE EFD DIRECT ENERGY CONVERSION PRINCIPLE PROMISES A SIMPLER, LESS EXPENSIVE SYSTEM, FREE OF FRONTAL AREA AND VELOCITY LIMITATIONS OF CONVENTIONAL ROTATING WIND ENERGY CONVERSION SYSTEMS. THE PRESENT RESEARCH IS DIRECTED TOWARD THE ACHIEVEMENT OF A THIRD AND LAST MILESTONE, THE ENERGY ECONOMIC PRODUCTION OF CHARGED WATER DROPLETS HAVING THE PROPER CHARACTERISTICS FOR EFD WIND ENERGY APPLICATION. THIS PAPER REPORTS ON THE PROGRESS MADE TOWARD ATTAINING THIS THIRD MILESTONE.

1980-0412 NOLL R B, HAM N D
TETHERED GYROTURBINE WIND ENERGY SYSTEM.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 19-26.
SERI/CP-635-1601

THE GYROTURBINE CONSISTS OF A BODY/ROTOR SYSTEM OPERATING IN AN AUTOGYRO MODE IN THE JET STREAM AND TETHERED TO A GROUND ANCHOR SYSTEM BY A HIGH STRENGTH CABLE. THE ROTOR PRODUCES SUFFICIENT POWER IN THE AUTOGYRO MODE TO SUSTAIN THE WEIGHT OF THE ENTIRE SYSTEM AND TO TURN AN INDUCTION GENERATOR WHICH PRODUCES POWER IN THE MEGAWATT RANGE. THE GYROTURBINE IS FLOWN IN A HELICOPTER MODE TO LIFT THE SYSTEM INTO THE JET STREAM OR TO RECOVER THE SYSTEM. THE GYROTURBINE SYSTEM AND ITS OPERATIONAL MODES ARE DESCRIBED, AND ITS FEASIBILITY IS DISCUSSED FOR SYSTEMS OF SEVERAL SIZES.

1980-0413 PAYNE P R
CABLE STRUMMING TO COLLECT WIND POWER.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 91-101.
SERI/CP-635-1601

"GALLOPING" OF POWER LINES IN A WIND GIVES RISE TO LARGE FATIGUE STRESSES WHICH CAN CAUSE FAILURE. WE WONDERED IF MECHANICAL POWER COULD BE USEFULLY EXTRACTED FROM THIS PHENOMENON, BUT THE BRIEF STUDY REPORTED HEREIN SHOWED THAT THE ENERGY EXTRACTION EFFICIENCY IS FAR TOO LOW. WE THEN CONSIDERED TWO PARALLEL CABLES ACROSS A VALLEY, THE SPACE BETWEEN BEING COVERED WITH PLASTIC OR CLOTH, SO THAT THE WING-LIKE STRUCTURE RESULTING WOULD EXECUTE A COUPLED HEAVE AND PITCH BINARY FLUTTER. PRELIMINARY INDICATIONS ARE THAT SUCH A SYSTEM EXTRACTS ENERGY WITH REASONABLE EFFICIENCY. SINCE CABLE SPANS ACROSS A VALLEY CAN BE A MILE OR MORE, THIS OPENS UP THE POSSIBILITY OF A ONE HUNDRED MEGAWATT WINDMILL.

1980-0414 POWER H M
A SIMULATION MODEL FOR WIND TURBINES.
APPL. ENERGY 6(5): 395-399, SEPTEMBER, 1980.

THE EQUATION OF MOTION OF A WIND TURBINE MAY BE WRITTEN AS J(D(OMEGA)/DT)=G(V,OMEGA)-T, WHERE J IS MOMENT OF INERTIA, T LOAD TORQUE, V WIND SPEED AND OMEGA ANGULAR VELOCITY. IT IS PROPOSED THAT THE GENERATED TORQUE G(V,OMEGA) MAY BE DESCRIBED BY AN HOMOGENEOUS SECOND-DEGREE FUNCTION IN V AND OMEGA. THIS FUNCTION IS DEFINED AND SOME RELEVANT PROPERTIES ARE EXPLORED.

1980-0415 PREUSS R D, SUCIU E O, MORINO L
UNSTEADY POTENTIAL AERODYNAMICS OF ROTORS WITH APPLICATIONS TO HORIZONTAL-AXIS WINDMILLS.
AIAA J. 18(4): 385-393, APRIL 1980.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL IN INCOMPRESSIBLE, POTENTIAL FLOW IS CONSIDERED. THE PROBLEM IS FORMULATED IN A FRAME OF REFERENCE RIGIDLY CONNECTED WITH THE ROTOR. TWO DIFFERENT INTEGRAL EQUATIONS (FOR FINITE-THICKNESS AND ZERO-THICKNESS BLADES) ARE PRESENTED. THE FINITE-THICKNESS INTEGRAL EQUATION RELATES THE VALUES OF THE POTENTIAL ON THE SURFACE OF THE WINDMILL TO THE VALUES OF THE NORMAL DERIVATIVE, WHICH ARE KNOWN FROM THE BOUNDARY CONDITIONS. THE WAKE IS TREATED AS A DOUBLET LAYER OF PRESCRIBED HELICOIDAL GEOMETRY. IN ORDER TO SOLVE THE INTEGRAL EQUATION, THE WINDMILL SURFACE IS DIVIDED INTO SMALL QUADRILATERAL SURFACE ELEMENTS. EACH ELEMENT IS APPROXIMATED BY A PORTION OF A HYPERBOLOIDAL PARABOLOID PASSING THROUGH THE CORNERS OF THE ACTUAL SURFACE ELEMENT. THE VALUES OF THE POTENTIAL AND ITS NORMAL DERIVATIVE WITHIN EACH ELEMENT ARE ASSUMED TO BE CONSTANT AND EQUAL TO THE VALUES AT THE CENTROID OF THE ELEMENT. THIS YIELDS A SET OF LINEAR ALGEBRAIC EQUATIONS IN THE UNKNOWN VALUES OF THE POTENTIAL. THE ZERO-THICKNESS INTEGRAL EQUATION IS TREATED IN A SIMILAR WAY. NUMERICAL RESULTS FOR POTENTIAL AND POWER COEFFICIENT FOR FINITE-THICKNESS AND ZERO-THICKNESS HORIZONTAL-AXIS WINDMILLS IN STEADY AND UNSTEADY INCOMPRESSIBLE, POTENTIAL FLOWS ARE PRESENTED. COMPARISON WITH EXPERIMENT IS PRESENTED FOR HELICOPTER ROTORS IN HOVER.

1980-0416 PROCEEDINGS OF THE FOURTH BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS.
NTIS, JUNE 1980. 641 P.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL, WASH NGTON, D.C., OCTOBER 29-31, 1979.
CONF-791097

THE 46 PAPERS IN THIS PROCEEDINGS REPRESENT SUMMARIES WHICH HAVE COME OUT OF A SERIES OF SMALLER WORKSHOPS ON VARIOUS ASPECTS OF WIND ENERGY CONVERSION SYSTEMS.

1980-0417 MEIJER S
A COMPARISON OF RESULTS OBTAINED WITH TWO DIFFERENT METHODS FOR CALCULATION OF HORIZONTAL AXIS WIND TURBINE PERFORMANCE, PART 4.
NTIS, FEBRUARY 6, 1980. 31 P.
N81-22580, FFA-TN-HU-2189-PT-4

THE TURBINE AND FLOW FIELD ARE DESCRIBED WITH FINITE ELEMENT TECHNIQUES. FOR THE CASE OF A WIND TURBINE

OPERATING IN STEADY UNIFORM FLOW, PERFORMANCE AND LOAD CHARACTERISTICS WERE CALCULATED AND COMPARED WITH THE RESULTS FROM THE STANDARD COMPUTER PROGRAM, WINRO, BASED ON A COMBINATION OF BLADE ELEMENT AND MOMENTUM THEORY. THE CALCULATIONS WERE MADE FOR A REFERENCE TEST CASE AT DIFFERENT WIND SPEEDS. THE REFERENCE UNIT IS A 9 M RADIUS TWO BLADED 65 KW TURBINE. THE RESULTS ARE IN EXCELLENT AGREEMENT EXCEPT FOR LOW WIND SPEEDS PROBABLY BECAUSE THREE DIMENSIONAL EFFECTS ARE MORE IMPORTANT FOR LOW WIND SPEEDS THAN FOR HIGH.

1980-0418 RAAB A
COMBINED EFFECTS OF DETERMINISTIC AND RANDOM LOADS IN WIND TURBINE DESIGN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D1, P. 169-182.

LOADS ON WIND TURBINE BLADES ARE PERIODIC BECAUSE OF THE ROTATION OF THE BLADE. WELL DEFINED (DETERMINISTIC) LOADS ARE THOSE DUE TO THE MEAN WIND, WIND SHEAR, TOWER SHADOW (INTERACTION OF THE TOWER WITH THE MEAN WIND), GRAVITATION AND CENTRIFUGAL FORCES, ON CONDITION THAT THE MEAN WIND IS SPECIFIED. THEY CAUSE THE MAJOR PART OF FATIGUE DAMAGE. RANDOM FORCES TAKE RISE FROM TURBULENCE AND ITS INTERACTION WITH THE TOWER. THOUGH LESS IMPORTANT ON THEIR OWN, THEIR INTERACTION WITH THE DETERMINISTIC LOADS PRECIPITATE FATIGUE. THUS A GLOBAL TREATMENT OF ALL KINDS OF LOADS IS NECESSARY. TWO METHODS WILL BE CONSIDERED: NUMERICAL SIMULATION AND PROBABILISTIC INTERACTION. FOR SIMULATION A DIGITAL FILTER TECHNIQUE AND A METHOD USING TRIANGULAR DECOMPOSITION OF THE CORRELATION MATRIX ARE KNOWN. WORK ON THE LATTER IS IN PROGRESS. PRINCIPLES OF THE PROBABILISTIC METHOD WILL BE SHOWN.

1980-0419 RAJVANASHI A K
A SCHEME FOR LARGE SCALE DESALINATION OF SEA WATER BY SOLAR ENERGY.
SOL. ENERGY 24(6): 551-560, 1980.

A SCHEME IS PROPOSED TO DESALINATE SEA WATER USING SOLAR ENERGY FOR THE THAR DESERT OF INDIA. THE SOLAR COLLECTORS ARE RECTANGULAR CONCRETE TUBES, HALF BURRIED IN THE GROUND, THROUGH WHICH SEA WATER FLOWS AND IS HEATED BY SOLAR ENERGY. THE HEATED SEA WATER IS THEN FLASH EVAPORATED IN A MULTI-STAGE FLASH EVAPORATOR (MSF) UNIT TO YIELD FRESH WATER. PUMPING OF THE SEA WATER TO THE SITE AND THROUGH THE MSF UNIT IS POWERED BY 415 WIND TURBINES EACH OF 200 KW CAPACITY. ECONOMIC ANALYSIS OF THE SCHEME SHOWS THAT IT COMPARES FAVOURABLY WITH THE EXISTING FOSSIL FUEL FIRED DESALINATION PLANTS OF THE EQUIVALENT CAPACITY.

1980-0420 RAMSDELL J V, HOUSTON S, WEGLEY H L
MEASUREMENT STRATEGIES FOR ESTIMATING LONG-TERM AVERAGE WIND SPEEDS.
SOL. ENERGY 25(6): 495-503, 1980.

THE UNCERTAINTY AND BIAS IN ESTIMATES OF LONG-TERM AVERAGE WIND SPEEDS INHERENT IN CONTINUOUS AND INTERMITTENT MEASUREMENT STRATEGIES ARE EXAMINED BY SIMULATING THE APPLICATION OF THE STRATEGIES TO 40 DATA SETS. CONTINUOUS STRATEGIES HAVE THE SMALLER UNCERTAINTIES FOR FIXED DURATION MEASUREMENT PROGRAMS, BUT INTERMITTENT STRATEGIES MAKE MORE EFFICIENT USE OF INSTRUMENTS AND HAVE SMALLER UNCERTAINTIES FOR A FIXED AMOUNT OF INSTRUMENT USE.

1980-0421 RAMSDELL J V, HOUSTON S, WEGLEY H L
MEASUREMENT STRATEGIES FOR ESTIMATING LONG-TERM AVERAGE WIND SPEEDS.
NTIS, OCTOBER 1980. 29 P.
PNL-3448

THE UNCERTAINTY AND BIAS IN ESTIMATES OF LONG-TERM AVERAGE WIND SPEEDS INHERENT IN CONTINUOUS AND INTERMITTENT MEASUREMENT STRATEGIES ARE EXAMINED BY SIMULATING THE APPLICATION OF THE STRATEGIES TO 40 DATA SETS. CONTINUOUS STRATEGIES HAVE THE SMALLER UNCERTAINTIES FOR FIXED DURATION MEASUREMENT PROGRAMS, BUT INTERMITTENT STRATEGIES MAKE MORE EFFICIENT USE OF INSTRUMENTS AND HAVE SMALLER UNCERTAINTIES FOR A FIXED AMOUNT OF INSTRUMENT USE. CONTINUOUS STRATEGIES TEND TO GIVE BIASED ESTIMATES OF THE LONG-TERM ANNUAL MEAN SPEED UNLESS AN INTEGRAL NUMBER OF YEARS' DATA IS COLLECTED OR THE MEASUREMENT PROGRAM EXCEEDS 3 YEARS IN DURATION. INTERMITTENT STRATEGIES WITH 3 OR MORE MONTH-LONG MEASUREMENT PERIODS/YR DO NOT SHOW ANY TENDENCY TOWARD BIAS.

1980-0422 RASMUSSEN F
EFFEKTMALINGER PA SJ-10 KW-R VINDMOLLE. (POWER MEASUREMENTS ON SJ-10 KW-R WINDMILL.)
RISO NATL. LAB. REP. NO. 2225: MARCH 1980. 20 P. (IN DUTCH) ALSO: NTIS, MARCH 1980. 21 P.
RISO-M-2225, PB81-174047

THIS REPORT CONTAINS RESULTS FROM MEASURMENTS OF POWER OUTPUT FOR A 10 KW, 5.65M DIAMETER WINDROSE. THE IMPROVEMENTS OF THE WINDMILL DURING THE TESTS ARE DESCRIBED AND THE YEARLY ENERGY OUTPUT IS COMPUTED FOR THE WINDMILL SITUATED AT DIFFERENT WIND LOCATIONS.

1980-0423 RASMUSSEN F
EFFEKTMALINGER PA 15-KW GYROMOLLE. (POWER MEASUREMENTS OF 15-KW GIRO WINDMILL.)
RISO NATL. LAB. REP. NO. 2226: MARCH 1980. 14 P. (IN DUTCH) ALSO: NTIS, MARCH 1980. 15 P.
RISO-M-2226, PB81-174054

IT IS INVESTIGATED IF THE RESULTS FROM TEMPORARY MEASUREMENTS OF POWER OUTPUT FOR A 15-KW GIRO WINDMILL ARE IN REASONABLE ACCORDANCE WITH COMPUTED VALUES.

1980-0424 RASMUSSEN F
EFFEKTMALINGER PA 30-KW RIISAGERMOLLE. (POWER MEASUREMENTS OF 30-KW RIISAGER WINDMILL.)
RISO NATL. LAB. REP. NO. 2227: MARCH 1980. 14 P. (IN DUTCH) ALSO: NTIS, MARCH 1980. 15 P.
RISO-M-2227, PB81-174062

THIS REPORT CONTAINS RESULTS FROM MEASUREMENTS OF POWER OUTPUT FOR A 30-KW, 10-M DIAMETER RIISAGER WINDMILL. THE POWER CURVE IS MEASURED INTO THE STALLED REGION, WHICH FORMS THE BASIS OF A CALCULATION OF A MORE SUITABLE ROTATION SPEED FOR THE ROTOR.

1980-0425 RCS AUDITOR TRAINEE MANUAL: RENEWABLE RESOURCE MEASURES (REVISED).
NTIS, OCTOBER 1980. 196 P.
SERI/SP-722-739

THIS MANUAL DESCRIBES THE USE OF RENEWABLE MEASURES AND THE PROCEDURES USED TO AUDIT FOR THEM. INCLUDED ARE ACTIVE SOLAR SPACE AND WATER HEATING SYSTEMS, PASSIVE SOLAR SPACE AND WATER HEATING SYSTEMS, AND WIND ENERGY SYSTEMS. SAMPLE AUDIT FORMS ARE COMPLETED FOR A HOUSE IN OKLAHOMA CITY, OKLAHOMA. A SUMMARY OF INSTALLATION STANDARDS FOR ACTIVE SOLAR SYSTEMS IS INCLUDED.

1980-0426 REDDOCH T W, KLEIN J W
ELECTRICAL ENERGY FROM THE WIND IN A U.S. TOWN.
ELETTROTECNICA 67(7): 673-678, JULY 1980. (IN ITALIAN)

THE ARTICLE DESCRIBES THE EXPERIMENTAL 200 KW WIND GENERATOR INSTALLED BY WESTINGHOUSE ELECTRIC IN CLAYTON, NEW MEXICO. AFTER SOME TEETHING TROUBLES IS HAS NOW (MARCH 1979) OPERATED SATISFACTORILY FOR 1500 HOURS SUPPLYING 15 PERCENT OF THE TOTAL SYSTEM LOAD IN CLAYTON. THE MAIN FEATURES OF THE DESIGN ARE PRESENTED, TOGETHER WITH INFORMATION ON THE WORKING OF THE WIND GENERATOR IN PARALLEL WITH THE MAIN DIESEL ENGINE DRIVEN PLANT.

1980-0427 REDDOCH T W
THE WIND-ELECTRIC POWER PLANT AS A UTILITY COMPONENT.
IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS, HOUSTON, APRIL 28-30, 1980. PROCEEDINGS. NEW YORK, IEEE, 1980. P. 71-73.

IN AN EFFORT TO DEVELOP A CONCEPTUAL FRAMEWORK FOR WIND-ELECTRIC SYSTEM DESIGN, A STRUCTURE IS PROPOSED FOR CHARACTERIZING ITS VARIOUS SUBSYSTEMS. AN UNDERSTANDING OF THESE SUBSYSTEMS AND THEIR INTERACTION ALLOWS FOR THE DERIVATION OF RATIONAL ARGUMENTS FOR BOTH TECHNICAL AND ECONOMIC TRADE-OFFS IN THE DESIGN OF THE WIND-ELECTRIC SYSTEMS FOR INTERTIE TO ELECTRIC UTILITY SYSTEMS. THE FIVE SUBSYSTEMS CONSIST OF THE MECHANICAL SYSTEM (AEROTURBINE), THE MECHANICAL INTERFACE, THE ELECTRIC SYSTEM, THE ELECTRICAL INTERFACE WITH THE UTILITY SYSTEM AND THE WIND-ELECTRIC CONTROL SYSTEM. THE FUNCTIONAL SPECIFICATIONS OF EACH SUBSYSTEM ARE DISCUSSED WITH EMPHASIS ON THEIR MACRO BEHAVIOR.

1980-0428 REID M A, THALLER L H
IMPROVEMENT AND SCALE-UP OF THE NASA REDOX STORAGE SYSTEM.
NTIS, 1980. 10 P.
NASA-TM-81632, CONF-800806-40, DOE/NASA/12726-6

AS LARGER CELLS AND STACKS ARE DEVELOPED AND TESTED, THE NASA REDOX ENERGY STORAGE SYSTEM CONTINUES TO SHOW THE TECHNICAL PERFORMANCE REQUIRED AND COST-EFFECTIVENESS FOR USE WITH STAND-ALONE PHOTOVOLTAIC AND WIND TURBINE INSTALLATIONS AND ELECTRIC UTILITY LOAD-LEVELING. OVER THE PAST YEAR, THE ANION EXCHANGE MEMBRANES AND CHROMIUM ELECTRODES HAVE BEEN FURTHER IMPROVED. PARAMETRIC FLOW STUDIES SHOW THAT PUMPING POWER REQUIREMENTS AND SHUNT CURRENT LOSSES IN COMPLETE SYSTEMS WILL BE ACCEPTABLE. MORE REFINED COST ESTIMATES CONFIRM EARLIER PREDICTIONS THAT SYSTEM COSTS SHOULD BE ATTRACTIVELY LOW. A PREPROTOTYPE 1.0 KW REDOX SYSTEM (2 KW PEAK) WITH 11 KWH STORAGE CAPACITY HAS BEEN BUILT AND INTEGRATED WITH THE NASA/DOE PHOTOVOLTAIC TEST FACILITY AT NASA LEWIS. THIS FULL FUNCTION REDOX SYSTEM INCLUDES FOUR SUBTRACKS OF 39 CELLS EACH (1/3 SQ. FT. ACTIVE AREA) WHICH ARE CONNECTED HYDRAULICALLY IN PARALLEL AND ELECTRICALLY IN SERIES. AN OPEN CIRCUIT VOLTAGE CELL AND A SET OF REBALANCE CELLS ARE USED TO CONTINUOUSLY MONITOR THE SYSTEM STATE OF CHARGE AND AUTOMATICALLY MAINTAIN THE ANODE AND CATHODE REACTANTS ELECTROCHEMICALLY IN BALANCE. RECENT MEMBRANE AND ELECTRODE ADVANCES ARE REVIEWED, AND THE RESULTS OF MULTICELL STACK TESTS OF 1 SQ. FT. HARDWARE AND THE DESIGN OF THE 1 KW (2 KW PEAK) INTEGRATED SYSTEM ARE BRIEFLY DESCRIBED.

1980-0429 RENEWABLE RESOURCES: A NATIONAL CATALOG OF MODEL PROJECTS. VOL.1: NORTHEAST SOLAR ENERGY CENTER REGION; VOL.2: MID-AMERICAN SOLAR ENERGY COMPLEX REGION; VOL. 3: SOUTHERN SOLAR ENERGY CENTER REGION; VOL.4: WESTERN SOLAR UTILIZATION NETWORK REGION.
NTIS, JULY 1980. VOL.1: 414 P.; VOL.2: 444 P.; VOL.3: 779 P.; VOL.4: 542 P.
DOE/CS/30098-1(VOL. 1-4)

THIS COMPILATION OF DIVERSE CONSERVATION AND RENEWABLE ENERGY PROJECTS ACROSS THE UNITED STATES WAS PREPARED THROUGH THE ENTHUSIASTIC PARTICIPATION OF SOLAR AND ALTERNATE ENERGY GROUPS FROM EVERY STATE AND REGION. COMPILED AND EDITED BY THE CENTER FOR RENEWABLE RESOURCES, THESE PROJECTS REFLECT MANY LEVELS OF INNOVATION AND TECHNICAL EXPERTISE. IN MANY CASES, A CRITIQUE ANALYSIS IS PRESENTED OF HOW PROJECTS PERFORMED AND OF THE INSTITUTIONAL CONDITIONS ASSOCIATED WITH THEIR SUCCESS OR FAILURE. SOME 2000 PROJECTS ARE INCLUDED IN THIS COMPILATION; MOST HAVE WORKED, SOME HAVE NOT. INFORMATION ABOUT ALL IS PRESENTED TO AID LEARNING FROM THESE EXPERIENCES. THE FOUR VOLUMES IN THIS SET ARE ARRANGED IN STATE SECTIONS BY GEOGRAPHIC REGION, COINCIDING WITH THE FOUR REGIONAL SOLAR ENERGY CENTERS. THE TABLE OF CONTENTS IS ORGANIZED BY PROJECT CATEGORY SO THAT MAXIMUM CROSS-REFERENCING MAY BE OBTAINED.

1980-0430 RENNE D S, SANDUSKY W F
DOE CANDIDATE SITE METEOROLOGICAL MEASUREMENT PROGRAM.
IEA EXPERT MEETING, BOONE, N.C., SEPTEMBER 26, 1979. NTIS, JANUARY 1980. 10 P.
PNL-SA-7840

IN MARCH 1976, DOE ISSUED AN RFP TO ACQUIRE, ON A COMPETITIVE BASIS, A GROUP OF CANDIDATE SITES, PROPOSED BY UTILITIES INTERESTED IN THE FIELD TESTING PROGRAM. A TOTAL OF 17 CANDIDATE SITES WERE SELECTED FROM THE 64 PROPOSALS SUBMITTED IN RESPONSE TO THE RFP. FROM THESE SITES, FIVE HAVE BEEN CHOSEN THUS FAR TO RECEIVE TURBINES FOR FIELD TESTING. THIS PAPER DISCUSSES THE METEOROLOGICAL MEASUREMENT ACTIVITIES AT THESE SITES AND PROVIDES DETAILS OF THE MEASUREMENT PROGRAM AS IT EXISTS IN LATE 1979. IN ADDITION, THE PAPER BRIEFLY DISCUSSES THE DIRECTIONS THIS PROGRAM WILL TAKE IN THE NEAR FUTURE, AND THE OPTIONS INTERESTED ELECTRICAL SERVICE ORGANIZATIONS HAVE FOR PARTICIPATING IN THE PROGRAM.

1980-0431 REUTER R C
TORQUE RIPPLE IN A DARRIEUS, VERTICAL AXIS WIND TURBINE.
ASME PAPER 80-WA/SOL-13, 1980. 7 P.

INTERACTION BETWEEN A STEADY WIND AND A ROTATING, DARRIEUS, VERTICAL AXIS WIND TURBINE PRODUCES TIME PERIODIC AERODYNAMIC LOADS WHICH CAUSE TIME DEPENDENT TORQUE VARIATIONS, REFERRED TO AS TORQUE RIPPLE, TO OCCUR IN THE MECHANICAL LINK BETWEEN THE TURBINE AND THE ELECTRICAL GENERATOR. AN ANALYTICAL SOLUTION CHARACTERIZING THE PHENOMENON OF TORQUE RIPPLE HAS BEEN OBTAINED WHICH IS BASED UPON A FOURIER EXPANSION OF THE TIME DEPENDENT FEATURES OF THE PROBLEM.

1980-0432 REUTER R C
TORQUE RIPPLE IN A DARRIEUS, VERTICAL AXIS WIND TURBINE.
NTIS, 1980. 21 P.
SAND-80-0475

INTERACTION BETWEEN A STEADY WIND AND A ROTATING, DARRIEUS, VERTICAL AXIS WIND TURBINE PRODUCES TIME PERIODIC AERODYNAMIC LOADS WHICH CAUSE TIME DEPENDENT TORQUE VARIATIONS, REFERRED TO AS TORQUE RIPPLE, TO OCCUR IN THE MECHANICAL LINK BETWEEN THE TURBINE AND THE ELECTRICAL GENERATOR. THERE IS CONCERN FOR THE EFFECT OF TORQUE RIPPLE UPON FATIGUE LIFE OF DRIVE TRAIN COMPONENTS AND UPON POWER QUALITY. AN ANALYTICAL SOLUTION CHARACTERIZING THE PHENOMENON OF TORQUE RIPPLE HAS BEEN OBTAINED WHICH IS BASED UPON A FOURIER EXPANSION OF THE

TIME DEPENDENT FEATURES OF THE PROBLEM. NUMERICAL RESULTS FOR TORQUE RIPPLE, SOME EXPERIMENTAL DATA, DETERMINATION OF ACCEPTABLE LEVELS AND METHODS OF CONTROLLING IT, ARE PRESENTED AND DISCUSSED.

1980-0433 REVELL P S, EVERITT K W
SAILWING DARRIEUS ROTORS.
WIND ENG. 4(1): 11-31, 1980.

RECENTLY PUBLISHED DATA FOR A NUMBER OF SIMPLY CONSTRUCTED SAILWINGS ARE USED IN A NUMERICAL ANALYSIS OF THE PERFORMANCE OF FLEXIBLE BLADED DARRIEUS ROTORS. TO FACILITATE COMPARISONS, THE ANALYSIS HAS BEEN REPEATED USING DATA FOR A SOLID AEROFOIL. AN IMPROVED UNDERSTANDING OF THE OPERATION OF SAILWING ROTORS HAS BEEN GAINED AND SOME CRITERIA FOR THEIR DESIGN ARE REACHED. IT IS CONCLUDED THAT SUCH ROTORS CAN RELIABLY SELF-START AND ACHIEVE A HIGHER POWER COEFFICIENT THAN SO FAR REPORTED, ALTHOUGH STILL RATHER LOWER THAN CAN BE OBTAINED WITH SOLID BLADES, BUT THAT THEIR FULL POTENTIAL WILL NOT BE REALIZED IN VERY SMALL SCALE APPLICATIONS.

1980-0434 REYNOLDS R D, BARNETT K M
PRELIMINARY INVESTIGATION OF EXCEPTIONALLY STRONG WINDS IN MOUNTAINOUS AREAS OF NEW MEXICO.
SANTA FE, NEW MEXICO, NEW MEXICO ENERGY AND MINERALS DEPARTMENT, OCTOBER 1980. 26 P.
EMD-78-2227

THE MEAN WIND SPEED IN FOUR MOUNTAINOUS AREAS IN NEW MEXICO WERE SAMPLED FOR ONE YEAR USING WIND DATA ACCUMULATORS. THE SITES STUDIED WERE: (1) SAN AUGUSTIN PASS, 15 MILES NORTHEAST OF LAS CRUCES; (2) SIERRA GRANDE, AN ISOLATED PEAK MIDWAY BETWEEN RATON AND CLAYTON; (3) BUCK MOUNTAIN, 10 MILES NORTHEAST OF SIERRA BLANCA PEAK NEAR RUIDOSO, AND (4) PALOMAS MESA, 20 MILES WEST-SOUTHWEST OF TUCUMCARI.

1980-0435 RIEDLINGER T
NEW WINDMILLS WRING PROFIT FROM OLD ENERGY SOURCE.
MOD. MET. 35(12): 12, 14, 16, 18, JANUARY 1980.

THE AUTHOR BRIEFLY DISCUSSES THE POSSIBILITY OF USING WIND-POWERED GENERATORS OR "WIND TURBINES" AS A COST-EFFECTIVE SOURCE OF ELECTRIC POWER. ALSO DISCUSSED ARE ALUMINUM COMPANY OF AMERICA'S EFFORTS TO DEVELOP AND MARKET THE TWO- OR THREE-BLADED VERTICAL AXIS WIND TURBINES (VAWTS) USING EXTRUDED ALUMINUM BLADES OF 6063-T6 ALLOY. THE MANUFACTURE OF THE BLADES THROUGH A BRIDGE DIE IS DETAILED, AND THE BLADE DESIGN AND COST FACTORS INVOLVED ARE DISCUSSED.

1980-0436 RIEGLER G, RIEDLER W, HORVATH E
FEASIBILITY STUDY FOR A HIGH ALTITUDE WIND POWER PLANT.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 93-111.
SERI/CP-635-938

THE BASIC CONCEPT OF A HIGH-ALTITUDE WIND POWER PLANT CONSISTS OF A BALLOON-BORNE PLATFORM FOR ELECTRICAL POWER GENERATORS, A CONNECTION BY CABLE FOR TETHERING AND ENERGY TRANSFER AND A GROUND STATION FOR METEOROLOGICAL AND TECHNICAL CONTROL AS WELL AS FOR ENERGY DISTRIBUTION. OF GREAT IMPORTANCE IS THE NOMINAL WIND SPEED OF THE TURBINE, WHICH DEPENDS ON THE LOCAL WIND STATISTICS, SINCE IT DETERMINES THE DRAG OF THE SYSTEM AND THEREFORE THE MAIN FORCES AND THE MAXIMUM POWER OUTPUT. THE ULTIMATE AIM FOR THESE POWER PLANTS IS CONSIDERED TO BE THE CONTINUOUS POWER OUTPUT OF 80 TO 100 MW FOR A PLATFORM GENERATING ELECTRICITY WITH CAPITAL AND OPERATING COSTS COMPETITIVE WITH CONVENTIONAL THERMAL POWER STATIONS. THE PAPER DESCRIBES THE BASIC CONCEPTS AND PROVES THE FEASIBILITY OF THE SUGGESTED PROJECT.

1980-0437 RILEY J J, GELLER E W, COON M D, SCHEDVIN J C
A REVIEW OF WIND TURBINE WAKE EFFECTS. FINAL REPORT.
NTIS, JANUARY 1980. 124 P.
DOE/ET/23160-80/1

FOR WIND ENERGY TO HAVE A SIGNIFICANT IMPACT ON U.S. ELECTRICAL POWER PRODUCTION, WIND TURBINES WILL HAVE TO BE GROUPED TOGETHER INTO ARRAYS, OR WIND FARMS. WHILE MANY FACTORS (E.G., CONSTRUCTION COSTS, MAINTENANCE, LAND COSTS) CALL FOR THE UNITS TO BE PLACED AS CLOSELY TOGETHER AS POSSIBLE, A CLOSE SPACING CAN LEAD TO DOWNWIND UNITS BEING IN THE WAKES OF UPWIND UNITS, CAUSING POSSIBLE DETRIMENTAL EFFECTS ON POWER OUTPUT AND STRUCTURAL INTEGRITY. IN THIS REPORT THE CRITICAL ISSUES RELEVANT TO WAKE EFFECTS ARE DEFINED, PAST WORK RELATED TO WAKE EFFECTS IS REVIEWED, AND FINALLY RECOMMENDATIONS ARE MADE ON A FURTHER COURSE OF ACTION NECESSARY TO RESOLVE THE IMPORTANT ISSUES.

1980-0438 ROBBINS W H, THOMAS R L, BALDWIN D H
LARGE WIND TURBINES--A UTILITY OPTION FOR THE GENERATION OF ELECTRICITY.
NTIS, 1980. 19 P.
DOE/NASA/23139-1, NASA-TM-81502, N80-32858

THE WIND RESOURCE IS SUCH THAT WIND ENERGY GENERATION HAS THE POTENTIAL TO SAVE 6 TO 7 QUADS OF ENERGY NATIONALLY. THUS, THE FEDERAL GOVERNMENT IS SPONSORING AND ENCOURAGING THE DEVELOPMENT OF COST EFFECTIVE AND RELIABLE WIND TURBINES. ONE ELEMENT OF THE FEDERAL WIND ENERGY PROGRAMS, LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT, IS MANAGED BY THE NASA LEWIS RESEARCH CENTER FOR THE DEPARTMENT OF ENERGY. THERE ARE SEVERAL ONGOING WIND SYSTEM DEVELOPMENT PROJECTS ORIENTED PRIMARILY TOWARD UTILITY APPLICATION WITHIN THIS PROGRAM ELEMENT. IN ADDITION, A COMPREHENSIVE TECHNOLOGY PROGRAM SUPPORTING THE WIND TURBINE DEVELOPMENT PROJECTS IS BEING CONDUCTED. THIS PAPER PRESENTS AN OVERVIEW OF THE NASA ACTIVITIES WITH EMPHASIS ON APPLICATION OF LARGE WIND TURBINES FOR GENERATION OF ELECTRICITY BY UTILITY SYSTEMS.

1980-0439 ROBERTS B W, BLACKLER J
VARIOUS SYSTEMS FOR THE GENERATION OF ELECTRICITY USING UPPER ATMOSPHERIC WINDS.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 67-90.
SERI/CP-635-938

THE STRENGTH AND PERSISTENCE OF TROPOSPHERIC WIND GENERALLY INCREASES WITH INCREASING ALTITUDE. IN MID-LATITUDES THE JET STREAMS BOOST THE AVAILABLE POWER DENSITIES TO AROUND 20 KW/SQ.-M. SIX DIFFERENT TETHERED SYSTEMS ARE REVIEWED. THESE RANGE FROM BALLOONS THROUGH FIXED WIND SYSTEMS WITH OPEN OR DUCTED TURBINES. HOWEVER, NONE OF THESE SYSTEMS ARE AS ATTRACTIVE AS A ROTARY-WIND DEVICE, WHICH IS DESCRIBED IN SOME DETAIL. GESSOW'S ROTARY-WIND THEORY HAS BEEN EXTENDED TO JUSTIFY A SUCCESSFUL SERIES OF WIND-TUNNEL TESTS ON A TWIN ROTOR, GYROMILL. A STABILITY THEORY WILL BE PRESENTED TO INDICATE THE IDEAL LOCATION OF THE TETHER ATTACHMENT POINT OR POINTS, TAKING DUE ACCOUNT OF THE ELECTRICAL CONDUCTORS. A BRIEF FEASIBILITY STUDY IS ALSO GIVEN.

1980-0440 ROBERTS F
ENERGY ACCOUNTING OF ALTERNATIVE ENERGY SOURCES.
APPL. ENERGY 6(1): 1-20, JANUARY-FEBRUARY 1980.

THE PAPER IS DEVOTED TO AN ENERGY ACCOUNTING ESTIMATE FOR THE FIVE SYSTEMS--SOLAR, GEOTHERMAL, WIND, WAVE, AND TIDAL POWER. IN EACH CASE THE DATA SOURCES, THE ASSUMPTIONS, AN OUTLINE OF THE PROCEDURE, RESULTS, AND SOME GENERAL COMMENTS ARE GIVEN. THE PAPER REVEALS HOW MUCH OUR PRIMARY NONRENEWABLE FUELS COULD BE CONSERVED BY USING THEM TO OPERATE RENEWABLE ENERGY RESOURCE SYSTEMS ALTHOUGH ECONOMIC ASSESSMENTS AT THE PRESENT TIME MIGHT NOT PROVIDE JUSTIFICATION FOR SUCH A POLICY.

1980-0441 ROSS F
WIND POWER GENERATOR.
U.S. PATENT NO. 4,219,309, AUGUST 26, 1980.

THIS WIND POWERED GENERATOR IS COMPRISED OF A MEANS FOR OPPOSING THE FORCE OF A WIND BEING MOUNTED TO A FIRST PIVOT AND EXTENDING RADIALLY FROM WIND OPPOSING WITH A FIRST AND SECOND PORTION. THERE IS A COUNTERWEIGHTING THAT IS MOUNTED TO THE FIRST PIVOT AND EXTENDS RADIALLY SO THAT THE AXIS OF THE PIVOT IS INTERPOSED AND THE WIND FORCE OPPOSES IT. THE FIRST WEIGHT IS FIXED ALONG THE AXIS OF THE SECOND PIVOT. THERE IS ALSO A MEANS FOR AIDING THE TURNING OF THE WIND OPPOSING DEVICE AROUND THE FIRST PIVOT.

1980-0442 RUTLEDGE G, LANE D, EDBLOM G
SITING CRITERIA AND PRELIMINARY SCREENING OF COMMUNITIES FOR ALTERNATE ENERGY USE.
ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT. PHASE 2: COAL, HYDROELECTRIC AND ENERGY ALTERNATIVES. VOLUME III. ALASKA'S ALTERNATIVE ENERGIES AND REGIONAL ASSESSMENT INVENTORY UPDATE. NTIS, 1980. P. 17.1--17.10.
DOE/EV/73002-1(VOL.3)

SITING CRITERIA ARE DISCUSSED FOR WIND POWER, HYDROELECTRIC POWER, GEOTHERMAL ENERGY, AND FUEL CELLS. A PRELIMINARY EVALUATION LISTS THE APPROPRIATENESS OF USING THESE FOUR ALTERNATIVE ENERGY APPLICATIONS FOR 365 ALASKAN COMMUNITIES.

1980-0443 RUTLEDGE G, LANE D, EDBLOM G
WIND.
ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT. PHASE 2: COAL, HYDROELECTRIC AND ENERGY ALTERNATIVES. VOLUME III. ALASKA'S ALTERNATIVE ENERGIES AND REGIONAL ASSESSMENT INVENTORY UPDATE. NTIS, 1980. P. 15.1--15.66.
DOE/EV/73002-1(VOL.3)

THE HISTORY OF THE USE OF WINDMILLS IN ALASKA IS TRACED. THE TECHNOLOGY, ENVIRONMENTAL IMPACT, AND APPLICABILITY OF WIND POWER TO RURAL ALASKA ARE DISCUSSED. TABLES OF WIND DATA OBTAINED AT ALASKAN LOCATIONS ARE INCLUDED.

1980-0444 SAKR I A, ABDEL HAFIEZ M S, HEGAZY A S
COMBINATION OF WIND AND SOLAR ENERGIES AT THE NORTHERN COAST OF EGYPT.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1862-1870.

THIS PAPER PRESENTS A MATHEMATICAL AND NUMERICAL ANALYSIS OF THE POSSIBLE COMBINATIONS OF WIND AND SOLAR ENERGIES TO SHOW THE EFFECT OF SUCH COMBINATIONS ON VOLUME AND PERFORMANCE OF THE STORAGE SYSTEM. A PROCEDURE FOR CHOOSING THE BEST COMBINATION OF THE TWO ENERGIES BASED ON MINIMUM STORAGE VOLUME IS PROPOSED.

1980-0445 SAMBAR H, PAVELIC V, WARNER R J
COMPUTER SIMULATION AND DESIGN OF THE CONTROL SYSTEM FOR A WIND TURBINE GENERATOR.
ASME TRANS. J. MECH. DES. 102(1): 14-18, JANUARY 1980.

THIS PROJECT IS A PART OF AN OVERALL STUDY AIMED AT PRODUCING A NEW GENERATION OF WIND TURBINE GENERATORS. THE WIND TURBINE GENERATOR PROPOSED IS A HORIZONTAL AXIS MACHINE WITH THREE BLADES OPERATING DOWNWIND. A HYDRAULIC SYSTEM ACTUATES MECHANICAL LINKAGES TO CONTROL BLADE PITCH DURING OPERATION. THE BLADE PITCH CONTROL CONCEPT PROVIDES ACTIVE CONTROL OF ROTOR RPM ABOVE THE RATED WIND SPEED AND DURING NO LOAD CONDITION. THE LOWERING OF BLADE AND TOWER LOADS WHILE PROVIDING THE CAPABILITY FOR WELL TUNED ROTOR CONTROL ARE ITS PRIMARY FEATURES. A HYDRAULIC SYSTEM, DESIGNED TO CONTROL THE PITCH OF THE BLADES OF A WIND TURBINE GENERATOR, IS SIMULATED ON THE DIGITAL COMPUTER USING THE RUNGE-KUTTA METHOD. THE CONTROL SYSTEM SUBROUTINE IS COUPLED WITH THE AERODYNAMIC SUBROUTINES OF THE BLADES TO REPRESENT THE MODEL FOR THE WIND TURBINE GENERATOR. THE RESPONSE OF THE SIMULATED WIND TURBINE TO A REAL WIND CASE IS SHOWN TO AGREE WITH THE DESIRED RESPONSE.

1980-0446 SAMMELLS A F, FEJER A A
WIND ENERGY FOR ELECTRIC VEHICLE RECHARGE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 1, P. 835-839.

THE SPATIALLY DILUTED CHARACTER OF THE KINETIC ENERGY CONTENT OF WIND MAKES IT AN ATTRACTIVE MEANS OF ENERGY SUPPLY FOR ELECTRIC VEHICLES INTENDED FOR LOCAL TRAFFIC IN SUBURBAN AREAS WHERE INDIVIDUALLY OWNED WINDMILLS USED FOR THIS PURPOSE CAN BE SPACED AT LARGE ENOUGH DISTANCES FROM ONE ANOTHER TO AVOID UNDESIRABLE INTERFERENCE EFFECTS. THESE WINDMILLS WOULD CHARGE LARGE STATIONARY BATTERIES WHENEVER THE WIND INTENSITY IS SUFFICIENTLY HIGH, AND THE BATTERIES WOULD TRANSFER THEIR CHARGE OVERNIGHT TO THE SMALL BATTERIES CARRIED BY THE VEHICLES. SUCH SYSTEMS USING WIND GENERATORS OF RELATIVELY SMALL SIZE (5 TO 10 KW) ARE SIMPLE AND RUGGED AND SHOULD BE ABLE TO OPERATE OVER LONG PERIODS BETWEEN OVERHAULS. SINCE IT WOULD BE EQUIPPED WITH AUTOMATIC CONTROLS, IT COULD OPERATE UNATTENDED AND COULD BRING ABOUT A SIGNIFICANT NEAR-TERM SAVINGS IN THE FUEL REQUIRED FOR TRANSPORTATION. THIS PAPER EXAMINES VARIOUS ASPECTS OF SYSTEMS OF THIS TYPE, LEADING TO THE CONCLUSION THAT WITH THE MAJOR COMPONENTS OF THE SYSTEM ALREADY WELL-DEVELOPED, THIS SOURCE OF ENERGY COULD BE UTILIZED IN A COST-EFFECTIVE MANNER IN MOST PARTS OF THIS COUNTRY.

1980-0447 SATHIKH S, RAMAMURTI V, CHARI R T
ACCEPTANCE CURVE FOR OVERHEAD LINE DAMPER EVALUATION.
IEEE PROC. 68(5): 634-635, MAY 1980.

A METHOD TO DEVELOP AN ACCEPTANCE CURVE USING ABSOLUTE POWER QUANTITIES OBTAINED FROM WIND POWER AVAILABLE IN LITERATURE AND DIRECT LABORATORY MEASUREMENT OF DISSIPATION POWERS OF DAMPER AND CONDUCTOR IN QUESTION IS ADVANCED. IT IS AN EASY-TO-UNDERSTAND AND RELATIVELY-SIMPLE-TO-APPLY TECHNIQUE OF DAMPER EVALUATION AND WOULD

BE HELPFUL TO THE MANUFACTURER AND USER OF DAMPERS IN OVERHEAD TRANSMISSION LINES.

1980-0448 SCHATZLE P R, KLIMAS P C, SPAHR H R
AERODYNAMIC INTERFERENCE BETWEEN TWO DARRIEUS WIND TURBINES.
NTIS, 1980. 6 P.
CONF-800406-2, SAND-79-1984C

THE EFFECT OF AERODYNAMIC INTERFERENCE ON THE PERFORMANCE OF TWO CURVED BLADED DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES HAS BEEN CALCULATED USING A VORTEX/LIFTING LINE AERODYNAMIC MODEL. THE TURBINES HAVE A TOWER-TO-TOWER SEPARATION DISTANCE OF 1.5 TURBINE DIAMETERS, WITH THE LINE OF TURBINE CENTERS VARYING WITH RESPECT TO THE AMBIENT WIND DIRECTION. THE EFFECTS OF FREESTREAM TURBULENCE WERE NEGLECTED. FOR THE CASES EXAMINED, THE CALCULATIONS SHOWED THAT THE DOWNWIND TURBINE POWER DECREMENT (1) WAS SIGNIFICANT ONLY WHEN THE LINE OF TURBINE CENTERS WAS COINCIDENT WITH THE AMBIENT WIND DIRECTION, (2) INCREASED WITH INCREASING TIP-SPEED-RATIO, AND (3) IS DUE MORE TO INDUCED FLOW ANGULARITIES DOWNSTREAM THAN TO SPEED DEFICITS NEAR THE DOWNSTREAM TURBINE.

1980-0449 SCHELLENS F J C
THE 25 M EXPERIMENTAL HORIZONTAL AXIS WIND TURBINE (25 M HAT).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER H2, P. 375-390.

THIS PROJECT FORMS PART OF THE NETHERLANDS NATIONAL RESEARCH PROGRAMME INTO THE USE OF WIND ENERGY FOR ELECTRICITY GENERATION. THIS PROGRAMME INCLUDES: THE DESIGN, CONSTRUCTION AND TESTING OF A HORIZONTAL AXIS WIND TURBINE, AS WELL AS AN EVALUATION OF THIS TYPE OF TURBINE. THE DESIGN HAS BEEN PREPARED TO THE ORDER OF ECN BY FDO TECHNISCHE ADVISEURS, WHO ARE ALSO CO-ORDINATING THE CONSTRUCTION WHICH IS BEING CARRIED OUT BY A NUMBER OF OTHER DUTCH COMPANIES AND INSTITUTIONS TO BE NAMED LATER. COMPLETION DATE IS EXPECTED TO BE AT THE END OF 1980. THE DESIGN WAS REQUIRED TO BE BASED ON TWO FUNCTIONS, THOSE OF: -PROTOTYPE POWER PLANT -TEST SYSTEM. A PARTICULAR DETAIL CONSIDERATION WHICH HAD TO BE TAKEN INTO ACCOUNT IN THE DESIGN IS THE LOCATION OF THE SITE IN RELATICN TO LOCAL TRAFFIC. THE WIND TURBINE IS SITUATED ON THE ECN SITE AT PETTEN, IN THE NORTH-WEST OF THE NETHERLANDS ADJACENT TO THE NORTH SEA COAST. (PETTEN IS APPROXIMATELY 65 KM NORTH OF AMSTERDAM).

1980-0450 SCHENK K F, UKO P, RAU N S
INTEGRATION OF INTERMITTENT ENERGY SOURCES INTO A UTILITY RESOURCE PLAN BY THE METHOD OF MOMENTS.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 15-17, 1980. NEW YORK, IEEE, 1980. P. 223-229.

THE PAPER DESCRIBES THE APPLICATION OF THE METHOD OF MOMENTS IN THE EVALUATION OF LOSS OF LOAD PROBABILITY AND PRODUCTION COSTING FOR GENERATION EXPANSION PLANNING, FOR A SYSTEM OF CONVENTIONAL GENERATING UNITS AND AN INTERMITTENT ENERGY SOURCE, NAMELY A WIND ENERGY CONVERSION SYSTEM, OPERATING ON A NON-DEMAND BASIS. THE OUTPUT OF SUCH A SYSTEM MUST BE ASSUMED TO BE A MULTISTATE STOCHASTIC PROCESS DEPENDENT ON THE VARIABILITY OF THE WIND. THIS PROCESS MAY BE REPRESENTED BY SEVERAL AVAILABLE CAPACITY STATES, WITH EACH STATE DESCRIBED BY A PROBABILITY OF OCCURRENCE. THESE PROBABILITIES ARE COMPUTED AS THE PERCENTAGE OF POSSIBLE TIMES THAT THE OUTPUT FALLS BETWEEN SPECIFIED CAPACITY LEVEL INTERVALS FOR THE PARTICULAR HOUR OR PERIOD CONSIDERED. RANDOM MECHANICAL FAILURE IS INCORPORATED BY CHANGING THE PROBABILITIES OF OCCURRENCE OF THE PARTIAL CAPACITY STATES. THE METHOD OF MOMENTS IS IDEALLY SUITED FOR PROBABILISTIC SIMULATION OF SUCH MULTISTATE UNITS AS WELL AS FOR AN EQUAL MARGINAL COST LOADING OF CONVENTIONAL CYCLING UNITS. THE PROCEDURE IS APPLIED TO THE IEEE RELIABILITY TEST SYSTEM.

1980-0451 SCHLUETER R A, PARK G L, MODIR H, DORSEY J, LOTFALLIAN M
ASSESSMENT OF THE EFFECTS OF LARGE WIND GENERATOR ARRAYS ON POWER SYSTEM OPERATION.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, NY, FEBRUARY 3-8, 1980. NEW YORK, IEEE, NO. CH 1523-4/80, 1980. 9 P.

THE EFFECTS OF LARGE RAPID CHANGES IN GENERATION FROM LARGE ARRAYS OF WIND TURBINE GENERATORS ON THE OPERATION OF AUTOMATIC GENERATION CONTROL AND FREQUENCY REGULATION ARE ASSESSED. THE MAXIMUM CHANGE AND RATES OF CHANGE OF GENERATION FROM AN ARRAY OF WIND TURBINES DUE TO PASSAGE OF A THUNDERSTORM FRONT IS DETERMINED FIRST. THE ASSESSMENT REQUIRES (1) MODELING AN ARRAY OF WIND TURBINES IN ORDER TO DETERMINE POWER VARIATION FOR CHANGES IN WIND SPEED CAUSED BY A STORM FRONT; (2) SIMULATION OF THE MODEL TO DETERMINE POWER VARIATION FOR A WORST CASE COASTAL FORM DUE TO PASSAGE OF A FRONT, AND (3) ANALYSIS OF THE MAXIMUM CHANGE AND RATES OF CHANGE FROM THE PORTION OF THE ARRAY AFFECTED BY THE FRONT. CONSTRAINTS ON THE PENETRATION OF THE PORTION OF AN ECHELON AND FARM THAT ARE AFFECTED BY THE FRONT ARE DERIVED SO THAT POWER VARIATION RATES WILL NOT EXCEED THE RESPONSE RATE CAPABILITY OF A TYPICAL SYSTEM.

1980-0452 SCHOENMACKERS R, BARNETT K
NEW MEXICO WIND ENERGY PROGRAM.
WESTERN SUN 1980 SOLAR UPDATE CONFERENCE, SALT LAKE CITY, UTAH, SEPTEMBER 24, 1980. PROCEEDINGS. NTIS, 1980. P. 243-246.
CONF-800995

THE STATE OF NEW MEXICO, PRIMARILY THROUGH THE DEPARTMENT OF ENERGY AND MINERALS, IS SPONSORING AN ENERGY RESEARCH AND DEVELOPMENT PROGRAM STARTED IN 1974 TO DEVELOP NEW ENERGY OPTIONS FOR THE FUTURE. THIS PROGRAM IS ADMINISTERED BY THREE ENERGY INSTITUTES, WHICH ARE RESPONSIBLE FOR DIFFERENT AREAS OF ENERGY RESEARCH. IN 1977, IN ADDITION TO THESE, THE NEW MEXICO STATE LEGISLATURE ESTABLISHED THE NEW MEXICO SOLAR ENERGY INSTITUTE. SINCE ITS CREATION, THE NEW MEXICO SOLAR ENERGY INSTITUTE HAS DEVELOPED INTO THE CENTER FOR THE STATE'S SOLAR ENERGY RESEARCH. RESEARCH ACTIVITIES INCLUDE SOLAR HEATING AND COOLING, PHOTOVOLTAIC DEMONSTRATIONS, BIOMASS, AND WIND ENERGY TECHNOLOGIES. ACTIVITIES IN WIND TURBINE TECHNOLOGY ARE SUMMARIZED.

1980-0453 SCHOLZ H J, SIMHAN K
REMARKS ON THE REGULATION AND CONTROL SYSTEM OF WIND ENERGY CONVERTERS WITH A VERTICAL AXIS.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 468-480.

AS OPPOSED TO WIND ENERGY CONVERTERS WITH A HORIZONTAL AXIS THE NUMBER OF CONVERTERS WITH VERTICAL AXIS IN OPERATION IS LIMITED AND MOST OF THEM SERVE RESEARCH AND DEVELOPMENT AIMS. THEREFORE THE DEFINITION OF THE REGULATION AND CONTROL SYSTEM IS STILL IN A PRELIMINARY STAGE. THE LACK OF EXPERIENCE NECESSITATES A FREE PROGRAMMABLE REGULATION AND CONTROL SYSTEM WHICH IS CAPABLE OF A FLEXIBLE REACTION IN FACE OF FAILURE AND PROHIBITED SITUATIONS, WHICH ARE DEFINABLE TO A LIMITED EXTENT ONLY. THE FOLLOWING PAPER DESCRIBES, ON THE BASIS OF A 2.5 KW WIND ENERGY CONVERTER REALISED AND UNDER OPERATION AT THE UNIVERSITY OF BREMEN, AND A DRAFT DESIGN FOR A CONVERTER PREPARED THROUGH ERNO, BREMEN, THE BROAD PRINCIPLES UNDERLYING SUCH SYSTEMS.

1980-0454 SCHUETTE K W
RELAY PROTECTION FOR SMALL WIND-DRIVEN TURBINE-GENERATORS WITH INTERCONNECTIONS TO A UTILITY POWER SYSTEM. MINUTES OF THE MEETING OF THE PENNSYLVANIA ELECTRIC ASSOCIATION, ERIE, PENNSYLVANIA, MAY 22, 1980. HARRISBURG, PENNSYLVANIA, PENNSYLVANIA ELECTRIC ASSOCIATION, 1980. P. 28.

THE PAPER EXAMINES THE DESIGN PHILOSOPHY AND THE EQUIPMENT NECESSARY TO ADEQUATELY PROTECT SMALL WIND-DRIVEN TURBINE-GENERATORS INSTALLED BY AN INDIVIDUAL HOMEOWNER OR A SMALL BUSINESS, AND INTERCONNECTIONS TO A UTILITY POWER SYSTEM. STANDARD RELAYS CAN BE COMBINED IN SCHEMES TO PROVIDE ADEQUATE PROTECTION FOR THESE SYSTEMS.

1980-0455 SEDEFIAN L
ON THE VERTICAL EXTRAPOLATION OF MEAN WIND POWER DENSITY.
J. APPL. METEOROL. 19(4): 488-493, APRIL 1980.

A SIMPLE METHOD OF ESTIMATING THE HEIGHT VARIATION OF THE MEAN WIND POWER DENSITY IS PRESENTED WHICH ACCOUNTS FOR THE VARIATION OF THE EXPONENT P, OF THE WIND SPEED POWER LAW, WITH STABILITY AND ROUGHNESS. MEASUREMENTS ARE USED TO COMPARE THE NEW METHOD TO TWO PREVIOUSLY SUGGESTED METHODS. THE RESULTS INDICATE THAT THE PRESENTLY SUGGESTED METHOD GIVES THE MOST ACCURATE ESTIMATE OF THE EXTRAPOLATED MEAN WIND POWER DENSITIES.

1980-0456 SELZER H
ECONOMICAL ASPECTS FOR LARGE WEC.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 2: FRAGEN DER WIRTSCHAFTLICHKEIT. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980.) MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 142-148.

THE ESTIMATION OF SOME ECONOMICAL ASPECTS FOR LARGE WEC RESULTED IN: THE ENERGY NEEDED FOR PRODUCTION WILL BE RAPID IN 2 TO 3 MONTHS BY WIND ENERGY; THE GENERATION PRICE WILL BE APPROXIMATELY 0.06 DM/KWH IN CASE OF SERIES PRODUCTION; APPROXIMATELY 65 MENYEARS ARE NEEDED FOR THE PRODUCTION OF ONE LARGE UNIT.

1980-0457 SELZER H
WIND ENERGY IN EUROPE.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 6(2): 14-16, APRIL 1980. (IN GERMAN)

WIND ENERGY ACTIVITIES IN DENMARK ARE REVIEWED. APART FROM THE SMALL CONVERTERS, THERE ARE FOUR LARGE SYSTEMS WHICH ARE DESCRIBED IN THIS ARTICLE. IN THE FRAMEWORK OF A PROGRAMME SPONSORED BY THE MINISTER FOR ENERGY, A TEST FIELD IS NOW BEING SET UP WHERE SMALL WIND POWER PLANTS CAN BE TESTED.

1980-0458 ANDERSEN T S, BODENSCHATZ C A, EGGERS A G, HUGHES P S, LAMPE R F, LIPNER M H, SCHORNHORST J R
MOD-0A 200 KW WIND TURBINE GENERATOR DESIGN AND ANALYSIS REPORT.
NTIS, AUGUST 1980. 393 P.
NASA-CR-165128, AESD-TME-3052, DOE/NASA/0163-2

THIS REPORT DOCUMENTS THE DESIGN, ANALYSIS, AND INITIAL PERFORMANCE OF THE MOD-0A 200 KW WIND TURBINE GENERATOR AT CLAYTON, N.M. THE REPORT DISCUSSES THE PROJECT REQUIREMENTS, APPROACH, SYSTEM DESCRIPTION, DESIGN REQUIREMENTS, DESIGN ANALYSIS, SYSTEM TESTS, INSTALLATION, SAFETY CONSIDERATIONS, FAILURE MODES AND EFFECTS ANALYSIS, DATA ACQUISITION, AND INITIAL PERFORMANCE FOR THE WIND TURBINE.

1980-0459 SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE. VOLUME II.
NTIS, 1980. 214 P.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, 2ND, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980.
SERI/CP-635-1061

FOR VOLUME I SEE 1980-0336.

1980-0460 SETHURAMAN S, RAYNOR G S
COMPARISON OF MEAN WIND SPEEDS AND TURBULENCE AT A COASTAL SITE AND AN OFFSHORE LOCATION.
J. APPL. METEOROL. 19(1): 15-21, JANUARY 1980.

OBSERVATIONS ARE REPORTED OF MEAN WIND SPEED AND LONGITUDINAL TURBULENCE MEASURED SIMULTANEOUSLY AT A HEIGHT OF 8M ABOVE THE SEA 5KM OFF LONG ISLAND, AND ON THE BEACH. MEAN WINDS OVER THE OCEAN WERE 15-100% HIGHER THAN AT THE BEACH. CHANGES IN TURBULENCE APPEARED TO DEPEND ON VARIATIONS IN AERODYNAMIC ROUGHNESS OF THE SEA SURFACE AND THE THERMAL PROCESSES WHICH OCCUR OVER WATER.

1980-0461 SEXTON J H
GRUMMAN WINDSTREAM 25 WIND TURBINE GENERATOR. FINAL TEST REPORT.
NTIS, MARCH 1980. 20 P.
RFP-3134

THE GRUMMAN WINDSTREAM 25 WIND TURBINE GENERATOR (WTG) TESTED AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) WAS ONE OF NINETEEN WINDSTREAM 25'S MANUFACTURED BY GRUMMAN ENERGY SYSTEMS, INC. THE MACHINE WAS CONSIDERED A FIRST GENERATION PROTOTYPE AND IS NO LONGER BEING PRODUCED. WHILE BEING TESTED AT THE WSTC, THE WINDSTREAM 25 WAS STILL IN A DEVELOPMENTAL STAGE, AND OPERATIONAL PROBLEMS WERE EXPERIENCED DURING ITS TESTING PERIOD. IT IS IMPORTANT TO UNDERSCORE, HOWEVER, THAT PROBLEMS ENCOUNTERED DURING TESTING OF THE MACHINE CREATED VALUABLE GAINS IN EXPERIENCE AND DATA FOR BOTH ROCKY FLATS AND GRUMMAN PERSONNEL. IT IS BELIEVED THESE GAINS HAVE CONTRIBUTED SIGNIFICANTLY TO FURTHER DEVELOPMENT OF GRUMMAN WTG'S.

1980-0462 SEXTON J H
NORTH WIND EAGLE WIND TURBINE GENERATOR. FINAL TEST REPORT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, JANUARY 1980. 23 P.
RFP-3071/3533/80/9

THE NORTH WIND EAGLE 3 WIND TURBINE GENERATOR HAS MET OR EXCEEDED ALL MANUFACTURER CLAIMS OF PERFORMANCE AND SURVIVABILITY. AFTER PROBLEMS ENCOUNTERED DURING EARLY STAGES OF TESTING WERE CORRECTED BY THE NORTH WIND POWER COMPANY, THE EAGLE OPERATED IN WINDS EXCEEDING 40 M/S (90 MPH) SEVERAL TIMES WITHOUT INCURRING DAMAGE. DURING CONTROLLED VELOCITY TESTING, THE MACHINE PRODUCED OVER 4 KW OF OUTPUT. THE NORTH WIND EAGLE 3 HAS BEEN TAKEN OUT OF PRODUCTION AND IS NO LONGER COMMERCIALLY AVAILABLE.

1980-0463 SFORZA P M
HIGH YIELD WIND ENERGY RESOURCES IN NEW YORK STATE. FINAL REPORT MAY 1979 - MAY 1980.
NTIS, JUNE 1980. 177 P. ALSO: ALBANY, NEW YORK, NYSERDA, JUNE 1980. 173 P.
PB81-142754, NYSERDA-80-11

THIS REPORT DETAILS A WIND ENERGY INVENTORY FOR NEW YORK STATE. THE INVENTORY IS BASED ON DATA COLLECTED AT NUMEROUS METEOROLOGICAL STATIONS AND ANEMOMETERS THROUGHOUT THE STATE. THE DATA INDICATES THERE ARE A NUMBER OF REGIONS IN THE STATE WHICH COULD POSSIBLY HOST ONE OR MORE LARGE (GREATER THAN 100 KW) WIND TURBINE GENERATORS. THE REPORT ALSO CONTAINS AN EXTENSIVE ANALYSIS OF LIFE CYCLE ELECTRICAL ENERGY PRODUCTION COSTS OF VARIOUS WIND TURBINE GENERATORS WHICH ARE NOW BEING MANUFACTURED OR WHICH WILL BE MANUFACTURED IN THE NEAR FUTURE.

1980-0464 SHELDAHL R E
AERODYNAMIC PERFORMANCE OF A 5-M-DIAMETER DARRIEUS TURBINE.
J. ENERGY 4(5): 227-232, SEPTEMBER-OCTOBER, 1980.

A 5-M-DIAM VERTICAL-AXIS WIND TURBINE HAS UNDERGONE CONTINUED TESTING SINCE 1976 AT THE SANDIA NATIONAL LABORATORIES WIND TURBINE SITE. THE LATEST TESTS OF THIS MACHINE HAVE BEEN WITH EXTRUDED ALUMINUM BLADES OF NACA-0015 AIRFOIL CROSS SECTION. THE RESULTS OF THESE TESTS AT SEVERAL TURBINE ROTATIONAL SPEEDS ARE PRESENTED AND COMPARED WITH EARLIER TEST RESULTS. A PERFORMANCE COMPARISON IS MADE WITH A VORTEX/LIFTING LINE COMPUTATIONAL CODE. THE PERFORMANCE OF THE TURBINE WITH THE EXTRUDED BLADES MET ALL EXPECTATIONS.

1980-0465 SHERMAN D J
WIND ENERGY--HOW RELIABLE?
NTIS, JANUARY 1980. 36 P.
AD-A94988, ARL/STRUC-380

THE RELIABILITY OF A WIND ENERGY SYSTEM DEPENDS ON THE SIZE OF THE PROPELLER AND THE SIZE OF THE BACK-UP ENERGY STORAGE. DESIGN OF THE OPTIMUM SYSTEM FOR A GIVEN RELIABILITY LEVEL CAN BE PERFORMED IF A TIME SERIES OF WIND SPEED DATA IS AVAILABLE. HOWEVER, A DESIGN BASED ON CONVENTIONAL METEOROLOGICAL RECORDS, WHICH SAMPLE THE WIND SPEED WITH A TEN MINUTE AVERAGING TIME AT THREE-HOURLY INTERVALS, WILL OVER-ESTIMATE THE STORAGE BY A FACTOR OF APPROXIMATELY 2, AND IF THE WIND SPEED IS ONLY AVAILABLE ON A DAILY BASIS THE STORAGE WILL BE OVER-ESTIMATED BY A FACTOR OF 2.5 TO 4.0. THIS IS BECAUSE A PROPELLER CAN RESPOND TO WIND SPEED CHANGES IN MUCH LESS THAN TEN MINUTES AND ALSO BECAUSE THREE-HOURLY SAMPLING DOES NOT OFTEN PICK UP THE BRIEF HIGH-SPEED INCIDENTS WHICH GENERATE A SIGNIFICANT PART OF THE WIND ENERGY. A NOMOGRAM IS PRESENTED, BASED ON SOME CONTINUOUS WIND SPEED MEASUREMENTS, WHICH ENABLES STORAGES CALCULATED FROM THREE-HOURLY OR DAILY DATA TO BE APPROPRIATELY REDUCED BECAUSE OF THESE TWO EFFECTS.

1980-0466 SHISHODIA K S, KUMAR K L, SAH P L
VERTICAL AXIS WIND MILL MODELS: DESIGN TESTING AND EVALUATION.
TAGUNGSBERICHT DES 3. INTERNATIONALEN SONNENFORUMS. KAPITEL 6: WINDENERGIE. (INTERNATIONAL SOLAR FORUM, 3D, HAMBURG, GERMANY, JUNE 24, 1980). MUENCHEN, GERMANY, DGS-SONNENENERGIE VERL., 1980. P. 458-467.

IN THE PRESENT WORK, AUTHORS HAVE DESIGNED VERTICAL AXIS WIND MILL MODELS TO BE ACCOMMODATED IN THE TEST SECTION OF A WIND TUNNEL OF THE DIMENSION 75 CM X 45 CM. THE BLADES ARE OF AIRFOIL SECTIONS, AND THE NUMBER OF BLADES IN THE WIND MILL VARY FROM 4 TO 8. THE WIND MILL MODELS ARE TESTED IN THE SUBSONIC LOW MACH NUMBER WIND TUNNEL AT THE WIND SPEEDS OF 3.66 METERS PER SECOND AND AT 5.1 METERS PER SECOND. ON THE BASIS OF THESE TESTS, OPTIMUM NUMBER OF BLADES AND THEIR ORIENTATION ARE ARRIVED AT.

1980-0467 SIMMS D
WIRING FOR YOUR HOMEMADE ELECTRICITY.
ALTERN. SOURCES ENERGY NO. 46: 22-26, NOVEMBER/DECEMBER 1980.

1980-0468 SIMON R L
LOCATION OF SITES FOR WIND POWER DEVELOPMENT IN NORTHEASTERN CALIFORNIA. FINAL REPORT.
SAN JOSE, CALIFORNIA GLOBAL WEATHER CONSULTANTS, MAY 1980. 147 P. AVAILABLE: SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION.
P-500-80-053

A WIND ENERGY PROSPECTING METHODOLOGY DEVELOPED BY THE CALIFORNIA ENERGY COMMISSION WAS APPLIED AND EVALUATED DURING A ONE-YEAR STUDY IN REMOTE NORTHEASTERN CALIFORNIA, WHERE ONLY SKETCHY INFORMATION ABOUT THE WIND RESOURCE POTENTIAL WAS AVAILABLE. EXISTING WIND DATA WERE ANALYZED, AND A FIELD SURVEY OF THE REGION WAS MADE TO DETERMINE THE GENERAL CHARACTERISTICS OF THE WIND REGIME AND SELECT SITES FOR ANEMOMETER INSTALLATION. WINDS WERE MEASURED AT TWENTY-FIVE LOCATIONS AS PART OF THIS STUDY, WITH MOSTLY TOTALIZING AND SEVERAL RECORDING ANEMOMETERS. AN EXCELLENT WIND RESOURCE WAS FOUND IN NORTHEASTERN CALIFORNIA ONLY AT HIGH, WELL-EXPOSED ELEVATIONS. MEAN ANNUAL WIND SPEEDS APPARENTLY EXCEED 15 MPH ALONG THE ENTIRE 60-MILE CRESTLINE OF THE WARNER MOUNTAINS, THE ONE TOPOGRAPHIC FEATURE OF THE REGION WELL-SUITED FOR WIND FARM DEVELOPMENT.

1980-0469 SIMON R L, NORMAN G T, ELLIOTT D L, BARCHET W R, GEORGE R L
WIND ENERGY RESOURCE ATLAS. VOLUME 9. THE SOUTHWEST REGION.
NTIS, NOVEMBER 1980. 128 P.
PNL-3195-WERA-9

THIS ATLAS OF THE WIND ENERGY RESOURCE IS COMPOSED OF INTRODUCTORY AND BACKGROUND INFORMATION, A REGIONAL SUMMARY OF THE WIND RESOURCE, AND ASSESSMENTS OF THE WIND RESOURCE IN NEVADA AND CALIFORNIA. BACKGROUND ON HOW THE WIND RESOURCE IS ASSESSED AND ON HOW THE RESULTS OF THE ASSESSMENT SHOULD BE INTERPRETED IS PRESENTED. A DESCRIPTION OF THE WIND RESOURCE ON A REGIONAL SCALE IS THEN GIVEN. THE RESULTS OF THE WIND ENERGY ASSESSMENTS FOR EACH STATE ARE ASSEMBLED INTO AN OVERVIEW AND SUMMARY OF THE VARIOUS FEATURES OF THE REGIONAL WIND ENERGY RESOURCE. AN INTRODUCTION AND OUTLINE TO THE DESCRIPTIONS OF THE WIND RESOURCE GIVEN FOR EACH STATE ARE GIVEN. ASSESSMENTS FOR INDIVIDUAL STATES ARE PRESENTED AS SEPARATE CHAPTERS. THE STATE WIND ENERGY RESOURCES ARE DESCRIBED IN GREATER DETAIL THAN IS THE REGIONAL WIND ENERGY RESOURCE, AND FEATURES OF SELECTED STATIONS ARE DISCUSSED.

1980-0470 SITE INSOLATION AND WIND POWER CHARACTERISTICS, TECHNICAL REPORT NORTHEAST REGION. VOL. 2.
NTIS, AUGUST 1980. 104 P.
DOE/CS/20160-01(V.2)

THIS PHASE OF THE SITE INSOLATION AND WIND POWER CHARACTERISTICS STUDY WAS PERFORMED TO PROVIDE STATISTICAL INFORMATION ON THE EXPECTED FUTURE AVAILABILITY OF SOLAR AND WIND POWER AT VARIOUS SITES IN THE NORTHEAST REGION OF THE U.S. HISTORIC DATA (SOLMET), AT 8 NATIONAL WEATHER SERVICE STATIONS WITH HOURLY SOLAR INSOLATION AND COLLATERAL METEOROLOGICAL INFORMATION, WERE INTERROGATED TO PROVIDE AN ESTIMATE OF FUTURE TRENDS.

1980-0471 SITE INSOLATION AND WIND POWER CHARACTERISTICS, TECHNICAL REPORT WESTERN REGION (NORTH SECTION). VOL. 5.
NTIS, AUGUST 1980. 213 P.

THIS PHASE OF THE SITE INSOLATION AND WIND POWER CHARACTERISTICS STUDY WAS PERFORMED TO PROVIDE STATISTICAL INFORMATION ON THE EXPECTED FUTURE AVAILABILITY OF SOLAR AND WIND POWER AT VARIOUS SITES IN THE WESTERN REGION, NORTH SECTION OF THE U.S. HISTORIC DATA (SOLMET), AT 21 NATIONAL WEATHER SERVICE STATIONS WITH HOURLY INSOLATION AND COLLATERAL METEOROLOGICAL INFORMATION, WERE INTERROGATED TO PROVIDE AN ESTIMATE OF FUTURE TRENDS.

1980-0472 SIVASEGARAM S
TRANSIENT BEHAVIOR OF WIND ENERGY SYSTEMS.
WIND ENG. 4(2): 53-63, 1980.

THE TRANSIENT RESPONSE OF WIND ENERGY SYSTEMS TO SUDDEN CHANGES IN WIND SPEED AND TO FLUCTUATING WIND SPEEDS ARE STUDIED USING SIMPLE AND GENERALIZED REPRESENTATIONS OF ROTOR AND LOAD CHARACTERISTICS. IT IS SHOWN THAT ANALYTICAL SOLUTIONS ARE POSSIBLE IN A LIMITED NUMBER OF INSTANCES AND THAT RESULTS OF GENERAL VALIDITY CAN BE OBTAINED. THE RESPONSE TIME IS SHOWN TO BE DEPENDENT UPON THE MAGNITUDE OF THE CHANGE IN WIND SPEED AND THAT THE TIME CONSTANT USED IN CONTROL THEORY FOR SMALL PERTURBANCES WILL BE OFTEN INADEQUATE TO DESCRIBE SYSTEM BEHAVIOR. THE EXTRACTION OF THE EXCESS ENERGY AVAILABLE IN THE WIND BECAUSE OF FLUCTUATIONS OF WIND SPEED IS SHOWN TO BE AFFECTED BY THE NONLINEARITY OF THE CHARACTERISTICS AND BY THE FREQUENCY AND AMPLITUDE OF THE FLUCTUATIONS. IT IS, AGAIN, DEMONSTRATED THAT SMALL PERTURBATION MODELS ARE INADEQUATE FOR DESCRIBING THE SYSTEM.

1980-0473 SIVIER K R
A PRELIMINARY STUDY OF A TETHERED WIND ENERGY SYSTEM INCLUDING THE EFFECT OF A DUCTED ROTOR.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 65.
SERI/CP-635-1601

A PRELIMINARY DESIGN STUDY WAS MADE OF A TETHERED WIND ENERGY SYSTEM (TWES). ALTITUDES FROM 150 M TO 3050 M WERE INVESTIGATED. THE BASIC STUDY INVOLVED SYSTEMS WITH FREE (OR UNDUCTED) ROTORS. IN ADDITION, PRELIMINARY ESTIMATES WERE MADE OF THE EFFECTS OF USING A DUCTED ROTOR. BECAUSE OF THE INCREASE IN MEAN WINDSPEED WITH ALTITUDE, THE ROTOR DIAMETER AND WEIGHT OF THE BASIC WIND ENERGY SYSTEM (WES) DECREASE WITH ALTITUDE. HOWEVER, THE AEROSTAT VOLUME AND THE TOTAL TWES WEIGHT EXHIBIT MINIMUMS AT MODERATE (600 TO 1200 M) ALTITUDES. IT WAS FOUND ALSO THAT AEROSTAT VOLUME AND TWES WEIGHT CAN BE REDUCED BY ADDING AERODYNAMIC LIFT. PRELIMINARY ESTIMATES SUGGEST THE POTENTIAL FOR DESIGN AND PERFORMANCE ADVANTAGES WITH THE USE OF DUCTED ROTORS.

1980-0474 SMITH O J M
SOW WIND TURBINES AND REAP THE WIND.
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM-WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1796-1833.

THIS PAPER DESCRIBES THE DESIGN AND DEVELOPMENT OF A 6-METER DIAMETER WIND TURBINE. IT IS LIKE A BICYCLE WHEEL WITH THIN AIRFOILS THREADED OVER THE SPOKES. THIS IS A MODIFICATION OF THE TRADITIONAL MULTI-BLADED FARMER'S WINDMILL PUMP IMPROVED TO 35% EFFICIENCY. AN ADVANTAGE IS THAT THE GENERATOR IS AT THE BOTTOM, WITH THE POWER TAKE OFF BEING A RUBBER TIRE ON THE RIM OF THE WHEEL. NO GEARS OR BELTS ARE USED. THIS 6-METER DIAMETER TURBINE CAN DELIVER 10 KW IN A 45 KM/H WIND AND 17 KW IN A 60 KM/H WIND. IN A REGION WITH 25 KM/H AVERAGE WIND SPEED, IT CAN DELIVER 51 KWH PER DAY AT A COST OF 2.1 CENTS/KWH. IN A REGION WITH 30 KM/H AVERAGE WIND SPEED, THE TURBINE CAN DELIVER 105 KWH PER DAY AT A COST OF ONLY ONE CENT PER KWH. BOTH THE GENERATOR AND THE WIND TURBINE ARE MOUNTED ON A LOW ROTATING TOWER. A ROTATING WIND SCOOP MADE OF SAIL CLOTH CAN INCREASE THE POWER OUTPUT WITH MINIMUM INCREASED CAPITAL COST.

1980-0475 SMITH P R
WINDMILL TOWER.
U.S. PATENT NO. 4,217,738, AUGUST 19, 1980.

THIS WINDMILL IS COMPRISED OF: A BASE MEMBER WITH MEANS FOR ANCHORING, IN THE GROUND, LATERALLY ADJACENT, A WELL; AN ELONGATED UPRIGHT TOWER ON BASE AND HAVING A SUPPORT PLATFORM FIXED AT ITS UPPER END EXTENDING LATERALLY TO A POSITION OVER WELL. THE TOWER IS COMPRISED OF A TUBULAR MEMBER HAVING EXTERNAL BRACING TRUSSES. THE HINGE MOUNTING TOWER TO BASE FOR PIVOTAL MOVEMENT IS ON A HORIZONTAL AXIS WHERE THE TOWER MAY BE PIVOTALLY LOWERED IN A DIRECTION AWAY FROM THE WELL TO A HORIZONTAL POSITION ADJACENT TO THE GROUND. THIS INCLUDES THE MEANS FOR LOCKING THE TOWER IN AN UPRIGHT POSITION. THE MOUNTING SECURING THE TOWER TO THE HINGE FOR RELATIVE ROTATION ON THE LONGITUDINAL AXIS OF THE TOWER SO IT MAY BE ROTATED IS IN AN UPRIGHT POSITION SO IT MAY SWING THE SUPPORT PLATFORM AWAY FROM A POSITION OVER THE WELL.

1980-0476 SMITH R J
WIND POWER EXCITES UTILITY INTEREST.
SCIENCE 207(4432): 739-742, FEBRUARY 15, 1980.

SEVERAL LARGE-SCALE UTILITY APPLICATIONS OF WIND POWER ARE DISCUSSED.

1980-0477 SNECK H J, DUFFY R E, SCHLOSSER A
WASTE ENERGY POWER GENERATION CONCEPT--THE PLUMEMILL.
ASME PAPER 80-JPGC/PWR-9, 1980. 8 P.

A SET OF EQUATIONS DESCRIBING THE FLOW IN A NATURAL DRAFT DRY COOLING TOWER WERE DEVELOPED AND SOLVED ON THE COMPUTER. EXIT AND INLET CONDITIONS, SUCH AS VELOCITY AND TEMPERATURE, WERE DETERMINED FOR A RANGE OF TOWER SIZES, TOWER SHAPES, AND HEAT EXCHANGER FLUXES AND DRAG COEFFICIENTS. THE TOWER EQUATIONS WERE EXTENDED TO INCLUDE THE POTENTIAL FOR POWER EXTRACTION INSIDE THE TOWER. HARNESSING THIS ENERGY WITH A WINDMILL INSIDE THE TOWER IS PROPOSED. THE AMOUNT OF EXTRACTABLE WORK WAS FOUND FOR THE SAME PARAMETERS AS ABOVE. THE MAXIMUM AMOUNT OF WORK WAS FOUND TO BE A LINEAR FUNCTION OF THE HEAT INPUT AND THE TOWER HEIGHT.

1980-0478 SODERHOLM L H
INTERFACING WIND SYSTEMS WITH THE UTILITY GRID.
ASAE PAPER 80-3042, 1980. 5 P.

THE METHODS AND FACTORS THAT MUST BE WEIGHED IN THE INTER-CONNECTION OF WIND ENERGY SYSTEMS WITH A UTILITY GRID FOR SUPPLYING ELECTRICAL POWER ARE PRESENTED IN RELATION TO PERFORMANCE AND APPLICATION. FOR BEST UTILIZATION OF WIND SYSTEMS, THESE FACTORS MUST BE CAREFULLY CONSIDERED TO ENSURE SAFETY AND PERFORMANCE.

1980-0479 SODERHOLM L H, ANDREW J F

FIELD CONTROL FOR WIND-DRIVEN GENERATORS.
U.S. PATENT APPLICATION. NTIS, OCTOBER 3, 1980. 12 P.
PB81-129678, PAT-APPL-6-193-877

THE FIELD CURRENT OF A WIND-DRIVEN GENERATOR IS AUTOMATICALLY CONTROLLED IN RESPONSE TO A FIRST SIGNAL REPRESENTING THE WIND SPEED AND A SECOND SIGNAL REPRESENTING THE IMPELLER TIP SPEED SO AS TO CONTINUOUSLY LOAD THE WIND MACHINE TO THE EXTENT NECESSARY FOR MAINTAINING A CONSTANT TIP SPEED/WIND SPEED RATIO, THEREBY OPTIMIZING THE PERFORMANCE OF THE MACHINE.

1980-0480 SOLAR BUDGET CUTS.
WIND POWER DIG. NO. 20: 42-44, SUMMER 1980.

1980-0481 SOLAR ENERGY: PROGRAM SUMMARY DOCUMENT FY 1981.
NTIS, AUGUST 1980. 376 P.
DOE/CS/0050

AN OVERVIEW OF THE US DEPARTMENT OF ENERGY SOLAR ENERGY PROGRAM IN THE OFFICE OF THE ASSISTANT SECRETARY FOR CONSERVATION AND SOLAR ENERGY IS PRESENTED. THE SOLAR TECHNOLOGIES ARE BIOMASS ENERGY SYSTEMS, PHOTOVOLTAIC ENERGY SYSTEMS, WIND ENERGY CONVERSION SYSTEMS, SOLAR THERMAL POWER, OCEAN SYSTEMS, AGRICULTURAL AND INDUSTRIAL PROCESS HEAT, ACTIVE SOLAR HEATING AND COOLING, AND PASSIVE AND HYBRID SOLAR HEATING AND COOLING. THE STATUS OF THE SOLAR PROGRAMS IN EACH OF THESE TEHCNOLOGY AREAS IS REVIEWED, AND PROPOSED FY 1981 ACTIVITIES ARE PRESENTED.

1980-0482 SOREL J, BAINVILLE D, MAEGEY M, NOEL J M, SEGER G
APPLICATION OF THE FINITE ELEMENT METHOD TO THE STUDY OF THE BEHAVIOUR OF BLADES OF INDUSTRIAL WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D3, P. 193-206.

AMONGST AVAILABLE ENERGY FORMS, WIND ENERGY HAS BEEN USED FOR MANY YEARS TO PRODUCE ELECTRICITY. THE DEVELOPMENT OF NEW MATERIALS AND THE IMPROVEMENT OF MANUFACTURING TECHNIQUES HAVE MADE POSSIBLE HIGH POWER (100 KW) WIND ENERGY SYSTEMS (WECS) WITH LARGE DIAMETER (18 M) PROPELLERS. THOSE ERECTED ON WINDY SITES ARE OFTEN EXPOSED TO HEAVY MECHANICAL OVERLOADS DUE TO SEVERE CLIMATIC CONDITIONS. THE BLADE ATTACHMENT IS THUS CRITICAL AND LED US TO INTRODUCE POLYMERS AS AN ECONOMIC WAY OF STRAIN DISTRIBUTION. THE BLADE FOOTING HAS THEN BEEN COMPUTED BY THE FINITE ELEMENT METHOD. THE RESULT IS A STRAIN MAPPING PROVIDING VITAL INFORMATION CONCERNING WIND TURBINE DESIGN.

1980-0483 SORENSEN B
A REGIONAL WIND-HYDRO ELECTRICITY SUPPLY SYSTEM.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER L1, P. 533-543.

THE COMBINATION OF A WIND-BASED ELECTRICITY GENERATING SYSTEM WITH A HYDRO-BASED SYSTEM IS INVESTIGATED BY USE OF A SIMULATION MODEL. THE HYDRO-POWER SYSTEM IS AN IDEALISED VERSION OF THE NORWEGIAN SYSTEM, AND THE WIND-POWER SYSTEM CORRESPONDS TO GENERATING ALL THE ELECTRIC POWER NEEDED IN DENMARK BY WIND. A TRANSMISSION CAPABILITY BETWEEN THE TWO COUNTRIES IS ASSUMED TO ALLOW A POWER TRANSFER UP TO 2.5 TIMES THE MAXIMUM CAPACITY OF THE PRESENT INTERCONNECTIONS. THE MODEL HAS BEEN USED TO SIMULATE THE PERFORMANCE OF SUCH A SYSTEM, USING WIND AND HYDRO DATA FOR THE RESPECTIVE COUNTRIES. NOT ONLY "TYPICAL" OR AVERAGE YEARS HAVE BEEN CONSIDERED, BUT ALSO THE VARIATIONS CAUSED BY EXCEPTIONALLY GOOD OR BAD WIND YEARS OR HYDRO YEARS. IT IS CONCLUDED THAT THE COMBINED SYSTEM IS AS DEPENDABLE AS THE HYDRO SYSTEM ALONE, AND THAT THE COMBINATION THUS OFFERS A WAY OF LARGE-SCALE ELECTRICITY SUPPLY BY USE OF WIND ENERGY, WITHOUT BACKUP OR STORAGE SYSTEMS OTHER THAN THE HYDRO SYSTEM. THE EXTRA TRANSMISSION LOSSES ASSOCIATED WITH THE POWER EXCHANGE BETWEEN THE WIND AND THE HYDRO SYSTEM AMOUNTS TO 8.9% OF THE WIND ENERGY PRODUCTION.

1980-0484 SORENSEN B
A SCANDINAVIAN ENERGY SYSTEM BASED ON RENEWABLE ENERGY.
FRA FYS. VERDEN 42(2) 30-33, 1980. (IN NORWEGIAN)

THIS REPORT QUOTES SOME STATISTICS FOR THE ENERGY REQUIREMENTS AND RESOURCES OF NORWAY, DENMARK, AND SWEDEN. THE AUTHOR ATTEMPTS TO SHOW THAT THE ENERGY REQUIREMENTS OF THESE COUNTRIES CAN BE MET BY A COMBINATION OF SOLAR UNITS, WINDMILLS ALONG THE COASTS, WATER POWER STATIONS, WAVE ENERGY, AND BIO-FUELLED POWER PLANT. THIS WOULD INVOLVE SOME CHANGES IN THE LIFE-STYLE OF THE INHABITANTS AND MORE FLOW OF ENERGY ACROSS NATIONAL FRONTIERS.

1980-0485 SOUTH P, JACOBS E W
EVALUATION OF INNOVATIVE WIND ENERGY CONCEPTS.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 11-32.
SERI/CP-635-938

THE PAPER DESCRIBES THE PROCESS BEING DEVELOPED AT SERI TO EFFICIENTLY, CONSISTENTLY, AND OBJECTIVELY EVALUATE INNOVATIVE WIND ENERGY CONCEPTS. COSTING METHODS ARE BEING DEVISED WHEREBY DEVELOPMENTAL, PRE-PRODUCTION, AND PRODUCTION COSTS CAN BE ASSESSED FOR INNOVATIVE WIND ENERGY SYSTEMS IN THEIR CONCEPTUAL AND/OR DEVELOPMENTAL STAGES. PRELIMINARY AERODYNAMIC AND ENGINEERING ANALYSES WILL BE PERFORMED IN CONJUNCTION WITH THE COST ANALYSES TO DETERMINE RELEVANT PERFORMANCE, STRUCTURAL, AND MATERIAL CHARACTERISTICS. THESE ESTIMATES WILL BE USED TO IDENTIFY INNOVATIVE IDEAS WARRANTING MORE DETAILED AND COMPREHENSIVE STUDIES. THE OBJECTIVE EMPHASIZES FINDING USEFUL AND VIABLE INNOVATIVE WIND ENERGY CONCEPTS.

1980-0486 SPERA D A, VITERNA L A, RICHARDS T R, NEUSTADTER H E
PRELIMINARY ANALYSIS OF PERFORMANCE AND LOADS DATA FROM THE 2MW MOD-1 WIND TURBINE GENERATOR.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 99-118.
CONF-791097

THE DOE/NASA MOD-1 WIND TURBINE GENERATOR INSTALLED ON HOWARD'S KNOB NEAR BOONE, NORTH CAROLINA, WAS DEDICATED ON JULY 11, 1979. WITH A RATED POWER OF 2 MW AND A ROTOR DIAMETER OF 61 METERS, THE MOD-1 IS THE LARGEST WIND TURBINE EVER CONSTRUCTED. INITIAL OPERATION DURING AUGUST, SEPTEMBER, AND OCTOBER OF 1979 HAS PRODUCED PRELIMINARY TEST DATA ON OUTPUT POWER VERSUS WIND SPEED, ROTOR BLADE LOADS, SYSTEM DYNAMIC BEHAVIOR, AND START/STOP CHARACTERISTICS. THESE DATA HAVE BEEN ANALYZED STATISTICALLY AND ARE COMPARED WITH DESIGN PREDICTIONS OF SYSTEM PERFORMANCE AND LOADS.

1980-0487 STARR P J
ENERGY FROM WIND POWERED OSCILLATORS. SEMI-ANNUAL TECHNICAL PROGRESS REPORT, AUGUST 1, 1979-JANUARY 31, 1980.
NTIS, 1980. 10 P.
DOE/R5/10129-1

INFORMATION IS PRESENTED CONCERNING A LITERATURE REVIEW ON FLOW INDUCED VIBRATIONS; AN ESTIMATION OF AVAILABLE POWER; DESIGN PROCEDURE FOR BOTH VORTEX SHEDDING AND GALLOPING; AND CONVERSION SCHEMES.

1980-0488 STEPHENS H S, STAPLETON C A
PAPERS PRESENTED AT THE INTERNATIONAL SYMPOSIUM ON WAVE AND TIDAL ENERGY. VOLUME 2: DISCUSSION.
INTERNATIONAL SYMPOSIUM ON WAVE AND TIDAL ENERGY, CANTERBURY, ENGLAND, SEPTEMBER 27-29, 1978. CRANFIELD, BEDFORD, ENGLAND, BHRA, 1980. VARIOUS PAGING.

THIS VOLUME CONTAINS 11 PAPERS PRIMARILY CONCERNED WITH ELECTRIC POWER GENERATION RESULTING FROM THE UTILIZATION OF WIND AND WATER WAVE ENERGY.

1980-0489 STEPHENS H S, STAPLETON C A
PAPERS PRESENTED AT THE THIRD INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS.
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. 587 P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, COPENHAGEN, AUGUST 26-29, 1980.

1980-0490 STOUT B A, CLARK J A, MAYCOCK P, ASMUSSEN J
OVERVIEW OF SOLAR-ENERGY TECHNOLOGIES: HEATING, PHOTOVOLTAICS, WIND AND BIOMASS.
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS ANNUAL MEETING, 46TH, DETROIT, MICHIGAN, JULY 20, 1980. ENERGY AWARENESS LUNCHEON AND ENERGY SEMINAR. NTIS, JULY 23, 1980. P. 69-128.
CONF-800780-(VOL.1)

SOLAR ENERGY IS A TECHNICALLY AND ENVIRONMENTALLY FEASIBLE ALTERNATIVE TO FOSSIL FUELS. AN OVERVIEW OF FOUR SOLAR TECHNOLOGIES AND THEIR COSTS COVERS SPACE AND WATER HEATING, PHOTOVOLTAICS, WIND, AND BIOMASS. A LIFE-CYCLE MODEL OF SOLAR-SPACE-HEATING SYSTEMS CONSIDERS FOUR SPECIFIC TYPES OF INVESTMENT POSSIBILITIES. A TI-59 PROGRAMMABLE CALCULATOR ANALYZES THE ECONOMICS OF SOLAR-WATER-HEATING SYSTEMS. SOLAR HEATING AND COOLING COULD CONTRIBUTE 5.6 QUADS PER YEAR BY 2000. ANOTHER QUAD COULD COME FROM PHOTOVOLTAICS IF THE PRICE OF SOLAR CELL MODULES IS REDUCED ENOUGH, WHILE DOE ESTIMATES THE WIND POTENTIAL AT 1.7 AND BIOMASS AT 5.5 QUADS. THE DISCUSSION FOR EACH TECHNOLOGY INCLUDES A TECHNICAL AND ECONOMIC ASSESSMENT AND THE POTENTIAL FOR APPLICATION.

1980-0491 STROCK O J
DOE/NASA WIND TURBINE DATA ACQUISITION. PART 1: EQUIPMENT.
NTIS, JANUARY 1980. 56 P.
NASA-CR-159779, EMR-827053

LARGE QUANTITIES OF DATA WERE COLLECTED, STORED, AND ANALYZED IN CONNECTION WITH RESEARCH AND DEVELOPMENT PROGRAMS ON WIND TURBINES. THE HARDWARE CONFIGURATION OF THE WIND ENERGY REMOTE DATA ACQUISITION SYSTEM IS DESCRIBED ALONG WITH ITS USE ON THE NASA/DOE WIND ENERGY PROGRAM.

1980-0492 STROJAN C L
ENVIRONMENTAL ASPECTS OF SOLAR ENERGY TECHNOLOGIES.
NTIS, SEPTEMBER 1980. 21 P.
SERI/TP-743-826

SOLAR ENERGY TECHNOLOGIES HAVE ENVIRONMENTAL EFFECTS, AND THESE MAY BE POSITIVE OR NEGATIVE COMPARED WITH CURRENT WAYS OF PRODUCING ENERGY. IN THIS RESPECT, SOLAR ENERGY TECHNOLOGIES ARE NO DIFFERENT FROM OTHER ENERGY SYSTEMS. WHERE SOLAR ENERGY TECHNOLOGIES DIFFER IS THAT NO UNRESOLVABLE TECHNOLOGICAL PROBLEMS (E.G., CARBON DIOXIDE EMISSIONS) OR SOCIOPOLITICAL BARRIERS (E.G., WASTE DISPOSAL, CATASTROPHIC ACCIDENTS) HAVE BEEN IDENTIFIED. THIS REPORT REVIEWS SOME OF THE ENVIRONMENTAL ASPECTS OF SOLAR ENERGY TECHNOLOGIES AND ONGOING RESEARCH DESIGNED TO IDENTIFY AND RESOLVE POTENTIAL ENVIRONMENTAL CONCERNS. IT IS IMPORTANT TO CONTINUE RESEARCH AND ASSESSMENT OF ENVIRONMENTAL ASPECTS OF SOLAR ENERGY TO ENSURE THAT UNANTICIPATED PROBLEMS DO NOT ARISE. IT IS ALSO IMPORTANT THAT THE KNOWLEDGE GAINED THROUGH SUCH ENVIRONMENTAL RESEARCH BE INCORPORATED INTO TECHNOLOGY DEVELOPMENT PROGRAMS AND POLICY INITIATIVES.

1980-0493 STROJAN C L, LAWRENCE K, O'DONNELL D
FIELD STUDY OF THE AESTHETICS OF SMALL WIND MACHINES: A PRELIMINARY REPORT.
NTIS, MARCH 1980. 4 P.
CONF-800406-3, SERI/TP-743-621

A FIELD STUDY WAS CONDUCTED AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER TO DETERMINE IF AESTHETIC PREFERENCES EXIST FOR PARTICULAR DESIGNS OF SMALL WIND MACHINES, AND TO GATHER DATA ON THE IMPORTANCE OF AESTHETICS RELATIVE TO OTHER WIND SYSTEM ISSUES. PARTICIPANTS ON PUBLIC TOURS OF THE TEST CENTER WERE ASKED TO ANSWER SEVERAL GENERAL QUESTIONS AND TO RATE THE VISUAL APPEARANCE OF VARIOUS WORKING PARTS (ROTOR AND NACELLE), TOWERS, AND COMPLETE MACHINES. WORKING PARTS INCLUDED VERTICAL- AND HORIZONTAL-AXIS DESIGNS (BOTH UPWIND AND DOWNWIND), WHILE TOWERS INCLUDED WOOD, CONCRETE AND STEEL COLUMNS, AND VARIOUS TRUSS DESIGNS. IN SPITE OF A RELATIVELY SMALL SAMPLE SIZE (N=139), THE RESULTS INDICATE DEFINITE PREFERENCES FOR PARTICULAR DESIGNS, WITH DOWNWIND HORIZONTAL-AXIS WORKING PARTS AND COLUMNAR TOWERS RECEIVING THE HIGHEST RATINGS.

1980-0494 SULLIVAN W N, LEONARD T M
A COMPUTER SUBROUTINE FOR ESTIMATING AERODYNAMIC BLADE LOADS ON DARRIEUS VERTICAL AXIS WIND TURBINES.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, NOVEMBER 1980. 34 P.
SAND-80-2407

AN IMPORTANT ASPECT OF STRUCTURAL DESIGN OF THE DARRIEUS ROTOR IS THE DETERMINATION OF AERODYNAMIC BLADE LOADS. THIS REPORT DESCRIBES A LOAD GENERATOR WHICH HAS BEEN USED AT SANDIA FOR QUASI-STATIC AND DYNAMIC ROTOR ANALYSES. THE GENERATOR IS BASED ON THE SINGLE STREAMTUBE AERODYNAMIC FLOW MODEL AND IS CONSTRUCTED AS A FORTRAN IV SUBROUTINE TO FACILITATE ITS USE IN FINITE ELEMENT STRUCTURAL MODELS. INPUT AND OUTPUT CHARACTERISTICS OF THE SUBROUTINE ARE DESCRIBED AND A COMPLETE LISTING IS ATTACHED AS AN APPENDIX.

1980-0495 SUMMARY OF SOLAR ENERGY TECHNOLOGY CHARACTERIZATIONS.
NTIS, SEPTEMBER 1980. 190 P.
DOE/EV-0099

THIS REPORT SUMMARIZES THE DESIGN, OPERATING, ENERGY, ENVIRONMENTAL, AND ECONOMIC CHARACTERISTICS OF 38 MODEL SOLAR ENERGY SYSTEMS USED IN THE TECHNOLOGY ASSESSMENT OF SOLAR ENERGY SYSTEMS PROJECT INCLUDING SOLAR HEATING

AND COOLING OF BUILDINGS. WIND ENERGY IS INCLUDED.

1980-0496 SUPPOSE THE OIL STOPS...
ENERGY AND TECHNOLOGY REVIEW. NTIS, JUNE 1980. P. 19-27.
UCRL-52000-80-6

CONTINUED TURMOIL IN THE MIDDLE EAST MAKES A COMPLETE CUTOFF OF IMPORTED OIL SUPPLIES FROM THAT REGION A POSSIBILITY THAT MUST BE CONSIDERED. IF A MAJOR OIL CUTOFF OCCURRED, IT WOULD CAUSE DISASTROUS SHORT- AND MID-RANGE CONSEQUENCES TO OUR ECONOMY. DRASTIC CONSERVATION MEASURES WOULD HELP TO STRETCH THE REMAINING SUPPLIES BUT ONLY ENOUGH TO COVER ABOUT HALF OF THE SHORTFALL. EFFORTS TO PRODUCE SIGNIFICANT EFFECTS BY INTRODUCING OTHER ENERGY TECHNOLOGIES AND SUPPLIES INVOLVE LONG LEAD TIMES AND THEREFORE CANNOT BE EFFECTIVE IN THE SHORT TERM. FORESIGHT AND INITIATIVE WILL BE REQUIRED IF WE ARE TO DEVELOP EFFECTIVE COPING STRATEGIES BEFOREHAND. OUR PURPOSE IN THIS ARTICLE IS TO ESTIMATE THE MAGNITUDE OF THE MAXIMUM SHORTFALL, TO IDENTIFY THE MAJOR SHORT-TERM ACTIONS POSSIBLE IN RESPONSE TO SUCH A CRISIS, AND TO POINT OUT SOME LONGER RANGE ACTIONS TO COMPLETE OUR RECOVERY.

1980-0497 SUTZ R
WIND MACHINE SYSTEM FOR PUSHING AND LIFTING LOADS AND HAVING IMPROVED COUNTERBALANCING.
U.S. PATENT NO. 4,211,126, JULY 8, 1980. 5 P.

A DESCRIPTION IS GIVEN OF A WIND MACHINE SYSTEM ADAPTED FOR BOTH LIFTING UP AND PUSHING DOWN EXTERNAL LOADS, COMPRISING: A STATIONARY ELEVATED SUPPORT; TRANSMISSION MEANS MOUNTED ON SAID SUPPORT AND ARRANGED FOR CONVERTING ROTARY MOTION TO RECIPROCATING MOTION; A MULTIPLE BLADE ROTOR DRIVEN BY WIND AND CONNECTED TO SAID TRANSMISSION MEANS TO DRIVE THE SAME; A VERTICAL SHAFT CONNECTED TO SAID TRANSMISSION MEANS AND CYCLICALLY RECIPROCATED THEREBY FOR LIFTING UP AND PUSHING DOWN SAID LOADS WHEN SAID ROTOR ROTATES; AND MOUNTING MEANS ARRANGED TO RETAIN AND RESTRAIN SAID TRANSMISSION MEANS ON SAID SUPPORT IN SUCH A WAY THAT SAID TRANSMISSION MEANS PUSHES SAID SHAFT DOWN AND PULLS SAID SHAFT UP WITH EQUAL MAXIMUM FORCES DURING EACH CYCLE OF RECIPROCATION OF SAID SHAFT.

1980-0498 SWEDISH WIND PROJECTS.
WIND POWER DIG. NO. 20: 34-35, SUMMER 1980.

1980-0499 TAYLOR P A
ON WAKE DECAY AND ROW SPACING FOR WECS FARMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J4, P. 451-468.

A NUMERICAL MODEL OF WAKES IN THE NEUTRALLY STRATIFIED ATMOSPHERIC BOUNDARY LAYER IS DEVELOPED AND APPLIED TO THE FLOW BEHIND HORIZONTAL AND VERTICAL AXIS WIND TURBINES. THE MODEL IS LINEARIZED, USES BOUNDARY LAYER APPROXIMATIONS AND IS INTEGRATED ACROSS TURBINE ROWS BUT SHOULD STILL PROVIDE USEFUL ESTIMATES OF POWER REDUCTIONS AT TURBINES IN SECOND AND SUBSEQUENT ROWS OF A WECS FARM ARRAY. VARIATIONS WITH TURBINE SIZE AND OTHER CHARACTERISTICS ARE INVESTIGATED AS WELL AS VARIATIONS DUE TO DIFFERENT SURFACE ROUGHNESS, WIND SPEED AND DIRECTION. COMPARISONS ARE MADE WITH OTHER THEORIES OF WAKE INTERACTIONS AND WITH WIND TUNNEL INVESTIGATIONS.

1980-0500 TAYLOR P A
ON WAKE DECAY AND ROW SPACING FOR WECS FARMS.
DOWNVIEW, ONTARIO, ATMOSPHERIC ENVIRONMENT SERVICE, BOUNDARY LAYER RESEARCH DIVISION, 1980. 42 P.
AQRB-80-001-L

A NUMERICAL MODEL OF WAKES IN THE NEUTRALLY STRATIFIED ATMOSPHERIC BOUNDARY LAYER IS DEVELOPED AND APPLIED TO THE FLOW BEHIND HORIZONTAL AND VERTICAL AXIS WIND TURBINES. THE MODEL IS LINEARIZED, USES BOUNDARY LAYER APPROXIMATIONS AND IS INTEGRATED ACROSS TURBINE ROWS BUT SHOULD STILL PROVIDE USEFUL ESTIMATES OF POWER REDUCTIONS AT TURBINES IN SECOND AND SUBSEQUENT ROWS OF A WECS FARM ARRAY. VARIATIONS WITH TURBINE SIZE AND OTHER CHARACTERISTICS ARE INVESTIGATED AS WELL AS VARIATIONS DUE TO DIFFERENT SURFACE ROUGHNESS, WIND SPEED AND DIRECTION. COMPARISONS ARE MADE WITH OTHER THEORIES OF WAKE INTERACTIONS (CRAFOORD AND LISSAMAN) AND WITH WIND TUNNEL INVESTIGATIONS (BUILTJES).

1980-0501 TAYLOR P A
WAKE DECAY AND POWER REDUCTION IN WIND FARM ARRAYS--AN APPLICATION TO THE ARRAY PROPOSED FOR THE KAHUKU HILLS.
WIND ENG. 4(2): 76-79, 1980.

A NUMERICAL MODEL OF WIND TURBINE WAKE DECAY IN THE NEUTRALLY STRATIFIED ATMOSPHERIC BOUNDARY LAYER IS BRIEFLY DESCRIBED. IT IS A LINEARISED, TWO DIMENSIONAL MODEL OF THE WAKE BEHIND A ROW OF WIND TURBINES AND CAN BE USED TO ESTIMATE POWER REDUCTIONS AT SECOND AND SUBSEQUENT ROWS IN WIND FARM ARRAYS. A TENTATIVE APPLICATION TO THE PROPOSED KAHUKU HILLS 80 MW WIND FARM ARRAY SUGGESTS A POWER LOSS OF ABOUT 10% WITH THE PLANNED FOUR ROW CONFIGURATION FOR THE PREVAILING EASTERLY WIND AT RATED SPEED. A TWO ROW CONFIGURATION ON THE SAME SITE COULD POSSIBLY REDUCE THIS LOSS TO 5%.

1980-0502 TAYLOR R H, SWIFT-HOOK D T
WIND POWER STUDIES IN THE CENTRAL ELECTRICITY GENERATING BOARD, U.K.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 269-286.
CONF-791097

THE CEGB IS CURRENTLY PARTICIPATING WITH PRIVATE INDUSTRY AND UNIVERSITY GROUPS IN A STUDY FUNDED BY THE UK DEPT. OF ENERGY TO ASSESS THE TECHNICAL PROBLEMS AND ECONOMICS OF OFFSHORE WINDPOWER. OUR OWN STUDIES HAVE CENTERED AROUND OBTAINING, INFERRING AND ANALYSING WIND DATA FROM OFFSHORE AREAS; DETERMINING THE OPTIMUM LAYOUT AND SPACINGS OF AEROGENERATORS WITHIN LARGE CLUSTERS AND THE ENERGY LOSS ASSOCIATED WITH SHADOWING EFFECTS; AND THE INTEGRATION OF LARGE AMOUNTS OF WIND ENERGY INTO THE NATIONAL GRID SYSTEM.

1980-0503 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. FY 1980 PROGRAM SUMMARY.
NTIS, MARCH 1, 1980. 41 P.
RFP-3121/3533/80/8

THIS DOCUMENT GIVES AN OVERVIEW OF THE ROCKY FLATS SMALL WIND SYSTEMS PROGRAM OPERATED BY THE ROCKWELL INTERNATIONAL ENERGY SYSTEMS GROUP FOR THE US DEPARTMENT OF ENERGY. THIS PROGRAM PROVIDES TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. THE OVERALL OBJECTIVE IS TO STIMULATE THE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS BY THE PRIVATE SECTOR AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. THE INFORMATION PROVIDED IN THIS DOCUMENT DESCRIBES THE CURRENT RELATIONSHIPS, PROGRAM ADMINISTRATION, ACTIVITY HIGHLIGHTS, AND PLANS FOR FY 1980 AS WELL AS PROJECTIONS THROUGH 1982.

1980-0504 TEGTH U
TV-INTERFERENCE MEASUREMENTS FROM THE TRIAL WIND POWER PLANT IN KALKUNGEN.
TELE (SWEDISH ED) 86(3): 41-48, 1980. (IN SWEDISH)

ROTATING METAL BLADES, AS USED ON A POWER GENERATING WIND MILL CAN ADVERSELY AFFECT TV RECEPTION. THE ARTICLE REPORTS ON MEASUREMENTS TAKEN IN THE AREA AFFECTED BY THE WIND MILL IN KALKUNGEN.

1980-0505 TELLER E
EMERGENCY PLANNING FOR THE PERSIAN GULF.
NTIS, JUNE 1980. 20 P.
LA-8383-MS

THIS WAS A TALK GIVEN BY EDWARD TELLER FOR THE LAMPF USERS GROUP, INC. THE SUBJECTS DISCUSSED INCLUDED: THE SALT TREATY, MILITARY STRENGTHS OF THE USSR AND USA, CIVIL DEFENSE PREPAREDNESS, THE PRESENT IRANIAN-AFGHANISTAN SITUATIONS, AND THE POSSIBILITY THAT THE USSR WILL GAIN CONTROL OF THE MID-EAST OIL INDUSTRY. HE SUGGESTED THE FOLLOWING POSSIBILITIES IN PREPARING FOR THE LATTER SITUATION: THE SYNTHESIS OF OIL FROM WOOD; THE USE OF ALASKAN COAL BY COAL-SLURRY TRANSPORT; THE USE OF METHA-COAL; THE USE OF IN-SITU COAL GASIFICATION; THE USE OF WIND POWER; AND THE USE OF NUCLEAR POWER. SEVERAL INNOVATIONS CURRENTLY UNDERWAY IN THE STATE OF WASHINGTON UNDER THE DIRECTION OF GOVERNOR DIXIE LEE RAY ARE POINTED OUT.

1980-0506 TEMPLIN R J
THE CANADIAN WIND ENERGY PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 301-306.
CONF-791097

THE NATIONAL RESEARCH COUNCIL WAS ASSIGNED RESPONSIBILITY FOR COORDINATION OF R&D ON RENEWABLE ENERGY, INCLUDING HYDRAULIC, SOLAR, BIOMASS, GEOTHERMAL, AND WIND ENERGY. THIS PAPER DETAILS AREAS OF STUDY IN WIND RESOURCE ASSESSMENT, WECS DEVELOPMENT, AND THE MEGAWATT SCALE VAWT.

1980-0507 TENNYSON G
OVERVIEW OF THE FEDERAL DISPERSED WIND SYSTEMS PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 339-342.
CONF-791097

THE RESOURCE WORK IS BEING DONE IN RICHLAND, WASHINGTON, BY THE RICHLAND OPERATIONS OFFICE AND BATTELLE/PNL. THIS WORK TELLS US WHERE AND HOW MUCH WIND THERE IS, WHAT ARE THE WIND CHARACTERISTICS TO DESIGN FOR AND HOW YOU FORECAST THE WIND FOR POWER GENERATION.

1980-0508 THOMAS R L
KEY ISSUES ASSOCIATED WITH LARGE SCALE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 137-151.
CONF-791097

THIS PAPER SUMMARIZES THE KEY ISSUES ASSOCIATED WITH LARGE WIND TURBINES: TECHNOLOGY READINESS, POTENTIAL FOR SIGNIFICANT IMPACT. WILL THE USERS REALLY ACCEPT THESE MACHINES, WHAT DOES IT TAKE FOR THE CREATION OF A COMPETITIVE WIND TURBINE INDUSTRY, AND WILL THE PUBLIC ACCEPT THEM?

1980-0509 THOMAS R L, ROBBINS W H
LARGE WIND TURBINE PROJECTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 75-98.
CONF-791097

THE OBJECTIVE OF THE UNITED STATES WIND ENERGY PROGRAM IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS AND ENABLE THE EARLIEST POSSIBLE COMMERCIALIZATION OF WIND POWER. TO ACHIEVE THIS OBJECTIVE REQUIRES ADVANCING THE TECHNOLOGY, DEVELOPING A SOUND INDUSTRIAL TECHNOLOGY BASE, AND ADDRESSING THE NON-TECHNOLOGICAL ISSUES WHICH COULD DETER THE USE OF WIND ENERGY.

1980-0510 THOMAS R L, ROBBINS W H
LARGE WIND-TURBINE PROJECTS IN THE UNITED STATES WIND ENERGY PROGRAM.
J. IND. AERODYN. 5(3-4): 323-335, MAY 1980.

THIS PAPER DESCRIBES THE DEVELOPMENT STATUS OF LARGE, HORIZONTAL AXIS WIND TURBINES (100 TO 2500 KW) FROM MOD-0 TO MOD-2 DESIGN. THE WIND TURBINE COST-OF-ELECTRICITY IS CALCULATED. THE OBJECTIVES OF THE US WIND ENERGY PROGRAM ARE OUTLINED.

1980-0511 THOMPSON J E
FLUID FLOW INTENSIFIER FOR TIDE, CURRENT OR WIND GENERATOR.
U.S. PATENT NO. 4,224,527, SEPTEMBER 23, 1980.

THIS REPORT DESCRIBES A METHOD OF INTENSIFYING A FLUID FLOW, CAUSING A RELATIVELY SLOW SPEED NATURAL SUBSTANTIALLY HORIZONTAL FLOW OF A NATURAL FLUID TO TURN ROTARY ABOUT A HORIZONTAL AXIS, CAUSING THE ROTARY TO ACT DIRECTLY ON A WORKING FLUID AND FORCING THE WORKING FLUID THROUGH A PIPE SYSTEM WITHOUT THE FORMATION OF AN ELEVATED HEAD TO A FLOW INTENSIFIER IN THE FORM OF A CONSTRICTION. THEREFORE, THE FLOW OF WORKING FLUID IS SUFFICIENT TO DRIVE MEANS FOR GENERATING ELECTRICITY.

1980-0512 TIELEMAN H W
PLANETARY BOUNDARY LAYER WIND MODEL EVALUATION AT A MID-ATLANTIC COASTAL SITE.
NTIS, OCTOBER 1980. 184 P.
DOE/ET/23007-80/1

THE PURPOSE OF THIS REPORT IS TO PROVIDE INFORMATION ON THE LOCAL WIND CLIMATE AT A MID-ATLANTIC COASTAL SITE. THE ACQUIRED INFORMATION CAN BE USED FOR THE DESIGN OF WIND-TURBINE GENERATORS AT SIMILAR SITES. SINCE WIND IS A VERY IMPORTANT DESIGN PARAMETER FOR THESE GENERATORS, INFORMATION IS PROVIDED IN THIS REPORT ON WIND SPEED, WIND DIRECTION, WIND SHEAR AND WIND TURBULENCE. THE DATA PRESENTED IN THIS REPORT WERE COLLECTED FROM AN INSTRUMENTED METEOROLOGICAL TOWER, 76.2 M (250 FT) TALL AND LOCATED AT WALLOPS ISLAND. THE RESULTS ACQUIRED FROM THIS FACILITY SHOULD BE TYPICAL FOR ANY ATLANTIC COASTAL SITE, ALTHOUGH LOCAL EFFECTS SUCH AS UPSTREAM BUILDINGS AND OBSTACLES AND CHANGES IN SURFACE ROUGHNESS AND SURFACE TEMPERATURE MODIFY THE FLOW NEAR THE SURFACE.

1980-0513 TORNKVIST G

LOAD CASES FOR WIND ENERGY CONVERSION SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER D2, P. 183-192.

AN INTERNATIONAL PROGRAMME FOR RESEARCH AND DEVELOPMENT ON WIND ENERGY CONVERSION SYSTEMS (WECS) IS ORGANISED BY THE INTERNATIONAL ENERGY AGENCY (IEA). ONE OF THE PROJECTS OF THE PROGRAMME CONCERNS LOAD CASE RECOMMENDATIONS. THE STATUS OF THE PROJECT IS PRESENTED AND RESULTS ON WIND DATA FOR WECS AND ON MAIN LOAD CASES ARE GIVEN.

1980-0514 TRACI R M, WYATT D C, PATNAIK P C, PHILLIPS G T
WIND ENERGY SITING METHODOLOGY WINDFIELD MODEL VERIFICATION PROGRAM. II. NEVADA TEST SITE DATA SET. INTERIM REPORT FOR THE PERIOD JUNE 15, 1979-FEBRUARY 15, 1980.
NTIS, FEBRUARY 1980. 138 P.
DOE/ET/20280-80/2

RESULTS ARE PRESENTED FROM THE SECOND PART OF A TWO PART VERIFICATION PROGRAM FOR A MATHEMATICAL-MODEL-BASED WIND ENERGY CONVERSION SYSTEM SITING METHODOLOGY. THE FIRST PART OF THE PROGRAM INVOLVED WINDFIELD SIMULATIONS AND WIND DATA COMPARISONS FOR THE ISLAND OF OAHU, HAWAII. THE OBJECTIVE OF THE PRESENT PROGRAM IS TO EXPAND THE MODEL VERIFICATION BY ASSESSING THE QUANTITATIVE ACCURACY OF THE MODELS RELATIVE TO OBSERVED DATA FOR A MIDCONTINENTAL REGION OF COMPLEX TOPOGRAPHY AND METEOROLOGY; THE NEVADA TEST SITE (NTS), NEVADA. IN PARTICULAR, THE GOAL IS TO DETERMINE THE ABILITY OF THE DETAILED-PHYSICS SIGMET MODEL TO DESCRIBE DYNAMIC ATMOSPHERIC AND BOUNDARY LAYER EFFECTS ON THE WINDFIELD IN A MESOSCALE REGION WITH COMPLEX TERRAIN AND TO DETERMINE THE ABILITY OF THE SIMPLIFIED-PHYSICS NOABL MODEL TO PREDICT WINDFIELDS UTILIZING A SMALL AMOUNT OF DATA. TO THIS END, RESULTS OF TWO SIGMET, NOABL AND LINMET SIMULATIONS FOR TYPICAL FLOW EVENTS ARE COMPARED AND CONTRASTED WITH AVAILABLE WIND DATA. LINMET IS A LINEAR THEORY MODEL, WHICH WAS ADDED TO THE MODEL COMPARISON STUDY, TO PROVIDE COMPARATIVE RESULTS FROM A STATE-OF-THE-ART MODELING APPROACH INTERMEDIATE BETWEEN SIGMET AND NOABL. IN ADDITION, 112 NOABL SIMULATIONS OF ACTUAL "WIND EVENTS" IN THE NTS DATA NETWORK HISTORICAL RECORD WERE PERFORMED AND A DETAILED STATISTICAL ANALYSIS OF THE RESULTS RELATIVE TO THE DATA IS PRESENTED.

1980-0515 TRENKA A R
KEY ISSUES ASSOCIATED WITH THE COMMERCIALIZATION OF SMALL WIND ENERGY CONVERSION SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 59-74.
CONF-791097

ONE OF OUR PRIME TASKS, DURING THE SMALL WIND SYSTEMS WORKSHOP COORDINATED BY ROCKY FLATS IN FEBRUARY-MARCH 1979, WAS TO IDENTIFY AND DISCUSS KEY ISSUES RELEVANT TO THE COMMERCIALIZATION OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). WE ARE ALL AWARE OF THE TECHNOLOGICAL AND ECONOMIC BARRIERS WHICH LED TO THE DEVELOPMENT OF THE SMALL WIND SYSTEMS ELEMENT OF THE FEDERAL WIND ENERGY PROGRAM. THE KEY ISSUES IDENTIFIED BY PARTICIPANTS IN THE WORKSHOP ARE SUBSETS OF THESE BARRIERS. THEIR RESOLUTION WOULD CONTRIBUTE TO MEETING THE OVERALL PROGRAM OBJECTIVES OF COST COMPETITIVENESS, RELIABILITY IMPROVEMENT AND PUBLIC ACCEPTANCE OF SWECS.

1980-0516 TUMA J
NEW ENERGY RESOURCES AND THEIR UTILISATION IN THE FUTURE.
ENERGETIKA 30(11): 507-509, NOVEMBER 1980. (IN CZECHOSLOVAKIAN)

THIS ARTICLE DISCUSSES THE STATE OF ENERGY RESOURCES AVAILABLE FOR FUTURE UTILISATION. IN PARTICULAR, SOLAR POWER, PHOTOELECTRIC CONVERSION, GEOTHERMAL SOURCES, WIND POWER AND BIOLOGICAL CONVERSION ARE CONSIDERED. THE EXPECTED UTILISATION OF SOLAR POWER IN CZECHOSLOVAKIA DURING YEARS 1985 TO 2000 IS ESTIMATED.

1980-0517 TWISS R H, SMITH P L, GATZKE A E, MCCREARY S T
LAND USE AND ENVIRONMENTAL IMPACTS OF DECENTRALIZED SOLAR ENERGY USE.
NTIS, JANUARY 1980. 206 P.
DOE/EV-0067

THE PHYSICAL, SPATIAL AND LAND-USE IMPACTS OF DECENTRALIZED SOLAR TECHNOLOGIES APPLIED AT THE COMMUNITY LEVEL BY THE YEAR 2000 ARE EXAMINED. THE RESULTS OF THE STUDY ARE INTENDED TO PROVIDE A BASIS FOR EVALUATING THE WAY IN WHICH A SHIFT TOWARD RELIANCE ON DECENTRALIZED ENERGY TECHNOLOGIES MAY EVENTUALLY ALTER COMMUNITY FORM. SIX LAND-USE TYPES REPRESENTATIVE OF THOSE FOUND IN MOST US CITIES ARE ANALYZED ACCORDING TO SOLAR PENETRATION LEVELS IDENTIFIED IN THE MAXIMUM SOLAR SCENARIO FOR THE YEAR 2000. THE SCENARIO IS TRANSLATED INTO SHARES OF END USE DEMAND IN THE RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS. THESE PROPORTIONS BECOME THE SCENARIO GOALS TO BE MET BY THE USE OF DECENTRALIZED SOLAR ENERGY SYSTEMS. THE PERCENTAGE OF TOTAL ENERGY DEMAND IS ASSUMED TO BE 36.5 PERCENT, 18.8 PERCENT AND 22.6 PERCENT IN THE RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS RESPECTIVELY. THE COMMUNITY LEVEL SCENARIO STIPULATED THAT A CERTAIN PERCENTAGE OF THE TOTAL DEMAND BE MET BY ON-SITE SOLAR COLLECTION, I.E. PHOTOVOLTAIC AND THERMAL COLLECTORS, AND BY PASSIVE DESIGN. THIS ON-SITE SOLAR GOAL IS 31.9 PERCENT (RESIDENTIAL), 16.8 PERCENT (COMMERCIAL) AND 13.1 PERCENT (INDUSTRIAL).

1980-0518 UPMALIS A
COMBINED OPERATION OF SOLAR-HEAT AND WIND-POWER GENERATING PLANTS.
WAERME 86(6): 109-111, DECEMBER 1980. (IN GERMAN)

THE ARTICLE DEALS FIRST WITH THE HEAT BALANCE OF THE EARTH RESULTING FROM INSOLATION AND WITH THE INFLUENCE THEREON OF ATMOSPHERIC POLLUTION, GOING ON TO DISCUSS THE DESIGN AND PERFORMANCE OF SOLAR COLLECTORS AND TO GIVE A BRIEF RESUME OF THE INCIDENCE OF WIND-POWER IN BELGIUM, AND CONCLUDES BY DESCRIBING AN INSTALLATION IN A HOUSE NEAR BRUSSELS CONSISTING OF A WIND-DRIVEN GENERATOR PRODUCING AN AVERAGE OF 2 KW AND A 40 SQ. M. SOLAR COLLECTOR. WITH SOME EMERGENCY HELP FROM A WOOD-BURNING BOILER IT IS HOPED THAT THE INSTALLATION WILL BE SELF-SUFFICIENT.

1980-0519 UTILIZATION OF FIBER REINFORCED PLASTICS IN ROTOR BLADES OF WIND TURBINES. WF INFORMATION.
NTIS, 1980. 70 P. (IN GERMAN)
NP-25123

IN ORDER TO PRODUCE WIND POWER PLANTS OF THE FUTURE WITH HIGH POWER (1-5 MW), THE WIND TURBINES ARE CONSTRUCTED WITH LARGE ROTOR DIAMETERS (UP TO 145 M). THE ROTOR BLADE HAS TO BE DESIGNED FOR A SERVICE LIFE OF AT LEAST 25 YEARS. THE FIBER BONDED OR HYBRID STRUCTURE (METAL + FIBER COMPOSITE MATERIAL) IS CERTAINLY ATTRACTIVE, ESPECIALLY IN CORRCSIVE ENVIRONMENT, COMPARED TO CONVENTIONAL METAL CONSTRUCTIONS (STEEL OR ALUMINUM IN WELDED, RIVETED, OR BOLTED FORM). LIGHT, RIGID, AND DYNAMICALLY HIGH-STRENGTH ROTOR BLADES CAN BE BUILT WITH FIBER REINFORCED PLASTICS. THE PRESENT REPORT GIVES A SURVEY OF THE MATERIAL PROBLEMS ARISING IN SUCH PLANTS.

1980-0520 VACHON W A

LARGE WIND TURBINE GENERATOR PERFORMANCE ASSESSMENT. TECHNOLOGY STATUS REPORT NO. 1.
NTIS, JANUARY 1980. 90 P.
EPRI-AP-1317

THE RESULTS OF LARGE WIND TURBINE GENERATOR (WT) DEVELOPMENT AND FIELD TEST ACTIVITIES ARE PRESENTED. AN APPROACH FOR GATHERING, DISTILLING, AND ASSESSING WT TEST DATA IS PRESENTED, WITH EMPHASIS ON THE USEFULNESS OF THE DATA TO THE INDUSTRY. TEST RESULTS TO DATE HAVE VALIDATED THE DOE/NASA WT DESIGN PROCEDURES WHICH HAVE BEEN ESTABLISHED BY BOTH SUPPORTING RESEARCH AND TECHNOLOGY AND SOUND ENGINEERING PROGRAMS. THESE PROGRAMS HAVE EMPLOYED FIRST-GENERATION, HORIZONTAL AXIS WT'S IN RESEARCH AND OPERATION TESTS. COST OF ENERGY (COE) PROJECTIONS INDICATE THAT LATER GENERATION WT'S ARE LIKELY TO PROVIDE ELECTRICITY AT COMPETITIVE COSTS IN SOME UTILITY SYSTEMS WITHIN SEVERAL YEARS. SEVERAL PRIVATELY FUNDED HORIZONTAL AND VERTICAL-AXIS WT'S ARE PRESENTLY EITHER IN THE PLANNING OR CONSTRUCTION PHASE, OR ACTUALLY UNDER TEST IN UTILITY GRIDS. TEST RESULTS FROM THESE WT'S WILL BE PRESENTED IN FUTURE REPORTS.

1980-0521 VACHON W A
LARGE WIND TURBINE GENERATOR PERFORMANCE ASSESSMENT. TECHNOLOGY STATUS REPORT NO. 2.
NTIS, DECEMBER 1980. 77 P.
EPRI-AP-1641

THIS REPORT IS THE SECOND IN A SERIES DOCUMENTING A PROJECT WHOSE MAIN OBJECTIVE IS TO COMMUNICATE THE SIGNIFICANT RESULTS OF FEDERAL AND PRIVATELY FUNDED LARGE WIND TURBINE (WT) GENERATOR DEVELOPMENT AND FIELD TESTS. THIS INFORMATION IS BEING COMMUNICATED PRIMARILY TO THE ELECTRIC UTILITY INDUSTRY.

1980-0522 VAN DER AUWERA L, DE MEYER F, MALET L M
USE OF THE WEIBULL THREE-PARAMETER MODEL FOR ESTIMATING MEAN WIND POWER DENSITIES.
J. APPL. METEOROL. 19(7): 819-825, JULY 1980.

THE WEIBULL THREE-PARAMETER MODEL IS DISCUSSED FOR ESTIMATION OF MEAN WIND POWER DENSITIES. THIS PROBABILITY DENSITY FUNCTION IS A GENERALIZATION OF A NUMBER OF MORE CONVENTIONAL DENSITY FUNCTIONS. USING WIND SPEED OBSERVATIONS, IT IS SHOWN THAT THIS MODEL GENERALLY GIVES A MORE RELIABLE FIT TO THE EMPIRICAL WIND SPEED FREQUENCY DATA THAN THE DENSITY FUNCTIONS WITH ONE OR TWO PARAMETERS. WIND POWER DENSITY ESTIMATIONS TURN OUT TO BE STRONGLY DEPENDENT ON THE HYPOTHESIZED PROBABILITY DENSITY FUNCTION. THE VARIATION WITH HEIGHT OF THE THREE PARAMETERS OF THE DISCUSSED MODEL IS INVESTIGATED; NO SIMPLE HEIGHT DEPENDENCE CAN BE PROPOSED.

1980-0523 VANKUIKEN J C, BUEHRING W A, HUBER C C, HUB K A
RELIABILITY, ENERGY, AND COST EFFECTS OF WIND-POWERED GENERATION INTEGRATED WITH A CONVENTIONAL GENERATING SYSTEM.
NTIS, JANUARY 1980. 114 P.
ANL-AA-17

THE PURPOSE OF THIS INVESTIGATION IS TO EXAMINE THE POTENTIAL IMPACTS OF INCORPORATING WIND TURBINES, WITHOUT THE AID OF ENERGY-STORAGE DEVICES, INTO A CONVENTIONAL ELECTRICAL GENERATING SYSTEM. THIS STUDY FOCUSES ON THE CONTRIBUTION TO GENERATING-SYSTEM RELIABILITY OF WIND TURBINES, AND THE METHODS USED TO CALCULATE THESE BENEFITS. IN ADDITION, A SIMPLE COST MODEL WAS DEVELOPED TO ESTIMATE RANGES OF BREAKEVEN COSTS FOR WIND TURBINES BASED ON THE SUM OF FUEL COST SAVINGS, VARIABLE OPERATION AND MAINTENANCE (O AND M) COST SAVINGS, AND RELIABILITY BENEFITS OF THE WIND TURBINES.

1980-0524 VAN LEERSUM J
ESTIMATING SIZES AND OUTPUTS FROM WIND ENERGY SYSTEMS.
INST. ENG. AUST. ELECTR. ENG. TRANS. EE16(3): 120-127, SEPTEMBER 1980.

A SIMPLE METHOD FOR EVALUATING THE ANNUAL ENERGY OUTPUT FROM WIND TURBO GENERATORS CONNECTED INTO AN EXISTING ELECTRICAL NETWORK IS GIVEN. A MODEL FOR DETERMINING THE RELATIONSHIP BETWEEN LOAD FRACTION SUPPLIED BY WIND AND STORAGE SIZE IS DEVELOPED FOR WIND ENERGY CONVERSION SYSTEMS CONTAINING ENERGY STORES AND AUXILIARY POWER SUPPLIES. SOME GENERAL TRENDS PREDICTED BY THIS MODEL ARE GIVEN, AND RELATED CONCLUSIONS DRAWN.

1980-0525 VAS I E
KEY ISSUES ASSOCIATED WITH WIND ENERGY INNOVATIVE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 417-418.
CONF-791097

EARLIER THIS YEAR WE HELD THE FIRST CONFERENCE SOLELY DEDICATED TO INNOVATIVE CONCEPTS. REVIEW PAPERS WERE PRESENTED ON THE EFFORTS BEING CARRIED OUT BY MAJOR CONTRACTORS OF THE WIND PROGRAM. PAPERS WERE ALSO PRESENTED BY THE PRINCIPAL INVESTIGATORS OF RESEARCH STUDIES FUNDED BY DOE. IN ADDITION, CONSIDERABLE TIME WAS ALLOWED FOR OPEN DISCUSSION OF THE PAPERS, AND RECOMMENDATIONS FOR THE FUTURE DIRECTION OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM. THE ISSUES THAT I WISH TO DISCUSS ARE THOSE THAT WERE BROUGHT UP AT THAT CONFERENCE, TOGETHER WITH A FEW ADDITIONAL MATTERS RELATING TO THE INNOVATIVE PROGRAM.

1980-0526 VAS I E, SOUTH P
A REVIEW OF THE SERI WIND ENERGY INNOVATIVE SYSTEMS PROGRAM.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER A4, P. 61-74.

THIS PAPER PRESENTS THE MAJOR EFFORTS OF THE SUBCONTRACTED RESEARCH STUDIES OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM SUPPORTED BY THE SOLAR ENERGY RESEARCH INSTITUTE. ELEVEN OF THE 17 STUDIES FUNDED ARE R & D STUDIES THAT CONSIDER POTENTIALLY COST-EFFECTIVE INNOVATIVE CONCEPTS. HIGHLIGHTS OF THESE CONCEPTS ARE DISCUSSED.

1980-0527 VAS I E
WORKING GROUP REPORT ON INNOVATIVE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 523-526.
CONF-791097

1980-0528 VAS I E
WORKSHOP SUMMARY. WIND ENERGY INNOVATIVE SYSTEMS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 577-580.
CONF-791097

1980-0529 VAS I E, MITCHELL R L
A REVIEW OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM.

CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 349-416.
CONF-791097

THE OBJECTIVE OF THE PROGRAM IS TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF POTENTIALLY COST COMPETITIVE INNOVATIVE SYSTEMS. STUDIES PERFORMED IN THIS PROGRAM ARE SUBCONTRACTED TO SMALL AND LARGE PRIVATE COMPANIES AS WELL AS TO UNIVERSITIES. IN FY79, 17 STUDIES WERE FUNDED, 11 OF WHICH WERE R&D STUDIES THAT ADDRESS VARIOUS TYPES OF INNOVATIVE EXTRACTION, AUGMENTATION, AND ELECTROFLUID DYNAMIC TYPE SYSTEMS. THE REMAINING WERE SHORT TERM STUDIES ASSESSING THE VALUE OF INNOVATIVE SYSTEMS BY GENERIC ORDER.

1980-0530 VEENHUIZEN S D, LIN J T
WIND FIELD PREDICTIONS FOR THE COLUMBIA GORGE AND THE GOODNOE HILLS WIND TURBINE SITE.
NTIS, AUGUST 1980. 104 P.
DOE/BP/18979-T1

NUMERICAL ESTIMATES OF THE LONG TERM SEASONAL MEAN WIND SPEEDS, WIND DIRECTIONS, AND AVAILABLE WIND POWER DENSITY WERE CONDUCTED FOR COMPARISON WITH THE RESULTS OF FIELD WIND MEASUREMENTS OBTAINED BY THE BONNEVILLE POWER ADMINISTRATION FOR THE COLUMBIA GORGE REGION ALONG THE OREGON-WASHINGTON BORDER. THE AUTHORS HAD PREVIOUSLY USED THE NUMERICAL METHOD OF ESTIMATING WIND FLOWS IN COMPLEX TERRAIN TO IDENTIFY HIGH WIND ENERGY AREAS WITHIN THE OLYMPIC PENINSULA AND NORTHERN CASCADE REGIONS OF THE STATE OF WASHINGTON. THE NUMERICAL TECHNIQUE WAS USED AS A GENERALIZED WIND PROSPECTING TOOL TO PROVIDE THE LINK BETWEEN REGIONAL ASSESSMENTS AND ON-SITE BIOLOGICAL OR GEOMORPHOLOGICAL INDICATORS OF MEAN WIND SPEEDS AND AVAILABLE WIND ENERGY. THE WIND FLOW MODEL USED IS A TWO DIMENSIONAL MODEL BASED UPON SIMPLIFIED HYDRODYNAMICAL EQUATIONS DESCRIBING THE FLUID AND THERMODYNAMIC MOTION OF THE ATMOSPHERE.

1980-0531 VEENHUIZEN S D, LIN J-T, YAMAGIWA A T
WIND RESOURCE ASSESSMENT IN THE UPPER SKAGIT RIVER VALLEY OF WASHINGTON.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1143-1148.

EARLY IN 1979 SEATTLE CITY LIGHT BEGAN A PROGRAM WITH UNITED INDUSTRIES CORP. TO INVESTIGATE AND ASSESS THE POTENTIAL FOR ELECTRICAL GENERATION BY THE WIND WITHIN THE BONNEVILLE POWER ADMINISTRATION, THE STATE OF WASHINGTON, AND IN PARTICULAR, CITY LIGHT'S GENERATION AREA. TO OBTAIN MORE DETAILED WIND ESTIMATES FOR THE COMPLEX TERRAIN OF THE UPPER SKAGIT RIVER VALLEY, THE WIND FIELD WAS NUMERICALLY ESTIMATED OVER AN AREA 24 KM BY 26 KM WITH A GRID SPACING OF 318 METERS, AND OVER AN AREA 6 KM BY 14 KM WITH A GRID SPACING OF 127 M. THE DETAILED NUMERICAL ESTIMATES SUGGEST A VERY HIGH WIND SPEED OVER MOUNTAIN RIDGES THAT LIE PERPENDICULAR TO THE PREVAILING BACKGROUND WIND DIRECTION, IN THE GORGE BETWEEN GORGE DAM AND DIABLO DAM AND IN THE VICINITY OF ROSS DAM. IN CONJUNCTION WITH THE NUMERICAL ESTIMATES AN ON-SITE SURVEY WAS CONDUCTED IN THE DIABLO DAM AND ROSS DAM AREAS TO EXAMINE THE EVERGREEN TREES FOR EFFECTS OF STRONG AND PERSISTENT WINDS. FLAGGED TREES WERE OBSERVED THROUGHOUT THE AREA OF THE UPPER SKAGIT RIVER VALLEY. THE WIND DIRECTIONS AND SPEEDS EXHIBITED BY THE TREE DEFORMATION GENERALLY AGREE WELL WITH THE RESULTS OF THE NUMERICAL ESTIMATES. A SITE SELECTION CRITERION WAS DEVELOPED, AND THE RESULTS OF THE NUMERICAL ESTIMATES AND ON-SITE SURVEYS WERE USED TO SELECT TWO SITES FOR FUTURE INSTALLATION OF WIND SPEED MEASURING EQUIPMENT.

1980-0532 VERMUELEN P E J
AN EXPERIMENTAL ANALYSIS OF WIND TURBINE WAKES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER J3, 431-450.

EXPERIMENTAL DATA FROM VARIOUS STUDIES ARE USED TO DEVELOP A SEMI-EMPIRICAL CALCULATION METHOD FOR (THE DOWNSTREAM GROWTH AND DECAY OF) THE WAKE OF A SINGLE WIND TURBINE.

1980-0533 WALDON C A
WIND MACHINE FATIGUE ANALYSIS AND LIFE PREDICTION.
NTIS, APRIL 1980. 68 P.
RFP-3135/3533/80-19

WIND MACHINES ARE, INHERENTLY, GENERATORS OF FATIGUE. THIS IS TRUE FOR ALL TYPES AND SIZES. TESTING AT THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER HAS SHOWN THAT FATIGUE IS THE DOMINANT MODE OF STRUCTURAL FAILURE AND ITS PREDICTION IS THE HARDEST TASK FOR THE MANUFACTURER. THE OBJECTIVE OF THIS PAPER IS TO PRESENT A TECHNIQUE, DEVELOPED BY THE AUTHOR, FOR MEASURING FATIGUE AND PREDICTING FATIGUE LIFE FOR DIFFERENT WIND REGIMES. PRESENTED HEREIN ARE THE TECHNIQUES FOR LOCATING HIGH STRESS MEASURING POINTS, OBTAINING DATA, USING COMPUTER PROGRAMS FOR CALCULATING FATIGUE REDUCTION, AND FINALLY PREDICTING FATIGUE LIFE. THIS PAPER ALSO PRESENTS CURRENT WORK WHICH EXTENDS THE LIFE PREDICTION TECHNIQUE TO OTHER WIND REGIMES.

1980-0534 WALLACE V
CONVERSION OF ENERGY BY MEANS OF TETHERED WHIRLWINDS.
U.S. PATENT NO. 4,211,084, JULY 8, 1980. 5 P.

A DESCRIPTION IS GIVEN OF A PROCESS FOR TRANSFORMING HEAT CONTAINED IN SUPERDIABATIC AIR AT OR NEAR GROUND LEVEL INTO USEFUL WIND ENERGY IN THE FORM OF A TETHERED ARTIFICIAL WHIRLWIND WHICH COMPRISES (A) INITIATING A TETHERED WHIRLWIND COLUMN, (B) POWERING SAID WHIRLWIND COLUMN BY CAUSING SAID SUPERDIABATIC AIR TO FLOW INTO THE BASE OF THE WHIRLWIND COLUMN, AND (C) UTILIZING THE WIND ENERGY CONTAINED IN SAID WHIRLWIND COLUMN.

1980-0535 WALLENSTEIN A R
UTILITY COMPANY INTERFACE WITH ALTERNATE ENERGY SYSTEMS.
PUBLIC UTIL. FORTN. 105(13): 28-37, JUNE 19, 1980.

LEGAL ISSUES MAY ARISE WHEN UTILITIES--EITHER INVESTOR-OWNED OR PUBLICLY OWNED--SELL POWER TO OR PURCHASE POWER FROM CUSTOMERS WHO OWN SOLAR OR WIND ENERGY SYSTEMS, OR IF THE UTILITIES SELL, INSTALL, OR FINANCE SUCH SYSTEMS. ISSUES MAY ALSO ARISE WHEN A UTILITY COMPANY ATTEMPTS TO SELF-GENERATE POWER BY A CENTRALIZED ALTERNATE ENERGY SYSTEM. THESE INCLUDE RATE STRUCTURE, OWNERSHIP, COMPETITION, FINANCING ARRANGEMENTS, LAND USE, SAFETY, AND RELIABILITY. THE APPENDIX LISTS SOLAR RATES AND POLICIES OF 27 UTILITY COMPANY AND PUBLIC UTILITY COMMISSIONS. A COMPLETE SURVEY AND SUMMARY OF UTILITY SOLAR AND WIND PROJECTS CAN BE FOUND IN AN ELECTRIC POWER RESEARCH INSTITUTE REPORT, ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES, 1978 SURVEY, EPRI-ER-966-SR, MAY 1979.

1980-0536 WALTERS R E, MIGLIORE P G, WOLFE W P
VERTICAL AXIS WIND TURBINE RESEARCH AT WEST VIRGINIA UNIVERSITY.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 159-178.

SERI/CP-635-938

SEVERAL ASPECTS OF VAWT DESIGN HAVE BEEN INVESTIGATED. INDOOR BLADE TESTING IS COMPLICATED BY AN INDUCED OUTFLOW, ANALOGOUS TO INDUCED DOWNWASH BEHIND A FINITE SPAN WING. ANALYTICAL METHODS ARE PRESENTED WHICH MODEL THE PHENOMENON AND FROM WHICH THE INDUCED VELOCITIES CAN BE CALCULATED, ALLOWING CORRECTIONS TO INDOOR TEST DATA. ALSO, A COMPUTER CODE HAS BEEN DEVELOPED TO CALCULATE TARE TORQUES CAUSED BY VARIOUS STRUCTURAL COMPONENTS OF VAWTS. CALCULATIONS ARE COMPARED WITH RESULTS FROM WVU TESTS WITH EXCELLENT AGREEMENT. THE CODE IS VALID FOR BOTH STRAIGHT AND CURVED BLADED VAWTS. DISCUSSION IS INCLUDED REGARDING SOME MECHANICAL AND AERODYNAMIC (BLADE) DESIGN FEATURES OF A CIRCULATION CONTROLLED VAWT.

1980-0537 WALTON J J, SHERMAN C A, KNOX J B
WIND-POWER SITE-SCREENING METHODOLOGY. FINAL REPORT.
NTIS, OCTOBER 1980. 66 P.
UCRL-52938

IN 1975, THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) REQUESTED THAT THE LAWRENCE LIVERMORE LABORATORY DEVELOP, VALIDATE, AND DEMONSTRATE A WIND-ENERGY SITE-SCREENING METHODOLOGY SUITABLE FOR DEFINING THE LOCATION, GEOGRAPHIC EXTENT, AND STRENGTH OF THE RESOURCE. THE APPROPRIATE CORE CAPABILITIES EXISTING AT THAT TIME, NAMELY PRINCIPAL-COMPONENTS ANALYSIS TECHNIQUES FOR CLASSIFYING TYPES OF REGIONAL FLOW FIELDS, AND A THREE-DIMENSIONAL DIAGNOSTIC FLOW MODEL WERE BLENDED INTO A RATIONALE FOR SCREENING WIND SITES IN THE PRESENCE OF COMPLEX TERRAIN. THIS REPORT DESCRIBES THE RELEVANT CONTRIBUTING CAPABILITIES, THE DEVELOPED SCREENING METHODOLOGY, THE PROSPECTORS' PRELIMINARY WIND-RESOURCE MAPS FOR THE ISLAND OF OAHU--GENERATED TO GUIDE THE DEVELOPMENT OF THE OBSERVATIONAL NETWORK, AND THE DATA BASE DEVELOPED FOR TESTING. IT ALSO ILLUSTRATES THE USE OF THE METHODOLOGY ON THE ISLAND OF OAHU AND DESCRIBES TWO ANNUAL ASSESSMENTS OF OAHU'S WIND-ENERGY POTENTIAL. THE METHODOLOGY, TESTED ON AN INDEPENDENT SET OF SEVERAL STATIONS WITHHELD FROM MODEL DEVELOPMENT, IS SHOWN AS ABLE TO IDENTIFY WIND-ENERGY RESOURCES CREATED BY TERRAIN ENHANCEMENT QUITE WELL, WITH THE ANNUAL MEAN WIND SPEED FOR THE INDEPENDENT DATA SET DEPICTED WITHIN ABOUT 1 M/S FOR A REASONABLE RANGE OF ANNUAL WIND SPEEDS.

1980-0538 WARDMAN J C, ADAMS J Y
SOLAR AND WIND ENERGIZED POWER GENERATION DEVICE.
U.S. PATENT NO. 4,222,241, SEPTEMBER 16, 1980.

THIS IS A SOLAR AND WIND ENERGIZED POWER GENERATION DEVICE COMPRISED OF A COLD FLUID RESERVOIR CONTAINING A FIRST BODY OF FLUID, A HOT FLUID RESERVOIR CONTAINING A SECOND BODY OF FLUID, AND A COVERING FOR THE TWO. THE COVER CONTAINS A HEAT TRAPPING PORTION WHICH CONFINES HEAT IN THE SECOND BODY OF FLUID AND AN AIRFOIL PORTION WHICH CAN DIRECT WIND PAST THE COLD FLUID RESERVOIR TO COOL THE FIRST BODY OF FLUID. THE HEAT EXCHANGE FOR CONVERTING THE THERMAL ENERGY RESIDING IN THE TEMPERATURE DIFFERENCE BETWEEN THE BODIES OF FLUID INTO MECHANICAL ENERGY IS CAPABLE OF PERFORMING USEFUL WORK.

1980-0539 WARMBRODT W, FRIEDMANN P
COUPLED ROTOR/TOWER AEROELASTIC ANALYSIS OF LARGE HORIZONTAL AXIS WIND TURBINES.
AIAA J. 18(9): 1118-1124, SEPTEMBER 1980.

FORMULATION OF THE GOVERNING NONLINEAR EQUATIONS OF MOTION FOR THE COUPLED ROTOR/TOWER DYNAMICS OF A LARGE TWO-BLADED HORIZONTAL AXIS WIND TURBINE (HAWT) IS PRESENTED. EACH BLADE HAS ELASTIC FLAP AND LEAD-LAG BENDING DEFLECTIONS. ROTOR/TOWER COUPLING IS ACCOMPLISHED BY ENFORCING DYNAMIC EQUILIBRIUM BETWEEN THE ROTOR AND THE TOP OF THE TOWER. THE NONLINEAR PERIODIC COEFFICIENT EQUATIONS OF MOTION ARE USED TO STUDY AEROELASTIC STABILITY AND RESPONSE OF THE NASA/DOE 100 KW MOD-0 WIND TURBINE. THE INFLUENCE OF THE FLEXIBLE TOWER AND NONLINEAR TERMS ON ROTOR STABILITY IS EXAMINED. ISOLATED ROTOR BLADE BEHAVIOR IS COMPARED TO THE COMPLETE COUPLED ROTOR/TOWER SYSTEM AND THE BASIC DIFFERENCES ARE IDENTIFIED. IT IS CONCLUDED THAT FOR HIGH TOWER STIFFNESS, THE AEROELASTIC RESPONSE IS PRIMARILY DEPENDENT ON ISOLATED ROTOR FORCING, YAW MECHANISM FLEXIBILITY, AND TOWER SHADOW EFFECT.

1980-0540 WEBER W
THE CONCEPTUAL DESIGN OF THE HIGH SPEED RATIO WIND ROTOR FOR THE 52 M DIAMETER HORIZONTAL AXIS VOITH WIND ENERGY CONVERTER.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER E2, P. 239-251.

THE VOITH WIND TURBINE IS A DEVELOPMENT OF A HORIZONTAL AXIS TURBINE WITH TWO BLADES FULLY CONSTRUCTED IN COMPOSITE MATERIALS. IT IS DESIGNED EITHER TO SUPPLY ELECTRIC POWER WITH A 265 KW GENERATOR TO AN ELECTRIC GRID OR TO BE AN INDEPENDENT ELECTRICITY SOURCE FOR SPECIFIC TASKS IN HIGHLY DEVELOPED COUNTRIES AND IN REMOTE AREAS. FOR THIS REASON THE CONCEPTUAL PHILOSOPHY OF THIS WIND TURBINE GOES IN A SLIGHTLY DIFFERENT DIRECTION TO OTHER DEVELOPMENTS OF WIND ENERGY CONVERTERS ACTUALLY DESIGNED AND IN OPERATION, A SITUATION WHICH MAY BE EXPLAINED IN THE FIRST CHAPTER.

1980-0541 WEGLEY H L, RAMSDELL J V, ORGILL M M, DRAKE R L
SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, MARCH 1980. 90 P.
PNL-2521(REV.1)

THIS HANDBOOK WAS WRITTEN TO SERVE AS A SITING GUIDE FOR INDIVIDUALS WISHING TO INSTALL SMALL WIND ENERGY CONVERSION SYSTEMS (WECS); THAT IS, MACHINES HAVING A RATED CAPACITY OF LESS THAN 100 KILOWATTS. IT INCORPORATES HALF A CENTURY OF SITING EXPERIENCE GAINED BY WECS OWNERS AND MANUFACTURERS, AS WELL AS RECENTLY DEVELOPED SITING TECHNIQUES. THE USER NEEDS NO TECHNICAL BACKGROUND IN METEOROLOGY OR ENGINEERING TO UNDERSTAND AND APPLY THE SITING PRINCIPLES DISCUSSED; HE NEEDS ONLY A KNOWLEDGE OF BASIC ARITHMETIC AND THE ABILITY TO UNDERSTAND SIMPLE GRAPHS AND TABLES. BY PROPERLY USING THE SITING TECHNIQUES, AN OWNER CAN SELECT A SITE THAT WILL YIELD THE MOST POWER AT THE LEAST INSTALLATION COST, THE LEAST MAINTENANCE COST, AND THE LEAST RISK OF DAMAGE OR ACCIDENTAL INJURY.

1980-0542 WEIS P
PROCEEDINGS: PANEL ON INFORMATION DISSEMINATION FOR WIND ENERGY.
NTIS, APRIL 1980. 86 P.
PANEL ON INFORMATION DISSEMINATION FOR WIND ENERGY, ALBUQUERQUE, N.M., AUGUST 2-3, 1979.
SERI/TP-732-343

THIS MEETING WAS CALLED AS PART OF A MULTI-YEAR PLANNING EFFORT. GROUPS INVOLVED IN THE PRODUCTION AND/OR DISSEMINATION OF INFORMATION ON WIND ENERGY WERE INVITED TO DESCRIBE THEIR CURRENT ACTIVITIES AND THEIR PERCEPTIONS OF THE NEEDS OF THE 80'S IN THIS AREA. PARTICIPANTS EXCHANGED COPIES OF MATERIALS THEY DISTRIBUTE REGULARLY AND DISCUSSED FREQUENTLY ASKED QUESTIONS.

1980-0543 WEISBRICH A L
ALTERNATIVE ENERGY FOR DOMESTIC HOT WATER: WIND OR SOLAR?
SOLAR ENERGY INTERNATIONAL PROGRESS. INTERNATIONAL SYMPOSIUM/WORKSHOP ON SOLAR ENERGY, PART IV, CAIRO, JUNE 16-22, 1978. PROCEEDINGS. OXFORD, PERGAMON PRESS, 1980. P. 1834-1849.

A COMPARATIVE PARAMETRIC ANALYSIS ON ENERGY COST IS PRESENTED FOR WIND ENERGY CONVERSION SYSTEMS (WECS) AND SOLAR COLLECTOR SYSTEMS DESIGNED FOR HEATING WATER.

1980-0544 WEISBRICH A L, DUFFY R E
DEVELOPMENT STATUS OF THE TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) FOR WIND ENERGY CONVERSION.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. P. 55-65.
SERI/CP-635-938

RECENT MODEL WIND TUNNEL TESTS AT RENSSELAER POLYTECHNIC INSTITUTE UNDER NEW YORK STATE ERDA CONTRACT OF THE MOST PRIMITIVE TARP CONFIGURATION WITH AN INSTALLED CONVENTIONAL HORIZONTAL AXIS WIND TURBINE ROTOR HAVE DEMONSTRATED POWER OUTPUT AMPLIFICATION FOR THAT ROTOR IN EXCESS OF 4.5 TIMES ITS MAXIMUM IDENTICAL FREE STREAM OUTPUT. THE TARP FURTHERMORE REPRESENTS A UNIQUE WIND ENERGY CONVERSION SYSTEM (WECS) DESIGN IN THAT ITS STRUCTURE CAN SERVE A MULTI-FUNCTIONAL (E.G., HOUSING) AND HENCE IMPORTANT, RESOURCE CONSERVING AND ECONOMIZING ROLE.

1980-0545 WENDELL L L
FEDERAL WIND ENERGY PROGRAM FOR WIND RESOURCE ASSESSMENT AND SITING: AN OVERVIEW.
WESTERN SUN 1980 SOLAR UPDATE CONFERENCE, SALT LAKE CITY, UTAH, SEPTEMBER 24, 1980. PROCEEDINGS. NTIS, 1980. P. 255-261.
CONF-800995

IN THIS OVERVIEW, THE TECHNICAL PROGRESS IN WIND RESOURCE ASSESSMENT AND SITING IS HIGHLIGHTED FROM THE WORK OF THE PACIFIC NORTHWEST LABORATORY (PNL) AND ITS SUBCONTRACTORS. ONE OF THE MAJOR EFFORTS IN THE PROGRAM IS THE COMPLETION OF THE REGIONAL WIND ENERGY ASSESSMENTS COVERING THE UNITED STATES AND ITS TERRITORIES. ALSO, METHODS FOR SELECTING THE SPECIFIC LOCATIONS OF WIND TURBINES HAVE BEEN DEVELOPED FOR BOTH LARGE AND SMALL MACHINES.

1980-0546 WENDELL L L
KEY ISSUES ASSOCIATED WITH WIND CHARACTERISTICS AND WIND ENERGY SITING.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 245-248.
CONF-791097

THE FOUR MAJOR TASK AREAS IN THE WIND CHARACTERISTICS PROGRAM ARE: RESOURCE ASSESSMENT, SITING METHODOLOGIES, DESIGN AND PERFORMANCE EVALUATION, AND WIND CHARACTERISTICS FOR OPERATIONS. THESE KEY ISSUES ARE PROPOSED FOR DISCUSSION IN THIS PAPER.

1980-0547 WENDELL L L
OVERVIEW OF THE WIND CHARACTERISTICS PROGRAM.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 209-244.
CONF-791097

THE PACIFIC NORTHWEST LABORATORY (PNL) HAS BEEN RESPONSIBLE FOR THE TECHNICAL MANAGEMENT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE FEDERAL WIND PROGRAM SINCE APRIL OF 1976. IN THIS OVERVIEW, THE TECHNICAL PROGRESS IN WIND CHARACTERISTICS WILL BE HIGHLIGHTED FROM THE WORK OF PNL AND SUBCONTRACTOR CONTRIBUTORS.

1980-0548 WENDELL L L
WORKING GROUP REPORT ON WIND CHARACTERISTICS AND SITING.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 513-518.
CONF-791097

1980-0549 WENDELL L L
WORKSHOP SUMMARY. WIND CHARACTERISTICS AND WIND ENERGY SITING 1979.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 581-588.
CONF-791097

1980-0550 WENDELL L L, BARCHET W R, CONNELL J R, MILLER A H, PENNELL W T
ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT, JULY 1978-SEPTEMBER 1979.
NTIS, MAY 1980. 209 P.
PNL-3211

AS A SERVICE ELEMENT WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS ESTABLISHED TO PROVIDE THE APPROPRIATE WIND CHARACTERISTICS INFORMATION TO THOSE INVOLVED IN: THE DESIGN AND EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS); ENERGY PROGRAM PLANNING; SELECTING SITES FOR WECS INSTALLATION; AND THE OPERATION OF WECS. TO EFFECTIVELY PRODUCE THE INFORMATION NEEDED IN THESE FOUR CATEGORIES, THE WCPE, FOR WHICH THE PACIFIC NORTHWEST LABORATORY (PNL) HAS THE RESPONSIBILITY FOR MANAGEMENT AND TECHNICAL ASSISTANCE, HAS BEEN DIVIDED INTO FOUR TECHNICAL PROGRAM AREAS. DURING THIS REPORTING PERIOD PNL WAS ALSO ASSIGNED THE MANAGEMENT RESPONSIBILITY FOR THE DATA COLLECTION AT THE US DEPARTMENT OF ENERGY'S (DOE'S) CANDIDATE SITES, AS WELL AS THE TASK OF PROVIDING TECHNICAL ASSISTANCE TO DOE EVALUATION AND SITE SELECTION PANELS FOR NEW CANDIDATE SITES.

1980-0551 WENTWORTH M C
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1980 SURVEY.
NTIS, DECEMBER 1980. 283 P.
EPRI-AP-1713-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. BRIEF DESCRIPTIONS OF 839 PROJECTS BEING CONDUCTED BY 236 UTILITY COMPANIES ARE GIVEN. ALSO INCLUDED ARE AN INDEX OF PROJECTS BY CATEGORY, A STATISTICAL SUMMARY, A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, A LIST OF UTILITIES ORGANIZED BY STATE, A LIST OF AVAILABLE REPORTS ON UTILITY-SPONSORED PROJECTS, AND A LIST OF PROJECTS HAVING MULTIPLE UTILITY PARTICIPANTS. PROJECT CATEGORIES INCLUDE SOLAR HEATING AND COOLING OF BUILDINGS, WIND ENERGY CONVERSION, SOLAR-THERMAL ELECTRIC POWER, PHOTOVOLTAICS, BIOMASS CONVERSION, PROCESS

HEAT, AND OCEAN ENERGY CONVERSION.

1980-0552 WENTZ W H, SNYDER M H, CALHOUN J T
FEASIBILITY STUDIES OF SPOILER AND AILERON CONTROL SYSTEMS FOR LARGE HORIZONTAL-AXIS WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 15TH, SEATTLE, WASHINGTON, AUGUST 18-22, 1980.
PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1980. VOLUME 2, P. 1138-1142.

STUDIES HAVE BEEN CONDUCTED TO DETERMINE THE FEASIBILITY OF USING AILERON OR SPOILER CONTROLS AS ALTERNATES TO PITCH CONTROL FOR LARGE HORIZONTAL AXIS WIND TURBINES. THE NASA MOD-0 MACHINE WAS USED AS THE BASIS FOR THIS STUDY. RESULTS OF THE STUDY SHOW THAT EITHER AILERONS OR SPOILERS CAN PROVIDE CONTROL NECESSARY TO LIMIT TURBINE POWER IN HIGH WIND CONDITIONS. AN AILERON SYSTEM IS RECOMMENDED FOR THE PRESENT APPLICATION, BASED UPON THE ABILITY OF AILERONS TO PROVIDE SELF-STARTING AND ADDED POWER AT LOW WIND SPEED CONDITIONS. THE PRELIMINARY DESIGN STUDY INCLUDING AILERON COMPONENT SIZING AND MAXIMUM HINGE MOMENTS WAS COMPLETED AND AILERONS WILL BE FABRICATED FOR TESTING ON THE MOD-0 TURBINE.

1980-0553 WENTZ W H, SNYDER M H, CALHOUN J T
FEASIBILITY STUDY OF AILERON AND SPOILER CONTROL SYSTEMS FOR LARGE HORIZONTAL AXIS WIND TURBINES.
NTIS, MAY 1980. 69 P.
NASA-CR-159856, DOE/NASA/3277-1, N80-27803/9

THE FEASIBILITY OF USING AILERON OR SPOILER CONTROLS AS ALTERNATES TO PITCH CONTROL FOR LARGE HORIZONTAL AXIS WIND TURBINES WAS STUDIED. THE NASA MOD-0 100 KW MACHINE WAS USED AS THE BASIS FOR THE STUDY. SPECIFIC PERFORMANCE STUDIES WERE CONDUCTED FOR 20% CHORD AILERONS OVER THE OUTBOARD 30% SPAN, AND FOR 10% CHORD SPOILERS OVER THE SAME PORTION OF THE SPAN. BOTH CONTROL SYSTEMS UTILIZED CONTROL DEFLECTIONS UP TO 60 DEGREES. RESULTS OF THE STUDY SHOW THAT EITHER AILERONS OR SPOILERS CAN PROVIDE THE CONTROL NECESSARY TO LIMIT TURBINE POWER IN HIGH WIND CONDITIONS. THE AILERON SYSTEM, AS DESIGNED, PROVIDES OVERSPEED PROTECTION AT HURRICANE WIND SPEEDS, LOW WIND SPEED STARTING TORQUE OF 778 N-M (574 FT-LB) AT 3.6 M/S, AND A 1.3 TO 1.5% INCREASE IN ANNUAL ENERGY COMPARED TO A FIXED PITCH ROTOR. THE AILERON CONTROL SYSTEM PRELIMINARY DESIGN STUDY INCLUDES AILERON LOADS ANALYSIS AND THE DESIGN OF A FAILSAFE FLYWEIGHT ACTUATOR FOR OVERSPEED PROTECTION IN THE EVENT OF A HYDRAULIC SYSTEM FAILURE.

1980-0554 WHAT PRICE WIND.
ENERGY MANAGER 3(6): 44-46, 53, OCTOBER 1980.

A COST BREAKDOWN OF WIND-POWERED SYSTEMS AND AN ASSESSMENT OF THE VALUE OF WIND-GENERATED POWER IS DEVELOPED USING CURRENT WINDMILL TECHNOLOGY. THE MOD 2 WINDMILL IS ECONOMICALLY FEASIBLE FOR UNITED KINGDOM SITES HAVING 12 MILE-PER-HOUR WIND SPEEDS IF PRODUCTION AND DISCOUNT RATES AND REAL FUEL PRICE INCREASES DEVELOP AS EXPECTED.

1980-0555 WHITTLE G E, BOSSANYI E A, MACLEAN C, DUNN P D, LIPMAN N H, MUSGROVE P J
A SIMULATION MODEL OF AN ELECTRICITY GENERATING SYSTEM INCORPORATING WIND TURBINE PLANT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 3D, COPENHAGEN, AUGUST 26-29, 1980. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1980. PAPER L2, P. 545-554.

AN HOUR-BY-HOUR SIMULATION MODEL OF AN ELECTRICITY GENERATING SYSTEM INCORPORATING WIND TURBINE PLANT IS DESCRIBED. IT IS FORMULATED IN A WAY WHICH MAKES IT APPROPRIATE TO THE CENTRAL ELECTRICITY GENERATING BOARD GRID SYSTEM. WIND PLANT RATINGS OF UP TO 25 GW (60% OF MAXIMUM SYSTEM DEMAND) ARE CONSIDERED. THE EFFECT OF THE FLUCTUATING WIND POWER ON THE OUTPUT OF THE CONVENTIONAL PLANT IS IDENTIFIED AS WELL AS THE AMOUNT OF WIND ENERGY LOST DUE TO SHORT TERM EXCESSES OF WIND POWER. THE USE OF STEAM PLANT SPINNING RESERVE AND GAS TURBINE POWER TO COMPENSATE FOR UNCERTAINTIES IN WIND POWER AVAILABILITY IS STUDIED. ASSUMPTIONS ABOUT RELATIVE FUEL COSTS ARE MADE TO DETERMINE AN OPTIMUM SPINNING RESERVE, AND TO CALCULATE A FUEL COST PENALTY ON THE VALUE OF FUEL SAVED BY THE WIND ENERGY SYSTEM.

1980-0556 WILLIAMS R A
AN UPDATE ON ACTIVITIES AT ROCKY FLATS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS JUNE 1980. P. 9-38.
CONF-791097

THE ROCKY FLATS WIND SYSTEMS PROGRAM IS DESCRIBED. THE PROGRAM OBJECTIVES ARE TO 1) REDUCE COSTS, 2) IMPROVE RELIABILITY AND SAFETY, 3) PROMOTE THE INDUSTRIAL INFRASTRUCTURE, 4) IDENTIFY AND ELIMINATE INSTITUTIONAL BARRIERS, AND 5) INCREASE PUBLIC AWARENESS.

1980-0557 WILSON R E
WIND-TURBINE AERODYNAMICS.
J. IND. AERODYN. 5(3-4): 357-372, MAY 1980.

THE AERODYNAMICS OF WIND TURBINES IS REVIEWED STARTING WITH EFFECTS OF LIFT AND DRAG ON TRANSLATING DEVICES AND PROCEEDING THROUGH THE PERFORMANCE AERODYNAMICS OF THE HORIZONTAL-AXIS AND VERTICAL-AXIS MACHINES CURRENTLY IN SERVICE. HORIZONTAL-AXIS ROTOR AERODYNAMICS IS OUTLINED AND THE PERFORMANCE LIMITS ARE PRESENTED ALONG WITH KEY ASSUMPTIONS AND PROBLEM AREAS. THE DARRIEUS ROTOR MULTIPLE STREAMTUBE ANALYSIS IS DEVELOPED AND COMPARED WITH FIXED AND FREE WAKE ANALYSES FOR AN IDEALIZED CASE.

1980-0558 WIND ENERGY EQUIPMENT MANUFACTURERS.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, NOVEMBER 1980. 9 P.
SEIDB INF. MOD. 10201

MANUFACTURERS OF WIND ENERGY EQUIPMENT ARE LISTED IN A CLASSIFIED INDEX, BY PRODUCT CATEGORY, AND ALPHABETICALLY IN A MANUFACTURERS INDEX.

1980-0559 WIND ENERGY IN AGRICULTURE: QUICK BIBLIOGRAPHY SERIES. JANUARY 1970 - DECEMBER 1979. PART I. 48 CITATIONS. PART II. 122 CITATIONS.
BELTSVILLE, MARYLAND, NATIONAL AGRICULTURAL LIBRARY, 1980. 35 P.

BIBLIOGRAPHIES IN THIS SERIES ARE DERIVED FROM COMPUTERIZED ON-LINE SEARCHES OF SELECTED DATA BASES. TIMELINESS OF THE TOPIC AND EVIDENCE OF EXTENSIVE INTEREST ARE SELECTION CRITERIA. COMPREHENSIVE SUBJECT COVERAGE IS NOT AN OBJECTIVE; HOWEVER, THE CITATIONS PROVIDE A SUBSTANTIAL RECENT RESOURCE FOR INVESTIGATION OF THE SUBJECT. EACH BIBLIOGRAPHY IS UPDATED OR DROPPED AFTER SIX MONTHS.

1980-0560 WIND ENERGY INTEGRATION STUDY.
NTIS, AUGUST 1980. 77 P.

DOE/BP/10552-17

THE OVERALL OBJECTIVE OF THIS STUDY WAS TO INVESTIGATE THE FEASIBILITY OF INTEGRATING A SIMULATED 3000 MEGAWATT (MW) WIND ENERGY CONVERSION NETWORK INTO THE PACIFIC NORTHWEST HYDRO-THERMAL GENERATION SYSTEM. THE SPECIFIC PURPOSE WAS TO IDENTIFY THOSE SIGNIFICANT EFFECTS WHICH REQUIRE PLANNING CONSIDERATION AND FURTHER STUDY PRIOR TO EXTENSIVE DEVELOPMENT OF WIND ENERGY. THE FOLLOWING AREAS WERE IDENTIFIED FOR PRELIMINARY ANALYSIS: SEASONAL POWER PLANNING (REGULATION); SECONDARY ENERGY (SURPLUS); ENERGY RESERVE PLANNING; PEAK RESERVES; AND HOURLY PLANNING.

1980-0561 WIND ENERGY SYSTEMS: PROGRAM SUMMARY.
NTIS, MAY 1980. 237 P.
DOE/CS/20097-01

THE FEDERAL WIND ENERGY PROGRAM (FWEP) WAS INITIATED TO PROVIDE FOCUS, DIRECTION AND FUNDS FOR THE DEVELOPMENT OF WIND POWER. EACH YEAR A SUMMARY IS PREPARED TO PROVIDE THE AMERICAN PUBLIC WITH AN OVERVIEW OF GOVERNMENT SPONSORED ACTIVITIES IN THE FWEP. THIS PROGRAM SUMMARY DESCRIBES EACH OF THE DEPARTMENT OF ENERGY'S (DOE) CURRENT WIND ENERGY PROJECTS INITIATED OR RENEWED DURING FY 1979 (OCTOBER 1, 1978 THROUGH SEPTEMBER 30, 1979) AND REFLECTS THEIR STATUS AS OF APRIL 30, 1980. THE SUMMARY HIGHLIGHTS ON-GOING RESEARCH, DEVELOPMENT AND DEMONSTRATION EFFORTS AND SERVES AS A RECORD OF PROGRESS TOWARDS THE PROGRAM OBJECTIVES. IT ALSO PROVIDES: THE PROGRAM'S GENERAL MANAGEMENT STRUCTURE; REVIEW OF LAST YEAR'S ACHIEVEMENTS; FORECAST OF EXPECTED FUTURE TRENDS; DOCUMENTATION OF THE PROJECTS CONDUCTED DURING FY 1979; AND LIST OF KEY WIND ENERGY PUBLICATIONS.

1980-0562 WIND ENERGY SYSTEMS. QUARTERLY REVIEW, APRIL 1, 1980 - JUNE 30, 1980.
NTIS, NOVEMBER 1980. 215 P.
SERI/PR-635-770

THE QUARTERLY REVIEW FOR THE WIND ENERGY SYSTEMS (WES) PROGRAM IS PREPARED BY THE SOLAR ENERGY RESEARCH INSTITUTE (SERI) AS AN OVERVIEW OF THE PROGRAM EFFORTS. THE REVIEW PRESENTS THE OBJECTIVES, ACCOMPLISHMENTS, PLANNED ACTIVITIES, AND OUTPUTS OF EACH TASK IN THE WES PROGRAM.

1980-0563 WIND ENERGY TASK FORCE. FINAL REPORT.
SALEM, OREGON, OREGON DEPARTMENT OF ENERGY, 1980. 153 P.
NP-25026

RECENT ESTIMATES MADE BY BATTELLE PACIFIC NORTHWEST LABORATORIES INDICATE THAT ABOUT 4.7% OR 4500 SQUARE MILES OF OREGON HAS SUFFICIENT WIND ENERGY DENSITY FOR THE SITING OF WIND TURBINE GENERATORS (WTGS). IF THREE 3 MEGAWATT (MW) WTGS WERE SITED IN EACH SQUARE MILE, THE TOTAL GROSS INSTALLED NAMEPLATE CAPACITY WOULD BE ABOUT 40,500 MW. THIS DRAFT PRESENTS THE WORK OF THE WIND ENERGY TASK FORCE IN ITS INVESTIGATION OF WIND ENERGY IN OREGON. WHILE THE GROSS POTENTIAL ABOVE IS SUBSTANTIAL, NUMEROUS CONSTRAINTS--RANGING FROM THE COST AND POTENTIAL AVAILABILITY OF COMMERCIAL HARDWARE TO SITING AND ZONING ISSUES--WERE EXAMINED BY THE TASK FORCE. THE RESULTING NET POTENTIAL FOR WIND ENERGY SYSTEMS/NAMEPLACE CAPACITY BY THE YEAR 2000 IS APPROXIMATELY 1400 MW.

1980-0564 WIND GENERATES EXCITEMENT.
N. ENGL. BUS. 2(6): 34-36, APRIL 1, 1980.

WIND TURBINES DESIGNED BY KAMAN AEROSPACE CORPORATION AND UNITED TECHNOLOGIES CORPORATION'S HAMILTON STANDARD DIVISION AND RESEARCH CENTER ARE DESCRIBED.

1980-0565 WIND-HYDROELECTRIC IN MEDICINE BOW.
WIND POWER DIG. NO. 20: 20-29, SUMMER 1980.

1980-0566 WIND POWER: SLOW OUT OF THE SOLAR GATE OF THE 70'S... PICKING UP SPEED IN THE BACKSTRETCH OF THE 80'S.
ALTERN. SOURCES ENERGY NO. 46: 8-10, NOVEMBER/DECEMBER 1980.

THIS ARTICLE IS A REPORT ON THE AMERICAN WIND ENERGY ASSOCIATION CONFERENCE IN PITTSBURGH IN JUNE 1980.

1980-0567 WIND RESOURCE OF THE AREA SURROUNDING MEDICINE BOW, WYOMING.
NTIS, AUGUST 1980. 39 P.
PB81-109621

FIVE HIGH-WIND SITES IN THE VICINITY OF MEDICINE BOW, WYOMING, WERE INSTRUMENTED TO RECORD WIND RESOURCE DATA, WITH THE ULTIMATE GOAL OF INSTALLING A LARGE NUMBER OF WTG'S (WIND TURBINE GENERATORS), I.E., ESTABLISHING A WINDFARM. INTEGRATION OF WINDPOWER AND HYDROELECTRIC POWER WOULD BE ACCOMPLISHED BY TYING THE WINDFARM OUTPUT INTO AN EXISTING HYDROPOWER ELECTRICAL GRID. THIS REPORT PRESENTS DATA COLLECTED FROM FEBRUARY 1, 1978, THROUGH OCTOBER 31, 1979. THE DATA IS PRESENTED IN THE FORM OF PLOTS OF MONTHLY MEAN WINDSPEED, DURATION WINDSPEED EXCEEDED, WINDSPEED FREQUENCY, AND POLAR WIND ROSES.

1980-0568 WIND/WATER ENERGY CONVERTER: A PROPOSED DEVICE THAT COULD BE DRIVEN BY WIND OR WATER CURRENTS WOULD GENERATE ELECTRICITY TO OPERATE PUMPS.
NTIS, 1980. 1 P.
PB80-971940

1980-0569 WIND-WHEEL ELECTRIC-POWER GENERATOR: A ROTOR MOUNTED IN A SPECIAL HOUSING UTILIZES WIND CURRENTS TO GENERATE ELECTRIC POWERS.
NTIS, 1980. 1 P.
PB80-974480, PB80-925303

THIS TECHNICAL NOTE IS NOT AVAILABLE SEPARATELY. IT MUST BE ORDERED AS PB80-925393 (ENERGY).

1980-0570 WINDHEIM R, NEUMANN R
WIND ENERGY R&D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY AND CURRENT WIND ENERGY PROJECTS.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH BIENNIAL. NTIS, JUNE 1980. P. 249-268.
CONF-791097

THE WIND ENERGY R&D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY, PART OF THE GOVERNMENT'S PROGRAM FOR ENERGY RESEARCH AND TECHNOLOGIES, FOLLOWS THE OBJECTIVE TO DEVELOP RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS) AND TO BRING ABOUT THE COMMERCIALIZATION OF WIND POWER. TO ACHIEVE THIS OBJECTIVE MORE THAN 40 PROJECTS ARE SUPPORTED BY THE PROGRAM. THESE PROJECTS COVER THE FOLLOWING PROGRAM ELEMENTS: ADAPTION OF SMALL WECS WITH HORIZONTAL OR VERTICAL AXIS FOR SPECIAL APPLICATIONS, AND ELECTRICITY GENERATION BY

LARGE SCALE WECS FOR THE NATIONAL GRID, ESPECIALLY THE GROWIAN PROGRAM.

1980-0571 WORSTELL M H
AERODYNAMIC PERFORMANCE OF THE 17-M-DIAMETER DARRIEUS WIND TURBINE IN THE THREE-BLADED CONFIGURATION: AN ADDENDUM.
NTIS, FEBRUARY 1980. 59 P.
SAND-79-1753

THE US DEPARTMENT OF ENERGY (DOE)/SANDIA 17-M WIND TURBINE HAS BEEN TESTED IN THE THREE-BLADED CONFIGURATION AT FIVE ROTATIONAL SPEEDS. THESE DATA ARE PRESENTED ALONG WITH SOME FUNDAMENTAL COMPARISONS TO THE EARLIER TWO-BLADED RESULTS. ALSO INCLUDED IS THE THEORETICAL OUTPUT OF THE THREE-BLADED 17-M WIND TURBINE AT TWO SELECTED ROTATIONAL SPEEDS.

1980-0572 WORSTELL M H
PERFORMANCE OF THE DOE/SANDIA 17-M VERTICAL AXIS WIND TURBINE.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 4TH, ALBUQUERQUE, N.M., OCTOBER 30-NOVEMBER 1, 1979. SILVER SPRINGS, MARYLAND, INFORMATION TRANSFER INC., 1980. P. 149-155.

THE DOE/SANDIA 17-M WIND TURBINE HAS BEEN IN OPERATION SINCE MARCH 1977. THIS MACHINE IS FUNDED BY THE DEPARTMENT OF ENERGY TO PROVIDE FIELD TEST DATA OF A LARGE DARRIEUS WIND TURBINE TO BE USED IN CONJUNCTION WITH ONGOING ANALYTICAL STUDIES. THE 17-M TURBINE HAS ALSO PROVIDED VALUABLE EXPERIENCE FROM BOTH CONSTRUCTION AND OPERATIONAL STANDPOINTS. THIS PAPER WILL ADDRESS TURBINE PERFORMANCE.

1980-0573 WRIGHT P, STEVENS B
ALLISON'S WIND ENGINE: SPIRALED BLADES FOR HIGH EFFICIENCY.
POP. SCI. 216(3): 64-65, 68, MARCH 1980.

A HORIZONTAL AXIS WIND TURBINE WITH MULTIPLE SPIRAL-ARRANGED BLADES DEVELOPED BY WILLIAM ALLISON IS DESCRIBED.

1980-0574 YEN J T
TORNADO-TYPE WIND ENERGY SYSTEM: OUTLINE OF RECENT DEVELOPMENTS.
SERI SECOND WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, DECEMBER 3-5, 1980. NTIS, 1980. VOLUME II, P. 9-18.
SERI/CP-635-1601

AN OUTLINE OF RECENT DEVELOPMENTS ON TORNADO-TYPE WIND ENERGY SYSTEM (TWES) IS PRESENTED. SMALL MODELS UP TO 1.1 M (42 INCHES) IN TOWER HEIGHT AND 0.1 M (4 INCHES) IN TURBINE DIAMETER WERE TESTED IN THE GRUMMAN RESEARCH TUNNEL, FOLLOWED BY A SHORT TEST IN THE NASA LANGLEY V/STOL TUNNEL. THE MODELS TESTED WERE CONSTRUCTED WITH FIXED OMNIDIRECTIONAL PERIPHERAL VANES. DATA OBTAINED FROM THE GRUMMAN TUNNEL SHOW A BEST POWER COEFFICIENT BASED ON THE TOWER FRONTAL AREA OF AROUND 14%, WHILE THE LANGLEY TEST SHOWS A MAXIMUM VALUE OF AROUND 10%. HOWEVER, DUE TO THE SHORT DURATION (1 1/2 DAYS) OF THE LANGLEY TEST, WE WERE NOT ABLE TO BRING OUT THE BEST PERFORMANCE OF THE MODEL TESTED. A COST ANALYSIS BASED ON A 10% POWER COEFFICIENT WAS CARRIED OUT. RESULTS SHOW THAT FOR MASS PRODUCED FULL-SCALE UNITS THE CAPITAL COST WOULD BE LESS THAN $700 PER RATED KW AND THE ENERGY COST WOULD BE BELOW 4 CENTS PER KWH. THUS, IT IS CONCLUDED THAT THE TWES HAS A GOOD COMMERCIAL POTENTIAL, REINFORCING THE CONCLUSIONS WE HAVE REACHED IN PREVIOUS COST ANALYSES.

1979-0130 AKINS R E
WIND CHARACTERISTICS FOR FIELD TESTING OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, NOVEMBER 1979. 53 P.
SAND-78-1563

TECHNIQUES ARE PRESENTED TO DETERMINE PLACEMENT OF INSTRUMENTATION TO BE USED IN MEASUREMENT OF WIND CHARACTERISTICS FOR FIELD TESTING OF WIND ENERGY CONVERSION SYSTEMS (WECS). POTENTIAL ERRORS IN THE MEASUREMENT OF A REFERENCE WIND VELOCITY AS A RESULT OF PHYSICAL SEPARATION BETWEEN AN ANEMOMETER AND A WECS AND INTERFERENCE BETWEEN THE WECS AND THE REFERENCE ANEMOMETER ARE OUTLINED. METHODS OF CORRECTING ERRORS CAUSED BY BOTH OF THESE SOURCES ARE DEVELOPED.

1979-0131 ALTSEIMER J H, BLAUNSTEIN R P
STATUS REVIEW OF THE TECHNOLOGY ASSESSMENT OF SOLAR ENERGY PROGRAM.
NTIS, 1979. 6 P.
LA-UR-79-1369, CONF-790541-4

AN INTERIM STATUS REPORT IS GIVEN ON THE TECHNOLOGY ASSESSMENT OF SOLAR ENERGY (TASE) PROGRAM SPONSORED BY THE OFFICE OF ENVIRONMENT OF THE DEPARTMENT OF ENERGY (DOE). A NUMBER OF EMERGING SOLAR TECHNOLOGIES AND SELECTED APPLICATIONS ARE BEING ASSESSED FOR THE ENVIRONMENTAL, INSTITUTIONAL, AND SOCIAL IMPACTS RESULTING FROM THE LARGE-SCALE DEPLOYMENT OF DECENTRALIZED SOLAR TECHNOLOGIES. TWO NATIONAL ENERGY SCENARIOS FOR THE YEAR 2000 ARE BEING USED, ONE PREDICTING 6 QUADS OF SOLAR AND THE OTHER 14.2 QUADS. A FEW RESULTS OF A PRELIMINARY STUDY OF THE SYSTEM CHARACTERIZATION DATA ARE GIVEN.

1979-0132 ANDERSEN P S, KRABBE U, LUNDSAGER P, PETERSEN H
BASIC MATERIALS FOR THE CALCULATION OF THE WIND TURBINE POWER.
ROSKILDE, DENMARK, RISO NATIONAL LABORATORY, FEBRUARY 1979. (IN DANISH)
RISO-M-2153

THIS REPORT TREATS ELEMENTS OF BASIC WIND TURBINE THEORY. THE SUBJECTS ARE: AERODYNAMICS OF THE HORIZONTAL SHAFT ROTOR INCLUDING COMPUTATION OF LOADS AND EXPECTED POWER PRODUCTION; STRUCTURAL STATIC AND DYNAMIC ANALYSIS OF THE ROTOR BLADES; AND THE USE OF ASYNCHRONOUS MACHINES AS GENERATORS FOR WIND-MILLS AND VARIOUS POSSIBLITIES FOR THE CONTROL OF THE GENERATOR. THE THEORETICAL TREATMENT IS ILLUSTRATED WITH EXAMPLES TO FACILITATE APPLICATION OF THEORY.

1979-0133 MOMENT R L
NEW DEVELOPMENTS IN SMALL WIND ENERGY CONVERSION SYSTEMS.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 220-232.
040 CONF-7905109

THE GOAL OF THE ROCKY FLATS WIND ENERGY PROGRAM, SPONSORED BY THE DEPARTMENT OF ENERGY'S WIND SYSTEMS BRANCH, IS TO STIMULATE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BY PRIVATE INDUSTRY AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. SPECIFIC OBJECTIVES ARE REDUCING WIND GENERATED ENERGY COSTS THROUGH LOWERING HARDWARE CAPITAL INVESTMENT REQUIREMENTS AND IMPROVING SYSTEM RELIABILITY. ONE APPROACH TO MEETING THESE OBJECTIVES HAS BEEN FUNDING AND MANAGING THE DEVELOPMENT OF A NEW GENERATION OF SWECS. DURING 1977 AND 1978, NINE CONTRACTS WERE AWARDED FOR THE DESIGN AND CONSTRUCTION OF PROTOTYPE SYSTEMS IN 1-2 KW, 8 KW, AND 40 KW SIZE RANGES. THIS REPORT WILL UPDATE STATUS ON THESE EFFORTS AND OFFER A GLANCE AT ADDITIONAL SYSTEMS DEVELOPMENT PROJECTS JUST GETTING UNDERWAY.

1979-0134 BPA SITE SELECTED FOR MOD-2 CLUSTER.
WIND ENERGY REP.: 1, 3-4, 12, OCTOBER 1979.

THE BONNEVILLE POWER ADMINISTRATION (BPA) HAS BEEN SELECTED TO FIELD TEST THREE BOEING MOD-2 2.5-MEGAWATT WIND TURBINES AT A SITE ALONG THE COLUMBIA RIVER GORGE IN SOUTHERN WASHINGTON STATE.

1979-0135 BAIN D
SMALL-SCALE WIND AND THE PUBLIC UTILITY REGULATORY POLICIES ACT.
WIND POWER DIG. NO. 17: 5-6, FALL 1979.

THE ARTICLE IS AN EXCERPT OF TESTIMONY PRESENTED AT FEDERAL ENERGY REGULATORY COMMISSION HEARINGS IN CALIFORNIA. THE HEARINGS DEALT WITH THE FINAL DRAFT OF RULES WHICH WILL GOVERN THE PUBLIC UTILITY REGULATORY POLICIES ACT (PURPA). MANY SECTIONS OF THIS LEGISLATION ARE CONCERNED WITH THE RELATIONSHIP BETWEEN UTILITIES AND INDIVIDUAL POWER PRODUCERS, WHICH CAN AFFECT WIND POWER PRODUCERS. THE DRAFT PROPOSALS SUGGEST THAT SMALL POWER PLANTS WITH A RATED CAPACITY OF LESS THAN 10 KW BE EXEMPT FROM PURPA REGULATIONS WHICH REQUIRE UTILITIES TO ALLOW HOOKUPS AND TO ESTABLISH FORMAL RATE STRUCTURES BETWEEN THE INDIVIDUAL CONSUMER AND THE UTILITY.

1979-0136 BAKER R W
WINDPOWER POTENTIAL OF THE NORTHWEST REGION.
POWER ENG. 83(6): 64-67, JUNE 1979.

RESULTS OF A SIMULATED WIND TURBINE GENERATOR NETWORK STUDY INDICATE THAT SUFFICIENT WIND IS AVAILABLE IN THE BONNEVILLE POWER ADMINISTRATION SERVICE AREA TO SUCCESSFULLY OPERATE LARGE WIND TURBINE GENERATOR (WTG) UNITS IN THE 2 MW-4 RANGE. THE MONTHLY ZERO OUTPUT TIME VARIED FROM 0.1% TO 7.4% FOR THE NETWORK AND AVERAGED FROM 10.0% TO 78.0% AT INDIVIDUAL STATIONS. THE LONGEST CONTINUOUS NETWORK OUTAGE FOR A SINGLE DAY WAS 8 HOURS AND THE AVERAGE DOWNTIME, WHEN THERE WAS ZERO NETWORK POWER OUTPUT, WAS 3.5 HR. IF THIS LACK OF WIND COULD BE CONSTRUED AS A FORCED OUTAGE, THE BASE LOAD CAPABILITY OF THE WTG NETWORK WOULD NOT BE ZERO. DISTRIBUTING THE TURBINES OVER A LARGER AREA WOULD MOST LIKELY FURTHER REDUCE THE CHANCE OF ZERO NETWORK OUTPUT.

1979-0137 BERKOVITCH I
DESIGNING APPROPRIATE ENERGY SOURCES FOR DEVELOPING COUNTRIES (WINDMILLS).
DES. ENG. 67: 69-70, MAY 1979.

THIS ARTICLE DESCRIBES SOME OF THE IDEAS FOR SMALL SCALE ENERGY PRODUCTION FOR DEVELOPING COUNTRIES PRESENTED AT A RECENT CONFERENCE OF THE INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP.

1979-0138 BIRD M
NEW CONCEPT IN FARM WINDMILLS.
N. Z. J. AGRIC. 138(6): 65, JUNE 1979.

A NEW CONCEPT IN WINDMILL DESIGN SEEMS LIKELY TO LEAD TO A BIG DROP IN THE PRICE OF FARM WINDMILLS. THE

CONCEPT IS A VARIABLE-GEOMETRY, VERTICAL-AXIS MACHINE.

1979-0139 BIRD M
NEW WINDMILL HAS ROTARY SHAFT.
N. Z. J. AGRIC. 139(2): 41-42, AUGUST 1979.

GREAT IMPROVEMENTS IN THE PERFORMANCE OF THE OLD AMERICAN-TYPE WINDMILL HAVE RESULTED FROM 15 YEARS OF RESEARCH AND DEVELOPMENT BY G. ELLIS, AN ENGINEER IN NAMIBIA. IT IS A ROTARY SYSTEM WHICH HAS NUMEROUS ADVANTAGES OVER THE OLD PLUNGING-SHAFT SYSTEM, NOT THE LEAST OF WHICH IS AN ABILITY TO LIFT AND DELIVER MORE WATER IN AN HOUR THAN WINDMILLS HAVE PREVIOUSLY BEEN ABLE TO DO.

1979-0140 BLACK T W
PP&L TESTS POWER FROM THE WIND.
POWER ENG. 83(7): 79-81, JULY 1979.

RESEARCHERS AT PENNSYLVANIA POWER & LIGHT ARE TESTING THE PERFORMANCE OF A SMALL WIND TURBINE-GENERATOR (WTG) AS PART OF A CONTINUING PP&L-FINANCED PROGRAM IN WHICH DIFFERENT FORMS OF ENERGY TECHNOLOGY ARE BEING ASSESSED. EVERY ASPECT OF THE WIND TURBINE GENERATOR'S PERFORMANCE IS BEING MONITORED AS IT FEEDS SYNCHRONIZED POWER INTO PP&L'S DISTRIBUTION SYSTEM.

1979-0141 NELSON V, GILMORE E
SMALL WIND TURBINE SYSTEM OPERATION IN RURAL APPLICATIONS.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 264-270.
CONF-7905109

THE ALTERNATIVE ENERGY INSTITUTE (AEI) IS DEDICATED TO THE DEVELOPMENT OF ALTERNATIVE SOURCES OF ENERGY (WIND, SOLAR, AND BIOMASS). AEI'S PRIMARY EMPHASIS IS ON ENERGY FOR RURAL OPERATIONS, PARTICULARLY SMALL SYSTEMS FOR USE IN THE TEXAS PANHANDLE REGION. THE PROGRAM TO DATE HAS BEEN MAINLY DIRECTED TOWARD DEVELOPING WIND ENERGY, DELINEATING WIND CHARACTERISTICS FOR TEXAS, TESTING OF PROTOTYPE WIND TURBINES, AND DISSEMINATION OF INFORMATION TO STUDENTS AND THE PUBLIC. AEI AIMS TO ENLIST AS EARLY AS PRACTICAL THE AID OF FARMERS AND RANCHERS--THE EVENTUAL USERS OF SMALL WIND SYSTEMS--IN FIELD TESTS OF THESE CONCEPTS AND THE PROTOTYPE WIND MACHINES.

1979-0142 SODERHOLM L H
WIND ENERGY FOR HEATING FARM STRUCTURES.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 108-123.
CONF-7905109

HEATING OF FARM STRUCTURES CONSUMES APPROXIMATELY 10 PERCENT OF THE ENERGY USED IN AGRICULTURAL PRODUCTION. THE MAJOR SOURCES OF ENERGY FOR HEATING IN RURAL AREAS ARE PRESENTLY FROM THE USE OF TWO NONRENEWABLE RESOURCES, OIL AND LIQUIFIED PETROLEUM (LP) GAS. USE OF WIND ENERGY AS AN ALTERNATIVE ENERGY SOURCE FOR HEATING CAN BOTH REDUCE OUR USE OF NONRENEWABLE ENERGY AND HELP HEATING LOADS BY REDUCING DEMANDS ON THE RURAL POWER DISTRIBUTION SYSTEM.

1979-0143 BRAY R E
SOLAR-CLIMATIC STATISTICAL STUDY.
NTIS, FEBRUARY 1979. 570 P.
HCP/T4016-01/2

THE SOLAR-CLIMATIC STATISTICAL STUDY WAS PERFORMED TO PROVIDE STATISTICAL INFORMATION ON THE EXPECTED FUTURE AVAILABILITY OF SOLAR AND WIND POWER AT VARIOUS NATIONWIDE SITES. HISTORIC DATA (SOLMET), AT 26 NATIONAL WEATHER SERVICE STATIONS REPORTING HOURLY SOLAR INSOLATION AND COLLATERAL METEOROLOGICAL INFORMATION, WERE INTERROGATED TO PROVIDE AN ESTIMATE OF FUTURE TRENDS. SOLAR DATA ARE GLOBAL RADIATION INCIDENT ON A HORIZONTAL SURFACE, AND WIND DATA REPRESENT WIND POWER NORMAL TO THE AIR FLOW. SELECTED INSOLATION AND WIND POWER CONDITIONS WERE INVESTIGATED FOR THEIR OCCURRENCE AND PERSISTENCE, FOR DEFINED PERIODS OF TIME, ON A MONTHLY BASIS.

1979-0144 BROCK B C
SCATTERED EM FIELD DUE TO ROTATING BLADES OF HORIZONTAL-AXIS WIND MACHINES.
NTIS, MARCH 1979. 35 P.
SAND-79-0434

AN ANALYSIS OF THE SCATTERED ELECTROMAGNETIC FIELD FROM THE ROTATING BLADES OF A HORIZONTAL AXIS WIND MACHINE IS PRESENTED. THE GENERAL ANALYSIS INCLUDES ALL OF THE NEAR FIELD TERMS AND DOES NOT SPECIFY THE BLADE GEOMETRY. AFTER THE GENERAL RESULT IS DEVELOPED, APPROPRIATE APPROXIMATIONS WILL BE MADE AND A SIMPLE BLADE GEOMETRY WILL BE SPECIFIED IN ORDER TO SIMPLIFY NUMERICAL CALCULATIONS.

1979-0145 BURLEY R R, SAVINO J M, WAGNER L H, DIEDRICH J H
SOME TECHNIQUES FOR REDUCING THE TOWER SHADOW OF THE DOE/NASA MOD-0 WIND TURBINE TOWER.
NTIS, SEPTEMBER 1979. 128 P.
DOE/NASA/20370-79/17, NASA-TM-79202

DETAILED WIND SPEED PROFILE MEASUREMENTS WERE MADE IN THE WAKE OF 1/25 SCALE MODELS OF THE TOWER AND IN THE WAKE OF CERTAIN FULL SCALE COMPONENTS TO DETERMINE THE MAGNITUDE OF THE SPEED REDUCTION (TOWER SHADOW). TEST RESULTS ARE PRESENTED FOR THE FOLLOWING SHADOW ABATEMENT TECHNIQUES: REMOVAL OF DIAGONALS, REPLACEMENT OF DIAGONALS WITH SIMULATED TENSION RODS, REPLACEMENT OF DIAGONALS AND HORIZONTALS WITH ROUND CROSS-SECTION MEMBERS, INSTALLATION OF ELLIPTICAL SHAPES ON HORIZONTAL MEMBERS, INSTALLATION OF AIRFOILS ON VERTICAL MEMBERS, APPLICATION OF SURFACE ROUGHNESS TO VERTICAL MEMBERS. ALL TECHNIQUES OFFERED SOME REDUCTION IN TOWER SHADOW AT ALL WIND DIRECTIONS.

1979-0146 CALIFORNIA WATER AGENCY ACQUIRING VAWT.
WIND ENERGY REP. : 1,6, DECEMBER 1979.

1979-0147 CALVERT N G
WINDPOWER PRINCIPLES: THEIR APPLICATION ON THE SMALL SCALE.
N.Y., HALSTED PRESS, 1979. 122 P.

THIS BOOK IS FOR THE EXPERIMENTER WITH SOME CONSTRUCTIONAL ENGINEERING KNOWLEDGE AND PRACTICAL EXPERIENCE. IT

PROVIDES BASIC INFORMATION AND GUIDELINES NECESSARY FOR CONSTRUCTING SMALL-SCALE WINDPOWER PLANTS.

1979-0148 CHEN H C, CHEN J M
INTERACTION BETWEEN THE ARTIFICIAL VORTEX AND THE VORTEX JET.
J. IND. AERODYN. 4(2): 113-122, MARCH 1979.

A STUDY OF A VORTEX GENERATOR HAS BEEN MADE WHICH EXAMINES THE EFFECT OF A VORTEX JET WHICH SIMULATES THE FLOW ABOVE A HORIZONTAL TURBINE LOCATED AT THE THROAT OF AN INLET THAT IS OPEN AT THE BOTTOM OF THE TOWER. FOR A STRONG AND CONCENTRATIVE VORTEX JET, THE LOW-PRESSURE REGION WILL NOT COLLAPSE DUE TO THE PRESENCE OF THE TURBINE.

1979-0149 CHEN J-M
WIND AND SOLAR ENERGIES IN THE TORNADO TYPE WIND ENERGY SYSTEM.
INT. J. HEAT MASS TRANSFER 22 (7): 1159-1161, JULY 1979.

THE EFFECT OF A LINE HEAT SOURCE ON A TORNADO-TYPE WIND ENERGY GENERATOR HAS BEEN STUDIED. USING THE SIMILARITY TECHNIQUE, A SET OF ORDINARY DIFFERENTIAL EQUATIONS HAS BEEN DERIVED. IT IS FOUND THAT THE HEAT FROM THE SOLAR COLLECTOR AFFECTS THE TANGENTIAL VELOCITY AND PRESSURE DISTRIBUTION OF THE VORTEX. THE MAXIMUM PRESSURE DROP AT THE VORTEX CENTER AXIS WILL INCREASE AS THE STRENGTH OF THE LINE HEAT SOURCE INCREASES.

1979-0150 WITWER J G
DEVELOPING WIND POWER IN THE UNITED STATES.
ENERGY ENGINEERING TECHNOLOGY. WORLD ENERGY ENGINEERS CONGRESS, ATLANTA, GEORGIA, OCTOBER 31, 1978. ATLANTA, GEORGIA, FAIRMONT PRESS, 1979. P. 167-170.

THE KEY ECONOMIC, LEGAL, AND SOCIAL CONSIDERATIONS WHICH WILL PLAY AN IMPORTANT ROLE IN SHAPING THE EXPANSION OF WIND USE IN THE UNITED STATES ARE DISCUSSED.

1979-0151 CHENEY M C
DEVELOPMENT OF AN 8 KW WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE 1-DESIGN & ANALYSIS. VOLUME 11-TECHNICAL REPORT.
NTIS, JUNE 25, 1979. 240 P.
RFP-3006/68186/3533/79/14-2

THIS PHASE 1 SUMMARY REPORT CONTAINS A DESCRIPTION OF THE 8 KW WIND ENERGY CONVERSION SYSTEM DEVELOPED BY THE UNITED TECHNOLOGIES RESEARCH CENTER (UTRC) FOR THE DEPARTMENT OF ENERGY. THE WIND TURBINE EMPLOYS THE UTRC BEARINGLESS ROTOR CONCEPT IN CONJUNCTION WITH A PASSIVE PENDULUM CONTROL SYSTEM WHICH CONTROLS BLADE PITCH FOR START-UP, EFFICIENT POWER GENERATION, AND HIGH-SPEED SURVIVABILITY. THE REPORT CONTAINS A SUMMARY OF THE EXPERIMENTAL AND ANALYTICAL PROGRAMS IN SUPPORT OF DESIGN EFFORTS.

1979-0152 CHOPRA I, DUGUNDJI J
NON-LINEAR DYNAMIC RESPONSE OF A WIND TURBINE BLADE.
J. SOUND VIB. 63(2): 265-286, MARCH 22, 1979.

THE NON-LINEAR EQUATIONS OF MOTION FOR AN ISOLATED THREE-DEGREE FLAP-LAG-FEATHER ROTOR BLADE UNDER THE ACTION OF A GRAVITY FIELD ARE DERIVED, BY USING LAGRANGE'S EQUATIONS, FOR ARBITRARILY LARGE ANGULAR DEFLECTIONS. QUASI-STEADY AIRFOIL THEORY IS USED TO OBTAIN AERODYNAMIC FORCES FOR SHEARED WIND. THE EFFECTS OF SEVERAL PARAMETERS ON THE FORCED RESPONSE OF THE BLADE ARE EXAMINED, INCLUDING CONING ANGLE, STRUCTURAL DAMPING, LOCK NUMBER, INFLOW RATIO, AND WIND VELOCITY GRADIENT.

1979-0153 TENNYSON G P
THE FEDERAL WIND ENERGY PROGRAM: AN OVERVIEW.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 172-201.
CONF-7905109

PRESENT PROGRAM ACTIVITIES AND PLANNED DEVELOPMENT OF WIND POWER PLANTS IS REVIEWED. POWER COSTS ESTIMATES FOR LARGE WIND POWER PLANTS ARE PRESENTED.

1979-0154 PENNELL W T, WEGLEY H L
SITING SMALL WIND TURBINES.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 202-219.
CONF-7905109

A RECENT SURVEY INDICATED THAT IMPROPER SITING WAS A COMMON CAUSE OF DISSATISFACTION AMONG USERS OF SMALL WIND TURBINES. IN OTHER WORDS, THE USER DID NOT GET THE POWER OUTPUT OR MACHINE LIFE HE HAD EXPECTED. MOST POTENTIAL PURCHASERS WILL NEED TO BE REASONABLY CERTAIN OF THE COST OF WIND POWER FOR THEIR PARTICULAR APPLICATION BEFORE THEY DECIDE TO BUY A WIND ENERGY CONVERSION SYSTEM (WECS). SUCH AN ASSESSMENT REQUIRES AN ACCURATE KNOWLEDGE OF WIND CHARACTERISTICS AT THE TURBINE SITE. THIS PAPER PRESENTS A PROCEDURE FOR CHOOSING THE BEST AVAILABLE SITE FOR A WIND TURBINE AND FOR ESTIMATING THE PERTINENT WIND CHARACTERISTICS ONCE THE SITE IS CHOSEN. IN SOME CASES, EXTENSIVE ONSITE MEASUREMENTS MAY BE REQUIRED BEFORE AN ACCURATE ANALYSIS OF TURBINE PERFORMANCE CAN BE MADE.

1979-0155 COROTIS R B
STATISTICAL MODELS FOR WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES. FINAL REPORT, SEPTEMBER 15, 1977 - OCTOBER 14, 1978.
NTIS, JANUARY 1979. 86 P.
DOE/ET/20283-1

SIMPLE MODELS AND GUIDELINES ARE DEVELOPED FOR WIND ENERGY SITE SURVEYS. PROBABILISTIC PROCEDURES ARE EMPLOYED TO ASSESS SURVEY DURATION, CLIMATOLOGICAL ADJUSTMENT, AND RUN DURATION STATISTICS.

1979-0156 CRISP J N, BISHOP W S, PINSON J D, ANDERSON L A
ANALYSIS OF REMOTE SITE ENERGY STORAGE AND GENERATION SYSTEMS.
NTIS, JULY 1979. 148 P.
AD-A074869,UDR-TR-79-35, UDSE-TR-79-02

THIS REPORT PRESENTS THE RESULTS OF AN INVESTIGATION AND ANALYSIS OF ENERGY STORAGE SYSTEMS AND ALTERNATE ENERGY SOURCES FOR REMOTE SITE APPLICATIONS. THE FIRST PHASE OF THE EFFORT CENTERED ON THE BROAD BASED STUDY

OF HYDROGEN STORAGE, THERMAL STORAGE, BATTERIES, AND FLYWHEELS AS ENERGY STORAGE SYSTEMS ALONG WITH WIND TURBINE, SOLAR PHOTOVOLTAIC, AND SOLAR THERMIONIC ENERGY CONVERTERS. A WIND TURBINE BATTERY SYSTEM WAS RECOMMENDED BASED ON PERFORMANCE, COST AND AVAILABILITY. EFFORT UNDER THE SECOND PHASE OF THE PROGRAM CONCENTRATED ON A SYSTEM USING TWO SEPARATE NOMINAL EIGHT KILOWATT WIND TURBINE MODULES IN CONJUNCTION WITH A LEAD-ACID BATTERY ENERGY STORAGE UNIT. THE SYSTEM WAS SPECIFIED TO OPERATE IN CONJUNCTION WITH AN EXISTING POWER GRID SYSTEM LOCATED AT BAR MAIN, BARTER ISLAND, ALASKA. SPECIFIC SYSTEM CONCEPTS AND RECOMMENDATIONS ARE PRESENTED WITH SUPPORTING ANALYSES. A DESIGN CHECKLIST IS INCLUDED WITH SPECIFIC ITEMS FOR CONSIDERATION IN THE PREPARATION OF A DESIGN SPECIFICATION.

1979-0157 DASH P K, SAHU B, RAHMAN M A
DYNAMIC PERFORMANCE OF A WIND POWER CONVERSION SYSTEM (DIGITAL SIMULATION).
CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, COLLEGE STATION, TEXAS A & M UNIVERSITY, MARCH 19-21, 1979. CONFERENCE RECORD. NEW YORK, IEEE, NO. 79CH1377-1 REG 5, 1979. P. 154.

ONLY A SUMMARY OF THE PAPER WAS GIVEN. THE PAPER PRESENTS THE RESULTS OF A COMPUTER SIMULATION CONDUCTED FOR AN AEROTURBINE DRIVEN SYNCHRONOUS OR BRUSHLESS GENERATOR SUPPLYING A BATTERY STORAGE SYSTEM THROUGH A 3-PHASE BRIDGE RECTIFIER.

1979-0158 DAVID M L, BUZENBERG R J, GLYNN E F, JOHNSON G L, SHULTIS J K, WAGNER J P
WIND ENERGY APPLICATIONS IN AGRICULTURE. FINAL REPORT. EXECUTIVE SUMMARY.
NTIS, AUGUST 1979. 201 P.
DOE/SEA-1109-20401/79/2

THIS REPORT PRESENTS AN ASSESSMENT OF THE POTENTIAL USE OF WIND TURBINE GENERATOR SYSTEMS (WTGS) IN U.S. AGRICULTURE. IN PARTICULAR, THIS REPORT PRESENTS THE NUMBER OF WTGS'S ECONOMICALLY FEASIBLE FOR USE IN U.S. AGRICULTURE AND THE CONDITIONS WHICH YIELDED ECONOMIC FEASIBILITY OF WTGS'S FOR CERTAIN AGRICULTURAL APPLICATIONS.

1979-0159 BRAASCH R H
THE DESIGN, CONSTRUCTION, TESTING, AND MANUFACTURING OF VERTICAL AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E3/23-38.

A SUBSTANTIAL DESIGN AND DEVELOPMENT PROGRAM HAS BEEN UNDERWAY IN THE UNITED STATES OF AMERICA ON THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT). THE PURPOSE OF THIS REPORT IS TO PRESENT CURRENTLY AVAILABLE INFORMATION ON A) DESIGN, CONSTRUCTION AND TESTING OF A 17 METER RESEARCH TURBINE, B) VAWT PERFORMANCE-COST OPTIMIZATION STUDY, AND C) VAWT MANUFACTURING STUDIES.

1979-0160 DE RENZO D J
WIND POWER: RECENT DEVELOPMENTS.
PARK RIDGE, N.J., NOYES DATA CORPORATION, 1979. 347 P.

SOME OF THE TOPICS COVERED ARE THE TECHNICAL RESEARCH GOING ON AT LOCKHEED AND BOEING HAVING TO DO WITH STRUCTURAL STRESS FACTORS, AND WORK BEING DONE FOR THESE CORPORATIONS AT MIT AND GEORGIA TECH; ECONOMICS; RURAL SELF-SUFFICIENCY; WIND CHARACTERISTICS FOR DIFFERENT REGIONS; ROTOR DESIGN AND BLADE SPECIFICATIONS; INNOVATIVE WIND TURBINES; APPLICATION TO ELECTRIC UTILITIES; WIND SYSTEMS FOR FARMS AND RURAL REGIONS; AND LEGAL, SOCIAL, AND ENVIRONMENTAL ISSUES.

1979-0161 DESHMUKH R G, RAMAKUMAR R
RELIABILITY OF WIND-ASSISTED UTILITY SYSTEMS.
CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, COLLEGE STATION, TEXAS A & M UNIVERSITY, MARCH 19-21, 1979. CONFERENCE RECORD. NEW YORK, IEEE, NO. 79CH1377-1 REG 5, 1979. P. 143-148.

THIS PAPER DISCUSSES THE APPLICATION OF MARKOV MODELS IN THE STUDY OF WECS AND CONVENTIONAL GENERATORS OPERATING IN PARALLEL, FEEDING A COMMON LOAD. THE BASIC FACTORS INVOLVED IN THE RELIABILITY EVALUATION AND THEIR POSSIBLE INFLUENCE ON PLANNING THE LARGE SCALE INCORPORATION OF WECS AS A COMPONENT IN THE GENERATION MIX ARE DISCUSSED USING COMPUTER SIMULATION RESULTS OBTAINED FOR MODELS DEVELOPED WITH THE HELP OF HOURLY WIND-SPEED DATA FOR A TWO-YEAR PERIOD FOR POTENTIAL SITES IN THE HAWAIIAN ISLANDS.

1979-0162 DESIGN AND FABRICATION OF A LOW COST DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEM. PHASE 1. TECHNICAL REPORT.
NTIS, JUNE 22, 1979. 335 P.
ALO-4272-T2

PRESENTED IN THIS REPORT IS THE WORK COMPLETED IN PHASE 1, THE DESIGN PHASE OF THE "DESIGN AND FABRICATION OF A LOW COST DARRIEUS." THE OBJECTIVES ARE TO OBTAIN REALISTIC FABRICATION COST DATA BASED ON CURRENT TECHNOLOGY AND TO PROVIDE A LOW COST SYSTEM DESIGN SUITABLE FOR CONTINUED PRODUCTION AND/OR TO SERVE AS A BASELINE FOR FURTHER COST REDUCTION AS WELL AS ENGINEERING IMPROVEMENT EFFORTS.

1979-0163 DESIGN AND FABRICATION OF A LOW COST DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEM. PHASE 1. EXECUTIVE SUMMARY.
NTIS, JUNE 22, 1979. 49 P.
ALO-4272-T1

THE MAIN OBJECTIVES OF THIS PROJECT ARE TO OBTAIN REALISTIC FABRICATION COST DATA BASED ON CURRENT TECHNOLOGY AND TO PROVIDE A LOW COST SYSTEM DESIGN SUITABLE FOR CONTINUED PRODUCTION AND/OR TO SERVE AS A BASELINE FOR FURTHER COST REDUCTION AS WELL AS ENGINEERING IMPROVEMENT EFFORTS.

1979-0164 SEXTON J H
ZEPHYR WIND DYNAMO WIND TURBINE GENERATOR. FINAL TEST REPORT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, OCTOBER 1979. 21 P.
RFP-3071/3533/79/13

THE ZEPHYR WIND DYNAMO INCORPORATES AN INNOVATIVE ALTERNATOR AND CONTROL SYSTEM THAT SHOWS GREAT PROMISE FOR FUTURE WIND TURBINE GENERATORS (WTGS) OF THE SAME SIZE. FEW MACHINES OF THIS TYPE (I.E., WITH A PERMANENT MAGNET ALTERNATOR AND POSITIVE YAW DRIVE) HAVE BEEN BUILT. IT WAS, THEREFORE, A GOOD CANDIDATE FOR TESTING AT THE ROCKY FLATS WIND SYSTEMS TEST CENTER (WSTC). UNFORTUNATELY, VERY LITTLE LONG-TERM QUANTITATIVE DATA WERE TAKEN FROM THE MACHINE DUE TO PROBLEMS WITH THE DATA ACQUISITION SYSTEM WHICH WAS IN EARLY STAGES OF DEVELOPMENT DURING THIS TIME PERIOD.

1979-0165 SOLAR ENERGY EDUCATION PACKET FOR ELEMENTARY AND SECONDARY STUDENTS.
WASHINGTON, D.C., CENTER FOR RENEWABLE RESOURCES, 1979. 64 P.

EDUCATIONAL MATERIALS AND PROJECTS FOR DEMONSTRATING SOLAR ENERGY AT BOTH ELEMENTARY AND SECONDARY LEVELS ARE PRESENTED. SOLAR ENERGY FACTS AND TERMINOLOGY ARE INTRODUCED. ENERGY CONSERVATION, PASSIVE SOLAR CONCEPTS, AND HEAT STORAGE ARE DISCUSSED.

1979-0166 DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME III - SYSTEM ANALYSIS. FINAL REPORT.
NTIS, JUNE 14, 1979. 188 P.
WASH-2330-78/4(VOL.3)

IN THIS VOLUME, THE STATE-OF-THE-ART COMPONENTS DESCRIBED IN VOLUME II ARE INTEGRATED TO FORM OPTIMUM OFFSHORE WIND ENERGY CONVERSION SYSTEMS. THE COST AND PERFORMANCE OF THESE SYSTEMS ARE DEVELOPED FOR A VARIETY OF CONDITIONS AND THE TRADE-OFF BETWEEN COST AND ENERGY PRODUCTION IS MADE FOR THE WIDE RANGE OF SCENARIOS CONSIDERED.

1979-0167 SOLAR ENERGY ON THE RESERVATION.
ENERGY ALTERN. Q. 3(2): 18-21, SUMMER 1979.

VARIOUS APPLICATIONS OF SOLAR ENERGY TECHNOLOGY ON INDIAN RESERVATIONS IN ARIZONA AND NEW MEXICO ARE REVIEWED. A SCHOOL IN BIRDSPRINGS, AZ, INCORPORATES TWO GEODESIC DOMES HEATED BY AN ACTIVE SOLAR ENERGY SYSTEM AND POWERED BY A WIND GENERATOR. IN SWEETWATER, AZ, A NAVAJO VILLAGE HAS SIX ARRAYS OF PHOTOVOLTAIC CELLS THAT PROVIDE POWER FOR PUMPING DRINKING WATER TO 50 HOMES. SOLAR GREENHOUSES HAVE BEEN ATTACHED TO SCHOOLS, CHAPTER HOUSES AND OTHER BUILDINGS FOR PASSIVE SOLAR HEATING. PROBLEMS WITH SOLAR ENERGY APPLICATIONS HAVE INCLUDED FAULTY EQUIPMENT, THE DELAYED APPROVAL OF WOOD-BURNING STOVES AND FIREPLACES AS THE ONLY FORM OF BACKUP HEAT, AND MISTRUST IN THE APPARATUS ASSOCIATED WITH SOLAR HEATING.

1979-0168 HAGEN L J, SHARIF M
DESIGN AND FIELD TESTING OF A VARIABLE-SPEED VAWT SYSTEM FOR LOW-LIFT IRRIGATION PUMPING.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 87-104.
CONF-7905109

1979-0169 HAGEN L J, LYLES L, SKIDMORE E L, SHARIF M
EVALUATION OF METHODS FOR APPLYING WIND ENERGY IN GREAT PLAINS IRRIGATION.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 42-66.
CONF-7905109

1979-0170 EDESESS M, MCCONNELL R D
A GENERAL RELIABILITY AND SAFETY METHODOLOGY AND ITS APPLICATION TO WIND ENERGY CONVERSION SYSTEMS.
NTIS, SEPTEMBER 1979. 52 P.
SERI/TR-35-234

IN CONVENTIONAL SYSTEM RELIABILITY CALCULATIONS, EACH COMPONENT MAY BE IN THE OPERABLE STATE OR THE UNDER REPAIR STATE. THESE CALCULATIONS DERIVE SYSTEM UNAVAILABILITY, OR THE PROBABILITY OF THE SYSTEM'S BEING DOWN FOR REPAIRS. BY INTRODUCING A THIRD COMPONENT STATE BETWEEN OPERABLE AND UNDER REPAIR--NAMELY, DEFECTIVE, BUT DEFECT UNDETECTED--THE METHODS DEVELOPED IN THIS REPORT ENABLE SYSTEM SAFETY PROJECTIONS TO BE MADE IN ADDITION TO AVAILABILITY PROJECTIONS. ALSO PROVIDED IS A MECHANISM OF COMPUTING THE EFFECTS OF INSPECTION SCHEDULES ON BOTH SAFETY AND AVAILABILITY. A RELIABILITY AND SAFETY PROGRAM (RASP) IS DETAILED WHICH PERFORMS THESE COMPUTATIONS AND ALSO CALCULATES COSTS FOR SYSTEM INSPECTIONS AND REPAIRS.

1979-0171 ELDRIDGE F
WIND MACHINES. 2ND ED.
NEW YORK, VAN NOSTRAND REINHOLD, 1979. 213 P.

ECONOMIC VIABILITY, PUBLIC ACCEPTANCE (INCLUDING PROBLEMS OF INTERFERANCE WITH TV), HISTORY, STATE-OF-THE-ART, ARE ALL COVERED. THE BOOK INCLUDES MANY ILLUSTRATIONS, AND SOME TECHNICAL CHARTS AND TABLES.

1979-0172 INNOVATIVE WIND FARM PROPOSED.
WIND POWER DIG. NO. 17: 17, FALL 1979.

1979-0173 O'BRIEN W F, VAUGHAN D H, SCHETZ J A
APPLICATION OF WINDMILLS TO APPLE COOLING AND STORAGE.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 158-171.
CONF-7905109

ENERGY USAGE FOR CROP STORAGE IS SIGNIFICANT IN AGRICULTURAL APPLICATIONS. WIND ENERGY REPRESENTS A POTENTIALLY IMPORTANT SOURCE FOR OBTAINING SOME OF THIS ENERGY. THIS REPORT DESCRIBES A RESEARCH PROJECT, WITH THE GOAL OF EVALUATING WIND ENERGY AS A SOURCE FOR THE ENERGY REQUIRED FOR THE LOW TEMPERATURE STORAGE OF APPLES. TO CONDUCT THE PROGRAM, A RESEARCH FACILITY WAS CONSTRUCTED AT THE HORTICULTURE FARM OF VIRGINIA POLYTECHNIC INSTITUTE, CONSISTING OF A WIND GENERATOR, A VAPOR COMPRESSION COOLING SYSTEM, A WELL-INSULATED STORAGE BUILDING, AND NECESSARY CONTROL AND INSTRUMENTATION DEVICES TO EVALUATE PERFORMANCE. INITIAL TESTS OF THE SYSTEM WERE DONE IN MARCH 1978. SINCE THEN, SOME MODIFICATIONS AND IMPROVEMENTS TO THE SYSTEM HAVE BEEN MADE, AND RECENTLY A CONTINUOUS PERFORMANCE TEST OF THE WIND-POWERED APPLE STORAGE WAREHOUSE SYSTEM WAS CONDUCTED. THE PRESENT REPORT DESCRIBES THE DESIGN AND CONSTRUCTION FEATURES OF THE SYSTEM, AND CONTAINS RESULTS OF SOME OF THE MOST RECENT TESTS.

1979-0174 ENVIRONMENTAL DEVELOPMENT PLAN. WIND ENERGY CONVERSION.
NTIS, JULY 1979. 34 P.
DOE/EDP-0030

THE ENVIRONMENTAL DEVELOPMENT PLAN (EDP) SYSTEM IS DESIGNED TO PROVIDE A COMMON BASIS FOR PLANNING, MANAGING, AND REVIEWING THE ENVIRONMENTAL ASPECTS OF THE VARIOUS ENERGY TECHNOLOGY PROGRAMS UNDER THE DEPARTMENT OF ENERGY'S (DOE) JURISDICTION.

1979-0175 EPRI: UTILITIES' INTEREST GROWS IN WIND POWER.
WIND ENERGY REP. : 5, OCTOBER 1979.

1979-0176 ESKINAZI S, GOETHALS R

MULTIPLE PUMP STAGE LOADING OF A VARIABLE-RPM WIND TURBINE.
J. ENERGY 3(2): 114-119, MARCH - APRIL 1979.

THIS PAPER STUDIES THE WIND ENERGY CAPTURE EFFICIENCY OF A MULTIPLE PUMP STAGE SYSTEM DRIVEN BY A 50-KW WIND TURBINE IN A SPECIFIED AVAILABLE WIND ENERGY PROBABILITY DENSITY. THIS WIND ENERGY PROBABILITY DENSITY CORRESPONDS TO AN AVERAGE SPRING WIND ON THE EASTERN SHORE OF LAKE ONTARIO. THESE RESULTS ARE COMPARED WITH THOSE OF THE SAME BLADE OPERATING AT OPTIMUM POWER COEFFICIENT; WITH FIXED OPTIMUM PITCH AND CONSTANT RPM; WITH THAT OF A CONVENTIONAL CONSTANT-RPM VARIABLE-PITCH BLADE DRIVING A SYNCHRONOUS GENERATOR.

1979-0177 EVERSOLE R A
SPECTRAL CHARACTERISTICS OF BOUNDARY LAYER OVER IRREGULAR TERRAIN.
NTIS, JUNE 1979. 115 P.
CSU-ATSP-314

THE SPECTRAL BEHAVIOR OF TURBULENCE IN A CONVECTIVELY UNSTABLE BOUNDARY LAYER OVER UNDULATING TERRAIN IS DISCUSSED. THE WIND AND TEMPERATURE FLUCTUATIONS WERE MEASURED WITH FAST RESPONSE SENSORS MOUNTED ON THE 300 M TOWER AT THE BOULDER ATMOSPHERIC OBSERVATORY (BAO). THE BOUNDARY LAYER IS DIVIDED INTO THREE LAYERS (SURFACE, MATCHING, AND MIXED). THE SPECTRA OF EACH LAYER ARE NORMALIZED USING THE APPROPRIATE SCALING RULES. THE GENERALIZED SPECTRA FOLLOW SIMILARITY THEORY. THIS PAPER COMPARES THE BAO RESULTS WITH THE DATA OBTAINED DURING AFCRL'S FIELD EXPERIMENTS IN KANSAS (1968) AND MINNESOTA (1973) OVER FLAT, UNIFORM TERRAIN.

1979-0178 EXECUTIVE SUMMARY. MOD-1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT.
NTIS, MAY 1979. 60 P.
DOE/NASA/0058-79/3, NASA-CR-159497

THE MOD-1 PROGRAM IS BEING CONDUCTED IN SIX PHASES: ANALYSIS AND PRELIMINARY DESIGN (CULMINATING IN A PRELIMINARY DESIGN REVIEW), DETAIL DESIGN (ENDING WITH A FINAL DESIGN REVIEW), FABRICATION AND ASSEMBLY, SYSTEM TESTING, SITE PREPARATION, AND INSTALLATION AND CHECKOUT. MAJOR MILESTONE DATES FOR THESE PHASES ARE SHOWN IN TABLE 1-1. THIS REPORT IS INTENDED TO DESCRIBE ONLY THE RESULTS OF THE FIRST TWO PHASES; THAT IS, ACTIVITIES LEADING TO THE COMPLETION OF DETAIL DESIGN.

1979-0179 NELLUMS R O
TOOLS FOR ECONOMIC VAWT DESIGN AT SANDIA
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 233-246.
CONF-7905109

1979-0180 JOHNSON G L
PRELIMINARY RESULTS OF A 5 KW SAVONIUS WIND TURBINE TEST.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 289-296.
CONF-7905109

1979-0181 FERC SETTING RULES ON SMALL PRODUCERS.
WIND ENERGY REP.: 1-2, OCTOBER 1979.

PROPOSED REGULATIONS ISSUED BY THE FEDERAL ENERGY REGULATORY COMMISSION ARE DESCRIBED.

1979-0182 FLETCHER C A J, ROBERTS B W
ELECTRICITY GENERATION FROM JET-STREAM WINDS.
J. ENERGY 3(4): 241-249, JULY-AUGUST 1979.

THE FEASIBILITY OF GENERATING ELECTRICITY FROM JET-STREAM WINDS HAS BEEN INVESTIGATED. ANALYSIS OF PUBLISHED METEOROLOGICAL DATA INDICATES THAT ANNUAL AVERAGE POWER DENSITIES APPROACHING 20 KW/M2 ARE AVAILABLE IN THE JET-STREAM ALTITUDES OVER THE COMPLETE WEST-EAST EXTENT OF AUSTRALIA AT A LATITUDE OF ABOUT 30 DEGREES S. COMPUTER-BASED OPTIMIZATION STUDIES INDICATE THAT A 100 MW POWER STATION BASED ON TETHERED AERODYNAMIC GENERATING PLATFORMS LOCATED AT A JET-STREAM ALTITUDE WOULD GENERATE ELECTRICITY AT CAPITAL AND OPERATING COSTS THAT ARE COMPETITIVE WITH OTHER METHODS OF ELECTRICITY GENERATION.

1979-0183 FOREMAN K M, GILBERT B L
FURTHER INVESTIGATIONS OF DIFFUSER AUGMENTED WIND TURBINES. PART 2 - TECHNICAL REPORT. FINAL REPORT.
NTIS, JULY 1979. 63 P.
COO-2616-2(PT.2)(REV.2), RE-585

THIS PAPER DESCRIBES A MULTIPHASED INVESTIGATION INVOLVING THREE TEST FACILITIES, OF SEVERAL COMPACT DIFFUSER APPROACHES. SCREENS, TO SIMULATE A WIND TURBINE, AND A THREE-BLADED, FIXED-PITCH TURBINE HAVE BEEN USED WITH THE DIFFUSER MODELS. A CANDIDATE BASELINE DESIGN IS DESCRIBED AND SOME OF THE KEY ISSUES ARE DISCUSSED THAT CAN LEAD TO FUTURE FULL SCALE IMPLEMENTATION

1979-0184 FOREMAN K M, GILBERT B L
FURTHER INVESTIGATIONS OF DIFFUSER AUGMENTED WIND TURBINES. PART 1 - EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, JULY 1979. 10 P.
COO-2616-2(PT.1)(REV.1), RE-585

THIS PROJECT USED A MULTIPHASED EXPERIMENTAL APPROACH INVOLVING THREE WIND TUNNEL TEST FACILITIES, AND MODELS OF SEVERAL COMPACT DIFFUSER CONFIGURATIONS. SCREENS TO SIMULATE A WIND TURBINE, AND A THREE-BLADED, FIXED-PITCH TURBINE HAVE BEEN USED WITH THE DIFFUSER MODELS. A CANDIDATE BASELINE DESIGN IS DESCRIBED, AND SOME OF THE KEY TECHNICAL AND ECONOMIC ISSUES WHICH CAN LEAD TO FUTURE FULL SCALE IMPLEMENTATION ARE DISCUSSED.

1979-0185 GEWEHR H W
DESIGN, FABRICATION, TEST, AND EVALUATION OF A PROTO-TYPE 150-FOOT LONG COMPOSITE WIND TURBINE BLADE.
NTIS, SEPTEMBER 1979. 135 P.
DOE/NASA/0600-79/1, NASA-CR-159775, R-1575

THE DESIGN, FABRICATION, TESTING, AND EVALUATION OF A PROTOTYPE 150 FOOT LONG COMPOSITE WIND TURBINE BLADE IS DESCRIBED. THE DESIGN APPROACH AND MATERIAL SELECTION, COMPATIBLE WITH LOW COST FABRICATION METHODS AND OBJECTIVES, ARE HIGHLIGHTED. THE OPERATING CHARACTERISTICS OF THE BLADE DURING ROTATING AND NONROTATING CONDITIONS ARE PRESENTED. THE TENSILE, COMPRESSION, AND SHEAR PROPERTIES OF THE BLADE ARE REPORTED. THE BLADE FABRICATION, TOOLING AND QUALITY ASSURANCE ARE DISCUSSED.

1979-0186 GILBERT B L, FOREMAN K M
EXPERIMENTAL DEMONSTRATION OF THE DIFFUSER-AUGMENTED WIND TURBINE CONCEPT.
J. ENERGY 3(4): 235-240, JULY-AUGUST 1979.

THE SURFACE AREA REQUIREMENTS OF AN EFFICIENT DIFFUSER HAS BEEN REDUCED BY INNOVATIVE USE OF THE EXTERNAL WIND TO PRODUCE A COST-EFFECTIVE WIND ENERGY CONVERSION SYSTEM (WECS). THREE SETS OF TESTS WERE CONDUCTED ON VERY COMPACT DIFFUSERS: 1 ON SMALL-SCALE MODELS USING SCREENS TO SIMULATE A REAL TURBINE; 2 ON TEN TIMES LARGER SCALE MODELS WITH SCREENS; AND 3 ON A REAL TURBINE. THE FIRST-GENERATION NONOPTIMIZED DIFFUSER-AUGMENTED WIND TURBINE (DAWT) CONFIGURATION IS A CONICAL, 60 DEG INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS FOR BOUNDARY-LAYER CONTROL. THIS BASELINE MODEL PROVIDED OVER THREE TIMES THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE EFFICIENCY, DIAMETER, AND FREE WIND. AN OPTIMIZED CONFIGURATION SHOULD PROVIDE AUGMENTATIONS GREATER THAN FOUR.

1979-0187 GIPE P
ESTIMATING WECS COSTS: A SIMPLIFIED CALCULATION METHOD FOR CONSUMERS.
WIND POWER DIG. NO. 17: 7-12, FALL 1979.

THE ARTICLE DESCRIBES A METHOD FOR CALCULATING THE LENGTH OF TIME REQUIRED BEFORE A WIND SYSTEM PAYS FOR ITSELF: THE LENGTH OF TIME TO PAYBACK. THE METHOD MAKES USE OF SIMPLE FORMULAS THAT CAN BE SOLVED ON A POCKET CALCULATOR, AND DEMANDS USE OF ONLY ONE TABLE.

1979-0188 GIPE P
LONE STAR WIND; AN OVERVIEW OF CURRENT WIND ACTIVITIES IN TEXAS.
WIND POWER DIG. NO. 17: 36-40, FALL 1979.

THE ACTIVITIES OF TEXAS COMPANY WIND ENGINEERING, AND COY HARRIS, ARE DESCRIBED; PARTICULARLY THEIR WIND TURBINE WIND GEN 25.

1979-0189 GIPE P
WIND AND UTILITIES; ALCOA MARKET VAWTS.
WIND POWER DIG. NO. 17: 29-32, FALL 1979.

ALCOA (ALUMINUM COMPANY OF AMERICA) HAS ANNOUNCED THAT IT IS TEST MARKETING AN INTRODUCTORY LINE OF DARRIEUS TURBINES. FIVE MODELS RANGE IN CAPACITY FROM 8 TO 500 KW, AND IN PRICE FROM $10,000 TO $190,000.

1979-0190 GLOSSARY OF WIND ENERGY TERMINOLOGY.
WIND POWER DIG. NO. 17: 50-53, FALL 1979.

1979-0191 GOELA J S
WIND POWER THROUGH KITES.
MECH. ENG. 101(6): 42-43, JUNE 1979.

IT IS PROPOSED IN THIS ARTICLE TO USE KITES TO EXTRACT ENERGY FROM THE WIND. IN ADDITION TO AVOIDING THE USE OF HIGH-CAPITAL-COST COMPONENTS SUCH AS TOWERS AND LARGE ROTORS, THE IMPORTANT ADVANTAGE OF USING THE PROPOSED SCHEME IS THAT IT UTILIZES THE FULL AVAILABLE POTENTIAL OF THE WIND. THE MOTION OF AIR GENERATES A PULL IN THE ROPE THAT HOLDS THE KITE. THIS PULL IS A FUNCTION OF BOTH THE ANGLE OF ATTACK OF THE KITE AND THE KITE AREA NORMAL TO THE WIND DIRECTION, AND BY VARYING ANY OF THESE WE CAN VARY THE PULL ON THE ROPE. ON THE SURFACE OF THE EARTH, THIS ROPE WILL BE SUITABLY CONNECTED TO AN ENERGY SYSTEM WHICH WILL CONVERT THE VARIATION IN DEVELOPED FORCE ON THE ROPE INTO THE ROTATIONAL ENERGY OF A ROTOR. A DETAILED THEORETICAL ANALYSIS OF THE PROPOSED TECHNIQUE HAS BEEN CARRIED OUT.

1979-0192 GRIMMER D
DARRIEUS BLADE CONSTRUCTION.
WIND POWER DIG. NO. 17: 54-57, FALL 1979.

THIS ARTICLE DESCRIBES A LOW-COST METHOD OF CONSTRUCTING DARRIEUS WIND-TURBINE BLADES THAT IS SUITABLE TO BOTH MASS-PRODUCTION AND HOME-CRAFTSMAN MANUFACTURE. A MILD STEEL STRIP BENT INTO THE TROPOSKIEN SHAPE FORMS THE CENTER OF THE DARRIEUS BLADE IN THIS LOW-COST METHOD OF CONSTRUCTION. THE STEEL STRIP IS CUT AS WIDE AS THE DESIRED AIRFOIL WIDTH, AND CAN BE MORE THAN ONE PIECE, FASTENED TOGETHER WITH RIVETS. EXPANDABLE PAPER HONEYCOMB IS USED TO FORM THE CURVED AIRFOIL CROSS-SECTION.

1979-0193 GROVER R D, KADLEC E G
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME III. POINT DESIGNS.
NTIS, AUGUST 1979. 94 P.
SAND-78-0962

VOLUME III OF THIS STUDY DISCUSSES MAJOR FEATURES OF THE DARRIEUS VERTICAL-AXIS WIND TURBINE DESIGN INCLUDING THE BLADES, THE SPEED INCREASER, GUY CABLES AND CABLE ANCHORS, TRANSMISSION, CLUTCH, BRAKES, AND THE ELECTRICAL SYSTEM. SYSTEM WEIGHT CHARACTERISTICS ARE TABULATED. THE REPORT DISCUSSES OPERATION AND MAINTENANCE COSTS AND REQUIREMENTS AND CONCLUDES WITH DETAILED DESCRIPTIONS OF POINT DESIGNS FOR 120, 200, 500, AND 1600-KW DARRIEUS VERTICAL-AXIS WIND-ENERGY SYSTEMS. THESE SAME POINT DESIGNS ARE USED FOR THE DETAILED ECONOMIC ANALYSES DISCUSSED IN VOLUME IV.

1979-0194 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS. VOL.1. 1964 - AUGUST 1978 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1979. 264 P.
PB80-800303

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES, AND INERTIA OR FRICTION WELDING ARE REVIEWED. THIS BIBLIOGRAPHY, ALONG WITH VOL. 2, SUPERCEDES PREVIOUS ONES BY THE SAME AUTHOR.

1979-0195 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS. VOL.2. SEPTEMBER 1978 - SEPTEMBER 1979 (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1979. 99 P.
PB80-800311

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES, AND INERTIA OR FRICTION WELDING ARE REVIEWED. THIS BIBLIOGRAPHY, ALONG WITH VOL. 1, SUPERCEDES EARLIER ONES BY THE SAME AUTHOR.

1979-0196 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, OCTOBER 1979. 271 P.
PB80-800329

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS AND REACTION WHEELS ARE INVESTIGATED IN THESE RESEARCH REPORTS GATHERED IN A WORLDWIDE LITERATURE SURVEY. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, ENERGY TRANSFER DEVICES, AND INERTIA OR FRICTION WELDING ARE REVIEWED. THIS BIBLIOGRAPHY SUPERCEDES PREVIOUS BIBLIOGRAPHIES BY THE SAME AUTHOR.

1979-0197 HAGEN L J, LYLES L, SKIDMORE E L
APPLICATION OF WIND ENERGY TO GREAT PLAINS IRRIGATION PUMPING. FINAL REPORT.
NTIS, OCTOBER 1979. 158 P.
DOE/SEA-3707-20741/80/1

WE INVESTIGATED APPLICATION OF DEDICATED WIND ENERGY SYSTEMS WITHOUT ENERGY STORAGE FOR IRRIGATION IN THE GREAT PLAINS. MAJOR USES OF IRRIGATION ENERGY WERE IDENTIFIED AS PUMPING FOR SURFACE DISTRIBUTION SYSTEMS, WHICH COULD BE SUPPLIED BY VARIABLE FLOW, AND PUMPING FOR SPRINKLER SYSTEMS USING CONSTANT FLOW.

1979-0198 HEWSON E W, WADE J E, BAKER R W
A HANDBOOK ON THE USE OF TREES AS AN INDICATOR OF WIND POWER POTENTIAL. FINAL REPORT.
NTIS, JUNE 1979. 26 P.
RLO-2227-79/3

THIS HANDBOOK DESCRIBES TECHNIQUES FOR USING TREES AS INDICATORS OF WIND POWER POTENTIAL AND IS AIMED AT PROVIDING THE WIND PROSPECTOR WITH AN INITIAL ASSESSMENT OF THE WIND POWER POTENTIAL. SUBSEQUENT SECTIONS WILL DESCRIBE TECHNIQUES FOR USING TREES IN A WIND SURVEY, THE ROLE OF VEGETATION INDICATORS IN SITE SELECTION AND THE LIMITATIONS OF THESE TECHNIQUES.

1979-0199 JACOBS UNVEILS NEW MACHINE.
WIND POWER DIG. NO. 17: 18, FALL 1979.

1979-0200 HEWSON E W, WADE J E, BAKER R W
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. ANNUAL PROGRESS REPORT, JUNE 15, 1978 - MARCH 14, 1979.
NTIS, MARCH 1979. 15 P.
DOE/ET/20316-79/2, RLO-2227-T24-79-2

THE MOST IMPORTANT RESULTS ARE PRESENTED OF WORK COMPLETED DURING THE PAST YEAR OF THIS STUDY THE MOST IMPORTANT ACHIEVEMENT DURING THE PAST YEAR WAS THE COMPLETION OF A DRAFT OF A HANDBOOK ON THE USE OF TREES AS AN INDICATOR OF WIND POWER POTENTIAL. THIS HANDBOOK DESCRIBES RELATIONSHIPS BETWEEN MEAN ANNUAL WIND SPEED AND INDICES OF WIND DEFORMATION OF TWO SPECIES OF TREES WIDELY DISTRIBUTED IN THE WESTERN UNITED STATES. WORK DURING THE PAST YEAR ON OTHER SPECIES OF TREES INDICATES THAT THE TECHNIQUES CALIBRATED INITIALLY FOR ONLY DOUGLAS-FIR AND PONDEROSA PINE CAN ALSO BE CALIBRATED ON OTHER TREES INCLUDING BROADLEAF TREES SUCH AS OAKS.

1979-0201 HOFFMAN J A
WIND ENERGY SYSTEM TIME-DOMAIN (WEST) ANALYZERS USING HYBRID SIMULATION TECHNIQUES.
NTIS, OCTOBER 1979. 30 P.
DOE/NASA/0026-79/1, NASA-CR-159737, PPI-1030-6, N80-20909

TWO STAND-ALONE ANALYZERS CONSTRUCTED FOR REAL TIME SIMULATION OF THE COMPLEX DYNAMIC CHARACTERISTICS OF HORIZONTAL-AXIS WIND ENERGY SYSTEMS ARE DESCRIBED. MATHEMATICAL MODELS FOR AN AEROELASTIC ROTOR, INCLUDING NONLINEAR AERODYNAMIC AND ELASTIC LOADS, ARE IMPLEMENTED WITH HIGH SPEED DIGITAL AND ANALOG CIRCUITRY. MODELS FOR ELASTIC SUPPORTS, A POWER TRAIN, A CONTROL SYSTEM, AND A ROTOR GIMBAL SYSTEM ARE ALSO INCLUDED.

1979-0202 HUBBARTT J E
STUDY OF A VORTEX AUGMENTOR FOR A WIND-POWERED TURBINE.
J. ENERGY 3(6): 344-348, NOVEMBER - DECEMBER 1979.

AN EXPERIMENTAL INVESTIGATION OF AN AUGMENTOR WHICH EMPLOYS A VORTEX TO CREATE A LOW PRESSURE SINK FOR THE DISCHARGE OF A WIND-POWERED TURBINE IS REPORTED. THE TEST MODEL HAS A HORIZONTAL AXIS WITH THE VORTEX PRODUCED BY AN ANNULAR CASCADE OF STATOR VANES SURROUNDING THE TURBINE DUCT. THE MAXIMUM VALUE OF THE EXPERIMENTAL POWER COEFFICIENT WAS ONLY ABOUT ONE-THIRD OF THE IDEAL FLOW LIMIT. FURTHERMORE, THE POWER AUGMENTATION WITH THIS VORTEX PUMP WAS ONLY SLIGHTLY HIGHER THAN THAT OBTAINED WHEN THE STATOR-VANE ANNULUS WAS COMPLETELY BLOCKED. THUS, IT IS CONCLUDED THAT THIS TYPE OF VORTEX AUGMENTOR IS INEFFECTIVE.

1979-0203 IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS.
NTIS, JANUARY 1979. 268 P.
SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978.
JUEL-SPEZ-28

PAPERS ARE PRESENTED CONCERNING THE AERODYNAMICS, STABILITY, AND DESIGN ASPECTS OF LARGE WIND TURBINES.

1979-0204 INGLIS D R
A WINDMILL'S THEORETICAL MAXIMUM EXTRACTION OF POWER FROM THE WIND.
AM. J. PHYS. 47(5): 416-420, MAY 1979.

THE FRACTION OF THE KINETIC ENERGY OF THE WIND IMPINGING ON ITS AREA, THAT A WIND TURBINE CAN CONVERT TO USEFUL POWER, HAS BEEN SHOWN BY BETZ IN AN IDEALIZED LAMINAR-FLOW MODEL TO HAVE AN UPPER LIMIT OF 16/27 OR 59 PERCENT. THE LIMIT IS HERE SIMPLY REDERIVED AND IT IS SHOWN HOW DEVIATIONS FROM THE IDEALIZED MODEL, INVOLVING ROTATIONAL KINETIC ENERGY OF THE DOWNWIND STREAM AND TURBULENT MIXING FROM OUTSIDE THE BOUNDARIES OF THE IDEALIZED STREAM, CAN EITHER INCREASE OR DECREASE THE POWER AVAILABLE. THE LIMIT IS THUS NOT A STRICT UPPER LIMIT IN PRACTICE.

1979-0205 HARPER M R

AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS ASSESSMENT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 185-200.
SERI/TP-245-184, CONF-790501

AERODYNAMIC DEVICES THAT AUGMENT NATURAL WINDS OF LOW KINETIC ENERGY DENSITY HAVE THE POTENTIAL FOR PROVIDING A COST-EFFECTIVE ENERGY RESOURCE SYSTEM. SEVERAL CONCEPTS ARE DISCUSSED IN WHICH AN AUGMENTOR SURFACE IS USED TO INCREASE THE MASS FLOW THROUGH A TURBINE, INCREASING THE TURBINE'S POWER OUTPUT.

1979-0206 HEALY T J
ROCKY FLATS SMALL WIND SYSTEMS PROGRAM OVERVIEW.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 41-56.
SERI/TP-245-184, CONF-790501

THIS PAPER PROVIDES AN OVERVIEW OF THE ROCKY FLATS SMALL WIND SYSTEMS PROGRAM SPONSORED BY THE UNITED STATES DEPARTMENT OF ENERGY (DOE). THIS PROGRAM PROVIDES TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. THE OVERALL OBJECTIVE IS TO STIMULATE THE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BY THE PRIVATE SECTOR AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. THE INFORMATION PROVIDED IN THIS PAPER DESCRIBES THE CURRENT PROGRAM IN TERMS OF ITS OBJECTIVES, ACTIVITY HIGHLIGHTS AND FUTURE PLANS FOR FY1979 AS WELL AS PROJECTIONS THROUGH 1981.

1979-0207 HOFFERT M I, MILLER G
AUGMENTED VERTICAL AXIS WIND ENERGY SYSTEM EVALUATION.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 245-266.
SERI/TP-245-184, CONF-790501

PERFORMANCE AND COST CHARACTERISTICS OF WIND ENERGY CONVERSION SYSTEMS EMPLOYING BOTH A VERTICAL AXIS OF ROTATION AND SOME FORM OF AUGMENTATION BEYOND A "STAND-ALONE" ROTOR ARE ASSESSED, WITH EMPHASIS ON TWO SYSTEMS CURRENTLY APPROACHING COMMERCIAL FEASIBILITY: (1) THE TORNADO-VORTEX YEN WIND TURBINE (YWT) AND (2) THE DIFFUSOR-AUGMENTED LEBOST WIND TURBINE (LWT). BOTH TECHNOLOGICAL AND COST-EFFECTIVENESS CONSIDERATIONS ARE DISCUSSED FOR THESE SYSTEMS WITH EMPHASIS ON DEVELOPING APPROPRIATE ECONOMIC MEASURE FOR THEIR RESPECTIVE APPLICATIONS.

1979-0208 J. B. BUCHANAN'S WINDMILL COLLECTION: A BIT OF WIND POWER HISTORY IS PRESERVED.
WIND POWER DIG. NO. 17: 48-49, FALL 1979.

J. B. BUCHANAN'S COLLECTION OF OLD WINDMILLS IN TEXAS IS DESCRIBED.

1979-0209 J. CARTER'S DEVELOPMENT OF FIBERGLASS TECHNOLOGY.
WIND POWER DIG. NO. 17: 40-44, FALL 1979.

JAY CARTER'S WIND SYSTEM IS DESCRIBED: A UNIQUE 32-FOOT DIAMETER, TWO BLADED, DOWNWIND TURBINE CAPABLE OF 25 KILOWATTS AT WIND SPEEDS OF 25 MPH AND ABOVE.

1979-0210 JAYADEV T S, HENDERSON J, BINGHAM C
CONVERSION SYSTEM OVERVIEW ASSESSMENT. VOLUME II. SOLAR-WIND HYBRID SYSTEMS.
NTIS, AUGUST 1979. 34 P.
SERI/TR-35-078

SOLAR-WIND HYBRID SYSTEMS ARE DISCUSSED. IT IS SHOWN THAT THERE ARE LARGE AREAS IN THE UNITED STATES WHERE SOLAR AND WIND RESOURCES ARE COMPARABLE IN MAGNITUDE AND THERE ARE DIURNAL AND SEASONAL COMPLEMENTARITIES WHICH OFFER THE POTENTIAL FOR COST-EFFECTIVE HYBRID SYSTEMS. THERE ARE ALSO DISTINCT ENGINEERING FEATURES OF THE TWO CONVERSION TECHNOLOGIES. ELECTRIC POWER GENERATION FROM WIND IS STRAIGHTFORWARD AND COST-EFFECTIVE, WHEREAS SOLAR THERMAL CONVERSION TO GENERATE HEAT IS MORE COST-EFFECTIVE THAN TO GENERATE ELECTRICITY. EXAMPLES OF HYBRID SYSTEMS UTILIZING THESE FEATURES IN TOTAL ENERGY APPLICATIONS ARE PRESENTED.

1979-0211 KLUETER H H
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS.
NTIS, 1979. 324 P.
USDA WIND WORKSHOP, AMES, IOWA, MAY 15-17, 1979.
CONF-7905109

1979-0212 BELIVEAU K D
SOLAR AND WIND ENERGY RESEARCH PROGRAM (SWERP) INFORMATION CENTRE.
SOLAR ENERGY: BRINGING IT DOWN TO EARTH. VOLUME 1. NTIS, 1979. PAPER 79-50, 9 P.
CONF-7908116-(VOL.1)

THE SOLAR AND WIND ENERGY RESEARCH PROGRAM (SWERP) WAS ESTABLISHED IN AUGUST, 1977 TO PROVIDE ALBERTANS WITH CURRENT AND COMPREHENSIVE INFORMATION ON SOLAR AND WIND ENERGY RESOURCES IN ALBERTA. ACTIVITIES OF THE SWERP STAFF FALL INTO THREE CATEGORIES: COLLECTING AND INDEXING A LIBRARY OF REFERENCE MATERIAL ON SOLAR AND WIND ENERGY; DEVELOPING AND MAINTAINING A NETWORK OF MONITORING STATIONS THROUGHOUT ALBERTA; AND PARTICIPATING IN VARIOUS RESEARCH PROJECTS AND SPECIAL EVENTS. THE SWERP INFORMATION CENTRE MAINTAINS THE FIRST COMPUTERIZED INDEX OF SOLAR AND WIND ENERGY INFORMATION IN CANADA. THE IMPORTANT FEATURES OF THE DATABASE AND OTHER INFORMATION SERVICES AT SWERP ARE DISCUSSED.

1979-0213 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 36, FEBRUARY/MARCH 1979; NO. 37, MAY/JUNE 1979; NO. 38, JULY/AUGUST 1979; NO. 39, SEPTEMBER/OCTOBER 1979; NO. 40, NOVEMBER/DECEMBER 1979.

1979-0214 KMW/ERNO WIN SWEDISH WECS BID.
WIND ENERGY REP. :5, OCTOBER 1979.

1979-0215 KANAKI M T, PROBERT S D
CRETAN WINDMILLS.
APPL. ENERGY 5(3): 215-222, JULY 1979.

A RESURGENCE OF INTEREST IN THIS TYPE OF WINDMILL HAS OCCURRED RECENTLY BECAUSE OF ITS DESIGN SIMPLICITY AND LOW COST. WITH IT A RELATIVELY HIGH RATE OF ENERGY EXTRACTION MAY BE ACHIEVED FROM LOW-SPEED WINDS.

1979-0216 KAZA K R V, KVATERNIK R G

AEROELASTIC EQUATIONS OF MOTION OF A DARRIEUS VERTICAL-AXIS WIND-TURBINE BLADE.
NTIS, DECEMBER 1979. 57 P.
DOE/NASA/1028-79/25, NASA-TM-79295

THE SECOND-DEGREE NONLINEAR AEROELASTIC EQUATIONS OF MOTION FOR A SLENDER, FLEXIBLE, NONUNIFORM, DARRIEUS VERTICAL-AXIS WIND TURBINE BLADE WHICH IS UNDERGOING COMBINED FLATWISE BENDING, EDGEWISE BENDING, TORSION, AND EXTENSION ARE DEVELOPED USING HAMILTON'S PRINCIPLE. THE BLADE AERODYNAMIC LOADING IS OBTAINED FROM STRIP THEORY BASED ON A QUASI-STEADY APPROXIMATION OF TWO-DIMENSIONAL INCOMPRESSIBLE UNSTEADY AIRFOIL THEORY. THE DERIVATION OF THE EQUATIONS HAS ITS BASIS IN THE GEOMETRIC NONLINEAR THEORY OF ELASTICITY AND THE RESULTING EQUATIONS ARE CONSISTENT WITH THE SMALL DEFORMATION APPROXIMATION IN WHICH THE ELONGATIONS AND SHEARS ARE NEGLIGIBLE COMPARED TO UNITY.

1979-0217 KAZA K R V, JANETZKE D C, SULLIVAN T L
EVALUATION OF MOSTAS COMPUTER CODE FOR PREDICTING DYNAMIC LOADS IN TWO-BLADED WIND TURBINES.
STRUCTURES, STRUCTURAL DYNAMICS & MATERIALS, 20TH CONFERENCE, ST. LOUIS, APRIL 4-6, 1979. COLLECT. TECH. PAPERS. NEW YORK, AIAA, 1979. PAPER 79-00733, P. 53-63.

CALCULATED DYNAMIC BLADE LOADS ARE COMPARED WITH MEASURED LOADS OVER A RANGE OF YAW STIFFNESSES OF THE DOE/NASA MOD-0 WIND TURBINE TO EVALUATE THE PERFORMANCE OF TWO VERSIONS OF THE MOSTAS COMPUTER CODE. THE FIRST VERSION USED A TIME-AVERAGED COEFFICIENT APPROXIMATION IN CONJUNCTION WITH A MULTIBLADE COORDINATE TRANSFORMATION FOR TWO-BLADED ROTORS TO SOLVE THE EQUATIONS OF MOTION BY STANDARD EIGENANALYSIS. THE RESULTS OBTAINED WITH THIS APPROXIMATE ANALYSIS DO NOT AGREE WITH DYNAMIC BLADE LOAD AMPLIFICATIONS AT OR CLOSE TO RESONANCE CONDITIONS.

1979-0218 KILAR L A
WIND BLOWS ANEW.
POWER 123(5): 40-42, MAY 1979.

BUSBAR ENERGY COSTS OF WIND-ENERGY CONVERSION SYSTEMS (WECS) DEPEND ON ENVIRONMENTAL AND APPLICATION PARAMETERS AS WELL AS ON MACHINE TYPE, BUT 40 TO 80 MILLS/KWH IS TYPICAL OF CURRENT FORECASTS FOR INTERMEDIATE (100-600-KW) AND LARGE (OVER-600-KW) UNITS ALTHOUGH ENERGY COSTS FOR SMALL COMMERCIAL WIND TURBINES CAN RUN TWO TO THREE TIMES THAT. DOE'S SHORT-RANGE GOAL FOR 200-KW-SIZE MACHINES IS 15-25 MILLS/KWH. BESIDES THE FICKLENESS OF LOCAL WIND CONDITIONS, TECHNICAL, ENVIRONMENTAL, AND SOCIAL PROBLEMS MUST BE ADDRESSED. WIND-TURBINE/GENERATORS ARE CATEGORIZED TODAY IN TERMS OF THE ORIENTATION OF THE AXIS OF ROTATION, RELATIVE TO THE WINDSTREAM. HORIZONTAL-AXIS, VERTICAL-AXIS, AND CROSS-WIND HORIZONTAL AXIS ROTORS ARE DESCRIBED.

1979-0219 KILAR L A, CHOWANIEC C R
TECHNICAL AND ECONOMIC ASSESSMENT OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, VANCOUVER, BC, JULY 15-20, 1979. PREPRINT. NEW YORK, IEEE, PAPER A 79 454-0, 1979. 6 P.

THIS PAPER PRESENTS THE PRINCIPAL RESULTS OF A COMPREHENSIVE ASSESSMENT OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS. CONCEPTUAL DESIGNS AND ASSOCIATED COSTS ARE GIVEN FOR THE MAJOR COMPONENTS OF MULTI-UNIT INSTALLATIONS. ON-SHORE ENERGY COSTS ARE DEVELOPED IN TERMS OF CONTROLLING ENVIRONMENTAL PARAMETERS, DISTANCE FROM SHORE, AND EQUIPMENT TYPE.

1979-0220 KLIMAS P C
DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES.
NTIS, 1979. 12 P.
SAND-79-0997C, CONF-790501-2

THE OBJECTIVE OF THE DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES IS TO DEVELOP AND TRANSFER THE NECESSARY INFORMATION ASSOCIATED WITH VERTICAL AXIS WIND TURBINES (VAWTS) TO ALLOW COMMERCIAL COMPANIES THE OPPORTUNITY TO DEVELOP, MANUFACTURE AND SELL VAWTS. FIRST-LEVEL AERODYNAMIC, STRUCTURAL, TESTING AND SYSTEMS ANALYSES CAPABILITIES HAVE EVOLVED TO SUPPORT AND EVALUATE COMPLETE SYSTEMS DESIGNS, AND CONTRACTS HAVE BEEN LET WHICH ARE PLANNED TO RESULT IN THE COMPLETED INSTALLATION OF A LOW-COST 17M VAWT BY FEBRUARY 1981. A NUMBER OF POTENTIAL IMPROVEMENTS HAVE BEEN IDENTIFIED DURING THIS FIRST LEVEL DESIGN CYCLE WHICH MAY SUBSTANTIALLY LOWER FUTURE SYSTEM COSTS.

1979-0221 KLIMAS P C
DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 57-70.
SERI/TP-245-184, CONF-790501

THE OBJECTIVE OF THE DARRIEUS WIND TURBINE PROGRAM AT SANDIA LABORATORIES IS TO DEVELOP AND TRANSFER THE NECESSARY INFORMATION ASSOCIATED WITH VERTICAL AXIS WIND TURBINES (VAWTS) TO ALLOW COMMERCIAL COMPANIES THE OPPORTUNITY TO DEVELOP, MANUFACTURE AND SELL VAWTS. FIRST-LEVEL AERODYNAMIC, STRUCTURAL, TESTING AND SYSTEMS ANALYSES CAPABILITIES HAVE EVOLVED TO SUPPORT AND EVALUATE COMPLETE SYSTEMS DESIGNS, AND CONTRACTS HAVE BEEN LET WHICH ARE PLANNED TO RESULT IN THE COMPLETED INSTALLATION OF A LOW-COST 17M VAWT BY FEBRUARY 1981. A NUMBER OF POTENTIAL IMPROVEMENTS HAVE BEEN IDENTIFIED DURING THIS FIRST LEVEL DESIGN CYCLE WHICH MAY SUBSTANTIALLY LOWER FUTURE SYSTEM COSTS.

1979-0222 KORNREICH T R, KOTTLER R J, JENNINGS D M
PRELIMINARY TECHNICAL AND ECONOMIC EVALUATION OF VORTEX EXTRACTION DEVICES.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 153-170.
SERI/TP-245-184, CONF-790501

TWO INNOVATIVE VORTEX EXTRACTION DEVICES--THE TORNADO WIND ENERGY SYSTEM (TWES) AND THE VORTEX AUGMENTOR CONCEPT (VAC)--ARE CRITICALLY EVALUATED TO PROVIDE A PRELIMINARY ASSESSMENT OF THEIR TECHNICAL AND ECONOMIC VIABILITY COMPARED TO CONVENTIONAL HORIZONTAL AXIS WIND ENERGY SYSTEMS.

1979-0223 CARTER J
INTRODUCTION TO SMALL-SCALE WIND POWER.
SOLAR AGE RESOURCE BOOK, MCPHILLIPS, M., ED. NEW YORK, EVEREST HOUSE, 1979. P. 79-84.

WIND ENERGY CONVERSION SYSTEMS FOR SMALL SCALE GENERATION OF ELECTRICITY AND WATER PUMPING ARE DISCUSSED. THE ECONOMICS, SIZING, LOAD ANALYSIS AND SITE SELECTION FOR WIND MACHINES ARE CONSIDERED.

1979-0224 LAITOS J, FEUERSTEIN R J
REGULATED UTILITIES AND SOLAR ENERGY: A LEGAL-ECONOMIC ANALYSIS OF THE MAJOR ISSUES AFFECTING THE SOLAR COMMERCIALIZATION EFFORT.

NTIS, JUNE 1979. 131 P.
SERI/TR-62-255

THE REACTION OF PUBLIC UTILITIES TO THE ADDITION OF COMPETITIVE SOURCES OF ENERGY SUPPLIED BY SOLAR TECHNOLOGIES WILL HAVE A SIGNIFICANT IMPACT ON THE COMMERCIALIZATION OF SOLAR ENERGY. DECENTRALIZED APPLICATIONS OF SOLAR ENERGY NEED UTILITY-PRODUCED POWER TO BACK UP THE ENERGY PRODUCED BY SOLAR MEANS. THE COST AND AVAILABILITY OF THIS POWER WILL LARGELY DETERMINE THE ACCEPTANCE OF SOLAR ENERGY. THERE ARE THREE LEGAL ISSUES SURROUNDING THE ROLE OF UTILITIES IN THE SOLAR COMMERCIALIZATION EFFORT: (1) THE EXTENT TO WHICH SOLAR-POWERED UTILITIES MAY OWN, SELL, LEASE, FINANCE, OR SERVICE SOLAR DEVICES FOR UTILITY CUSTOMERS; (2) THE DEGREE TO WHICH SOLAR-POWERED UTILITIES MAY BE ABLE TO COMPETE WITH EXISTING UTILITIES; AND (3) THE DEGREE TO WHICH VARIOUS UTILITY RATE STRUCTURES WILL BE ALLOWED TO PENALIZE DECENTRALIZED SOLAR USERS.

1979-0225 LAWRENCE K A
REVIEW OF THE ENVIRONMENTAL EFFECTS AND BENEFITS OF SELECTED SOLAR ENERGY TECHNOLOGIES.
NTIS, MAY 1979. 18 P.
SERI/TP-53-114R

DATA ARE REVIEWED AND SUMMARIZED ON THE ENVIRONMENTAL EFFECTS OF THREE SOLAR ENERGY TECHNOLOGIES: PHOTOVOLTAIC CELLS, WIND ENERGY CONVERSION (WEC), AND THE SOLAR THERMAL CENTRAL RECEIVER. POTENTIAL EFFECTS ARE IDENTIFIED FOR EACH OF THE LIFE CYCLE PHASES: RESOURCE EXTRACTION AND COMPONENT MANUFACTURE, PLANT CONSTRUCTION, OPERATION AND DECOMMISSION. THE SOLAR ENERGY TECHNOLOGIES ARE ASSUMED TO BE DEPLOYED AS CENTRALIZED ENERGY PRODUCTION FACILITIES. THE TECHNOLOGIES EXAMINED ARE MATERIALS INTENSIVE COMPARED TO FOSSIL FUEL PLANTS WITH THE SAME POWER RATING. AS A RESULT, THE LIFE-CYCLE PHASE OF RESOURCE EXTRACTION AND COMPONENT PRODUCTION IS THE MOST ENVIRONMENTALLY HAZARDOUS.

1979-0226 LEONARD T M
USER'S MANUAL FOR THE COMPUTER CODE PAREP.
NTIS, APRIL 1979. 58 P.
SAND-79-0431

PAREP (PARAMETRIC REPRESENTATION), A COMPUTER CODE THAT USES NUMERICAL AND EMPIRICAL DATA TO ESTIMATE THE AERODYNAMIC PERFORMANCE OF DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES, IS DISCUSSED. BOTH PROGRAM THEORY AND USAGE ARE DESCRIBED FOR THE CODE. SAMPLE RUNS AND PROGRAM LISTINGS ARE PROVIDED.

1979-0227 LIEBLEIN S, LONDAHL D S, FURLONG D B, PEERY D J, DREIER M E
EVALUATION OF FEASIBILITY OF PRESTRESSED CONCRETE FOR USE IN WIND TURBINE BLADES.
NTIS, SEPTEMBER 1979. 120 P.
DOE/NASA/5906-79/1, NASA-CR-159725, TRS 104

A PRELIMINARY EVALUATION WAS CONDUCTED OF THE FEASIBILITY OF THE USE OF PRESTRESSED CONCRETE AS A MATERIAL FOR LOW-COST BLADES FOR WIND TURBINES. A BASELINE BLADE DESIGN WAS ACHIEVED FOR THE DOE/NASA MOD-0 100 KW EXPERIMENTAL WIND TURBINE THAT MET AERODYNAMIC AND STRUCTURAL REQUIREMENTS. CALCULATED BLADE WEIGHT AND COST WERE 4,900 LB. AND AROUND $18,000, COMPARED TO 2,000 LB. AND AROUND $200,000 FOR A MOD-0 ALUMINUM BLADE. SIGNIFICANT COST REDUCTIONS WERE INDICATED FOR VOLUME PRODUCTION. CASTING OF A MODEL BLADE SECTION SHOWED NO FABRICATION PROBLEMS. COUPLED DYNAMIC ANALYSIS REVEALED THAT ADVERSE ROTOR-TOWER INTERACTIONS CAN BE SIGNIFICANT WITH HEAVY ROTOR BLADES. DESIGN OPTIONS ARE DISCUSSED.

1979-0228 WOODBRIDGE D D
SOURCES AND POTENTIAL USES OF WAVE ENERGY.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 544-555.

THIS PAPER DISCUSSES THE FEASIBILITY OF THE DEVELOPMENT OF AN OCEAN SWELL AND WAVE ENERGY CONVERSION SYSTEM, COMBINING BOTH SOLAR AND WIND ENERGY WITH OCEAN WAVE ENERGY, FOR APPLICATIONS AS A POWER SOURCE AND RECREATIONAL FACILITY.

1979-0229 LINDLEY C A, MELTON W C
ELECTRIC UTILITY APPLICATION OF WIND ENERGY CONVERSION SYSTEMS ON THE ISLAND OF OAHU.
NTIS, FEBRUARY 23, 1979. 341 P.
ATR-78(7598)-2

THIS WIND ENERGY APPLICATION STUDY WAS PERFORMED BY THE AEROSPACE CORPORATION FOR THE WIND SYSTEMS BRANCH OF THE DEPARTMENT OF ENERGY. THE OBJECTIVE WAS TO IDENTIFY INTEGRATION PROBLEMS FOR A WIND ENERGY CONVERSION SYSTEM (WECS) PLACED INTO AN EXISTING CONVENTIONAL UTILITY SYSTEM. THE INTEGRATION PROBLEMS INCLUDED ENVIRONMENTAL, INSTITUTIONAL AND TECHNICAL ASPECTS AS WELL AS ECONOMIC MATTERS, BUT THE EMPHASIS WAS ON THE ECONOMICS OF WIND ENERGY. THE HAWAIIAN ELECTRIC COMPANY UTILITY SYSTEM ON THE ISLAND OF OAHU WAS SELECTED FOR THE STUDY BECAUSE OF THE VERY REAL POTENTIAL FOR WIND ENERGY ON THAT ISLAND, AND BECAUSE OF THE SIMPLICITY AFFORDED IN ANALYZING THAT ISOLATED UTILITY.

1979-0230 ADKINS D W, YOUNG M I
DYNAMIC RESPONSE OF POWER GENERATING WIND TURBINES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE 1979. P. 560-561.

A MODEL IS PRESENTED OF THE ROTATIONAL DYNAMICS OF A LARGE WIND TURBINE DRIVING SYNCHRONOUS AND NON-SYNCHRONOUS ELECTRIC GENERATORS. THE ROTOR IS ASSUMED RIGID WITH CONSTANT-CHORD BLADES AND IS MODELED BY AERODYNAMIC STRIP THEORY. THE LOADS INCLUDE A DC GENERATOR WITH EITHER FIELD CURRENT CONTROL OR BLADE PITCH CONTROL AND A SYNCHRONOUS ALTERNATOR WITH BLADE PITCH CONTROL. THESE MODELS ARE USED TO EVALUATE ROTATIONAL RESPONSE OF THE WIND TURBINE TO STEP-CHANGES IN WIND SPEED.

1979-0231 AFANASJEVS J, MASSMAN W J, OEHLKERS R A, HINTON B B, SUOMI V E
EXTENDED RECORD LENGTH OF ATMOSPHERIC DATA GATHERED VIA NIMBUS-6.
IEEE TRANS. GEOSCI. ELECTRON. GE-17(4): 308-313, OCTOBER 1979.

A LOW-POWER NONVOLATILE DATA MEMORY UNIT WAS DEVELOPED FOR FREE FLOATING BALLOONS IN THE TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE), DESIGNED TO INVESTIGATE THE METEOROLOGY OF THE UPPER TROPOSPHERE AND LOWER STRATOSPHERE IN THE SOUTHERN HEMISPHERE. BY MULTIPLE IDENTIFICATION CODES DATA RECORDS, SEVERAL HOURS LONG, WERE TRANSFERRED IN COMPRESSED FORM TO THE NIMBUS-6 SATELLITE FOR RETRANSMISSION TO GROUND STATIONS. EIGHT OF THESE UNITS WERE FLOWN ON CONSTANT DENSITY BALLOONS TO INVESTIGATE ATMOSPHERIC WAVE MOTIONS THROUGHOUT THE SOUTHERN HEMISPHERE. ONE RETURNED VALID DATA FOR TEN MONTHS. SIMILAR TECHNIQUES WERE USED WITH

OTHER TYPES OF OBSERVING PLATFORMS.

1979-0232 WIND POWER'S BOON TO MANKIND.
NEW SCI. 83(1170): 645, AUGUST 30, 1979.

THE NASA/DOE 2 MEGAWATT MACHINE AT BOONE, NORTH CAROLINA, IS DESCRIBED.

1979-0233 ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT, PHASE 2: COAL, HYDROELECTRIC, AND ENERGY ALTERNATIVES. VOLUME III. ALASKA'S ALTERNATIVE ENERGIES AND REGIONAL ASSESSMENT INVENTORY UPDATE.
NTIS, JANUARY 1979. 326 P.
RLO-1002-T2(V.3)

THE ALASKA REGIONAL ENERGY RESOURCES PLANNING PROJECT IS PRESENTED IN THREE VOLUMES. THIS VOLUME, VOL. III, CONSIDERS ALTERNATIVE ENERGIES AND THE REGIONAL ASSESSMENT INVENTORY UPDATE. THE INTRODUCTORY CHAPTER, CHAPTER 12, EXAMINES THE HISTORICAL BACKGROUND, CURRENT TECHNOLOGICAL STATUS, ENVIRONMENTAL IMPACT, APPLICABILITY TO ALASKA, AND SITING CONSIDERATIONS FOR A NUMBER OF ALTERNATIVE SYSTEMS. ALL OF THE SYSTEMS CONSIDERED USE OR COULD USE RENEWABLE ENERGY RESOURCES. THE CHAPTERS THAT FOLLOW ARE ENTITLED: VERY SMALL HYDROPOWER (ABOUT 12 KW OR LESS FOR RURAL AND REMOTE VILLAGES); LOW-TEMPERATURE GEOTHERMAL SPACE HEATING; WIND; FUEL CELLS; SITING CRITERIA AND PRELIMINARY SCREENING OF COMMUNITIES FOR ALTERNATE ENERGY USE; WOOD RESIDUES; WASTE HEAT; AND REGIONAL ASSESSMENT INVENTORY UPDATE.

1979-0234 ALEXANDERSSON H
STATISTICAL ANALYSIS OF WIND, WIND PROFILES AND GUST RATIOS AT GRAENBY, UPPSALA.
NTIS, 1979. 73 P.
UUIM-55

A STATISTICAL ANALYSIS OF WIND DATA FROM UPPSALA, SWEDEN IS PRESENTED. MEASUREMENTS ARE OBTAINED FROM A 100 M METEOROLOGICAL TOWER AT GRAENBY SITUATED AT THE N E BOUNDARY-LINE OF THE CITY. THE DATA FROM THE PROFILE INSTRUMENTATION (8 LEVELS) ARE EXPLOITED. THE COLLECTION OF DATA IS PRIMARILY DIVIDED INTO 5 X 8 CLASSES WITH RESPECT TO STABILITY AND WIND DIRECTION AND SOME MEAN PROFILES ARE PRESENTED AND DISCUSSED. THE WEIBULL DISTRIBUTION AND THE CORRESPONDING ASYMPTOTIC EXTREME VALUE DISTRIBUTION HAVE BEEN USED TO DESCRIBE THE OBSERVED FREQUENCIES AND EXTEND THE RESULTS. THE IMPORTANT EXTENSION TO SHORT AVERAGING TIMES IS BRIEFLY ANALYSED AND DISCUSSED.

1979-0235 APPENDIX: MOD-1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT, VOLUME 2.
NTIS, MAY 1979. 425 P.
NASA-CR-159496, DOE/NASA/0058-79/2-V-2-APP, N80-18565/5

THE MOD-1 DETAIL DESIGN IS APPENDED. THE SUPPORTING ANALYSES PRESENTED INCLUDE A PARAMETRIC SYSTEM TRADE STUDY, A VERIFICATION OF THE COMPUTER CODES USED FOR ROTOR LOADS ANALYSIS, A METAL BLADE STUDY, AND A DEFINITION OF THE DESIGN LOADS AT EACH PRINCIPAL WIND TURBINE GENERATOR INTERFACE FOR CRITICAL LOADING CONDITIONS. SHIPPING AND ASSEMBLY REQUIREMENTS, COMPOSITE BLADE DEVELOPMENT, AND ELECTRICAL STABILITY ARE ALSO DISCUSSED.

1979-0236 ARMENCOIU R D, COJOCARU D
NEW FORMS OF ENERGY CONSIDERED AS USABLE IN RUMANIA IN THE (PLANNING) STAGE.
ENERGETICA 27(7-8): 330-334, JULY-AUGUST 1979. (IN RUMANIAN)

FOUR ENERGY SOURCES ARE CONSIDERED BRIEFLY. SOLAR ENERGY IS DISCUSSED FIRST, IN TERMS OF DIRECT OR INDIRECT UTILIZATION, THE LATTER REFERRING TO LIVING PLANT GROWTH AND SUBSEQUENT GAS PRODUCTION THEREFROM. A SCHEME IS MENTIONED CONSISTING OF SOLAR COLLECTORS FOR WATER HEATING, BACKED BY A FOSSIL FUEL HEATER FOR PEAK DEMANDS. SOME SOLAR ENERGY CONTOURS ARE MAPPED FOR THE COUNTRY. WIND ENERGY IS CONSIDERED ONLY VERY BRIEFLY. NEXT, GEOTHERMAL ENERGY IS DISCUSSED AND A SCHEME OF UTILIZATION IS SKETCHED. FINALLY, MENTION IS MADE OF BIO GAS.

1979-0237 ARMSTRONG J R C, LIPMAN N H, DUNN P D
A REVIEW OF THE U.S. WIND ENERGY PROGRAMME.
WIND ENG. 3(2): 75-106, 1979.

THIS PAPER DISCUSSES THE DEVELOPMENT OF THE U.S. WIND ENERGY PROGRAMME AND ITS UTILITY APPLICATION WITH REFERENCE TO THE MOD-1 AND MOD-2 MACHINES. CHARACTERISTICS OF SMALL WECS, WIND CHARACTERISTICS AND SITING, TECHNOLOGY DEVELOPMENT AND ADVANCED SYSTEMS ARE ALSO DESCRIBED. A COMPARISON OF U K ACTIVITIES WITH THE U.S. PROGRAMME IS PRESENTED.

1979-0238 ARMSTRONG M D, ARMSTRONG J E
COMMUNITY IMPEDIMENTS TO IMPLEMENTATION OF SOLAR ENERGY.
NTIS, NOVEMBER 1979. 112 P.
DOE/EV-0059

THE COMPLETE ARRAY OF INSTITUTIONAL PROBLEMS EXPECTED WHEN SOLAR TECHNOLOGIES ARE IMPLEMENTED ON A NATIONAL SCALE IS ASSEMBLED. THE FINDINGS OF THE STUDY ARE PRESENTED IN TWO FORMATS. FIRST, THE RESULTS ARE ORGANIZED BY THE TIME FRAMES OF DELAYS IN SOLAR IMPLEMENTATION CAUSED BY THE INHERENT DIFFICULTIES A NATIONAL ENERGY POLICY WOULD ENCOUNTER IN CHANGING THE WAY A GIVEN INSTITUTION RESPONDS TO SPECIFIC SOLAR TECHNOLOGIES. THE SECOND FORMAT CONSTITUTES A DESCRIPTION OF THE DIFFICULTIES AT THE COMMUNITY LEVEL, ASSOCIATED WITH IMPLEMENTING EACH SOLAR TECHNOLOGY.

1979-0239 BABB S M, JOHNSON G L
WIND INSTRUMENTATION WITH MICROPROCESSORS.
IECI '79. INDUSTRIAL AND CONTROL APPLICATIONS OF MICROPROCESSORS: PAPERS PRESENTED AT IECI '79, PHILADELPHIA, MARCH 19-21, 1979. NEW YORK, IEEE, 1979. P. 126-130.

THIS PAPER DESCRIBES INSTRUMENTATION TO MEASURE PERFORMANCE OF A SAVONIUS WIND TURBINE. PERFORMANCE ANALYSIS REQUIRES DATA HISTOGRAMS OF WIND, SPEED, TORQUE, AND POWER. THESE HISTOGRAMS ARE PRODUCED BY A KIM-1 MICROCOMPUTER AND A/D SYSTEM. LIGHTNING PROTECTION AND ANALOG AND DIGITAL SENSORS FOR WIND SPEED, DIRECTION, RPM, TORQUE, TEMPERATURE, PRESSURE, AND POWER ARE DESCRIBED.

1979-0240 BAKER R W, WHITNEY R L, HEWSON E W
A LOW LEVEL WIND MEASUREMENT TECHNIQUE FOR WIND TURBINE GENERATOR SITING.
WIND ENG. 3(2): 107-114, 1979.

LARGE WIND TURBINE GENERATORS TO BE CONSTRUCTED SOON WILL HAVE ROTORS AS GREAT AS 100 M IN DIAMETER. STRONG

AND PERSISTENT WINDS ARE NEEDED IF THESE AEROGENERATORS ARE TO BE COST EFFECTIVE. PRELIMINARY SITE SURVEYS IN MOUNTAINOUS TERRAIN TO LOCATE SUCH LARGE MACHINES REQUIRE INEXPENSIVE, PORTABLE AND REASONABLY ACCURATE METHODS FOR MEASURING WINDS AT HEIGHTS UP TO 100 M OR MORE ABOVE THE GROUND. OF THE VARIOUS METHODS AVAILABLE, THE RECENTLY DEVELOPED TETHERED AERODYNAMICALLY LIFTING ANEMOMETER (TALA) HAS BEEN TESTED AND FOUND TO BE THE MOST SATISFACTORY.

1979-0241 BARRON J, COLE W J
AN INTEGRATED ENERGY SYSTEM FOR THE ASPHALT GREEN YOUTH SPORTS AND ARTS CENTER AND THE FIREBOAT HOUSE.
NTIS, SEPTEMBER 1979. 103 P.
PB80-187826

THIS REPORT OUTLINES ENERGY CONSERVATION AND SOLAR ENERGY MEASURES FOR TWO OLD BUILDINGS IN NEW YORK CITY, DIFFERENT IN SCALE AND CHARACTER, BEING RECYCLED BY THE NEIGHBORHOOD COMMITTEE FOR THE ASPHALT GREEN INTO A COMMUNITY SPORTS AND ARTS CENTER AND AN ENVIRONMENTAL STUDIES CENTER. ENERGY CONSERVATION AND RENEWABLE ENERGY MEASURES THAT MINIMIZE LIFE CYCLE COSTS WERE INCORPORATED INTO THE APPROACH TAKEN FOR THE COMMERCIAL SCALE SPORTS AND ARTS CENTER.

1979-0242 BARTON R S, BOWLER C E J, PIWKO R J
CONTROL AND STABILIZATION OF THE DOE/NASA MOD-1 TWO MEGAWATT WIND TURBINE GENERATOR.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 325-330.

THIS PAPER DESCRIBES THE CONTROLS DESIGN AND PERFORMANCE SIMULATION PROCESS AND SPECIALIZED DYNAMIC CONSIDERATIONS FOR THE DOE/NASA MOD 1 WIND TURBINE GENERATOR (WTG). IT SHOWS CONTROLS, STRUCTURAL AND UTILITY INTERFACE CONSIDERATIONS OF THE WIND TURBINE GENERATOR AND SHOWS HOW A WIND TURBINE GENERATOR CAN BE SUCCESSFULLY INTEGRATED WITH A SYNCHRONOUS POWER SYSTEM. DIFFERENCES WITH RESPECT TO FOSSIL OR HYDRO GENERATON AND THEIR IMPLICATIONS ARE VITAL TO LONG-TERM WTG RELIABILITY AND AVAILABILITY, AND ACCEPTANCE BY UTILITIES AND CONSUMERS.

1979-0243 BASE T E, RUSSELL L J
THE FLOW FIELD ABOUT A VERTICAL AXIS WIND TURBINE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE 1979. P. 558-559.

THE FLOW FIELD ABOUT A STRAIGHT BLADED VERTICAL AXIS WIND TURBINE WAS INVESTIGATED USING A COMPUTED VORTEX MODEL. THE VORTEX MODEL PROVIDED IMPROVED ESTIMATES OF THE INFLOW FACTORS WHICH DETERMINES THE DEGREE OF SLOWING DOWN OF THE LOCAL FLOW THROUGH THE TURBINE AND IS IMPORTANT IN TURBINE PERFORMANCE CALCULATIONS. THE STUDY ALSO PRODUCED A MODEL OF THE LOCAL FLOW FIELD USED TO DETERMINE COHERENT FLOW STRUCTURES WHICH ARE DEVELOPED BY THE TURBINE BLADES. THESE COHERENT FLOW STRUCTURES COULD PERSIST DOWNSTREAM AND NOT ONLY BUFFET THE OTHER ROTOR BLADES BUT ALSO CONTRIBUTE SIGNIFICANTLY TO THE WAKE STRUCTURE OF THE TURBINE AND AFFECT ANY OTHER TURBINE POSITIONED FURTHER DOWNSTREAM. AN IMPORTANT ASPECT, CONCERNING THE DESIGN OF VERTICAL AXIS TURBINES, IS TO ESTIMATE THE EXTENT OF THE BLADE VIBRATIONS INDUCED BY FORCES DUE TO THE LOCAL TURBULENT FLOW.

1979-0244 BEST R W B
LIMITS TO WIND POWER.
ENERGY CONVERS. 19(2): 71-72, 1979.

SIMPLE FORMULAS ARE GIVEN FOR THE CHANGE IN WIND-POWER, FRICTIONAL STRESS AND VERTICAL ENERGY TRANSPORT IN THE ATMOSPHERIC BOUNDARY LAYER, CAUSED BY THE ERECTION OF WINDMILL ARRAYS. THE LIMIT TO WIND-POWER CONVERSION APPEARS TO BE AROUND 1 W/M**2 OF TERRAIN IN BOTH COASTAL AND INLAND AREAS.

1979-0245 BINDER G, FRITZSCHE A, VOLLAN A, DEKITSCH A, JOOS R
DEVELOPMENT OF A 5.5 M DIAMETER VERTICAL AXIS WIND TURBINE, PHASE 2.
NTIS, JULY 1979. 138 P.
BMFT-FB-T-79-04, N80-22359/6

THE DESIGN WORK FOR THE TURBINE, INCLUDING THE AERODYNAMIC AND STRUCTURAL DYNAMIC INVESTIGATIONS, WAS PERFORMED, AND THE WIND TURBINE BUILT AND TESTED IN A WIND TUNNEL. THE ROTOR DIAMETER OF 5.5 M IS NOT ONLY A SUITABLE SIZE FOR THE TESTS, BUT INDICATES THAT THE RESULTS WILL CONTRIBUTE TO THE EXPERIMENTAL DATA REQUIRED FOR THE DESIGN OF LARGE CONVERTERS. THE LAYOUT OF THE ROTOR, THE CONSTRUCTION METHODS AND CHOICE OF MATERIALS FAVOR SERIES PRODUCTION, APPLYING ADVANCED MASS PRODUCTION TECHNOLOGY, WITHOUT EXCLUDING THE MANUFACTURE IN DEVELOPING COUNTRIES. THE WIND TUNNEL TEST PERFORMED WITH THE TWO, THREE, AND FOUR BLADE VERSION OF THE DARRIEUS-ROTOR AND WITH SAVONIUS-ROTORS OF DIFFERENT HEIGHTS CONFIRMED THE AERODYNAMIC CALCULATIONS. POSSIBILITIES TO IMPROVE THE EFFICIENCY OF THE SAVONIUS-ROTOR AND TO SIMPLIFY SOME DETAILS CONCERNING DESIGN AND MANUFACTURE WERE EVALUATED.

1979-0246 BISHOP C J
SYSTEMS ANALYSIS AND TESTING (SAT) PROGRAM. PROGRESS REPORT, OCTOBER 1, 1978--MARCH 31, 1979.
NTIS, JULY 1979. 19 P.
SERI/PR-35-313

THIS DOCUMENT DESCRIBES SERI ACTIVITIES FOR THE SAT PROGRAM DURING OCTOBER 1, 1978-MARCH 31, 1979. THESE INCLUDE A REEVALUATION OF THERMOSIPHON HOT WATER SYSTEMS; A REVIEW OF EXISTING WIND MACHINE PERFORMANCE MODELS; A STUDY OF THE EFFECTS OF WIND TRANSIENTS, AND CONTROL SYSTEM AND LOAD MANAGEMENT ON ENERGY CAPTURE; A STUDY OF NEW CONCEPTS FOR SOLAR PONDS INVOLVING STRATIFIED PONDS; ESTABLISHMENT OF THE SERI COMPUTATIONAL METHODS CENTER; DISSEMINATION OF F-CHART; A REVIEW OF PHOTOVOLTAIC SYSTEMS ANALYSIS METHODS; DEVELOPMENT OF A DRAFT SAT PROGRAM PLAN, SAT MANAGEMENT PLAN, AND AN INTEGRATED SYSTEM TEST AND VALIDATION PLAN; AND TRANSFER OF TECHNICAL MANAGEMENT OF DOE CONTRACTS IN THE SAT PROGRAM.

1979-0247 BOGLE A W, MCMULLAN J T, MORGAN R, MURRAY R B
MODELLING OF A DOMESTIC WIND POWER SYSTEM INCLUDING STORAGE.
INT. J. ENERGY RES. 3(2): 113-127, APRIL-JUNE 1979.

A SIMULATION ANALYSIS IS PRESENTED OF DOMESTIC HEATING BY A WIND POWER SYSTEM INCLUDING STORAGE AT A LOCATION 54 DEGREES 39' N, 6 DEGREES 13' W (ALDERGROVE, NORTHERN IRELAND). A SIMPLE THEORETICAL MODEL IS CONSTRUCTED COMPRISING A HOUSE OF SPECIFIED DIMENSIONS AND HEAT LOSS CHARACTERISTICS, AN AEROGENERATOR AND A THERMAL STORE. THE DATA BASE USED IS A MAGNETIC TAPE OF HOURLY WIND SPEED AND AIR TEMPERATURE READINGS TAKEN AT ALDERGROVE METEOROLOGICAL STATION DURING 1949-1975. THE RESULTS SUGGEST A MEASURE OF OPTIMIZATION BETWEEN STORE CAPACITY AND GENERATOR RATING BASED ON TECHNICAL CONSIDERATIONS ALONE. A SIMPLE ECONOMIC OPTIMIZATION IS ALSO PRESENTED.

1979-0248 BOLTON H R, NICODEMOU V C
OPERATION OF SELF-EXCITED GENERATORS FOR WINDMILL APPLICATION.
INST. ELECTR. ENG. PROC. 126(9): 815-820, SEPTEMBER 1979.

THIS PAPER DEALS WITH THE OPERATION OF SELF-CONTROLLED WOUND-FIELD GENERATORS FOR SMALL-SCALE WIND-POWER APPLICATION IN WHICH THE OUTPUT IS CONNECTED IN PLAIN SHUNT OR SERIES. IT IS SHOWN THAT, WITH THIS CONFIGURATION, A FAIRLY GOOD NATURAL MATCH CAN BE OBTAINED BETWEEN THE POWER/SPEED CHARACTERISTICS OF THE GENERATOR AND THE WINDMILL, PARTICULARLY WHEN THE MAGNETIC CIRCUIT OF THE GENERATOR GOES FAIRLY HARD INTO SATURATION AT HIGHER SPEEDS AND FIELD CURRENTS.

1979-0249 BRAGG G M
WIND POWER.
SOLAR ENERGY CONVERSION. AN INTRODUCTORY COURSE, WATERLOO, ONTARIO, AUGUST 6-19, 1978. OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1245-1265.

THIS ARTICLE DESCRIBES THE FUNDAMENTALS OF WIND POWER UTILISATION WITH EMPHASIS ON THE INFORMATION NEEDED TO DECIDE ON THE BASIC GEOMETRY OF WIND POWER DEVICES AND TO DISCUSS THE AVAILABILITY OF WIND FOR POWER GENERATION. IT ALSO DISCUSSES BRIEFLY THE ECONOMICS AND SOCIAL ACCEPTANCE OF WIND POWER DEVICES AT THE PRESENT TIME.

1979-0250 BRAGG G M, SCHMIDT W L
PERFORMANCE MATCHING AND OPTIMIZATION OF WIND POWERED WATER PUMPING SYSTEMS
ENERGY CONVERS. 19(1): 33-39, 1979.

A PROCEDURE IS PRESENTED WHICH ALLOWS OPTIMUM SELECTION OF PUMPS AND WINDMILLS FOR A GIVEN WATER PUMPING SITUATION. WHEN INFORMATION ON THE WIND, PUMP CHARACTERISTICS AND WINDMILL CHARACTERISTICS IS AVAILABLE, THE BEST PUMP AND WINDMILL FOR THE APPLICATION MAY BE SELECTED, AND THE DESIGN AND OFF-DESIGN PERFORMANCE OF THE COMPLETE SYSTEM MAY BE PREDICTED.

1979-0251 BUEHRING W A, HUB K A, HUBER C C, VANKUIKEN J C, GROS J G
RELIABILITY EFFECTS OF WIND INTEGRATION WITH A CONVENTIONAL ELECTRICAL UTILITY SYSTEM.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 555-557.

THE POTENTIAL IMPACTS OF INCORPORATING WIND TURBINES, AS AN EXAMPLE OF AN INTERMITTENT SUPPLY OPTION, INTO A CONVENTIONAL ELECTRICAL GENERATING SYSTEM ARE EXAMINED. THE STUDY FOCUSES ON THE AMOUNT OF ELECTRICITY GENERATION REPLACED BY WIND, THE CONTRIBUTION OF THE WIND TURBINES TO THE GENERATING SYSTEM RELIABILITY, AND THE METHODS USED TO CALCULATE THESE BENEFITS. A SIMPLE COST MODEL WAS DEVELOPED TO ESTIMATE BREAKEVEN COSTS FOR WIND TURBINES BASED ON ENERGY AND CAPACITY DISPLACEMENT SAVINGS.

1979-0252 BUEHRING W A, HUB K A, HUBER C C, VANKUIKEN J C, GROS J G
RELIABILITY, ENERGY AND COST EFFECTS OF WIND INTEGRATION WITH CONVENTIONAL ELECTRICAL GENERATING SYSTEMS.
NTIS, 1979. 14 P.
CONF-791204-32

THE RESULTS FROM THIS STUDY DEMONSTRATE THE IMPORTANCE OF SYSTEM INTEGRATION ANALYSIS IN EVALUATING THE EFFECTS OF WIND POWERED GENERATION ON AN ELECTRIC UTILITY SYSTEM. FOR THE ASSUMED UTILITY AND WIND CONDITIONS IT HAS BEEN SHOWN THAT AN INTERMITTENT ENERGY SOURCE SUCH AS WIND CAN CONTRIBUTE TO OVERALL SYSTEM RELIABILITY. SINCE RELIABILITY INDICES ARE THE PRIMARY CRITERIA FOR UTILITY EXPANSION PLANNING, IT SHOULD BE POSSIBLE TO REDUCE CONVENTIONAL CAPACITY INSTALLATIONS IN RESPONSE TO THE RELIABILITY IMPROVEMENTS ASSOCIATED WITH WIND GENERATION. WITH BOTH ENERGY AND RELIABILITY BENEFITS IT APPEARS THAT THERE IS A REASONABLE POTENTIAL FOR WIND GENERATORS TO BE COMPETITIVE, IN LIMITED PENETRATIONS, WITH CONVENTIONAL CAPACITY.

1979-0253 BULLO P
WIND MOTORS AND ELECTRICAL GENERATORS.
ELETTRIFICAZIONE NO. 8: 355-361, AUGUST 1979. (IN ITALIAN)

THE GENERATION OF ELECTRICITY BY WIND POWER IS DISCUSSED, WIRING-TOPOLOGY IS REVIEWED WITH PHOTOGRAPHS OF SOME RECENT AMERICAN AND RUSSIAN INSTALLATIONS. THE MAIN TYPES OF ELECTRICAL GENERATORS ARE CONSIDERED, INCLUDING CONSTANT SPEED AND FREQUENCY, AND VARIABLE SPEED AND CONSTANT FREQUENCY. CRITICAL PARAMETERS OF BOTH SYSTEMS ARE REVIEWED. A PROJECT FOR LARGE SCALE WIND CONVERSION CENTRES IN ITALY IS OUTLINED. THE SELECTION OF SITES WITHIN THE PREDOMINANT WIND PATTERN IS DISCUSSED.

1979-0254 CADWALLADER E A, WESTBERG J E
WIND-POWERED PROCESSING. II.
CHEMTECH. 9(5): 310-314, MAY 1979.

THIS PAPER DISCUSSES THE APPLICATION OF WIND TURBINES TO TWO CHEMICAL PROCESSES, ELECTRODIALYSIS AND REVERSE OSMOSIS, FOR THE PURIFICATION OF BRACKISH WATER.

1979-0255 CROMACK D E
INVESTIGATION OF THE FEASIBILITY OF USING WIND POWER FOR SPACE HEATING IN COLDER CLIMATES. ANNUAL REPORT FOR THE PERIOD ENDING JUNE 30, 1978.
NTIS, OCTOBER 1979. 114 P.
DOE/DP/03533-T3

CURRENT RESEARCH SUPPORTING THE DEVELOPMENT OF SPACE AND HOT WATER HEATING BY MEANS OF THE COMBINED USE OF A WIND TURBINE AND SOLAR FLAT-PLATE COLLECTORS IS DESCRIBED IN THIS UMASS ANNUAL REPORT. A VARIETY OF RESEARCH ACTIVITIES RANGING FROM ECONOMIC STUDIES TO FLOW FIELD MEASUREMENT AND ANALYSIS ARE DISCUSSED IN DETAIL IN THIS REPORT. ALSO INCLUDED IS A LIST OF PUBLICATIONS TO DATE.

1979-0256 ERIKSSON J
SMALL POWER STATIONS FOR THE ELECTRIFICATION OF THINLY-POPULATED AREAS.
ERA 52(10): 32-35, 1979. (IN SWEDISH)

THERE ARE STILL ABOUT 400 ESTATES IN SWEDEN WHICH ARE OCCUPIED FOR THE WHOLE YEAR AND WHICH ARE NOT YET ELECTRIFIED. CONVENTIONAL ELECTRIFICATION IS EXPENSIVE AND ALTERNATIVE SOLUTIONS ARE NECESSARY. SMALL POWER STATIONS FOR SUCH THINLY-POPULATED AREAS HAVE BEEN INVESTIGATED; THESE INCLUDE WATER POWER, DIESEL-DRIVEN SETS, WIND-POWER GENERATORS, ETC.

1979-0257 NAGY G D
POWER SUPPLIES FOR ARCTIC RADIO REPEATER SYSTEMS.
NTIS, SEPTEMBER 1978. 50 P.

THIS FEASIBILITY STUDY ASSESSES VARIOUS LONG-LIVED, SELF-CONTAINED 30-WATT POWER SUPPLIES FOR AN ARCTIC RADIO REPEATER SYSTEM. THE STUDY INVOLVES A REVIEW OF THE STATE OF THE ART, AVAILABILITY AND COST OF FIVE CANDIDATE SYSTEMS: BATTERIES, FUEL CELLS, RADIOISOTOPIC THERMOELECTRIC GENERATORS, FUELED THERMOELECTRIC GENERATORS AND WINDMILL-BATTERY SYSTEMS. THE ABOVE FIVE CANDIDATES WERE ALSO ASSESSED AS STANDBY POWER UNITS. RELIABILITY, SERVICE AND MAINTENANCE REQUIREMENTS ARE CONSIDERED SINCE THE APPLICATION CALLS FOR ONE YEAR UNATTENDED OPERATION AND SERVICING BY LIGHT HELICOPTER ON A SINGLE ANNUAL FLIGHT FOR ALL SITES.

1979-0258 JI B
CHINA TAPS THE WIND TO PROVIDE POWER IN REMOTE AREAS.
ELECTR. REV. INT. 205(17): 51, NOVEMBER 2, 1979.

AN 18 KW WIND TURBINE-GENERATOR HAS BEEN OPERATING SUCCESSFULLY FOR THE PAST YEAR ON A CHINESE ISLAND AND IS THE PROTOTYPE FOR A STANDARDISED RANGE OF MEDIUM-SIZED WIND-DRIVEN GENERATORS TO MEET THE NEEDS FOR ELECTRICITY IN REMOTE AREAS.

1979-0259 KULLGREN T E, WIEDEMEIER D W, TINSLEY J T
USAF ACADEMY VERTICAL AXIS WIND TURBINE DEVELOPMENT PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, 247-253.

THE UNITED STATES AIR FORCE ACADEMY WIND ENERGY CONVERSION SYSTEM PROJECT HAS AS ONE OF ITS GOALS THE DESIGN, FABRICATION AND FIELD TESTING OF A SMALL VERTICAL AXIS WIND TURBINE FOR USE IN REMOTE AREAS. THIS DARRIEUS-TYPE MACHINE WITH TWO FIXED CURVED BLADES HAS A NUMBER OF UNIQUE FEATURES INCLUDING A DEGREE OF PORTABILITY AND EASE OF INSTALLATION, VARIABLE SPEED OPERATION BY ALTERNATOR FIELD CONTROL, A LIGHTNING PROTECTION SYSTEM, AND SEGMENTED STEEL BLADES. TURBINE DESIGN BEGAN IN THE SUMMER OF 1977 WITH INSTALLATION AND INITIAL TESTING OF THE PROTOTYPE FOLLOWING ONE YEAR LATER. AN IMPROVED TURBINE IS PRESENTLY IN FABRICATION WITH TESTING TO COMMENCE IN THE SPRING OF 1979.

1979-0260 MARTINEZ A M, CALDERA E, PUGA N, MANDUJANO M, SANTANDER F, FELIX A, SANCHEZ S, WONG A, VALVERDE S, MULAS P, CASTELLANOS A , ESCOBEDO M, RESTREPO I
INTEGRATED ENERGY SYSTEM FOR NON-ELECTRIFIED RURAL COMMUNITIES.
CHANGING ENERGY USE FUTURES. INTERNATIONAL CONFERENCE ON ENERGY USE MANAGEMENT, 2ND, LOS ANGELES, OCTOBER 22-26, 1979. NEW YORK, PERGAMON, 1979. VOL. 4, P. 1964-1973.

LOCAL RENEWABLE ENERGY RESOURCES MAY BE USED FOR PRODUCTIVE ACTIVITIES IN RURAL NON-ELECTRIFIED COMMUNITIES. BIOMASS, SOLAR, WIND AND MICROHYDRAULIC SYSTEMS CAN COMBINE TO FORM AN INTEGRATED ENERGY SYSTEM; ONLY TECHNOLOGIES THAT ARE NOT PROHIBITIVE BY THE COST OR TOO TECHNICALLY SOPHISTICATED FOR THEIR MAINTENANCE ARE CONSIDERED. AN IMPORTANT PART OF THE STUDIES RELATES TO THE SOCIOECONOMIC ASPECTS INVOLVED IN THE IMPLEMENTATION OF SUCH A SYSTEM. AN EXAMPLE OF A PROPOSED PILOT COMMUNITY IS PRESENTED.

1979-0261 STEWART T D
DEVELOPMENT OF AN 8 KW VERTICAL AXIS WIND TURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 121-131.

ALCOA'S PROGRAM TO DEVELOP AN 8 KW MACHINE FOR FARM AND RURAL RESIDENTIAL APPLICATION IS DESCRIBED.

1979-0262 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. PROGRESS REPORT, OCTOBER 1978--SEPTEMBER 1979.
NTIS, OCTOBER 1979. 141 P.
DOE/BP/01310-T1

IN 1975 THE BONNEVILLE POWER ADMINISTRATION (BPA) CONTRACTED WITH OREGON STATE UNIVERSITY (OSU) TO PERFORM A FEASIBILITY STUDY OF THE WIND POWER POTENTIAL IN A PORTION OF THE COLUMBIA RIVER GORGE. SINCE THAT INITIAL ASSESSMENT THE RESEARCH AT OSU HAS EXPANDED TO INVESTIGATE THE WIND POWER POTENTIAL IN THE REST OF THE BPA SERVICE AREA WHICH COVERS WASHINGTON, OREGON, IDAHO, WESTERN MONTANA, AND NORTHERN NEVADA. PREVIOUS BPA REPORTS 76-1, 77-2, AND 78-3 HAVE DOCUMENTED THE PROGRESS OF THIS RESEARCH. THE OBJECTIVES AND CONCLUSIONS OF THE RESEARCH DURING FY 79 ARE SUMMARIZED. THE DATA ANALYZED WERE FOR THE PERIOD JUNE 1978 THROUGH MAY 1979. THE DETAILS OF THE RESEARCH ARE CONTAINED IN THE REPORT.

1979-0263 ADAMS J A
A MAINE ROMANCE.
SOL. AGE 4(9): 6-9, SEPTEMBER 1979.

THE CONSTRUCTION OF A HOUSE ON THE COAST OF MAINE INCLUDED TERRACING OF THE BLUFF FOR EROSION CONTROL, INSTALLATION OF WATER SOLAR COLLECTORS FOR SPACE AND WATER HEATING, AND CONSTRUCTION OF A WIND TURBINE FOR ELECTRIC POWER GENERATION. A TOTAL OF 4,027 SQ. FT. OF HOUSE AREA IS HEATED BY A SYSTEM OF 10 COLLECTORS AND 4,000 GAL WATER STORAGE. INSULATION VALUES ARE R-19 IN THE WALLS, R-40 IN THE CEILING, R-26 IN THE FLOORS, AND R-14 IN THE BASEMENT. SOUTH-FACING WINDOWS PROVIDE ADDITIONAL HEAT GAIN. THE WIND TURBINE AND GENERATOR SYSTEM SUPPLIES ALTERNATING CURRENT TO THE HOUSE AND ALSO HEATS AUXILIARY WATER STORAGE WHEN NECESSARY. THE HOUSE, COLLECTORS, AND WIND TURBINE ARE DESIGNED TO SUPPLY 85% OF THE HEATING LOAD.

1979-0264 ADLER F
GRUMMAN 8 KW WIND TURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS 1979. VOL. 1, P. 106-120.
RFP-3014(VOL. 1)

GRUMMAN ENERGY SYSTEMS PARTICIPATION IN THE DEPARTMENT OF ENERGY'S 8 KW WIND TURBINE GENERATOR PROJECT HAS BEEN TO DESIGN A MACHINE CAPABLE OF MASS PRODUCTION RATES OF 1000 MACHINES PER YEAR AND BUILD ONE PROTOTYPE. DESIGN CHARACTERISTICS OF THE TURBINE ARE PRESENTED.

1979-0265 AHMADI G
AN OSCILLATORY WIND ENERGY CONVERTOR.
WIND ENG. 3(3): 207-215, 1979.

THE PRINCIPLE OF WIND ENERGY CONVERSION THROUGH THE OSCILLATION OF AN AERODYNAMICALLY UNSTABLE SYSTEM IS REVIEWED, AND A NONLINEAR THEORY PREDICTING THE POWER COEFFICIENT FOR SUCH A DEVICE IS DEVELOPED. THE TEST RESULTS FOR A SMALL MODEL ARE PRESENTED AND COMPARED WITH THE THEORETICAL PREDICTION, AND RELATIVELY GOOD AGREEMENT IS OBSERVED.

1979-0266 AI D K
ALCOA WIND TURBINES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 155-172.
NASA-CP-2106

THE ALCOA WIND ENERGY PROGRAM, INITIATED IN 1975, BEGAN WITH THE FABRICATION OF TURBINE BLADES, AND TWO YEARS LATER BROADENED ITS SCOPE TO THE DESIGN AND FABRICATION OF COMPLETE SYSTEMS OF DARRIEUS-TYPE VERTICAL-AXIS WIND TURBINES.

1979-0267 AKINS R E
WIND SYSTEM TEST PROCEDURES.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 233-246.
RFP-3014(VOL. 1)

A SUMMARY IS PRESENTED OF THE METHOD OF BINS, A TECHNIQUE FOR DETERMINING THE MEAN PERFORMANCE OF A WIND TURBINE IN A FIELD ENVIRONMENT. THIS PROCEDURE REPRESENTS WHAT MAY BE CONSIDERED A MINIMUM REQUIREMENT FOR FIELD TESTING. TECHNIQUES WHICH HAVE BEEN DEVELOPED TO CONSIDER MORE DETAILED ASPECTS OF PERFORMANCE ARE OUTLINED. THESE PROCEDURES REQUIRE A LARGER AMOUNT OF BOTH BUDGET AND TECHNICAL EXPERTISE THAN THE METHOD OF BINS. ANYONE INVOLVED IN TESTING SHOULD UNDERSTAND THE GOALS OF SUCH TESTING AND BE ABLE TO MAKE USE OF THE RESULTS EVEN IF THEY ARE NOT ABLE TO PERFORM CERTAIN ASPECTS OF THE TESTING AT THEIR OWN FACILITY. AREAS IN WHICH THE DEVELOPMENT OF TEST PROCEDURES ARE STILL UNDERWAY ARE SUMMARIZED.

1979-0268 ALDRED J
FIELD EVALUATION PROGRAM FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
SOLAR 79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 30-32.
CONF-790845-(SUPPL.)

THE DEPARTMENT OF ENERGY (DOE) HAS RECOGNIZED THE IMPORTANCE OF SMALL WIND SYSTEMS AND HAS INITIATED A NUMBER OF PROGRAMS DESIGNED TO ACCELERATE THE COMMERCIALIZATION OF THEM. THE PROGRAMS INCLUDE THE ESTABLISHMENT OF A WIND SYSTEMS TEST CENTER TO PROVIDE A CAPABILITY FOR INTENSIVE LONG-TERM TESTING OF SWECS, AND A TECHNICAL MANAGEMENT ORGANIZATION CHARTERED TO FOSTER THE DEVELOPMENT OF NEW, LOW COST MACHINES, PROVIDE SUPPORT TO THE DEVELOPMENT OF INDUSTRY STANDARDS, AND TO DISSEMINATE TECHNICAL INFORMATION TO INDUSTRY AND TO THE GENERAL PUBLIC. IN ADDITION, A FIELD EVALUATION PROGRAM HAS BEEN DESIGNED AS A PART OF THIS PROGRAM TO ACCELERATE THE COMMERCIALIZATION PROCESS FOR SWECS. THE PROGRAM GOAL IS TO PROVIDE NEAR-TERM RESOLUTION OF EXISTING TECHNICAL AND INSTITUTIONAL CONSTRAINTS IN ORDER THAT WIND ENERGY CAN EFFECT MAXIMUM IMPACT ON THE NATION'S ENERGY NEEDS.

1979-0269 ALFREDSSON P H, DAHLBERG J A
A PRELIMINARY WIND TUNNEL STUDY OF WINDMILL WAKE DISPERSION IN VARIOUS FLOW CONDITIONS, PART 7.
NTIS, OCTOBER 12, 1979. 74 P.
FFA-AU-1499-PT-7, N80-28320/3

MEASUREMENTS OF THE WAKE DEVELOPMENT BEHIND A SMALL ROTATING MODEL OF A WIND TURBINE UNIT WERE CARRIED OUT. THE AMBIENT FLOW CONDITIONS WERE VARIED BY USING TURBULENCE GRIDS, A SIMULATED ATMOSPHERIC BOUNDARY LAYER, AND BY PLACING THE MODEL NEAR A SMOOTH WALL. MEAN VELOCITY AND TURBULENCE PROFILES FOR THE DIFFERENT FLOW CONDITIONS WERE ALSO CALCULATED. THE MEASUREMENTS WERE ALSO ANALYZED WITH RESPECT TO THE DECAY OF THE CENTER LINE VELOCITY DEFECT AND THE INFLOW OF MASS INTO THE WAKE. PHOTOGRAPHS OF THE VORTEX STRUCTURE BEHIND THE WIND TURBINE MODEL ARE PRESENTED.

1979-0270 ALLISON H J
RENEWABLE ENERGY SYSTEM FOR DEVELOPING COUNTRIES.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1475-1479.

THIS PAPER DESCRIBES AN ENERGY SYSTEM WHICH INTEGRATES SOLAR, WIND, AND BIOMASS RESOURCES IN A MANNER WHICH PRODUCES A MORE FLEXIBLE AND RELIABLE POWER SOURCE THAN COULD BE MADE AVAILABLE FROM SEPARATE USES OF THESE RENEWABLE RESOURCES. PROTOTYPE SYSTEMS BASED ON THE CONCEPTS DESCRIBED IN THIS PAPER ARE PLANNED FOR SRI LANKA, SENEGAL, AND MEXICO.

1979-0271 ALTERNATIVE ENERGY TECHNOLOGY.
ENERGY DIG. 8(4): 28-32, AUGUST 1979.

THIS PAPER CONSIDERS HOW, WITHIN THE NEXT 50 YEARS, THE UNITED KINGDOM COULD BALANCE ITS ENERGY DEMAND WITH CONSERVATION AND BY USING ALTERNATIVE ENERGY RESOURCES.

1979-0272 ALTERNATIVE RENEWABLE ENERGY PROGRAM: REPORT TO THE MONTANA LEGISLATURE.
NTIS, JANUARY 1979. 64 P.
PB80-214695

THE REPORT BEGINS WITH A HISTORY OF THE PROGRAM AND THE FUNCTION OF THOSE INVOLVED WITH THE REVIEWING AND GRANTING OF RENEWABLE ENERGY PROJECTS. IT POVIDES A DISCUSSION OF THE GRANTS AWARDED AND THE OPERATIONAL PROCEDURES OF THE PROGRAM. A BRIEF OVERVIEW OF PROGRAM ACTIVITY WITH THE RENEWABLE ENERGY SOURCES FOLLOWS. THE REPORT OUTLINES THE METHODS USED TO PROVIDE INFORMATION TO THE PUBLIC.

1979-0273 ANCONA D F
OVERVIEW OF FEDERAL WIND ENERGY PROGRAM.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 1-23.
NASA-CP-2106

A BRIEF OVERVIEW IS PRESENTED OF WHAT THE FEDERAL WIND PROGRAM IS TODAY, WHAT THE OBJECTIVES ARE, AND WHAT STRATEGIES ARE BEING FOLLOWED. SOME OF THE CHANGES IN THE PROGRAM STRUCTURE AND SOME OF THE ADDITIONS TO THE PROGRAM ARE ALSO INCLUDED. MENTION IS MADE OF UPCOMING ORGANIZATIONAL CHANGES, AND SOME BUDGET ITEMS ARE

COVERED, WITH PARTICULAR MENTION OF SOME RECENT SIGNIFICANT EVENTS REGARDING NEW APPROVALS.

1979-0274 ANCONA D F
OVERVIEW: DEPARTMENT OF ENERGY WIND ENERGY PROGRAM.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 3-43.
CONF-790352

THE DEPARTMENT OF ENERGY FEDERAL WIND PROGRAM IS DESCRIBED FOR BOTH LARGE TURBINES AND SMALL INNOVATIVE CONCEPTS. BUDGET INFORMATION IS ALSO INCLUDED.

1979-0275 ANDERSON M
APPROPRIATE TECHNOLOGY IN AFRICA.
SOL. AGE 4(5): 42-45, MAY 1979.

THE STUDY AND IMPLEMENTATION OF APPROPRIATE ENERGY TECHNOLOGY IN BOTSWANA, SWAZILAND, AND LESOTHO WAS CONDUCTED BY THE DOMESTIC TECHNOLOGY INSTITUTE AND THE INTER-CULTURE ASSOCIATES.

1979-0276 ARGYRIS J H, BRAUN K A
LASTWECHSELZAHLEN UND MATERIALWERTE FUER DIE AUSLEGUNG EINER WINDTURBINE SPEZIELLER NABENKONSTRUKTION. (LOAD CYCLE VALUES AND MATERIALS DATA USED FOR THE DESCRIPTION OF A WIND TURBINE FEATURING A SPECIAL HUB CONSTRUCTION.)
NTIS, JUNE 1979. 38 P.
N81-12627, ISD-260

FOR THE LAYOUT OF WINDMILL ROTOR BLADES MADE FROM DIFFERENT MATERIALS, ANALYSES OF MATERIALS DATA AND GEOMETRY WERE MADE. OF SPECIAL INTEREST ARE THE ADMISSIBLE STRESSES WHICH ARE DEPENDENT ON THE MATERIAL AS WELL AS KIND AND NUMBER OF LOADING CYCLES. THE NUMBER OF THESE LOADING CYCLES THOUGHT TO BE RELEVANT ARE DETERMINED. THE DECISIVE PARAMETERS ARE THE NUMBER OF STARTS AND THE TIME OF OPERATION. THE DEPENDENCE OF THESE PARAMETERS ON THE CUT-IN WIND VELOCITY, THE VERTICAL WIND GRADIENT, AND THE WIND CHARACTERISTICS IS DISCUSSED. WIND DATA COLLECTED IN NORTHERN GERMANY WERE USED IN CALCULATING ADMISSIBLE STRESSES. THE FATIGUE STRENGTHS ARE ALSO ESTIMATED IN TERMS OF THE ADMISSIBLE STRESSES DETERMINED. THE MATERIALS USED ARE WELL KNOWN GLASS FIBER AND CARBON FIBER REINFORCED PLASTICS.

1979-0277 ARGYRIS J H, BRAUN K A
STATISCHE UND DYNAMISCHE UNTERSUCHUNG VERSCHIEDENER TUERME FUER WINDTURBINEN. (STATIC AND DYNAMIC INVESTIGATIONS ON DIFFERENT TOWERS FOR WIND TURBINES.)
NTIS, JULY 1979. 122 P. (IN GERMAN)
N81-12628, ISD-261

THE STATIC LAYOUTS OF DIFFERENT TOWER DESIGNS ARE STUDIED IN TERMS OF GUST LOADS WHICH A TWO BLADED ROTOR (120 M DIAMETER) TRANSFERS TO A RIGID SUPPORT AS EXTERNAL LOADS. THE ROTOR BLADES ARE ASSUMED TO BE INELASTIC. EACH ONE HAS A FLAPPING HINGE AND A FLAP PITCH COUPLING. FIRST A CYLINDRICAL CANTILEVER STEEL TOWER IS DIMENSIONED SUCH THAT THE MAXIMAL LOADS ENLARGED BY A DYNAMIC MAGNIFICATION FACTOR PROVOKE TOLERABLE STRESSES AND DISPLACEMENTS. NEXT, BOTH A CANTILEVER AND GUYED TOWER STATIC LAYOUT ARE CONSIDERED AND A DYNAMIC RESPONSE CALCULATION FOR SEVERAL GUSTS IS PERFORMED USING FINITE ELEMENT METHODS. THE TOWER SYSTEM AND THE ROTOR SYSTEM ARE ASSUMED TO BE DYNAMICALLY DECOUPLED. THE GUYED TOWER PROVES TO BE SUPERIOR. FINALLY, A THEORETICAL TYPE OF TOWER IS STATICALLY CONCEIVED USING A GEOMETRICALLY NONLINEAR FINITE ELEMENT PROGRAM. THE KINEMATICS OF THREE TOWERS WITH DIFFERENT GUY ARRAYS ARE INVESTIGATED AND COMPARED.

1979-0278 ARGYRIS J H, KIRCHGAESSNER B
STABILITAET UND SCHWERKRAFTRESPONSE DER SCHLAG-SCHWENKBEWEGUNG EINES STARREN ROTORBLATTES MIT BLATTWINKELRUECKSTEUERUNG. (STABILITY AND DYNAMIC RESPONSE TO GRAVITATIONAL FORCES OF THE FLAPPING AND LEAD-LAG HINGES ON A RIGID ROTOR BLADE WITH THE LEADING-EDGE ANGLE OF ATTACK AND FLAPPING BEING COUPLED.)
NTIS, 1979. 53 P. (IN GERMAN, ENGLISH SUMMARY)
ISD-244, N80-30949/5

THE COUPLED FLAPPING AND LEAD-LAG MOTION OF A SINGLE, RIGID ROTOR BLADE OF A WIND ENERGY CONVERTER WITH FLAPPING AND LEAD-LAG HINGES AS WELL AS A COUPLING OF THE ANGLE OF ATTACK WITH THE FLAPPING MOTION IS INVESTIGATED. THE EQUATIONS OF MOTION ARE DEVELOPED UNDER THE ASSUMPTION OF LINEARIZED QUASI-STATIONARY AERODYNAMIC FORCES. STATIC AND DYNAMIC STABILITY OF THE COUPLED FLAPPING AND LEAD-LAG MOTION ARE INVESTIGATED. THE EQUATIONS ARE INTEGRATED FOR DIFFERENT CASES UNDER CYCLIC GRAVITATIONAL FORCES TO GET AN ESTIMATE OF THE INFLUENCE OF FORCE TERMS AND OF THE ERROR FROM THE LINEARIZATION OF THE CONSERVATION EXPRESSIONS.

1979-0279 ARGYRIS J H, BRAUN K A, KIRCHGAESSNER B
DYNAMISCHE ANALYSE EINES ROTORBLATTES MIT SCHLAGFREIHEIT, SCHWENKFREIHEIT UND BLATTWINKELRUECKSTEUERUNG. (DYNAMIC ANALYSIS OF A ROTOR BLADE WITH LEAD-LAG FREEDOM, FLAPPING FREEDOM, AND VARIABLE-CONTROLLED BLADE PITCH ANGLE.)
NTIS, 1979. 95 P. (IN GERMAN, ENGLISH SUMMARY)
ISD-258, N80-30950/3

THE DYNAMIC BEHAVIOR OF THE ROTOR BLADES OF A WIND ENERGY CONVERTER WITH FLAPPING AND LEAD-LAG HINGES AS WELL AS COUPLING OF FLAPPING AND BLADE PITCH IS INVESTIGATED. UNDER THE ASSUMPTION OF RIGID SUPPORT OF THE HUB AND OF CONSTANT ROTATIONAL SPEED, A LINEARIZED SYSTEM OF DIFFERENTIAL EQUATIONS OF MOTION IS DEVELOPED USING FINITE ELEMENT IDEALIZATION GIVEN LINEARIZED QUASI-STATIONARY AERODYNAMIC FORCES. FOR TWO ROTOR BLADE MODELS, WHICH DIFFER ONLY IN THEIR STIFFNESS IN THE LEAD-LAG DIRECTION, THE COMPLEX EIGENFREQUENCIES ARE CALCULATED. FURTHER, THE DYNAMIC RESPONSE OF THE ROTOR BLADES IS COMPUTED FOR CYCLIC GRAVITY LOADS AT RATED OPERATION, FOR A GUST, AND FOR THE CASE OF TOWER WAKE. FROM THE DEFORMATION OF THE STRUCTURE THE STRESSES AT SELECTED POINTS ALONG THE BLADE ARE DERIVED, WHILE FOR ONE VERSION OF THE ROTOR BLADE, TORQUE AND ROTOR THRUST ARE ALSO DETERMINED.

1979-0280 ARGYRIS J H, BRAUN K A, KIRCHGAESSNER B
STATISCHE UNTERSUCHUNG VON ROTORBLAETTERN UNTER EIGENGEWICHT UND IM STATIONAEREN BETRIEB. (STATIC INVESTIGATION OF ROTOR BLADES AT REST AND UNDER QUASI-STATIONARY LOADING.)
NTIS, 1979. 57 P. (IN GERMAN, ENGLISH SUMMARY)
ISD-243, N80-30948/7

THE ROTOR BLADES OF A HORIZONTAL AXIS WIND ENERGY CONVERTER WHICH HAVE FLAP AND LEADING-LAG FREEDOM AS WELL AS A FLAP-PITCH COUPLING, WERE DIMENSIONED AND STUDIED UNDER BOTH NONOPERATING DEADWEIGHT AND QUASI-STATIONARY LOADING AT CONSTANT FORCES RATED OPERATION. WITH A SUITABLE MASS DISTRIBUTION IT IS POSSIBLE TO DRASTICALLY

REDUCE THE BLADE BENDING MOMENTS IN THE FLAP DIRECTION. MATERIALS WELL KNOWN IN AIRCRAFT CONSTRUCTION WERE CONSIDERED, AMONG WHICH CARBON FIBER REINFORCED PLASTIC IS SHOWN TO BE THE MOST SUITABLE. MOST OF THE BLADE MODELS WERE INVESTIGATED WITHOUT A LEAD-LAG HINGE. CONICAL OSCILLATION AT RATED OPERATION WAS ASSUMED FOR THE LAYOUT OF THESE ROTOR BLADES. IT IS REDUCED CONSIDERABLY FOR THE SAME BLADE MODELS WHEN LEAD-LAG FREEDOM IS INCORPORATED WHILE MAINTAINING SUFFICIENT CENTRIFUGAL STIFFNESS IN THE LAG DIRECTION.

1979-0281 ARGYRIS J H, BRAUN K A, KIRCHGAESSNER B, WALTHER R
STATISCHE UND DYNAMISCHE UNTERSUCHUNGEN AN EINEM WINDROTORMODELL. (STATIC AND DYNAMIC INVESTIGATIONS USING A WINDMILL MODEL.)
NTIS, JUNE 1979. 69 P. (IN GERMAN)
N81-12626, ISD-259

IN THE FRAMEWORK OF WIND ENERGY RESEARCH A SCALE MODEL OF A WIND ROTOR WAS CONSTRUCTED, THEN USED TO DEVELOP AND TEST A DATA ACQUISITION AND DATA TRANSMISSION SYSTEM. WITH THIS SYSTEM EXPERIMENTAL DATA ARE COLLECTED FROM THE OPERATING MODEL AND DISPLAYED ON A SCREEN. COMPARISON BETWEEN EXPERIMENTAL DATA AND COMPUTED RESULTS FOR THE MODEL WERE USED TO CHECK APPLIED STATIC AND DYNAMIC ANALYSES OF THE ROTOR MODEL. DURING THE DYNAMIC ANALYSIS A RESPONSE PROBLEM WITH VARIABLE STIFFNESS IN TIME WAS FOUND. FOR THIS CASE A SOLUTION METHOD INVOLVING SYSTEMS OF EQUATIONS IS DESCRIBED.

1979-0282 ZVARA J, DREES H M, NOLL R B
DEVELOPMENT OF A 1-KW HIGH RELIABILITY CYCLOTURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 6-12, 12.1-12.14.
RFP-3014(VOL.1)

ROCKWELL INTERNATIONAL, IN CONJUNCTION WITH THE DEPARTMENT OF ENERGY (DOE), HAS INITIATED PROGRAMS TO DEVELOP PROTOTYPE WIND MACHINES IN THE ONE-, EIGHT-, AND FORTY-KILOWATT (KW) RANGES. THE PROGRAM IS MANAGED FOR DOE BY ROCKWELL AT ITS WIND SYSTEMS TEST CENTER NEAR GOLDEN, COLORADO. THE PROGRAM FOR THE 1-2 KW SIZE WIND MACHINE IS DESCRIBED. PERFORMANCE REQUIREMENTS AND DESIGN CHARACTERISTICS ARE PRESENTED. THE CONTROL SYSTEM IS OUTLINED.

1979-0283 ASIN J
FACTORS AFFECTING U.S. SOLAR TRADE WITH BRAZIL.
SOLAR EXPORT ISSUES WORKSHOP, BETHESDA, MARYLAND, AUGUST 12, 1979. FINAL PROCEEDINGS. NTIS, OCTOBER 1979. P. C.25-C.27.
CONF-790890

THE FOLLOWING TOPICS ARE DISCUSSED: ENERGY BACKGROUND, SURVEYING ALTERNATIVE SOURCES OF ENERGY, IDENTIFYING SECTORS FOR POTENTIAL USE OF SOLAR/WIND TECHNOLOGIES, PRIMARY CONSIDERATION AFFECTING U.S. EXPORTS TO BRAZIL, AND BY CONSIDERATIONS FOR U.S. COMPANIES.

1979-0284 AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS ASSESSMENT. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, DECEMBER 1979. 94 P.
SERI/TR-98003-3

THREE HORIZONTAL AXIS AUGMENTED SYSTEMS ARE CRITICALLY EXAMINED, AND THE TECHNICAL STATUS, PERFORMANCE CHARACTERISTICS, AND COST PROJECTIONS OF THESE SYSTEMS ARE EVALUATED. THE PURPOSE OF THE STUDY IS TO DETERMINE WHETHER THESE SYSTEMS HAVE THE POTENTIAL TO BE A COST EFFECTIVE ENERGY RESOURCE. THIS ASSESSMENT SHOULD PROVIDE GUIDANCE AND DIRECTION FOR FUTURE PROGRAMMATIC EFFORTS IN THE WEIS PROGRAM. ALTHOUGH IT IS NOT MEANT TO PROVIDE AN EXHAUSTIVE STUDY OF ALL ASPECTS OF THESE SYSTEMS, THE CURRENT STATUS OF HORIZONTAL AXIS AUGMENTED SYSTEMS HAS BEEN EXAMINED.

1979-0285 AWAY FROM OIL--BUT HOW?
BILD WISS. 16(10): 130-132, 135, 136, OCTOBER 1979. (IN GERMAN)

SCIENCE AND ECONOMY EXPERTS HAVE COME TOGETHER TO DISCUSS POSSIBLE WAYS AND METHODS OF AN ENERGY-SAVING UTILISATION OF ENERGY SOURCES AND OTHER WAYS OF ENERGY CONSERVATION. MAIN EMPHASIS HAS BEEN PLACED ON THE SUBJECTS OF SPACE HEATING AND TRAFFIC BECAUSE OF THE LARGE PORTION OF ENERGY CONSUMED IN THESE TWO FIELDS AS COMPARED TO TOTAL FINAL ENERGY CONSUMPTION. POSSIBLE METHODS OF USING OTHER PRIMARY ENERGY SOURCES INSTEAD OF OIL ARE CONSIDERED. THE RESULTS CAN BE SUMMARIZED IN THE OPINION THAT ALTHOUGH VARIOUS ATTEMPTS ARE CURRENTLY BEING MADE TO USE OTHER RENEWABLE ENERGY SOURCES, IT CANNOT BE SAID FOR SURE NOWADAYS THAT SUFFICIENT ENERGY SUPPLY IS GUARANTEED FOR THE RISING GENERATION.

1979-0286 BAHADORI M N
CONCEPTUAL DEVELOPMENT OF A SOLAR TOWN IN IRAN.
SOLAR ENERGY CONVERSION: AN INTRODUCTORY COURSE. NEW YORK, PERGAMON PRESS, 1979. P. 715-756.

SOLAR ENERGY, WIND, SKY RADIATION, DAILY TEMPERATURE RANGE, CITY ORGANIC WASTES AND WASTE WATER, AND ENERGY PLANTS MAY BE EMPLOYED TO MEET ALL THE ENERGY NEEDS OF A PURELY RESIDENTIAL TOWN. THE ENERGY REQUIREMENTS OF A RESIDENTIAL TOWN OF 4000 INHABITANTS ARE ESTIMATED. NO MAJOR CHANGE IN PEOPLE'S LIFE-STYLE, EXCEPT FOR LOW TEMPERATURE COOKING BY WATER VAPOR, IS INTRODUCED.

1979-0287 BAIN D
INTERIM RESULTS OF THE CALIFORNIA RESIDENTIAL SWECS MARKET STUDY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 145-154.
RFP-3014(VOL.2)

THIS PROJECT IS AN ASSESSMENT OF THE POTENTIAL MARKET IN CALIFORNIA FOR RESIDENTIAL WIND ENERGY SYSTEMS (SWECS) AND OF THE MANUFACTURING LABOR IMPACT IN PRODUCING THE REQUIRED NUMBER OF WIND TURBINE GENERATORS (WTGS). ESTIMATES WILL BE MADE AT 5 YEAR INTERVALS UP THROUGH 1995 AND THE RESULTS WILL HAVE THE FORMS OF MATRICES OF THE NUMBER OF POTENTIAL INSTALLATIONS BY MEAN WIND SPEED AND CUSTOMER DEMAND. THIS QUANTIFICATION OF THE SWECS MARKET OVER A RANGE OF REQUIREMENTS COULD GUIDE FUTURE DESIGN AND PRODUCTION ACTIVITIES. A CUSTOMER IS CLASSIFIED AS POTENTIAL IF THE NET PRESENT VALUE OF THE COSTS OF A WIND SYSTEM ARE LESS THAN OR EQUAL TO THE PROJECTED COSTS OF UTILITY SUPPLIED ELECTRICITY OVER THE SWECS LIFE. SINCE GENERAL INFLATION IS ALSO AN IMPORTANT FACTOR IN THE RELATIVE ECONOMICS, IT IS INCLUDED IN THE ANALYSIS IN ADDITION TO REAL ESCALATIONS IN UTILITY PRICES.

1979-0288 BALDWIN J D C
IMPROVED CONTROL STRATEGY FOR WIND-POWERED REFRIGERATED STORAGE OF APPLES. PH.D. THESIS.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, BLACKSBURG, VIRGINIA. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 80-7,330, 1979. 168 P.

THE NEED FOR AN IMPROVED CONTROL STATEGY FOR THE OPERATION OF A WIND-POWERED REFRIGERATION SYSTEM FOR THE STORAGE OF APPLES WAS INVESTIGATED. THE RESULTS ARE APPLICABLE TO OTHER SYSTEMS WHICH EMPLOY INTERMITTENTLY AVAILABLE POWER SOURCES, BATTERY AND THERMAL STORAGE, AND AN AUXILIARY, DIRECT CURRENT POWER SUPPLY. TESTS WERE CONDUCTED ON THE WIND-POWERED REFRIGERATION SYSTEM AT THE VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY HORTICULTURE RESEARCH FARM IN BLACKSBURG, VIRGINIA. TESTS WERE CONDUCTED ON THE INDIVIDUAL COMPONENTS OF THE SYSTEM. IN SITU WINDMILL PERFORMANCE WAS ALSO CONDUCTED.

1979-0289 BARNETT K M
SMALL WECS INTERCONNECTED WITH PUBLIC UTILITY ELECTRICITY WITH NO WECS ELECTRICITY PLACED INTO THE UTILITY GRID.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 61-65.
RFP-3014(VOL.2)

THIS PROJECT WAS ESTABLISHED TO DEMONSTRATE A WECS USING SEVERAL ASPECTS OF NEW WIND ENERGY TECHNOLOGY THAT WOULD BE APPLICABLE TO AN INDIVIDUAL HOME; AND ALSO TO DETERMINE THE CONDITIONS UNDER WHICH THE SYSTEM COULD BECOME COST COMPETITIVE. THE NEW TECHNOLOGY INCLUDES A VERTICAL AXIS WECS, AN OCTAHEDRON TOWER, A SYNCHRONOUS INVERTER, A DUMP CIRCUIT THAT DIVERTS EXCESS WECS ELECTRICITY TO OTHER USES IN THE HOME, AND THE USE OF WIND ENERGY TO ASSIST SOLAR ENERGY.

1979-0290 BARROWS R E
WTG ENERGY SYSTEMS' ROTOR: STEEL AT 80 FEET.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 285-292.
NASA-CP-2106

THE 80 FOOT DIAMETER ROTOR DESCRIBED HAS BEEN INSTALLED AND OPERATIONAL ON WTG ENERGY SYSTEMS' MP1-200 WIND TURBINE GENERATOR SYSTEM SINCE THE SUMMER OF 1977. THE MP1-200 WIND TURBINE IS INSTALLED AS PART OF THE ISLAND OF CUTTYHUNK'S ELECTRIC POWER UTILITY GRID SYSTEM. CUTTYHUNK ISLAND IS LOCATED APPROXIMATELY 14 MILES OFF THE COAST OF SOUTHERN MASSACHUSETTS. THE MP1-200 WIND TURBINE WAS DEVELOPED, FABRICATED AND INSTALLED BY WTG ENERGY SYSTEMS AS A PRODUCTION PROTOTYPE. THE MP1-200 IS A SYNCHRONOUS GENERATING SYSTEM RATED AT 200 KILOWATTS AT 29 MPH WIND VELOCITY. CONSTANT 60 HZ, 480 VAC CURRENT IS PRODUCED DIRECTLY FROM THE WIND TURBINE'S GENERATOR AT +-1% ACCURACY THROUGHOUT THE MACHINE'S OPERATING RANGE. A MICRO-PROCESSOR BASED CONTROL SYSTEM UTILIZING ELECTRICAL LOAD MODULATION IS UTILIZED TO MAINTAIN CONSTANT ROTOR SPEED.

1979-0291 WIND POWER SYSTEMS.
NTIS, NOVEMBER 1979. P. 6.1-6.32.
DOE/PE-3871-1

INFORMATION IS PRESENTED CONCERNING DIFFERENT TYPES OF WIND TURBINES; TURBINE COST AND OPERATING ECONOMICS; POWER GENERATION; ENERGY STORAGE; AND WIND POWER AVAILABILITY IN THE U.S.

1979-0292 BARTON J
NYSERDA 79 ANNUAL REPORT.
ALBANY, NEW YORK, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, 1979. 40 P.

DEVELOPMENT OF A BALANCED ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM GEARED TO THE PRESENT AND FUTURE ENERGY NEEDS OF NEW YORK STATE CONTINUES. ACCOMPLISHMENTS OF THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY INCLUDE FURTHERING THE USE OF INDIGENOUS AND RENEWABLE RESOURCES; AND REDUCING THE DETRIMENTAL IMPACTS OF ENERGY USE. TANGIBLE RESULTS OF THESE PROJECTS ARE HIGHLIGHTED IN THIS REPORT. INFORMATION ON ADMINISTRATIVE OFFICIALS, FACILITIES, AND FINANCIAL DATA OF THE ORGANIZATON IS PRESENTED.

1979-0293 BERGEY K H
THE LANCHESTER-BETZ LIMIT.
J. ENERGY 3(6): 382-384, NOVEMBER-DECEMBER 1979.

THE BETZ LIMIT DEFINES AN UPPER LIMIT TO THE AMOUNT OF ENERGY IN THE WIND THAT CAN BE CONVERTED TO USABLE POWER. IT IS THE MATHEMATICAL EXPRESSION OF A RELATIONSHIP THAT IS UNDERSTOOD INTUITIVELY FROM OBSERVATIONS OF FLUID FLOW. THE LIMIT CONCERNS THE MAXIMUM EFFICIENCY OF A WIND TURBINE AND THE DECREASE IN AIR-VELOCITY DUE TO THE TURBINE. BOTH BETZ'S AND LANCHESTER'S DERIVATIONS ARE SHOWN. BACKGROUND HISTORY ABOUT LANCHESTER IS GIVEN.

1979-0294 BOLLE T G
FINANCIAL PROBLEMS FACING THE MANUFACTURERS OF SMALL WIND ENERGY CONVERSION SYSTEMS. FINAL REPORT.
NTIS, NOVEMBER 1979. 66 P.
DOE/DP/03533-T2

THE FINANCIAL BARRIERS FACED BY THE MANUFACTURERS OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) ARE ASSESSED AND FOUND TO BE SIMILAR TO THOSE FACED BY OTHER START UP BUSINESSES. HOWEVER, THESE PROBLEMS ARE FOUND TO BE AGGRAVATED BY THE HIGH EXPECTATIONS FOR ACCELERATED SWECS INDUSTRY GROWTH IN THE FACE OF MODERATE GOVERNMENT SUPPORT AND LACK OF INVESTMENT CAPITAL. THE UNDERLYING CONDITIONS OF LIMITED SWECS ENTREPRENEUR BUSINESS EXPERIENCE, THE HIGHLY COMPETITIVE VENTURE CAPITAL MARKET, THE INABILITY OF EXISTING FINANCIAL INSTITUTIONS TO AID INFANT BUSINESSES AND PUBLIC UNAWARENESS OF SWECS ARE REVIEWED.

1979-0295 BORTZ S A, BUDENHOLZER R A, CARLSON R D, FIELDHOUSE I, KORNFELD J
NAVY-NEW HAMPSHIRE WIND ENERGY PROGRAM.
NTIS, NOVEMBER 1979. 251 P.
IITRI-M6052, AD-AO86506

THIS PROGRAM INVESTIGATED THE POTENTIAL OF THE MT. WASHINGTON, NEW HAMPSHIRE AREA FOR GENERATING ELECTRIC POWER FROM WIND ENERGY AS AN ALTERNATIVE TO FOSSIL FUELS. THE U.S. NAVAL SHIPYARD AT PORTSMOUTH, NEW HAMPSHIRE IS AMONG THOSE FACILITIES WHICH COULD BENEFIT INITIALLY FROM SUCCESSFUL WIND GENERATED POWER. IIT RESEARCH INSTITUTE (IITRI) SPECIALISTS PERFORMED THE FOLLOWING TASKS: (1) EVALUATION OF NEW HAMPSHIRE'S WIND ENERGY RESOURCES FOR POTENTIAL ELECTRIC POWER GENERATION USING METEOROLOGICAL, TOPOGRAPHICAL, BIOLOGICAL AND OTHER AVAILABLE INFORMATION, (2) ASSESSMENT OF THE ENVIRONMENTAL, SOCIAL, TECHNICAL, AND OTHER POSSIBLE BARRIERS TO THE DEVELOPMENT OF WIND ENERGY RESOURCES, AND (3) ECONOMIC EVALUATION OF INSTALLING ONE OR MORE WIND TURBINE-GENERATORS TO SUPPLY POWER EITHER DIRECTLY TO THE SHIPYARD OR TO LINES OF THE PUBLIC SERVICE COMPANY OF

NEW HAMPSHIRE WHICH SUPPLIES THE SHIPYARD.

1979-0296 BOWES M A, HOWES H E, PERLEY R
DEVELOPMENT OF A 40 KW HORIZONTAL AXIS WIND TURBINE GENERATOR.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 142-158.
RFP-3014(VOL.1)

KAMAN AEROSPACE CORPORATION IS CURRENTLY ENGAGED IN A PROGRAM TO DESIGN, FABRICATE, AND TEST A HORIZONTAL AXIS WIND TURBINE GENERATOR CAPABLE OF PRODUCING 40 KW OF ELECTRICAL OR MECHANICAL OUTPUT POWER IN A 20 MPH WIND. AN OVERALL REVIEW OF THE PROGRAM TO DATE IS PRESENTED WITH MAJOR EMPHASIS ON THE WTG SYSTEM DESIGN AND ITS EVOLUTION. DESIGN DESCRIPTIONS OF BOTH THE ELECTRICAL AND MECHANICAL POWER PRODUCING SYSTEMS ARE PRESENTED, INCLUDING DESCRIPTIONS OF THE MAJOR SUBSYSTEMS AND COMPONENTS. THE EVOLUTION OF THE CURRENT DESIGN THROUGH TRADEOFF ANALYSES IS ALSO DISCUSSED. FINALLY, THE REMAINING PROGRAM TASKS ARE DESCRIBED.

1979-0297 BRONDYKE K J
ROLE OF ALUMINUM IN THE DEVELOPMENT OF MODERN VERTICAL AXIS WIND TURBINES.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 81-83.
CONF-790845

THE ALUMINUM COMPANY OF AMERICA BELIEVES THE WIND CAN BE TURNED INTO A COST-EFFECTIVE COURSE OF SUPPLEMENTAL POWER FOR THE U.S. A RECENT AGREEMENT WITH THE EUGENE WATER AND ELECTRIC BOARD (EWEB) TO BUILD THE LARGEST WIND TURBINE IN AMERICA ON THE OREGON COAST STRONGLY SUPPORTS ALCOA'S FAITH IN THE WIND AND IN ALUMINUM'S ROLE IN TRANSFORMING IT INTO USABLE ELECTRICITY. RESEARCH AND DEVELOPMENT HAVE PLAYED A MAJOR ROLE IN THE COMPANY'S WIND ENERGY PROGRAM, SO A BRIEF REVIEW OF ALCOA LABORATORIES IS PRESENTED.

1979-0298 BROWN R H
DESIGN AND UTILIZATION OF LOW-COST SOLAR COLLECTORS FOR AGRICULTURE.
ASAE AND CSAE CANADIAN SOCIETY OF AGRICULTURAL ENGINEERING SUMMER MEETING, WINNIPEG, CANADA, JUNE 24, 1979.
ASAE TECH. PAPER, 1979. P. 15.

SOLAR ENERGY OFFERS A VERY REAL OPPORTUNITY FOR PRACTICAL APPLICATIONS IN AGRICULTURAL SITUATIONS SUCH AS CROP DRYING, SPACE HEATING, WATER HEATING, AND PERHAPS SPACE AND PRODUCT COOLING AND SHAFT HORSEPOWER. THIS ENERGY MAY BY COLLECTED WITH LOW-COST SOLAR COLLECTORS, EXPENSIVE COLLECTORS, BIOMASS PRODUCTION FROM PLANTS AND WIND ENERGY SYSTEMS FOR WATER PUMPING OR GENERATION OF ELECTRICITY. THE COSTS OF SOLAR COLLECTORS, WHETHER INITIAL PURCHASE CONSTRUCTION OR UPKEEP, ARE SIGNIFICANT. THESE COSTS REPRESENT A MAJOR HURDLE SLOWING THE ACCEPTANCE AND AGRICULTURAL APPLICATIONS OF SOLAR ENERGY OTHER THAN IN PHOTOSYNTHETIC PROCESS. THE PAPER REPORTS ON LOW-COST SOLAR COLLECTORS FOR HEATING OF AIR ($.85-1.67/SQ FT) AND WATER (3.25/SQ FT), WHICH HAVE BEEN USED SUCCESSFULLY IN AGRICULTURAL APPLICATIONS. DESIGN DATA AND SYSTEM CONCEPTS INCLUDING WIND ENERGY AND BIOMASS BURNING ARE PRESENTED.

1979-0299 BUTTERFIELD S, SEXTON J
TOWER DYNAMICS ANALYSES AND TESTING.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 171-178.
RFP-3014(VOL.1)

SUPPORT TOWERS FOR WIND TURBINES AFFECT THE SYSTEM IN SEVERAL WAYS. THESE SUPPORT TOWERS CAN HAVE AFFECTS SUCH AS AERODYNAMIC INTERFERENCE, WHICH IS INTRODUCED AT THE BLADING (TOWER SHADOW), THE MOTION OF THE TURBINE ARISING FROM TOWER OSCILLATIONS, AND THE ADDITION OF A MASS/ELASTIC CONTRIBUTION THAT COULD PARTICIPATE IN MECHANICAL AND AEROELASTIC INSTABILITIES. MATCHING ROTORS AND TOWERS TO AVOID VIBRATION PROBLEMS REQUIRES ACCURATE PREDICTION OF TOWER VIBRATION FREQUENCIES AND MODES. AT PRESENT, THERE IS A VARIETY OF STRUCTURAL DYNAMICS MODELS, COVERING A WIDE RANGE OF COMPLEXITY, COST AND APPLICATION. THE QUESTIONS THAT RISE WHEN SEARCHING FOR THE APPROPRIATE CODE ARE THE ACCURACY OF THE APPROXIMATE CODE AND THE COST OF THE MORE COMPLEX CODES. IN AN ATTEMPT TO ANSWER THESE QUESTIONS AND PROVIDE THE SWECS INDUSTRY WITH VALUABLE DATA FOR WIDELY USED TOWERS, ROCKY FLATS HAS INITIATED A TOWER DYNAMICS SUPPORTING RESEARCH AND TECHNOLOGY (SRT) STUDY. THIS STUDY HAS TWO CLOSELY INTEGRATED WORK AREAS: (1) THE TOWER TESTING AREA AND (2) THE ANALYSIS CODE EVALUATION.

1979-0300 CADWALLADER E A , WESTBERG J E
WIND-POWERED PROCESSING. I.
CHEMTECH. 9(4): 254-259, APRIL 1979.

THIS PART OF A TWO-PART PAPER DESCRIBES ALL ASPECTS OF WIND TURBINES, HORIZONTAL AXIS AND VERTICAL AXIS TYPES, WITH GRAPHS OF THEIR PERFORMANCE UNDER VARYING WIND CONDITIONS. THE ADVANTAGES OF SUCH POWER SOURCES FOR REMOTE LOCATIONS AND INTERMITTENT BUT LONG PERIOD SERVICE IS EMPHASIZED, TOGETHER WITH AN AMORTIZATION OF COSTS. A MAP OF THE ANNUAL AVAILABLE WINDPOWER OVER THE USA IS INCLUDED.

1979-0301 CAMPBELL J S
COMMERCIAL, OR USABLE, SIZE CAMPBELL CHINESE TYPE WINDMILL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 687-690.

THIS PAPER DESCRIBES THE DESIGN AND OPERATION OF A THREE-SAIL VERTICAL AXIS CHINESE-TYPE WINDMILL FOR COMMERCIAL APPLICATON.

1979-0302 CARROLL D P, KRAUSE P C
SECURITY ASSESSMENT OF POWER SYSTEMS INCLUDING ENERGY STORAGE AND WITH THE INTEGRATION OF WIND ENERGY.
PROGRESS REPORT, JULY 1-SEPTEMBER 30, 1979.
NTIS, OCTOBER 1979. 5 P.
COO-4206-10

THE PROGRESS OF THE FIRST THREE TASKS OF THE WIND ENERGY PART OF THE CONTRACT IS DISCUSSED. EMPHASIS IS ON THE MODELING OF THE WIND AND THE DETAILED COMPUTER REPRESENTATIONS OF THREE CANDIDATE WIND SYSTEMS; NAMELY, MOD-1, MOD-2 AND THE SHACKLE MACHINE. ONCE THE DETAILED COMPUTER REPRESENTATIONS OF THESE WIND SYSTEMS HAVE BEEN DEVELOPED THE NEXT STEP IS TO BEGIN WORK ON THE REDUCED ORDER MODELS TO BE USED IN TRANSIENT STABILITY PROGRAMS.

1979-0303 CASHMAN T
WINDMILLS FOR AGRICULTURE--THEIR EFFECTIVE USES AND THEIR PRACTICAL LIMITS.
CHANGING ENERGY USE FUTURES. INTERNATIONAL CONFERENCE ON ENERGY USE MANAGEMENT, 2ND, LOS ANGELES, OCTOBER 22-26, 1979. NEW YORK, PERGAMON, 1979. VOL. 4, P. 1741-1747.

TWO MAJOR STUDIES HAVE INDICATED THAT UP TO A MILLION WIND-POWERED GENERATORS OF ELECTRICITY COULD BE USED COST-EFFECTIVELY ON AMERICAN FARMS IN THE NEXT 15 YEARS. ADDITIONAL ECONOMIC USES OF WIND ENERGY CAN BE FOUND THROUGH DIVERSE STRATEGIES TO OVERCOME THE INHERENT DISADVANTAGE OF WIND AS AN INTERMITTENT RESOURCE.

1979-0304 CASKEY B C
SOLAR MECHANICAL ENERGY STORAGE PROGRAM OVERVIEW AND SYSTEMS ANALYSIS RESULTS.
NTIS, 1979. 6 P.
CONF-790854-1, SAND-79-1642C

THE CURRENT STATUS OF THE SOLAR MECHANICAL ENERGY STORAGE PROGRAM IS DESCRIBED, ALONG WITH THE REMAINING ACTIVITIES BEFORE LAWRENCE LIVERMORE LABORATORY ASSUMES PROGRAM RESPONSIBILITY IN OCTOBER 1979. CONTRACTOR RESULTS ARE PRESENTED IN OTHER PAPERS; PRELIMINARY SYSTEM ANALYSES RESULTS FOR RESIDENTIAL FLYWHEEL ENERGY STORAGE SYSTEMS (FESS) ARE PRESENTED. VARIOUS PHASES OF THE PROGRAM HAVE ADDRESSED SMALL-TO-INTERMEDIATE APPLICATIONS OF PHOTOVOLTAIC/WIND ENERGY STORAGE UTILIZING FLYWHEELS, COMPRESSED AIR AND LOW HEAD UNDERGROUND PUMPED HYDRO TECHNOLOGIES.

1979-0305 CATALOGUE OF WASHINGTON STATE MODEL SOLAR PROGRAMS.
OLYMPIA, WASHINGTON, WASHINGTON STATE ENERGY OFFICE, SEPTEMBER 1979. 58 P.
WAOENG-79-5

THE PROGRAMS INCLUDED ARE EDUCATIONAL PROGRAMS, COMMUNITY DEVELOPMENT EFFORTS, FARM EFFORTS, LEGISLATIVE EFFORTS, FINANCING PROGRAMS, AND COMMERCIAL AND BUSINESS PROGRAMS.

1979-0306 CERMINARA J
INSTALLATION AND TEST EXPERIENCE WITH A 200-KW WIND TURBINE-GENERATOR.
AM. POWER CONF. PROC. 41: 515-517, 1979.

IN MARCH 1977, AFTER COMPETITIVE BIDDING, NASA AWARDED TO WESTINGHOUSE ELECTRIC CORPORATION, SPECIAL SERVICES DIVISION, A CONTRACT TO FURNISH TWO TOWERS AND INSTALL A NASA-FURNISHED WIND TURBINE-GENERATOR (WTG) KNOWN AS THE MOD-0A, WHICH WAS A 200-KW RATED MACHINE AND AN UPGRADED VERSION OF THE MOD-0. UNDER THE SAME CONTRACT, WESTINGHOUSE ALSO ASSEMBLED AND TESTED A SECOND WTG MOD-0A WHICH WAS INSTALLED BY WESTINGHOUSE IN CULEBRA ISLAND, PUERTO RICO THE PAPER DESCRIBES THE MOST DIFFICULT PHASE OF THE WORK ENCOUNTERED ON THE PROJECT.

1979-0307 CHATEL B
SOME SOLAR ENERGY PROGRAMMES IN THE UNITED NATIONS SYSTEM.
SOL. ENERGY 23(3): 263-269, 1979.

THE REPORT OUTLINES RECENT ACTIVITIES IN THE UNITED NATIONS SYSTEM CONCERNING SOLAR AND WIND ENERGY APPLICATIONS, PARTICULARLY FOR THE BENEFIT OF DEVELOPING COUNTRIES. SUMMARIES ARE PROVIDED OF SOME OF THE MAIN PROGRAMS UNDERTAKEN IN THE FIELD OF SOLAR ENERGY BY A NUMBER OF AGENCIES AND BODIES OF THE UNITED NATIONS SYSTEM.

1979-0308 CHEN J
THE EFFECT OF LATENT HEAT FROM MOIST AIR ON THE VORTEX IN A TORNADO-TYPE WIND ENERGY GENERATOR SYSTEM.
J. IND. AERODYN. 5(1-2): 53-60, OCTOBER 1979.

A LOCAL-SIMILARITY METHOD IS PRESENTED FOR THE EQUATIONS THAT DESCRIBE A VORTEX, WHICH IS GENERATED BY A STATIONARY TOWER WITH A PARTLY OPENING TOP, DIRECTED BY VERTICAL VANES, AND WHICH IS AFFECTED BY THE LATENT HEAT OF CONDENSATION FROM MOIST AIR WHICH CREATES A BUOYANT FORCE.

1979-0309 CHENEY M C
DEVELOPMENT OF AN 8 KW WIND TURBINE GENERATOR FOR RESIDENTIAL TYPE APPLICATIONS. PHASE I: DESIGN AND ANALYSIS. VOLUME I. EXECUTIVE SUMMARY.
NTIS, JUNE 25, 1979. 8 P.
DOE/DP/03533-T1(VOL. 1)

THE COMPOSITE BEARINGLESS WIND TURBINE WAS DEVELOPED AT THE UNITED TECHNOLOGIES RESEARCH CENTER FOLLOWING MANY YEARS OF BEARINGLESS ROTOR RESEARCH AND DEVELOPMENT FOR HELICOPTER APPLICATIONS. THE CURRENT 8 KW CONTRACT WAS BEGUN IN OCTOBER 1977 WITH DELIVERY OF THE PROTOTYPE SCHEDULED FOR NOVEMBER 1979. THE CONTRACT CONSISTS OF TWO PHASES. PHASE I ENCOMPASSES THE COMPLETE DESIGN OF THE SYSTEM AND SUPPORTING ANALYTICAL AND EXPERIMENTAL STUDIES. THE PHASE I FINAL REPORT HAS BEEN COMPLETED, AND THIS EXECUTIVE SUMMARY HIGHLIGHTS THE PRINCIPAL FINDINGS DESCRIBED IN THAT REPORT.

1979-0310 CHILCOTT R E
WIND ENERGY RESEARCH AND DEVELOPMENT AT LINCOLN.
WIND ENG. 3(3): 187-196, 1979.

WIND ENERGY RESEARCH AND DEVELOPMENT WORK AT LINCOLN COLLEGE, CANTERBURY, NEW ZEALAND THAT COVERS A WIDE RANGE OF RELATED ACTIVITIES INCLUDING WIND-ENERGY SURVEYING AND RESOURCE ASSESSMENT, WIND-ENVIRONMENT AMELIORATION AND WIND-POWER UTILIZATION IS DESCRIBED. THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND IS PROVIDING A CLEARER PICTURE OF COMPLEX LOCAL WIND FLOWS AND THE SURVEY RESULTS ARE USED IN LONG-TERM ENERGY PLANNING FOR THE FUTURE.

1979-0311 CHILCOTT R E
WIND ENERGY RESEARCH AND DEVELOPMENT AT LINCOLN.
N.Z. ENERGY J. 52(12): 176-178, DECEMBER 25, 1979.

THIS PAPER REVIEWS THE RESEARCH AND DEVELOPMENT CURRENTLY UNDER WAY IN THE DEPARTMENT OF AGRICULTURAL ENGINEERING AT LINCOLN COLLEGE AIMED AT QUANTIFYING SOME OF THE VARIABLES SUCH AS WIND ENERGY AVAILABILITY, CONVERSION EQUIPMENT COST AND COMPETITIVENESS WITH CONVENTIONAL FORMS OF ENERGY IN AN EFFORT TO PROVIDE FIRM INFORMATION ON WHICH DECISIONS CONCERNED WITH WIND-POWER UTILISATION CAN BE BASED.

1979-0312 CHILCOTT R E
WIND ENERGY RESEARCH AND DEVELOPMENT AT LINCOLN.
CANTERBURY, NEW ZEALAND, LINCOLN COLLEGE, WMN-4, JUNE 1979.

1979-0313 WINEMILLER J R, SULLIVAN T L, SIZEMORE R L, YEE S T
DESIGN, FABRICATION, AND INITIAL TEST OF A FIXTURE FOR REDUCING THE NATURAL FREQUENCY OF THE MOD-0 WIND TURBINE TOWER.

NTIS, JULY 1979. 21 P.
NASA-TM-79200, DOE/NASA/1028-79/24

OPERATION OF THE MOD-0 WIND TURBINE WITH A TOWER FIRST BENDING FREQUENCY LESS THAN TWICE THE ROTOR SPEED WAS DESIRED. THIS WOULD PROVIDE AN OPPORTUNITY TO STUDY SYSTEM DYNAMICS FOR A SOFT TOWER AS WELL AS PROVIDE DATA FOR THE SYSTEM PASSING THROUGH RESONANCE. THE METHOD SELECTED TO REDUCE THE FREQUENCY WAS TO PLACE THE ORIGINAL MOD-0 TOWER ON A SET OF SPRINGS. THE FIXTURE FABRICATED TO DO THIS WAS DESIGNED SO THAT THE SPRING STIFFNESS COULD BE VARIED IN THE FIELD TO PROVIDE A RANGE OF TOWER FREQUENCIES. DESIGN REQUIREMENTS AND FIXTURE FABRICATION DETAILS ARE GIVEN. ACTUAL OPERATION OF THE MOD-0 WITH THE SOFTENING FIXTURE SHOWED THAT THE DESIRED TOWER NATURAL FREQUENCIES WERE OBTAINED. ONLY MODERATE FIXTURE DEFLECTIONS WERE OBSERVED WHEN THE SYSTEM PASSED THROUGH RESONANCE.

1979-0314 CHRISTENSEN D L
SOLAR ENERGY FOR BUILDINGS HANDBOOK.
NTIS, OCTOBER 1979. 268 P.
ORO-5362-T1

THIS HANDBOOK CONTAINS PRESENTATION MATERIALS AND SUPPORTING TEXT SUITABLE FOR PRESENTATIONS, EDUCATION, SHORT COURSES, ETC., FOR GENERAL AUDIENCES, AS WELL AS GOVERNMENT OFFICIALS AND MEMBERS OF THE BUILDING TRADE. THE FOLLOWING ARE DISCUSSED: CONSERVATION, SOLAR ENERGY, ECONOMICS, OBSTRUCTIONS, AND THE FUTURE.

1979-0315 CLARK E F, DE WINTER F
PROCEEDINGS OF THE WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS.
NTIS, JUNE 1979. 463 P.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979.
CONF-790352

PAPERS ARE PRESENTED CONCERNING WIND ENERGY TECHNOLOGY; WIND GENERATION VALUE IN ELECTRIC UTILITY SYSTEMS; LARGE WIND TURBINE GENERATOR OPERATION AND STATUS; AND NETWORK INTERACTION ANALYSES.

1979-0316 CLIFTON W W
FLUID CURRENT MOTOR.
U.S. PATENT NO. 4,142,832, MARCH 6, 1979. 12 P.

A FLUID CURRENT MOTOR IS DESCRIBED WHICH HAS A ROTABLE SHAFT, A PLURALITY OF ROTOR ARMS RIGIDLY MOUNTED TO AND EXTENDING RADIALLY OUTWARDLY FROM THE SHAFT AND A PLURALITY OF PAIRS OF SUPERPOSED ROTOR PANELS WHICH PAIRS ARE PIVOTALLY MOUNTED RESPECTIVELY TO EACH ROTOR ARM. IT MAY BE IMPROVED BY PROVIDING A RIGID CONNECTOR BETWEEN EACH PAIR OF PANELS MOVEABLY CONNECTING A LEADING PORTION OF ONE ROTOR PANEL IN EACH PAIR TO A TRAILING PORTION OF THE SECOND ROTOR PANEL IN EACH PAIR SUCH THAT THE ROTOR PANELS IN EACH PAIR OF ROTOR PANELS WILL COACTINGLY PIVOT BETWEEN RESISTING AND NON-RESISTING POSITIONS IN RESPONSE TO A FLUID CURRENT.

1979-0317 COLEMAN C, HUNNICUTT W
ROTOR AND CONTROL SYSTEM DESIGN FOR THE 8 KW 10 METER DIAMETER DOE/WINDWORKS WECS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 65-77.
RFP-3014(VOL.1)

THE FINAL ROTOR DESIGN, AS DEVELOPED IN PHASE I OF THE 8 KW WECS DEVELOPMENT PROGRAM BEING RUN BY ROCKY FLATS WIND DIVISION FOR DOE IS DESCRIBED. THE ROTOR IS 10 M (32.8 FT) IN DIAMETER WITH THREE BLADES. IT OPERATES IN A DOWNWIND CONFIGURATION USING POSITIVE PITCHING OF THE BLADES FOR OVERSPEED CONTROL. THIS PITCHING DECREASES THE ANGLE OF ATTACK OF THE BLADES. THE BLADES ARE FREE-FLAPPING, BEING HINGED AT THE ROOT, ALLOWING MOVEMENT IN THE OUT-OF-PLANE DIRECTION.

1979-0318 CONNELL J R
WIND CHARACTERISTICS FOR DESIGN OF WIND TURBINES: RESEARCH IN THE USA.
NTIS, DECEMBER 1, 1979. 22 P.
CONF-7990128-1, PNL-SA-7967

THE PACIFIC NORTHWEST LABORATORY (PNL) OF THE UNITED STATES DEPARTMENT OF ENERGY HAS THE PRIMARY RESPONSIBILITY FOR PROVIDING INFORMATION ON WIND CHARACTERISTICS FOR DESIGN AND FOR EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS). THE OBJECTIVES OF THE WHOLE PROGRAM ARE, BROADLY, TO DEVELOP TECHNICAL WIND INFORMATION WHICH IS RELEVANT TO THE DESIGN OF WECS, TO DETERMINE SUITABLE METHODS OF MEASURING AND ANALYZING THE WIND FOR EVALUATING WECS PERFORMANCE, AND TO COMMUNICATE THE INFORMATION USEFULLY TO WECS DESIGNERS.

1979-0319 COONLEY D R
WIND: MAKING IT WORK FOR YOU.
PHILADELPHIA, PENNSYLVANIA, THE FRANKLIN INSTITUTE PRESS, 1979. 99 P.

VARIOUS APPLICATIONS OF WIND POWER AND BUILDING DESIGNS INCORPORATING THE USE OF WIND ARE PRESENTED. THE CHARACTERISTIC MOVEMENTS OF THE WIND AND THE TERMINOLOGY USED IN MEASURING WIND ENERGY ARE REVIEWED PRIOR TO A DISCUSSION OF PASSIVE AND ACTIVE WIND ENERGY SYSTEMS. THE IMPORTANCE OF WIND IN AGRICULTURE, ECOSYSTEMS, CLIMATE, OCEAN CURRENTS, AND TRANSPORTATION IS ALSO REVIEWED. WIND BEHAVIOR DATA CAN BE USED TO PLAN PROTECTION FOR BUILDINGS, GARDENS AND CROPS. ACTIVE SYSTEMS INCORPORATING AUTOMATIC AND SPECIALIZED CONTROL SYSTEMS ARE OFTEN UTILIZED FOR PUMPING WATER, MILLING, GENERATING ELECTRICITY, AND MECHANICAL DRIVE SYSTEMS. WIND EQUIPMENT, SYSTEMS, AND DESIGNS ARE DETAILED AND DIAGRAMMED. VARIOUS BUILDING DESIGNS UTILIZING WIND ENERGY ARE ILLUSTRATED AND RECOMMENDATIONS FOR DESIGNING AND CONSTRUCTING WIND SYSTEMS ARE PROVIDED. PASSIVE AND ACTIVE WIND DESIGNS, PROJECTS AND EXPERIMENTAL SYSTEMS, AND A HISTORY OF WIND USE ARE INCLUDED IN APPENDICES.

1979-0320 CORCORAN W
OVERVIEW: DEPARTMENT OF ENERGY.
DOE/SOLAR EXPORT OPPORTUNITIES WORKSHOP, ATLANTA, GEORGIA, JANUARY 8, 1979. NTIS, APRIL 1979. P. 19-23.

A GENERAL NATIONAL PLAN FOR THE ACCELERATION OF THE COMMERCIALIZATION OF SOLAR ENERGY WITHIN THE DOE INVOLVES PROGRAMS ON HOT WATER, PASSIVE, INDUSTRIAL PROCESS HEAT, PHOTOVOLTAICS, WOOD, AND WIND. AN OVERVIEW OF THE U.S. GOVERNMENT INTERESTS AND ACTIVITIES IN STIMULATING TECHNOLOGIES THAT ARE READY FOR THE MARKETPLACE AND THOSE WHERE COOPERATIVE RESEARCH PROGRAMS ARE MUTUALLY BENEFICIAL INCLUDE SOLAR THERMAL SYSTEMS, PHOTOVOLTAICS, WIND ENERGY CONVERSION, BIOMASS, OCEAN THERMAL, AND LOWHEAD HYDRO. INTERNATIONAL ACTIVITIES ARE EMPHASIZED AND THESE INCLUDE COMMERCIALIZATION, TECHNICAL COOPERATION, AND COOPERATION WITH DEVELOPING COUNTRIES. THREE SLIDES ARE USED: SCOPE OF FEDERAL INTEREST, MULTI-NATIONAL ORGANIZATIONS, DEPARTMENT OF ENERGY'S INTERNATIONAL

SOLAR ENERGY ROLE TO ILLUSTRATE THE PRESENTATION.

1979-0321 COX M, ARMSTRONG P R
A STATISTICAL MODEL FOR ASSESSING THE RISK OF HAIL DAMAGE TO ANY GROUND INSTALLATION. TECHNICAL REPORT, JUNE 1978-MARCH 1979.
NTIS, SEPTEMBER 1979. 114 P.
ALO-4291-1

THIS REPORT DESCRIBES A STATISTICAL MODEL WHICH HAS BEEN DEVELOPED TO DETERMINE THE RISK OF DAMAGE BY LARGE HAIL TO ANY GROUND INSTALLATION (SUCH AS A SOLAR FLAT PLATE COLLECTOR). THE MODEL IS BASED ON DATA FOR THE NUMBER OF HAILDAYS PER YEAR, HAILSTONE SIZE DISTRIBUTION, AND STORM SEVERITY (EXPRESSED IN NUMBER OF HAILSTONES PER SQUARE METER PER STORM). OTHER THAN PARAMETERS DERIVED FROM THE RAW METEOROLOGICAL DATA AVAILABLE, THE PARAMETERS OF THE MODEL ARE THE NUMBER OF YEARS OF SURFACE EXPOSURE AND THE EXPOSURE AREA SIZE. THE END RESULT IS THE PROBABILITY CF A HAILSTONE OF A GIVEN SIZE STRIKING A GIVEN SURFACE AREA IN A GIVEN NUMBER OF YEARS. THE "MAXIMUM PROBABLE HAILSTONE SIZE" IS USED AS A CONVENIENT INDEX OF HAIL RISK.

1979-0322 COXON L
ALTERNATE ENERGY INSTALLATIONS ON THE JORDON COLLEGE CAMPUS.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE NATIONAL CONFERENCE, 3RD, TUCSON, ARIZONA, JANUARY 23-25, 1979. SILVER SPRING, MARYLAND, INFORMATION TRANSFER, INC., 1979. P. 290-293.

JORDAN COLLEGE HAS CONSTRUCTED SEVEN ALTERNATE ENERGY DEMONSTRATION UNITS, SOME OF WHICH CONTRIBUTE GREATLY TO REDUCING ENERGY EXPENSES. SOLAR HEATED AIR AND WATER ARE UTILIZED FOR THE HEATING OF SPACE AND DOMESTIC HOT WATER, BOTH SEPARATELY AND JOINTLY. A WIND ENERGY CONVERSION SYSTEM, ONE OF THE LATEST INSTALLATIONS, IS PROVIDING POWER FOR THE NEW SOLAR GREENHOUSE; A PHOTOVOLTAIC DEMONSTRATION UNIT AND A CONCENTRATOR SYSTEM FOR HEATING AND COOLING ARE IN THE PLANNING STAGES.

1979-0323 CRAFOORD C
INTERACTION IN LIMITED ARRAYS OF WINDMILLS: REVIEW OF EARLIER RESULTS FROM A SIMPLE MODEL AND A PRESENTATION OF THE CAPABILITIES OF A DYNAMIC PBL MODEL.
NTIS, MARCH 27, 1979. 57 P.
DM-26, N80-11631/2

THE PROBLEM OF HOW CLOSELY PACKED AN ARRAY OF WINDMILLS CAN BE ERECTED WITHOUT UNDULY INTERFERING WITH EACH OTHER IS CONSIDERED. A GENERAL TECHNICAL BACKGROUND FOR THE BEHAVIOR OF A SINGLE WINDMILL IN A HONOGENEOUS FLOW, TOGETHER WITH A LIST OF IMPORTANT PARAMETERS FOR THE GENERAL PERFORMANCE OF A GROUP, IS GIVEN. EARLIER RESULTS FOR NEUTRAL STRATIFICATION ARE REVIEWED AND PRESENTED IN A SLIGHTLY DIFFERENT MANNER MORE FULLY ILLUSTRATING THE TRADE-OFF BETWEEN WINDMILL DENSITY AND MEAN EFFICIENCY AS FUNCTION OF GROUP SIZE. THE ANALOGY BETWEEN PLUMES AND WAKES AS A BASIS FOR A MODEL FORMULATION IS REVIEWED. PRELIMINARY RESULTS INDICATE A VARIATION IN MEAN EFFICIENCY OF 13% FOR A GROUP WITH 80 UNITS, WHICH MAY CORRESPOND TO A FACTOR OF 2.5 IN AREA COVERAGE. A DYNAMIC ONE DIMENSIONAL PLANETARY BOUNDARY LAYER MODEL IS PRESENTED AND REDESIGNED FOR SIMULATION EXPERIMENTS. USING IT, THE REGENERATION OF THE WIND PROFILES BEHIND A WINDMILL UNIT IS STUDIED FOR DIFFERENT AMBIENT CONDITIONS. PRELIMINARY RESULTS INDICATE A VARIATION OF UP TO A FACTOR OF 9 IN THE RATE OF REGENERATION OF THE PROFILES. HOW THIS DATA MIGHT BE CONSIDERED IN A STATISTICAL ANALYSIS IS DISCUSSED.

1979-0324 CRAIG A G
FABRICATION OF EXTRUDED VERTICAL AXIS TURBINE BLADES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 193-204.
NASA-CP-2106

AN IMPORTANT COMPONENT OF THE MODERN DARRIEUS TYPE VERTICAL AXIS WIND TURBINE IS THE EXTRUDED ALUMINUM BLADE. THIS IS MADE POSSIBLE BY THE REQUIREMENT THAT THEY BE HOLLOW, OF CONSTANT AIRFOIL SHAPE CROSS SECTION, AND BE CAPABLE OF BEING BENT INTO A NEAR-TROPOSKEIN SHAPE ABOUT THE FLATWISE AXIS. THEY SHOULD BE LIGHT WEIGHT, STRONG, AND NEED A MINIMUM OF MAINTENANCE. THESE CHARACTERISTICS DESCRIBE SOME IMPORTANT ATTRIBUTES OF ALUMINUM ALLOY EXTRUSIONS.

1979-0325 CROMACK D E
SYSTEM DESIGN PROBLEMS AND DEVELOPMENT OF WIND FURNACE I.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 159-165.
RFP-3014(VOL.1)

THE DESIGN CONCEPT OF THE UMASS WIND FURNACE HEATING SYSTEM IS DESCRIBED. THE PROBLEMS ENCOUNTERED DURING THE DEVELOPMENT AND OPERATION ARE DISCUSSED. ALSO PRESENTED ARE CONCEPTS FOR REDESIGN THAT WOULD BE INCORPORATED IF A SECOND GENERATION MACHINE WERE TO BE BUILT. BASIC AND ESSENTIAL DESIGN REQUIREMENTS ARE ALSO INCLUDED, AS ARE COST CONSIDERATIONS.

1979-0326 CUBITT L J
REDESIGN OF WINDMILL TOWERS--A COST REDUCTION STUDY.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2272-2276.

THE MOST EXPENSIVE ELEMENT IN THE FARM TYPE WINDMILL SYSTEM, NAMELY THE TOWER, IS REDESIGNED. THE PAPER SHOWS THAT GUYED STEEL POLES, AND REINFORCED CONCRETE POLES ARE SIGNIFICANTLY CHEAPER THAN THE COMMONLY-USED 4 OR 3 POSTED TOWER.

1979-0327 CUNTZE R, ZAUN J
CALCULATION OF THE NATURAL FREQUENCIES OF THE BRACED GROWIAN TOWER WITH DEAD HEAD MASS.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 197-214.
JUEL-SPEZ-28

THE NATURAL FREQUENCIES OF THE BRACED GROWIAN STEEL AND CONCRETE TOWER WERE DETERMINED. IN THE CALCULATION THE MAIN ASSUMPTION TO TREAT THE MACHINE HOUSE AND THE ROTOR AS A DEAD MASS WAS MADE. THE FEM MODEL CONSISTED OF THE TOWER-BAR ELEMENT-STRUCTURE AND THE ROPE-CABLE STRUCTURES. ALL SUBSTRUCTURES WERE ELASTICALLY BOUND TO THE SOIL. THE PRESTRESSING OF TOWER AND CABLES WAS TAKEN INTO ACCOUNT. THE CALCULATION PROCEDURE AND THE MECHANICS AND NUMERICAL DIFFICULTIES WERE DISCUSSED. PARAMETRIC INVESTIGATIONS WERE UNDERTAKEN TO GET AN IDEA OF THE SENSITIVITIES OF SOME MAIN PARAMETERS. A COMPARISON OF THE STEEL AND THE CONCRETE TOWER NATURAL

FREQUENCY RESULTS ARE GIVEN AT THE END OF THE LECTURE.

1979-0328 DA-JUN Y
AN ANALYSIS FOR AERODYNAMIC PERFORMANCE OF THE VERTICAL AXIS "PHI" TYPE ROTOR WIND TURBINE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 766-769.

THIS PAPER PRESENTS A MULTI-STREAM-SHEET COMPUTING MODEL FOR THE ANALYSIS OF THE AERODYNAMIC PERFORMANCE OF THE DARRIEUS WIND TURBINE (VERTICAL AXIS PHI-TYPE). THE MODEL CONSIDERS BOTH AERODYNAMIC PERFORMANCE OF THE AEROFOIL AND THE SHEAR EFFECTS OF THE WIND.

1979-0329 DAS S C
SIMPLIFIED MODELS OF LARGE-WIND-TURBINE OPEN-TRUSS TOWER.
ENVIRONMENTAL FORCES ON ENGINEERING STRUCTURES: PROCEEDINGS OF THE FIRST INTERNATIONAL CONFERENCE, LONDON, JULY 1979. NEW YORK, WILEY, HALSTEAD PRESS, 1979. P. 151-164.

THE PURPOSE OF THE INVESTIGATION DESCRIBED WAS TO DEVELOP A METHOD FOR QUICKLY MODELING A WIND TURBINE TOWER STRUCTURE AND THE COMBINED SYSTEM AS A SYSTEM OF MASSES AND SPRINGS TO STUDY THE DYNAMIC CHARACTERISTICS OF THE TOWER STRUCTURE ALONE AND THE COMBINED SYSTEM INVOLVING NACELLE AND ROTOR BLADES. IN THE MATHEMATICAL MODEL OF THE TOWER STRUCTURE AND THE COMBINED SYSTEM, THE MASS OR MASS MOMENT OF INERTIA OF THE SYSTEM ARE SEPARATED FROM THE ELASTIC PROPERTIES AND EQUIVALENT CONCENTRATED MASSES ARE PLACED AT THE CHOSEN NODE POINTS TO REPRESENT THE INERTIA FORCES IN THE DIRECTION OF THE ASSUMED ELEMENT DEGREES OF FREEDOM. THE EXPRESSIONS FOR THE FLEXURAL AND TORSIONAL FLEXIBILITY AND/OR STIFFNESS CO-EFFICIENTS HAVE BEEN DEVELOPED IN TERMS OF THE SEGMENTAL DIMENSIONS AND THE ELASTIC PROPERTIES OF THE TOWER STRUCTURE.

1979-0330 DAS S C, LINSCOTT B S
WIND TOWER FREE VIBRATION USING LUMPED MASS MODELS.
CONFERENCE ON ELECTRONIC COMPUTATION, 7TH, ST. LOUIS, AUGUST 6-8, 1979. NEW YORK, ASCE, 1979. P. 206-218.

AN APPROXIMATE METHOD IS PRESENTED TO CALCULATE THE BENDING AND TORSION FREQUENCIES OF A TYPICAL TOWER STRUCTURE FOR A WIND TURBINE. THE TOWER STRUCTURE IS MODELED AS A SYSTEM OF MASSES AND SPRINGS. THESE SIMPLIFIED LUMPED-MASS MODELS LEAD TO A SET OF ORDINARY DIFFERENTIAL EQUATIONS INVOLVING MATRICES IN TERMS OF MASS, MASS MOMENTS OF INERTIA, STRUCTURAL STIFFNESS OR STRUCTURAL FLEXIBILITY. ALL FREQUENCIES AND MODE SHAPES OF THE STRUCTURAL MODELS HAVE BEEN OBTAINED BY DIRECT INPUT OF THE MASS OR MASS MOMENT OF INERTIA AND STIFFNESS/FLEXIBILITY MATRICES IN THE PROBLEM ORIENTED COMPUTER PROGRAM SUCH AS STRUDL II OR NASTRAN. THE FREQUENCIES FROM THE IDEALIZED STRUCTURAL MODELS COMPARE CLOSELY WITH THOSE DETERMINED BY EXPERIMENT AND THOSE PREDICTED BY USING THE DETAILED FINITE ELEMENT NASTRAN REPRESENTATION. THE SIMPLIFIED STRUCTURAL MODELS DEVELOPED CAN ALSO BE USED TO COMPUTE TOWER FUNDAMENTAL FREQUENCIES WITH THE AID OF A POCKET-TYPE CALCULATOR USING DUNKERLEY'S EQUATION.

1979-0331 DAVISON G N
BOEING MOD-2 WIND TURBINE SYSTEM ROTOR.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 343-354.
NASA-CP-2106

THE DESIGN DETAILS, SIGNIFICANCE OF FATIGUE STRENGTH, DESIGN DEVELOPMENT TEST RESULTS, AND CONCLUSIONS OF THE PRELIMINARY DESIGN EFFORTS FOR THE MOD-2 ROTOR ARE PRESENTED.

1979-0332 DEBONTRIDDER J, VANDENPUT A, GEYSEN W
BASISPRINCIPES VOOR DE EKONOMISCH VERANTWOORDE KONSTRUKTIE VAN EEN WINDMOLEN. (BASIS PRINCIPLES FOR THE ECONOMICALLY JUSTIFIABLE DESIGN OF WINDMILLS.)
INGENIEURSBLAD 48(8): 69-74, AUGUST 1979. (IN DUTCH)

MATHEMATICAL FORMULAS ARE DESCRIBED WHICH GOVERN ECONOMICAL UTILIZATION OF WIND POWER AND A REVIEW IS PRESENTED OF THE KNOWN WINDMILL TYPES. IT IS CONCLUDED THAT ONLY THE HIGH-SPEED SCREW AND THE DARRIEUS ROTOR PROVIDE AN ECONOMICAL SOLUTION.

1979-0333 DE CARVALHO H G, DO AMARANTE O A C, KOIKE B M
DEVELOPMENT OF WIND ENERGY CONVERTERS TO POWER MICROWAVE RELAY STATIONS UNDER BRAZILIAN METEOROLOGICAL CONDITIONS.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 453-456.

METEOROLOGICAL CONDITIONS IN BRAZIL ARE DESCRIBED. GOALS AND PRESENT STAGE OF THE RESEARCH PROGRAM AND DEVELOPMENT OF WIND ENERGY CONVERTERS IN THE 5 TO 11 METERS ROTOR DIAMETER RANGE ARE DISCUSSED. THE INTEGRATION OF WIND ENERGY CONVERTERS WITH CONVENTIONAL OR SOLAR POWERED SOURCES IS CONSIDERED. ASPECTS OF ELECTRICAL ENERGY STORAGE ARE EXAMINED. FINALLY RELIABILITY PARAMETERS ARE CONSIDERED.

1979-0334 DEKITSCH A, FRITZSCHE A , MUELLER W, WELTE D
DEVELOPMENT OF WIND ENERGY CONVERTERS WITH VERTICAL ROTATIONAL AXIS.
DORNIER-POST NO. 2: 28-30, 1979. (IN GERMAN)

1979-0335 DEMEO E A
EPRI WIND ENERGY ACTIVITIES.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 44-49.
CONF-790352

THE EPRI WIND ENERGY PROGRAM IS DESCRIBED CONCERNING THE IDENTIFYING AND ASSESSING OF PROSPECTIVE ROLES FOR WIND GENERATION IN ELECTRIC UTILITY SYSTEMS AND THE ASSESSING OF REQUIREMENTS THAT UTILITY OPERATION WILL PLACE ON WIND HARDWARE.

1979-0336 WINDMILL IRRIGATION SYSTEM.
SUNWORLD 3(4): 102-104, 1979.

TWO IRRIGATION PROJECTS IN PERU ARE DESCRIBED.

1979-0337 DESHMUKH R G, RAMAKUMAR R
MODELING AND SIMULATION OF WECS ASSISTED UTILITY SYSTEMS.

PITTSBURGH CONFERENCE ON MODELING AND SIMULATION, 10TH, APRIL 25-27, 1979. PITTSBURGH, INSTRUMENT SOCIETY OF AMERICA, 1979. PT. 3, P. 927-933.

A PROBABILISTIC MODEL IS DISCUSSED FOR WIND-ELECTRIC CONVERSION SYSTEMS (WECS) AND IT IS EMPLOYED IN A SIMULATION STUDY TO ASSESS THE RELIABILITY AND CAPACITY CREDIT ASPECTS OF WECS OPERATING IN PARALLEL WITH A CONVENTIONAL UTILITY GRID, FEEDING A COMMON LOAD. THE MAJOR PARAMETERS INVOLVED AND THEIR INFLUENCE ARE STUDIED BY SIMULATION TECHNIQUES FOR A TYPICAL WECS LOCATED IN THE SITE "KAHUKU UPPER" ON THE HAWAIIAN ISLAND OF OAHU. WIND SPEED DATA OVER A TWO-YEAR PERIOD COLLECTED BY THE UNIVERSITY OF HAWAII AT MANOA FORM THE BASIS OF THIS STUDY.

1979-0338 DESHMUKH R G
PROBABILISTIC STUDY OF WIND-ELECTRIC CONVERSION SYSTEMS FROM THE POINT OF VIEW OF RELIABILITY AND CAPACITY CREDIT.
OKLAHOMA STATE UNIVERSITY, STILLWATER, OKLAHOMA. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, 1979. ORDER NO. 79-28,197. 167 P.

THE EXPECTED ENTRY OF WIND-ELECTRIC CONVERSION SYSTEMS (WECS) INTO THE UTILITY GRIDS IN THE NEAR FUTURE BRINGS INTO FOCUS THE NEED TO ACCESS THE RELIABILITY OF WIND ASSISTED UTILITY SYSTEMS. IN PARTICULAR, THE INFLUENCE OF MAJOR PARAMETERS SUCH AS WIND REGIME, GENERATION MIX (PENETRATION), LOAD DEMAND AND THE LIKE IS OF INTEREST. THIS REQUIRES THE DEVELOPMENT OF APPROPRIATE PROBABILISTIC MODELS FOR WECS COMMENSURATE WITH THE MODELS OF OTHER COMPONENTS USED IN CONVENTIONAL POWER SYSTEMS, AND INTEGRATION OF THESE MODELS WITH THE MODELS OF OTHER POWER SYSTEM COMPONENTS TO EVALUATE THE RELIABILITY OF WECS ASSISTED UTILITY SYSTEMS WITH THE AID OF A SUITABLE LOAD MODEL.

1979-0339 DEWINKEL C C
WIND ENERGY CONVERSION SYSTEMS IN THE SERVICE AREA OF THE WISCONSIN POWER AND LIGHT COMPANY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 45-60.
RFP-3014(VOL.2)

A DISCUSSION OF THE WIND ENERGY RESOURCE OF WISCONSIN IS GIVEN. SOME CHARACTERISTICS OF THE WISCONSIN POWER AND LIGHT COMPANY ARE REVIEWED, PARTICULARLY SELECTED LOAD AND ENERGY FORECAST DATA WHICH INDICATE THE POTENTIAL OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS). THE DEVELOPMENT OF ANALYTICAL TOOLS TO ANALYZE ALTERNATIVE TECHNOLOGIES AND LOAD AND ENERGY MANAGEMENT SCHEMES IS DESCRIBED. FINALLY, WISCONSIN POWER AND LIGHT'S PRESENT WIND ENERGY PROGRAM IS DISCUSSED.

1979-0340 DIESENDORF M, FULFORD G
OPTIMAL VALUE OF THE RATED SPEED OF A WIND GENERATOR.
WIND ENG. 3(1): 62-68, 1979.

SOUTH AUSTRALIAN WINDSPEED DATA ARE MODELED WITH THE WEIBULL DISTRIBUTION, WHILE THE RESPONSE (POWER DENSITY OUTPUT) OF A WIND GENERATOR, BETWEEN ITS STARTING SPEED V//S AND RATED SPEED V//R, IS CHOSEN TO BE THE SUM OF A CUBIC FUNCTION OF WINDSPEED V AND A CONSTANT TERM. AN EXPRESSION IS DERIVED FOR THE VALUE OF THE PARAMETER V//R/VBAR) MAX, WHICH YIELDS THE MAXIMUM OF THE ANNUAL ENERGY PRODUCTION. ATTENTION IS DRAWN TO THE IMPORTANT ROLE OF THE STARTING SPEED OF THE WIND GENERATOR, WHICH DETERMINES, TOGETHER WITH V//R, WHETHER THERE IS A MAXIMUM ANNUAL ENERGY PRODUCTION AND, IF SO, WHERE IN PARAMETER SPACE THE MAXIMUM IS TO BE FOUND.

1979-0341 DIVONE L V
RECENT DEVELOPMENTS IN WIND ENERGY.
HEAT. VENT. ENG. J. AIR COND. 53(615): 14-15, FEBRUARY 1979.

THE CHANGING TREND IN THE UNITED STATES FROM STUDIES AND ESTIMATES TO ACTUAL EXPERIMENTS IS DESCRIBED. ALSO CONSIDERED ARE THE U.S. WIND ENERGY BUDGET, THE MOD-0 WIND TURBINE SYSTEM, THE POTENTIAL FOR TELEVISION BROADCAST INTERFERENCE, AND INTERNATIONAL RESEARCH COOPERATION.

1979-0342 DIVONE L V, BLAUNSTEIN R, GROS J, INGBERMAN A K, RICE W L R
COMMERCIALIZATION STRATEGY REPORT FOR LARGE WIND SYSTEMS.
NTIS, 1979. 41 P.
TID-28843(DRAFT)

THE COMMERCIALIZATION OF WIND TURBINES IS ANALYZED CONCERNING TECHNICAL READINESS; MARKET AND ECONOMIC ASPECTS; ENVIRONMENTAL IMPACTS; INSTITUTIONAL ACCEPTANCE; BENEFIT ANALYSIS; AND COMMERCIALIZATION DEVELOPMENT STRATEGY.

1979-0343 DODGE D M, STAFFORD J V
SMALL WIND TURBINE SYSTEMS 1979. A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES. VOLUME 1: R AND D REQUIREMENTS.
NTIS, 1979. 299 P.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979.
RFP-3014(VOL.1)

1979-0344 YPERLAAN G J
FREQUENCY DISTRIBUTIONS OF THE WIND VELOCITY AND THE WIND ENERGY OF THE LIGHTSHIPS TERSCHELLINGERBANK, TEXEL, GOEREE AND NOORDHINDER. (FREKWENTIEVERDELINGEN VAN DE WINDSNELHEID EN DE WINDENERGIE VAN DE LICHTSCHEPEN TERSCHELLINGERBANK, TEXEL, GOEREE EN NOORDHINDER.)
NTIS, 1979. 92 P. (IN DUTCH)
KNMI-V-309, N80-18650/5

TABLES OF WIND VELOCITY AND WIND ENERGY ARE PRESENTED, PREPARED FROM DATA TAKEN AT FOUR COASTAL LIGHTSHIPS OFF THE COAST OF THE NETHERLANDS FOR USE IN STUDYING THE FEASIBILITY OF WIND POWER. DATA WAS ALSO TAKEN AT SHORE STATIONS, BUT DIFFERENCES IN COLLECTION METHODS MAKE IT DIFFICULT TO COMPARE THE DATA SETS.

1979-0345 DODGE D M, STAFFORD J V
SMALL WIND TURBINE SYSTEMS 1979. A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES. VOLUME 2: UTILITY INTERFACE/INSTITUTIONAL ISSUES.
NTIS, 1979. 224 P.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979.
RFP-3014(VOL.2)

1979-0346 DOMAN G S
SYSTEM CONFIGURATION IMPROVEMENT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 384-395.
NASA-CP-2106

THE DESIGN OF A WIND TURBINE GENERATOR IS A VERY COMPLEX PROCESS BECAUSE OF THE MANY (AND OFTEN CONFLICTING) CHOICES AND CONSIDERATIONS INVOLVED. AS A CONSEQUENCE, THE DETERMINATION OF A SUPERIOR SYSTEM CAN BEST BE ACHIEVED FROM INTENSIVE STUDIES AND PROBINGS THAT REFLECT THE TRULY PERTINENT GOVERNING FACTORS. A DISCUSSION OF SUCH A PROCESS IN TERMS OF WORD CHARTS AND ASSOCIATED FIGURES IS PRESENTED.

1979-0347 DONHAM R E
EVALUATION OF AN OPERATING MOD-0A 200 KW WIND TURBINE BLADE.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 239-265.
NASA-CP-2106

THE MOD-0A WIND TURBINE BLADES, MANUFACTURED BY LOCKHEED AIRCRAFT SERVICE COMPANY (LAS), ONTARIO, CALIFORNIA, ARE NOW OPERATING IN CLAYTON, NEW MEXICO. THESE BLADES, ROTATED FOR THE FIRST TIME ON NOVEMBER 30, 1977, ESTABLISHED THE MOD-0A AS THE FIRST WIND-DRIVEN GENERATOR IN 35 YEARS TO BE CONTINUALLY TIED INTO AN ELECTRICAL POWER SYSTEM THAT SERVICES A COMMUNITY. TWO ADDITIONAL SETS OF MOD-0A BLADES HAVE BECOME OPERATIONAL ON THE ISLAND OF CULEBRA, PUERTO RICO, AND BLOCK ISLAND, RHODE ISLAND. BLADE DESIGN FOLLOWS THAT OF THE MOD-0 WIND TURBINE BUILT FOR NASA. THE MOD-0A WIND TURBINE BLADES ARE GEOMETRICALLY THE SAME AS THE MOD-0 BLADES. STRUCTURAL MODIFICATIONS RECOMMENDED BY LOCKHEED TO EXTEND THE FATIGUE LIFE OF THE MOD-0 BLADES AND NASA'S EXPERIENCE WITH THE MOD-0 UNIT INFLUENCED THE DESIGN OF THE MOD-0A TURBINE BLADE STRUCTURE; SO DID COST AND SCHEDULE CONSTRAINTS.

1979-0348 DOUGLAS R R
BOEING MOD-2: WIND TURBINE SYSTEM RATED AT 2.5 MW.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 61-78.
NASA-CP-2106

THE MOD-2 PROJECT IS AN APPROXIMATE 36 MONTH PROGRAM FOR THE DEVELOPMENT, DESIGN, FABRICATION, INSTALLATION, AND CHECK-OUT OF A WIND TURBINE SYSTEM (WTS) OPTIMIZED FOR COMMERCIAL PRODUCTION OF POWER INTO A UTILITY GRID. SIMILAR TO THE MOD-0 AND MOD-1 PROGRAMS, MOD-2 IS MANAGED BY NASA-LERC. CONTRARY TO THOSE PROGRAMS, THE PRIMARY OBJECTIVE OF THE END HARDWARE IS FOR DIRECT AND EFFICIENT COMMERCIAL APPLICATION, RATHER THAN FOR RESEARCH AND DEVELOPMENT. THE PROGRAM HAS BEEN STRUCTURED TO ACHIEVE THIS DESIRED COMMERCIAL OBJECTIVE BY A SUBSTANTIAL CONCEPT SELECTION EFFORT, COMPARATIVELY FEW FIRM REQUIREMENTS IMPOSED ON THE CONTRACTOR, AND ENCOURAGEMENT OF COMMERCIAL PRACTICE APPLICATION. A SUMMARY DESCRIPTION OF MOD-2 DEVELOPMENT AND OF THE RESULTING SYSTEM HARDWARE IS PRESENTED.

1979-0349 DRAKE W, CLEWS H
DEVELOPMENT OF A 2 KW HIGH-RELIABILITY WIND TURBINE GENERATOR.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 13-30.
RFP-3014(VOL.1)

ENERTECH CORPORATION IS CURRENTLY ENGAGED IN A PROGRAM TO DEVELOP AND FABRICATE PROTOTYPES FOR TESTING OF A 2 KW HIGH-RELIABILITY WIND TURBINE GENERATOR. THE MACHINE IS TO BE CAPABLE OF PRODUCING 2 KW OF ELECTRICAL POWER IN A 9 METER/SECOND (20 MILE/H) WIND, AND SHOULD REQUIRE NOT MORE THAN ONE MAN-DAY OF SERVICE PER YEAR. THE DESIGN CHARACTERISTICS AND OPERATING ECONOMICS ARE PRESENTED.

1979-0350 DREES H M
SELF-STARTING WINDMILL ENERGY CONVERSION SYSTEM.
U.S. PATENT NO. 4,180,367, DECEMBER 25, 1979. 14 P.

A WIND TURBINE APPARATUS IS DESCRIBED IN WHICH A PLURALITY OF WIND RESPONSIVE ELEMENTS ARE MOVABLY MOUNTED, SUCH AS BY BEING PIVOTALLY MOUNTED, ON A MOVABLE MEANS WHICH PRODUCES ROTARY MOTION. THE POSITIONS OF THE WIND RESPONSIVE ELEMENTS ARE ARRANGED TO PROVIDE A DRAG FORCE ON AT LEAST ONE OF THE ELEMENTS IN RESPONSE TO THE WIND WHEN THE SPEED OF ROTARY MOTION IS BELOW A PREDETERMINED LEVEL SO AS TO PRODUCE A STARTING FORCE TO INITIATE AND MAINTAIN THE ROTARY MOTION. WHEN THE SPEED OF THE ROTARY MOTION EXCEEDS SUCH PREDETERMINED LEVEL THE POSITIONS OF SUCH WIND RESPONSIVE ELEMENTS ARE SUCH THAT A LIFT FORCE IS PROVIDED THEREON IN RESPONSE TO THE WIND SO THAT THE ROTARY MOTION CAN ACHIEVE SPEEDS WHICH ARE CONSIDERABLY HIGHER THAN THOSE ACHIEVED BY THE STARTING FORCE.

1979-0351 DUTTON J A, PANOFSKY H A, LARKO D, SHIRER H N, STONE G, VILARDO M
STATISTICS OF WIND FLUCTUATIONS OVER COMPLEX TERRAIN. FINAL REPORT.
NTIS, OCTOBER 1979. 157 P.
DOE/ET/20560-1

THIS REPORT DEALS WITH THE PROPERTIES OF RELATIVE TURBULENCE INTENSITIES, TURBULENT SPECTRA AND FREQUENCY DISTRIBUTIONS OVER UNIFORM AND COMPLEX TERRAIN.

1979-0352 DUWE W D
40 KW GIROMILL PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 132-141.
RFP-3014(VOL.1)

ROCKWELL INTERNATIONAL HAS AWARDED THE MCDONNELL AIRCRAFT COMPANY A CONTRACT TO DESIGN, BUILD, AND DELIVER A 40 KW VERTICAL AXIS WINDMILL CALLED A GIROMILL. WORK BEGAN IN SEPTEMBER 1978. DELIVERY TO ROCKY FLATS IS SCHEDULED TOWARD THE END OF 1979. IN ORDER TO ACCOMPLISH THIS PROGRAM, A TEAMING ARRANGEMENT HAS BEEN MADE WITH THE VALLEY PUMP DIVISION OF VALLEY INDUSTRIES. VALLEY WILL PARTICIPATE IN THE DESIGN, WILL FABRICATE MOST OF THE PARTS, AND, IF THE MACHINE IS SUCCESSFUL, WILL MANUFACTURE THE GIROMILL.

1979-0353 YEN J T, DECARLO J, ZYWAN W
RECENT DEVELOPMENTS OF THE TORNADO-TYPE WIND ENERGY SYSTEM.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 137-152.
SERI/TP-245-184, CONF-790501

RECENT DEVELOPMENTS IN TORNADO-TYPE WIND ENERGY SYSTEM WILL BE PRESENTED IN THIS PAPER INCLUDING THE FINDINGS THAT (A) THE VANES OF THE VORTEX COLLECTING TOWER CAN BE PERMANENTLY FIXED AND OPENED TO WINDS FROM ALL DIRECTIONS, (B) DATA MEASURED FROM SMALL MODELS WITH FIXED-VANES GIVE A CURRENT LEVEL OF PERFORMANCE OF AROUND 0.10 FOR THE POWER COEFFICIENT BASED ON THE TOWER FRONTAL AREA, (C) FIXED-VANE TOWER DESIGN YIELDS MAJOR REDUCTIONS IN TOWER COSTS AND SIGNIFICANT REDUCTIONS IN CAPITAL COSTS AGAINST SOME DEGRADATION IN PERFORMANCE DUE TO SOME LEAKAGE OF WIND ENERGY FROM THE FIXED-VANES, (D) EMPLOYING A REASONABLE SYSTEM COST OF $100/SQ. M. ($10/SQ. FT.) OF TOWER SURFACE AREA SHOWS THAT AT MASS PRODUCTION OF FULL-SCALE UNITS, THE TORNADO-TYPE WIND ENERGY SYSTEM WOULD YIELD A CAPITAL COST OF $300 TO $500/KW INSTALLED AND AN ENERGY COST OF 2 TO 4 CENTS/KWH, AND HENCE (E) EVEN BASED ON CURRENT LEVEL OF PERFORMANCE MEASURED FROM SMALL MODELS, FULL-SCALE TORNADO-TYPE WIND ENERGY SYSTEM IS SEEN TO BE COST COMPETITIVE AGAINST THE CONVENTIONAL MODS 0A, 1 AND 2 WIND MACHINES.

1979-0354 EDRIS A-A
TRANSIENT ANALYSIS OF A WIND DRIVEN SYNCHRONOUS GENERATOR.
CHALMERS TEK. HOGSK. DOKTORSAVH. NO. 92, MARCH 1979. 157 P.

THIS PAPER PRESENTS A MATHEMATICAL STATE-SPACE MODEL FOR DIGITAL COMPUTER STUDIES OF THE TRANSIENT BEHAVIOR OF A WIND DRIVEN SYNCHRONOUS GENERATOR. THE PAPER IS DIVIDED INTO TWO PARTS. PART I DEALS WITH THE ANALYSIS FOR AN OPEN-LOOP WIND-ELECTRIC ENERGY CONVERSION PLANT. A WIND TURBINE IS MECHANICALLY COUPLED, THROUGH A GEAR-BOX, TO A SYNCHRONOUS GENERATOR CONNECTED TO A LARGE UTILITY NETWORK. PART II DEALS WITH THE ANALYSIS FOR A CLOSED-LOOP PLANT. THE MODEL DEVELOPED IS USED TO STUDY THE INFLUENCE OF INTRODUCING A SUPPLEMENTAL INPUT SIGNAL TO THE GENERATOR EXCITATION VOLTAGE ON THE DYNAMIC RESPONSE CHARACTERISTICS OF THE PLANT.

1979-0355 EGGWERTZ S, CARLSSON I, GUSTAFSSON A, LUNDEMO C, MONTGOMERIE B
SAFETY OF WIND ENERGY CONVERSION SYSTEMS (WECS): PRELIMINARY STUDY.
NTIS, NOVEMBER 16, 1979. 136 P.
FFA-HU-2126, N80-28933/3

A SAFETY STUDY TO PROVIDE INFORMATION ON THE RISKS INHERENT IN A WIND ENERGY CONVERSION SYSTEM (WECS) TO THE GENERAL PUBLIC IN THE SURROUNDING AREA AS WELL AS TO THE OPERATOR PERSONNEL IS PRESENTED. LAND BASED LARGE SCALE TURBINE SYSTEMS WITH HORIZONTAL AXES SITUATED IN SPARSELY POPULATED AREAS ARE CONSIDERED. THE STUDY IS INTENDED TO SERVE AS A PRELIMINARY MANUAL FOR SAFETY ANALYSIS OF WECS. AN OVERALL DESCRIPTION OF THE SYSTEM, STATISTICAL INFORMATION CONCERNING LOADS AND STRENGTH PROPERTIES OF MATERIALS CONSIDERED, AND A DISCUSSION OF GEOMETRICAL TOLERANCES ARE INCLUDED.

1979-0356 ELLIOTT D L, BARCHET W R
NORTHWEST REGIONAL WIND ENERGY ASSESSMENT.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 15-18.
CONF-790845

THE WIND ENERGY RESOURCE OF THE UNITED STATES AND ITS TERRITORIES MUST BE DESCRIBED IN ADEQUATE DETAIL TO MEET THE NEEDS OF A VARIETY OF USERS. TO MEET THESE NEEDS, THE WIND CHARACTERISTIC PROGRAM ELEMENT, MANAGED FOR THE U.S. DEPARTMENT OF ENERGY (DOE) BY PACIFIC NORTHWEST LABORATORY (PNL), DEVELOPED, APPLIED AND TESTED TECHNIQUES USING EXISTING WIND INFORMATION TO ASSESS THE WIND ENERGY POTENTIAL OF THE NORTHWEST REGION. THIS ASSESSMENT INCLUDED IDAHO, MONTANA, OREGON, WASHINGTON AND WYOMING.

1979-0357 ENVIRONMENTAL ASSESSMENT: INSTALLATION AND FIELD TESTING OF A LARGE EXPERIMENTAL WIND TURBINE GENERATOR SYSTEM NEAR KAHUKA POINT ON THE ISLAND OF OAHU, HAWAII.
NTIS, DECEMBER 1979. 56 P.
DOE/EA-0097

THE DEPARTMENT OF ENERGY (DOE) HAS PREPARED AN ENVIRONMENTAL ASSESSMENT (EA) ON THE PROPOSED MOD-0A WIND TURBINE FIELD TEST AND EVALUATION NEAR KAHUKA POINT ON THE ISLAND OF OAHU, HAWAII. BASED ON THE FINDINGS OF THE EA, WHICH IS AVAILABLE TO THE PUBLIC ON REQUEST, DOE HAS DETERMINED THAT THE PROPOSED ACTION DOES NOT CONSTITUTE A MAJOR FEDERAL ACTION SIGNIFICANTLY AFFECTING THE QUALITY OF THE HUMAN ENVIRONMENT WITHIN THE MEANING OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA), 42 USC 4321 ET SEQ. THEREFORE AN ENVIRONMENTAL IMPACT STATEMENT IS NOT REQUIRED.

1979-0358 ESTIMATION OF WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
NTIS, OCTOBER 1979. 149 P.
PNL-3074

A PRACTICAL METHOD HAS BEEN DEVELOPED AND APPLIED TO THE PROBLEM OF DETERMINING WIND CHARACTERISTICS AT CANDIDATE WIND ENERGY CONVERSION SITES WHERE THERE ARE NO AVAILABLE HISTORICAL DATA. THE METHOD USES A MASS CONSISTENT WIND FLOW MODEL (CALLED COMPLEX) TO INTERPOLATE BETWEEN STATIONS WHERE WIND DATA ARE AVAILABLE. THE COMPLEX MODEL INCORPORATES THE EFFECTS OF TERRAIN FEATURES AND AIRFLOW. THE KEY TO THE PRACTICAL APPLICATION OF COMPLEX TO THE DERIVATION OF WIND STATISTICS IS THE MODEL'S LINEARITY. THIS ALLOWS THE INPUT DATA SETS TO BE RESOLVED INTO ORTHODONAL COMPONENTS ALONG THE SET OF EIGENVECTORS OF THE COVARIANCE MATRIX.

1979-0359 FABIAN O
STRATEGY FOR AEROELASTIC ANALYSIS OF WECS.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 95-104.
JUEL-SPEZ-28

WITHIN THE FINITE ELEMENT METHOD, THE ROTOR BLADES ARE USUALLY MODELLED BY BEAM ELEMENTS BELONGING TO A CO-ORDINATE SYSTEM CO-ROTATING WITH THE ROTOR HUB. IN THE CASE OF A FLEXIBLE TOWER, HOWEVER, THIS ROTATING SYSTEM IS BOTH PITCHED AND YAWED. THE INCLUSION OF THESE ADDITIONAL MOTIONS IN THE VIBRATION ANALYSIS CONSTITUTES A SEVERE PROBLEM. THE PROPOSITION PRESENTED CONCERNS A PURELY INERTIAL FORMULATION OF THE VIBRATION PROBLEM AVOIDING THIS DIFFICULTY.

1979-0360 FALICOFF W, KOIDE G, TAKAHASHI P
SOLAR/WIND HANDBOOK FOR HAWAII--ENERGY APPLICATIONS FOR HAWAII, THE PACIFIC BASIN AND SITES WORLDWIDE WITH SIMILAR CLIMATIC CONDITIONS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2301-2305.

A NUMBER OF GENERAL HANDBOOKS, LOCAL METEOROLOGICAL DATA SETS, MANUFACTURERS' SPECIFICATIONS, USDOE INFORMATION CIRCULARS AND ASSORTED BOOKS AND REPORTS ARE AVAILABLE ON WIND AND SOLAR ENERGY. THE "SOLAR/WIND HANDBOOK FOR

HAWAII" IS THE VERY FIRST PUBLICATION TO CONDENSE THE WEALTH OF HISTORICAL AND CONTEMPORARY INFORMATION, BOTH REGIONALIZED AND UNIVERSAL, INTO ONE SOLAR AND WIND ENERGY APPLICATIONS VOLUME.

1979-0361 FALICOFF W, KOIDE G, TAKAHASHI P
SOLAR/WIND HANDBOOK FOR HAWAII: TECHNICAL APPLICATIONS FOR HAWAII, THE PACIFIC BASIN AND SITES WORLDWIDE WITH SIMILAR CLIMATIC CONDITIONS.
NTIS, MAY 1979. 647 P.
UCRL-15053

THE TECHNIQUES ARE PRESENTED FOR USING SOLAR ENERGY AND WIND POWER IN APPLICATIONS SUCH AS DOMESTIC HOT WATER PRODUCTION, SPACE COOLING, PROCESS HEATING, AND POWER GENERATION. THE FINDINGS AND INFORMATION ARE BASED UPON CONDITIONS IN HAWAII, BUT CAN APPLY TO LOCATIONS WITH SIMILAR ENVIRONMENTS SUCH AS THE ENTIRE PACIFIC AREA.

1979-0362 FELLHAUER C A
SPECIAL STUDIES TASK AREA OF THE ROCKY FLATS SMALL WIND ENERGY SYSTEMS GROUP.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 94-98.
RFP-3014(VOL.2)

THE ROCKY FLATS WIND SYSTEMS GROUP CONVENED REPRESENTATIVES OF THE SWECS INDUSTRY IN HYANNIS, MASSACHUSETTS AFTER THE AMERICAN WIND ENERGY ASSOCIATION CONFERENCE IN THE FALL OF 1978 TO SOLICIT SUGGESTIONS FOR THE SPECIAL STUDIES TASK AREA. THE NUMEROUS SUGGESTIONS COVERED MARKETING, COST ANALYSIS, UTILITY INTERFACE, FINANCING ISSUES, PRODUCT LIABILITY ISSUES AND A MISSION ANALYSIS. THE SUGGESTIONS WERE INTEGRATED AND PRIORITIZED IN ACCORDANCE WITH A METHODOLOGY DEVELOPED BY MR. M.E. NIGHTENGALE, MANAGER, INSTITUTIONAL ISSUES. THE ANALYSIS RESULTED IN 11 STUDIES THAT WILL PROGRESS THROUGH VARIOUS PHASES FROM STARTUP TO COMPLETION IN FY 1979. THESE STUDIES WERE INTEGRATED INTO THE SPECIAL STUDIES TASK AREA, AS A PART OF THE INSTITUTIONAL ISSUES PROGRAM AT ROCKY FLATS.

1979-0363 FERRELL G C, THORN W R, AGNELLO M, SMITH D
THE APPLICATION OF SMALL WIND ENERGY CONVERSION SYSTEMS TO THE TELECOMMUNICATIONS INDUSTRY.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 438-444.

THE RECENT TESTING OF WIND-ELECTRIC SYSTEMS UNDER HARSH ATMOSPHERIC CONDITIONS HAS PROVEN AND DOCUMENTED A HIGH LEVEL OF REQUIRED PERFORMANCE. SMALL WIND SYSTEMS ARE NOW CAPABLE OF REMOTE, UNATTENDED, AND NEAR MAINTENANCE FREE OPERATION, PERFORMANCE CHARACTERISTICS WHICH ARE WELL SUITED TO APPLICATIONS IN THE TELECOMMUNICATIONS INDUSTRY.

1979-0364 FERTIS D G, ROSS R S
LOW COST WIND GENERATOR URETHANE ROTORS.
ANNUAL CONFERENCE (OF THE) REINFORCED PLASTICS/COMPOSITES INSTITUTE, 34TH, NEW ORLEANS, JANUARY 30-FEBRUARY 2. 1979. NEW YORK, SOCIETY OF THE PLASTICS INDUSTRY, 1979. SECT. 15-D, 6 P.

THE PURPOSE OF THE RESEARCH PRESENTED IN THIS PAPER WAS TO EXECUTE A FEASIBILITY STUDY TO DETERMINE IF IT IS POSSIBLE TO REDUCE THE COST OF MANUFACTURING WIND GENERATOR ROTOR BLADES BY MAKING THEM OF CAST URETHANE.

1979-0365 FERTIS D G, ROSS R S
LOW COST WIND GENERATOR URETHANE ROTORS.
J. ELASTOMERS PLAST. 11(4): 253-268, OCTOBER 1979.

THIS PAPER DESCRIBES A RESEARCH PROGRAM WHICH WAS UNDERTAKEN TO EXECUTE A FEASIBILITY STUDY TO DETERMINE IF IT IS POSSIBLE TO REDUCE THE COST OF MANUFACTURING WIND GENERATOR ROTOR BLADES BY MAKING THEM OF CAST URETHANE. PRELIMINARY INVESTIGATIONS BY NASA HAVE SHOWN THAT LARGE SIZE WINDMILLS CAN PROVIDE SIGNIFICANT AMOUNTS OF ENERGY TO TAKE CARE OF FUTURE NEEDS. THE COST OF INSTALLATION OF SUCH LARGE SIZE WINDMILLS CAN BE REDUCED CONSIDERABLY IF LOW COST ROTOR BLADES ARE USED.

1979-0366 FEUERSTEIN R J
UTILITY RATES AND SERVICE POLICIES AS POTENTIAL BARRIERS TO THE MARKET PENETRATION OF DECENTRALIZED SOLAR TECHNOLOGIES.
NTIS, AUGUST 1979. 131 P.
SERI/TR-62-274

AT PRESENT, ECONOMIC AND INSTITUTIONAL CONCERNS DICTATE THAT DECENTRALIZED SOLAR TECHNOLOGIES GENERALLY REQUIRE AN AUXILIARY ENERGY SOURCE TO ASSURE CONTINUOUS SERVICE THROUGH PERIODS OF ADVERSE WEATHER. UTILITY RATES AND SERVICE POLICIES REGARDING AUXILIARY ENERGY SERVICE HAVE A SIGNIFICANT IMPACT UPON SOLAR SYSTEM ECONOMICS, AND THUS THE COMMERCIALIZATION OF SOLAR ENERGY. THE SCOPE OF THIS PAPER EVALUATES THREE BASIC ISSUES: (1) WHETHER A UTILITY CAN REFUSE TO PROVIDE AUXILIARY SERVICE TO SOLAR USERS, (2) WHETHER A UTILITY CAN CHARGE HIGHER OR LOWER THAN TRADITIONAL RATES FOR AUXILIARY SERVICE, AND (3) WHETHER A UTILITY CAN REFUSE TO PURCHASE EXCESS POWER GENERATED BY SMALL POWER PRODUCERS UTILIZING ELECTRICITY-PRODUCING SOLAR TECHNOLOGIES.

1979-0367 FINCH T
INSTITUTIONAL BARRIERS TO URBAN SWECS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 142-144.
RFP-3014(VOL.2)

THE FEASIBILITY OF SITING SMALL WIND TURBINES IN URBAN AREAS IS DESCRIBED. ECONOMIC CONSIDERATIONS AND INTERFACING REQUIREMENTS ARE DISCUSSED. AN EXAMPLE OF A SMALL WIND TURBINE LOCATED IN NEW YORK CITY IS PRESENTED.

1979-0368 FISHER E D, BELLAIRE M I
WIND TO HEAT CONVERTOR. TECHNICAL PROGRESS REPORT.
NTIS, DECEMBER 28, 1979. 20 P.
DOE/R5/10120-T1

THE PURPOSE OF THIS PROJECT IS TO DEMONSTRATE A WIND DRIVEN MACHINE WHICH CONVERTS WIND ENERGY TO HEAT THROUGH THE ACTION OF THE IMPELLOR OF THE WINDMILL, DRIVING THROUGH SUITABLE SHAFTING AND GEARING, A ROTARY HYDRAULIC BRAKE WHICH ABSORBS THE POWER BY CONVERTING THE MECHANICAL ENERGY INTO HEAT IN THE WORKING FLUID. RESISTANCE IS CREATED EXCLUSIVELY BY FLUID FRICTION AND AGITATION OF THE FLUID CIRCULATED BETWEEN THE VANED MEMBERS OF THE CONVERTOR. THIS PROJECT INCLUDES THE EFFORT TO DESIGN, PURCHASE COMPONENT PARTS AND MATERIALS, CONSTRUCT,

ASSEMBLE, ERECT THE PROTOTYPE MODEL, AND EVALUATE ITS PERFORMANCE UNDER THE PREVAILING WIND CONDITIONS AT THE SELECTED SITE.

1979-0369 FLUID BATTERY STORES "CHEAP" ELECTRICITY.
ELECTR. WORLD 192(2): 43-44, JULY 15, 1979.

A UNIQUE ENERGY STORAGE SYSTEM, CALLED REDOX, DEVELOPED AT NASA'S LEWIS RESEARCH CENTER, UNDER A PROGRAM JOINTLY FUNDED BY DOE AND NASA, GIVES PROMISE OF MAJOR COST REDUCTIONS IN STORING ELECTRICAL ENERGY, AS WELL AS LONG-TERM RELIABILITY AND MINIMAL ENVIRONMENTAL IMPACT. (REDOX IS AN ACRONYM FOR REDUCTION OXIDATION). FOR UTILITIES THE NEW NASA SYSTEM COULD BE SCALED UP IN THE NEXT SEVERAL YEARS, DEPENDING ON FUNDING, TO PROVIDE AN EFFICIENT MEANS OF LOAD LEVELING--THE STORAGE OF THOUSANDS OF KWH DURING LOW DEMAND PERIODS FOR LATER PEAK USE. MORE IMMEDIATELY, REDOX SYSTEMS IN THE KILOWATT RANGE COULD HELP TO SPEED THE GROWTH OF SOLAR ELECTRIC (PHOTOVOLTAIC) AND WIND-ENERGY SYSTEMS WHERE THE COST OF ELECTRICAL STORAGE HAS BEEN AN IMPORTANT CONSIDERATION.

1979-0370 FOREMAN K M, GILBERT B L
TECHNICAL DEVELOPMENT OF THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) CONCEPT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 121-136.
SERI/TP-245-184, CONF-790501

AN ATTRACTIVE ADVANCED WIND ENERGY CONCEPT IS THE DIFFUSER AUGMENTED WIND TURBINE (DAWT). THIS APPROACH EFFECTIVELY INCREASES THE CONCENTRATION OF NATURALLY DIFFUSE WIND ENERGY BY INDUCING GREATLY AUGMENTED MASS FLOW RATE THROUGH THE WIND TURBINE THAN IN CONVENTIONAL ARRANGEMENTS. THE TECHNICAL CHALLENGE HAS BEEN TO DEVELOP VERY COMPACT DIFFUSERS THAT WILL MINIMIZE THE EQUIPMENT COST AND COMPLICATION ACCOMPANYING THE POWER AUGMENTATION CAPABILITY.

1979-0371 WORLD'S LARGEST WINDMILL IS COMMISSIONED.
INT. POWER GENERATION 2(6): 39-41, SEPTEMBER 1979.

THE WORLD'S LARGEST WINDMILL, IN NORTH CAROLINA, USA, WAS COMMISSIONED IN JULY, 1979. DESIGNATED THE MOD-1 EXPERIMENTAL WIND TURBINE GENERATOR, IT IS INTERCONNECTED WITH THE BLUE RIDGE MEMBERSHIP CORPORATION UTILITY GRID SYSTEM.

1979-0372 FOREMAN K M, GILBERT B L
TECHNICAL DEVELOPMENT OF THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) CONCEPT.
WIND ENG. 3(3): 153-166, 1979.

THE AUTHORS DESCRIBE A PHASED THREE-YEAR INVESTIGATION, INVOLVING THREE TEST FACILITIES AND BASED UPON THE USE OF BOTH MULTIBLADED TURBINES AND OF SCREENS TO SIMULATE TURBINE PRESSURE DROP THAT HAS LED TO THE DEVELOPMENT OF SEVERAL COMPACT DIFFUSER DESIGNS THAT APPEAR TECHNICALLY AND ECONOMICALLY ATTRACTIVE. MODEL TESTS WITH A NONOPTIMIZED DAWT CONFIGURATION HAVE DEMONSTRATED POWER AUGMENTATION FOR A GIVEN TURBINE DIAMETER AND WIND SPEED BY A FACTOR OF ABOUT 3.5 COMPARED WITH AN CONVENTIONAL SYSTEM.

1979-0373 FRAENKEL P L
THE ITDG INTERNATIONAL WINDPUMP PROGRAMME: ENGINEERING DESIGN CONSIDERATIONS USED IN DEVELOPING A WINDPUMP SYSTEM FOR SMALL-SCALE MANUFACTURE AND USE IN UNDERDEVELOPED ARID OR SEMI-ARID REGIONS.
INDIAN ACAD. SCI. PROC. C2(1): 83-105, MARCH 1979.

SOME OF THE REASONS WHY WINDPUMPS HAVE NOT READILY FOUND WIDESPREAD APPLICATION IN THE LESS DEVELOPED ARID REGIONS, DESPITE THE FACT THAT THEY HAVE BEEN WIDELY AND SUCCESSFULLY APPLIED IN THE UNITED STATES AND AUSTRALIA, ARE DISCUSSED, IN THE CONTEXT OF THE LONDON-BASED INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP'S (ITDG) INVESTIGATIVE WORK AND FIELD EXPERIENCE WITH WINDPUMPS. ITDG'S INTERNATIONAL WINDPUMPS DEVELOPMENT PROGRAMME WHICH IS INTENDED TO OVERCOME SOME OF THE PREVIOUS SHORTCOMINGS OF WINDPUMPS WHEN APPLIED IN UNDER-DEVELOPED REGIONS IS DESCRIBED. AN ACCOUNT IS GIVEN OF THE ENGINEERING APPROACH CHOSEN IN DESIGNING THE ITDG WINDPUMP PROTOTYPE FOR DEVELOPMENT OF METHODS FOR REDUCING THE COST OR INCREASING THE OUTPUT OF MACHINES OF THIS KIND.

1979-0374 FRAENKEL P L
THE INTERMEDIATE TECHNOLOGY WIND-PUMP DEVELOPMENT PROGRAMME.
COLLOQUIUM ON WINDPOWER, LONDON, NOVEMBER 21, 1979. LONDON, IEE, 1979. P. 3-1 TO 3-4.

THE OBJECTIVES OF THE WIND PUMP DEVELOPMENT PROGRAMME ARE TO PRODUCE A DESIGN SUITABLE FOR LOW VOLUME ECONOMIC PRODUCTION IN DEVELOPING COUNTRIES FROM WIDELY AVAILABLE STANDARD STEEL SECTIONS. THE SYSTEM SHOULD ALSO BE ADAPTABLE THROUGH MINOR MODIFICATIONS FOR EITHER HIGH-VOLUME LOW-HEAD PUMPING OR THE MORE TRADITIONAL LOW-VOLUME HIGH-HEAD BORE-HOLE PUMPING FUNCTION. THE PRESENT STATUS OF THE PROGRAMME IS DESCRIBED.

1979-0375 FREDERICK W A, MILLER J A, PFLUGER J E
FULLY INTERCONNECTED WIND SYSTEM.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 297-309.
CONF-790352

IN NOVEMBER OF 1977 THE PENNSYLVANIA POWER AND LIGHT COMPANY DECIDED TO INSTALL A WIND TURBINE GENERATOR (WTG) THAT HAD A FULL THREE PHASE CONNECTION TO THE ELECTRICAL DISTRIBUTION SYSTEM. ENERGY DEVELOPMENT COMPANY WAS IN THE PROCESS OF INSTALLING TWO MACHINES JUST WEST OF ALLENTOWN (DORNEY PARK). THEIR READY AVAILABILITY AND SIMPLE DESIGN MADE THEM A NATURAL SUPPLIER FOR THE PP AND L PROJECT. THE MACHINE CHOSEN FOR INSTALLATION WAS EDC'S MODEL 445, A 45 KW, FOUR-BLADED MACHINE WITH 45-FOOT-DIAMETER ROTOR AND 40-FOOT TOWER. THE GENERATOR WAS THREE PHASE AC. THE UNIT HAS A BRAKE THAT CAN BE OPERATED MANUALLY OR AUTOMATICALLY; IN THE LATTER MODE IT WILL SHUT THE MACHINE DOWN AT 35 MPH. THE UNIT IS DESIGNED TO SURVIVE GUSTS OF UP TO 120 MPH. THE INSTALLATION WAS SUPERVISED BY T. MEHRKAM, ENERGY DEVELOPMENT COMPANY, 179 E. RD. NO. 2, HAMBURG, PENNSYLVANIA 19526.

1979-0376 FRERKING M
A SOLAR HEATED COMMERCIAL GREENHOUSE.
SOL. GREENHOUSE DIG. 2(2): 32-33, APRIL-MAY 1979.

A COMMERCIAL SOLAR GREENHOUSE IN DEWEY, AZ, WAS CONSTRUCTED AT A COST OF ABOUT $13/SQ. FT. AND WILL RECEIVE ABOUT 85% OF ITS HEATING LOAD FROM SOLAR ENERGY. THE 2,100 SQ. FT. GREENHOUSE INCORPORATES A 12-IN.-THICK CONCRETE BLOCK WALL FOR DIRECT SOLAR GAIN, A ROCK STORAGE FLOOR, 5 FANS FOR STORING HEAT, AND PIPE FRAME COVERED WITH FLAT FIBERGLASS GLAZING AND CORRUGATED LASCOLITE. COOLING IS PROVIDED BY 5 WIND TURBINES AND 100 SQ. FT. OF DOORS AND AN AXIAL FAN.

1979-0377 FROST W, NOWAK D K
SUMMARY OF GUIDELINES FOR SITING WIND TURBINE GENERATORS RELATIVE TO SMALL-SCALE, TWO-DIMENSIONAL TERRAIN FEATURES. FINAL REPORT.
NTIS, MARCH 1979. P. 395.
RLO-2443-77/1

A SUMMARY OF A DETAILED USERS' MANUAL ON SITING WIND TURBINE GENERATORS (WTG'S) RELATIVE TO SMALL-SCALE, TWO-DIMENSIONAL, TERRAIN FEATURES IS GIVEN. THE TERRAIN FEATURES CONSIDERED ARE ONE OR MORE SURFACE ROUGHNESS CHANGES ON OTHERWISE FLAT TERRAIN, SHELTERBELTS OR WINDBREAKS, AND BLUFF AND SMOOTH CONTOURED HILLS. ESTIMATES ARE GIVEN OF THE PREFERRED WTG LOCATION RELATIVE TO THESE TERRAIN FEATURES AND OF THE RESULTING DEGRADATION IN AVAILABLE WIND POWER DUE TO LOCATING THE WTG OTHER THAN AT THE PREFERRED SITE.

1979-0378 FRY C M, HISE H W
WIND DRIVEN, HIGH ALTITUDE POWER APPARATUS.
U.S. PATENT NO. 4,165,468, AUGUST 21, 1979. 10 P.

WIND DRIVEN ROTORS ARE AFFIXED ALONG THE LENGTH OF A FLEXIBLE POWER SHAFT, AND THE SHAFT IS SUSPENDED AT A GREAT HEIGHT ABOVE THE EARTH BY MEANS OF A SWIVEL. THE LOWERMOST END OF THE SHAFT IS CONNECTED TO ROTATE A GROUND SUPPORTED ENERGY CONVERSION DEVICE. THE WINDS ALOFT IMPART ROTATIONAL MOTION INTO THE WIND ROTORS, WHEREUPON THE ROTATIONAL ENERGY OF THE SHAFT IS CONVERTED INTO ELECTRICAL POWER OR OTHER FORM OF POWER BY THE CONVERSION DEVICE. THE SWIVEL ALLOWS THE ROTATING SHAFT TO BE AFFIXED TO A NONROTATING SUSPENSION DEVICE. THE SUSPENSION DEVICE IS GROUND SUPPORTED AND INCLUDES A MEMBER HAVING OPPOSED ENDS ANCHORED TO THE TOP OF TWO TOWERS OR TWO SPACED APART MOUNTAINS, WITH THE GENERATOR BEING PLACED THEREBETWEEN.

1979-0379 FUNKHOUSER D
ESTIMATES OF THE COSTS OF RENEWABLE ENERGY TECHNOLOGIES FOR NEW YORK STATE.
ALBANY, NEW YORK, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, JULY 1979. 485 P.
NYSERDA-79-7

THE FINDINGS OF URBAN SYSTEMS RESEARCH AND ENGINEERING ON THE COSTS OF RENEWABLE ENERGY TECHNOLOGIES IN NEW YORK STATE ARE SUMMARIZED. THE INPUT WILL BE USED BY THE FIRST NEW YORK STATE ENERGY MASTER PLAN AND WILL ASSIST THE STATE ENERGY OFFICE IN DETERMINING THE APPROPRIATE ROLE AND LIKELY LEVEL OF MARKET PENETRATION FOR RENEWABLE ENERGY TECHNOLOGIES THROUGH 1995. THE COSTS ASSOCIATED WITH INDIVIDUAL RENEWABLE ENERGY TECHNOLOGIES ARE IDENTIFIED AND LIFE CYCLE COSTS ARE PRESENTED FOR MOST RENEWABLE ENERGY TECHNOLOGIES.

1979-0380 FURNESS R
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1979 SURVEY.
NTIS, DECEMBER 1979. 217 P.
EPRI-ER-1299-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. IT CONTAINS BRIEF DESCRIPTIONS OF 735 PROJECTS BEING CONDUCTED BY 180 UTILITY COMPANIES. ALSO INCLUDED ARE AN INDEX OF PROJECTS BY CATEGORY, A STATISTICAL SUMMARY, A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, A LIST OF UTILITIES ORGANIZED BY STATE, AND A LIST OF AVAILABLE REPORTS ON UTILITY-SPONSORED PROJECTS.

1979-0381 GALLUP R B, TROMMERSHAUSEN W E
BRINGING IN THE WIND.
PUBLIC POWER 37(5): 14-19, SEPTEMBER 1979.

WITH A GROWING POPULATION AND SHIFTS FROM OTHER FORMS OF ENERGY TO ELECTRIC POWER EXPANDING ELECTRIC UTILITY LOADS, THE POTENTIAL FOR HARNESSING WIND POWER IS INCREASINGLY ATTRACTIVE. EARLY EFFORTS TO FIND ACCEPTABLE ENERGY-STORAGE METHODS HAVE GIVEN WAY TO DESIGNS OF WIND-POWERED GENERATORS THAT WILL MAXIMIZE OVERALL POWER GENERATION. WIND POWER RESEARCH PROJECTS RANGE FROM THE ALREADY COMMERCIALLY AVAILABLE 200-KILOVOLT (KV) RANGE TO THE 2,000-KV UNIT BEING TESTED IN BOONE, NC. BECAUSE ECONOMIES OF SCALE MAY NOT BE APPLICABLE TO WIND SYSTEMS, THE RECOMMENDED APROACHES ARE FOR A LARGE NUMBER OF WIDELY SCATTERED WINDMILLS AND FOR THE CONSTRUCTION OF LARGE ARRAYS ON ENERGY FARMS. NEW CONCEPTS OF UTILITY RATE STRUCTURES WILL BE NEEDED TO ACCOUNT FOR THE ADVANTAGES OF INTEGRATING WIND SYSTEMS WITH OTHER ENERGY SOURCES.

1979-0382 GARFINKEL P
THE NEW ALCHEMISTS: THEY HAVE TRIED THE FUTURE AND IT WORKS...OR DOES IT?
NATL. WILDLIFE 17(3): 4-11, APRIL-MAY 1979.

THE 12-ACRE CAPE COD FARM DESIGNED AND OPERATED BY THE NEW ALCHEMY INSTITUTE UTILIZES SOLAR ENERGY, WIND POWER, AQUACULTURE, AND INTENSIVE AGRICULTURE TO MAINTAIN THE SELF-SUFFICIENT EXPERIMENTAL COMMUNITY.

1979-0383 GENERATING TECHNOLOGY ASSESSMENT. PHASE I WORK PLAN, TAST 1 REPORT.
NTIS, OCTOBER 15, 1979. 78 P.
DOE/EIA/10480-T1

A PLAN OF WORK OUTLINING INFORMATION TO ASSESS ELECTRIC GENERATING TECHNOLOGIES IS PRESENTED. PROJECTIONS ARE MADE OF REALISTIC AND UNDERSTANDABLE ENGINEERING AND COST ASSESSMENTS OF NONNUCLEAR ELECTRICAL GENERATING TECHNOLOGIES.

1979-0384 GEORGI H
DYNAMIC DAMPING INVESTIGATIONS ON COMPOSITES.
AGARD CONF. PROC. NO. 277. DAMPING EFFECTS IN AEROSPACE STRUCTURES, 48TH MEETING OF AGARD STRUCTURES AND MATERIALS PANEL, WILLIAMSBURG, VA., APRIL 2-3, 1979. NTIS, 1979. P. 9-1 TO 9-20.
AD-A080451/8, AGARD-CP-277

CHARACTERISTIC REGULARITIES AND DATA FROM A SERIES OF DAMPING MEASUREMENTS ON FIBER REINFORCED COMPOSITE MATERIALS AND STRUCTURES ARE PRESENTED. EXPERIMENTS WERE CARRIED OUT MAINLY ON NATURAL FREQUENCIES OF LATERAL VIBRATIONS IN FREE DECAY AND FORCED EXCITATION. TESTS INCLUDED COMPOSITE MATERIAL (WITH REINFORCEMENT BY BORON-, CARBON-, GLASS- AND SYNTHETIC FIBERS), STRUCTURAL COMPONENTS (SANDWICH AND I-BEAMS); COMPOSITE STRUCTURES (WIND BOX, ROTOR BLADES). EXPERIMENTAL PARAMETERS CONSIDERED WERE: AMPLITUDE, TEMPERATURE, VIBRATION MODE, FREQUENCY, AIR PRESSURE, ASPECT RATIO, FIBER ORIENTATION.

1979-0385 GEWEHR H W
LARGE, LOW COST COMPOSITE WIND TURBINE BLADES.

LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 209-234.
NASA-CP-2106

VARIOUS STUDIES HAVE SHOWN THAT THE COST OF ENERGY DECREASES WITH INCREASING ROTOR SIZE IN WIND TURBINE GENERATOR SYSTEMS, AND THAT THE COST OF THE ROTOR IS A MAJOR CONTRIBUTION TO INITIAL PROCUREMENT AND ANNUAL OPERATING COSTS. IN AN EFFORT TO REDUCE ROTOR COST, NASA LEWIS RESEARCH CENTER, WITH DEPARTMENT OF ENERGY FUNDING, INITIATED A PROGRAM TO DEVELOP A LARGE, LOW COST WIND TURBINE BLADE REPRESENTATIVE OF A DESIGN FOR A 300 FT-DIAMETER WIND GENERATOR SYSTEM. THE DESIGN, ANALYSIS, AND TEST RESULTS OF THAT PROGRAM ARE PRESENTED. FABRICATION OF TWO COMPOSITE BLADES FOR THE MOD-1 200 FT-DIAMETER WIND TURBINE IS DESCRIBED. STRUCTURAL COMPOSITES INDUSTRIES, INC., AZUSA, CALIFORNIA, FABRICATED THE SPAR FOR THE 150 BLADE.

1979-0386 GILBERT L J, TRIEZENBERG D M
LEWIS RESEARCH CENTER STUDIES OF MULTIPLE LARGE WIND TURBINE GENERATORS ON A UTILITY NETWORK.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 388-402.
CONF-790352

THE WIND ENERGY PROJECT OFFICE OF NASA-LEWIS HAS UNDERTAKEN A MULTI-FACETED PROGRAM TO STUDY THE ANTICIPATED PERFORMANCE OF A WIND TURBINE GENERATOR FARM ON AN ELECTRIC UTILITY NETWORK. BOTH IN-HOUSE AND CONTRACTOR RESOURCES ARE BEING USED. PRELIMINARY RESULTS OF AN IN-HOUSE SIMULATION OF TWO MOD-2 SYSTEMS TIED TO AN INFINITE BUS INDICATE FAVORABLE SYSTEM PERFORMANCE.

1979-0387 GILBERT L J, TRIEZENBERG D M
SIMULATION STUDIES OF MULTIPLE LARGE WIND TURBINE GENERATORS ON A UTILITY NETWORK.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 375-384.
NASA-CP-2106

THE WIND ENERGY PROJECT OFFICE OF NASA-LEWIS HAS UNDERTAKEN, AS PART OF THE DEPARTMENT OF ENERGY WIND PROGRAM, A MULTI-FACETED PROJECT TO STUDY THE ANTICIPATED PERFORMANCE OF A CLUSTER OF WIND TURBINE GENERATORS ON AN ELECTRIC UTILITY NETWORK. BOTH IN-HOUSE AND CONTRACTOR RESOURCES ARE BEING USED. PRELIMINARY RESULTS OF AN IN-HOUSE SIMULATION OF TWO MOD-2 SYSTEMS TIED TO AN INFINITE BUS INDICATE FAVORABLE SYSTEM PERFORMANCE.

1979-0388 GILHAUS A
STATIONARY FLYWHEEL ENERGY ACCUMULATORS FOR INDUSTRIAL UNDERTAKINGS.
ENERGY. MEETING ON INDUSTRIAL PROCESSES--ENERGY CONSERVATION R AND D, BRUSSELS, NOVEMBER 23-24, 1978. PROCEEDINGS. LUXEMBOURG, COMM. EUROPEAN COMMUNITIES, 1979. P. 577-592.

THE AIM OF THIS SYSTEMS STUDY IS TO FIND OUT INDUSTRIAL APPLICATIONS OF STATIONARY FLYWHEEL ENERGY ACCUMULATORS AND TO DETERMINE THE ECONOMIC VALUE FOR THE INDIVIDUAL CONSUMER (E.G. INDUSTRIAL UNDERTAKING). THE EFFECTS ON THE PUBLIC POWER SUPPLY GRID ARE ALSO EXAMINED. THE RESULTS INDICATE THAT AN ADVANTAGEOUS APPLICATION OF THE FLYWHEEL ENERGY STORAGE UNITS CAN ONLY BE EXPECTED WHEN OTHER BENEFITS ARE COMBINED WITH THE REDUCTION OF ENERGY COSTS, FOR EXAMPLE A GAIN IN RELIABILITY, PERFORMANCE OR REDUCED INVESTMENTS FOR OTHER NECESSARY DEVICES. THE COMBINATION OF A FLYHWEEL ENERGY ACCUMULATOR WITH A WIND-POWER-PLANT SEEMS TO BE PROMISING.

1979-0389 GILLOIS J
WIND POWER STATION.
GERMAN (FRG) PATENT NO. 2,732,192/A/, JANUARY 25, 1979. 13 P. (IN GERMAN)

THE PATENT IS BASED ON THE IDEA OF USING A RING OF BLADES SIMILAR TO THAT OF THE OVERSHOT WATERWHEEL FOR CONVERTING WIND ENERGY INTO ENERGY OF ROTATION. THE WIND FLOWS INTO THE OPEN FRONT OF A WIND TRAP OF RECTANGULAR CROSSECTION WHICH CAN BE ADJUSTED IN THE WIND DIRECTION IN WHICH A LEADING SURFACE RUNNING AT AN ANGLE FROM BELOW UPWARDS, REDUCES THE CROSSECTION FOR AIR FLOW TO LESS THAN ONE HALF. BEHIND THE REMAINING SLIT SHAPED OUTFLOW OPENING FOR THE AIR FLOW THE BLADEWHEEL HAS AN AXIS OF ROTATION AT AN ANGLE TO THE WIND DIRECTION, WHICH THE WIND ONLY IMPINGES ON WHEN OVERSHOT AND WHICH IS THUS MADE TO ROTATE.

1979-0390 GLASGOW J C, ROBBINS W H
UTILITY OPERATIONAL EXPERIENCE ON THE NASA/DOE MOD-0A 200 KW WIND TURBINE.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 215-245. ALSO: ENERGY TECHNOL. 6: 961-981, 1979.
CONF-790352

THE MOD-0A 200 KW WIND TURBINE WAS DESIGNED AND FABRICATED BY THE LEWIS RESEARCH CENTER OF THE NASA UNDER THE DIRECTION OF THE U.S. DEPARTMENT OF ENERGY. THE PROJECT IS A PART OF THE FEDERAL WIND ENERGY PROGRAM AND IS DESIGNED TO OBTAIN EARLY WIND TURBINE OPERATION AND PERFORMANCE DATA WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. ON MARCH 6, 1978 THE MOD-0A WIND TURBINE WAS TURNED OVER TO THE TOWN OF CLAYTON LIGHT AND WATER PLANT, CLAYTON, NM, FOR UTILITY OPERATION AND ON DECEMBER 31, 1978, THE MACHINE HAD COMPLETED TEN MONTHS OF UTILITY OPERATION. THIS PAPER DESCRIBES THE MACHINE AND DOCUMENTS THE RECENT OPERATIONAL EXPERIENCE AT CLAYTON, NM.

1979-0391 GOH T N, NATHAN G K
NEW APPROACH FOR WIND SPEED CHARACTERIZATION FOR WIND ENERGY STUDIES.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2267-2271.

THIS PAPER DESCRIBES AN INVESTIGATION OF THE CHARACTERISTICS OF WIND SPEEDS RECORDED AT SIX METEOROLOGICAL STATIONS IN SINGAPORE. THE STUDY ILLUSTRATES THE EXTRACTION OF INFORMATION FROM WIND DATA THROUGH THE USE OF APPROPRIATE METHODS OF TIME SERIES ANALYSIS AND MODELING.

1979-0392 GOH T N, NATHAN G K
A STATISTICAL METHODOLOGY FOR STUDY OF WIND CHARACTERISITCS FROM A CLOSE ARRAY OF STATIONS.
WIND ENG. 3(3): 197-206, 1979.

THIS PAPER DESCRIBES AN APPROACH IN WIND SPEED ANALYSIS WHICH ENTAILS SYSTEMATIC EXTRACTION OF STATISTICAL CHARACTERISTICS FROM MEASURED METEOROLOGICAL DATA THROUGH THE USE OF SUITABLE TECHNIQUES OF TIME SERIES ANALYSIS. THIS IS ILLUSTRATED BY A CASE STUDY, IN WHICH DATA COLLECTED SIMULTANEOUSLY AT SIX STATIONS WITHIN A SPARSELY UNDULATED TERRAIN OF APPROXIMATELY 700 SQ KM ARE ANALYZED. CONSISTENCY OF WIND CHARACTERISTICS IN THIS AREA IS EXAMINED THROUGH VARIOUS MATHEMATICAL MODELS IN THE TIME DOMAIN THAT ARE CAPABLE OF REFLECTING THE DYNAMIC NATURE OF WIND DATA IN BOTH TIME AND SPACE. THE METHODOLOGY PROVIDES ANALYTICAL TOOLS FOR USE IN THE

SELECTION OF WIND POWER STATION SITES, WHICH OFTEN DEPENDS ON AN UNDERSTANDING OF THE ADEQUACY OF INTERPOLATING AND EXTRAPOLATING EXISTING DATA BEYOND LOCATIONS OF DATA SOURCES.

1979-0393 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. APPENDIX 1. WIND POWER SITE SURVEY REPORT.
NTIS, OCTOBER 1979. 102 P.
DOE/BP/01310-T1(APP.1)

RESULTS ARE PRESENTED FOR WIND SURVEY FIELD TRIPS TO NORTHWEST WASHINGTON, SOUTHERN OREGON COAST, CENTRAL COLUMBIA RIVER GORGE, COLUMBIA HILLS, GOODNOE HILLS, AND HORSE HEAVEN HILLS.

1979-0394 GOODALE B A
APPLICATIONS OF INTERMEDIATE SIZE WIND TURBINES.
ENERGY ENGINEERING TECHNOLOGY. WORLD ENERGY ENGINEERS CONGRESS, ATLANTA, GEORGIA, OCTOBER 31, 1978. ATLANTA, GEORGIA, FAIRMONT PRESS, 1979. P. 163-166.

THE OBJECT OF DOE'S WIND ENERGY PROGRAMS IS TO DEVELOP MACHINES WHICH WILL PROVIDE POWER AT COMPETITIVE PRICES AND TO COMMERCIALIZE THESE MACHINES AS SOON AS POSSIBLE. KAMAN INTENDS TO DO JUST THIS, STARTING WITH THE 40 KW MACHINE AND EXPANDING TO A PRODUCT LINE OF VARIOUS INTERMEDIATE SIZE MACHINES. MARKET POTENTIAL FOR INTERMEDIATE SIZE WIND TURBINES IS ANALYZED.

1979-0395 GOUGEON M, ZUTECK M
USE OF WOOD FOR WIND TURBINE BLADE CONSTRUCTION.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 298-308.
NASA-CP-2106

SEVERAL CONSTRUCTION CONCEPTS WERE CONSIDERED AND EVALUATED. A MONOCOQUE D SECTION FORMING THE LEADING EDGE, AND A BUILT-UP TRAILING EDGE SECTION WAS THE SELECTED METHOD OF CONSTRUCTION. THE REQUIRED THICKNESS TO ACHIEVE THE NECESSARY STRUCTURAL PROPERTIES IN THE D WAS EXAMINED FOR BOTH A LAMINATED VENEER AND BONDED SAWN STOCH FABRICATION TECHNIQUE. BOTH OF THESE TECHNIQUES WERE ULTIMATELY JUDGED TO BE FEASIBLE, WITH THE COMPARATIVE FABRICATION ADVANTAGES DETERMINED BY BLADE SIZE AND SPECIAL EPOXY AND WOOD STOCK HANDLING TECHNIQUES, RATHER THAN BY THE RESULTANT PHYSICAL PROPERTIES OF THE FINISHED NOSE.

1979-0396 GOVINDA RAJU S P, NARASIMHA R
A LOW-COST WATER PUMPING WINDMILL USING A SAIL TYPE SAVONIUS ROTOR.
INDIAN ACAD. SCI. PROC. C2(1): 67-82, MARCH 1979.

A WATER PUMPING WINDMILL WHICH CAN BE BUILT LARGELY WITH MATERIALS AND SKILLS AVAILABLE IN RURAL AREAS HAS BEEN DESIGNED AND FABRICATED. THE WINDMILL USES A SAVONIUS ROTOR AND INCORPORATES A NOVEL SAIL-TYPE CONSTRUCTION. THE PUMP IS OF A POSITIVE DISPLACEMENT TYPE USING THE CASING OF A PNEUMATIC TYPE FOR THE PUMPING CHAMBER. TWO PROTOTYPES HAVE BEEN CONSTRUCTED AND THESE HAVE INDICATED A REASONABLE PERFORMANCE AND RELIABILITY.

1979-0397 GOVINDA RAJU S P, NARASIMHA R
LOW-COST WATER PUMPING WINDMILL USING A SAIL-TYPE SAVONIUS ROTOR. REPORT 79 FM 2.
NTIS, JANUARY 1979. 107 P.
NP-24145

A WATER PUMPING WINDMILL WHICH CAN BE BUILT LARGELY USING MATERIALS AND SKILLS AVAILABLE IN RURAL AREAS HAS BEEN DESIGNED AND FABRICATED. THE WINDMILL USES A SAVONIUS ROTOR AND INCORPORATES A NOVEL SAIL-TYPE CONSTRUCTION. THE PUMP IS OF POSITIVE DISPLACEMENT TYPE USING THE CASING OF A PNEUMATIC TYPE FOR THE PUMPING CHAMBER. TWO PROTOTYPES HAVE BEEN CONSTRUCTED AND THESE HAVE INDICATED A REASONABLE PERFORMANCE AND RELIABILITY.

1979-0398 GOVINDA RAJU S P, SUNDARAM P
PERFORMANCE CHARACTERISTICS OF SAIL-TYPE HORIZONTAL AXIS WIND ROTORS.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. NTIS, 1979. P. 327-442.
CONF-791229

HORIZONTAL AXIS SAIL-TYPE WIND ROTORS ARE SIMPLE TO CONSTRUCT AND HAVE A GOOD STARTING TORQUE AND EFFICIENCY. THUS, THEY APPEAR TO BE VERY SUITABLE FOR WIND-PUMPS FOR USE IN RURAL AREAS. HOWEVER, DETAILED PERFORMANCE DATA ON SUCH ROTORS, NECESSARY FOR OPTIMAL DESIGN, IS NOT AVAILABLE. TO FILL THIS GAP, TESTS WERE CONDUCTED ON ROTORS OF ABOUT 1.25 M DIAMETER EMPLOYING SIX SAILS OF BOTH TRIANGULAR AND NEARLY RECTANGULAR SHAPE. ATTENTION WAS GIVEN TO THE RIGGING OF THE SAILS TO OBTAIN OPTIMAL PERFORMANCE. BASED ON THESE TESTS, IT IS CONCLUDED THAT SAIL TYPE ROTORS WITH TRIANGULAR SAILS CAN GIVE A POWER COEFFICIENT OF ABOUT 0.3. ROTORS WITH RECTANGULAR SAILS GIVE A POWER COEFFICIENT OF OVER 0.33. IN ADDITION, THEY HAVE A STARTING TORQUE ABOUT TWICE THAT OF ROTORS WITH TRIANGULAR SAILS AND HENCE APPEAR TO BE WELL SUITED FOR APPLICATIONS DEMANDING HIGH STARTING TORQUE.

1979-0399 GRANNEMANN W W
VARIABLE SPEED CONSTANT FREQUENCY VOLTAGE GENERATOR (ALTERNATOR).
NTIS, JULY 1979. 46 P.
NMEI-44, PB80-141286

THE OBJECTIVE ACHIEVED WAS CONSTRUCTING THE FIRST PROTOTYPE ALTERNATOR WITH DIGITAL CONTROL OF ITS OUTPUT FREQUENCY FOR A VARIABLE SHAFT SPEED, SUCH AS A WIND MACHINE WOULD HAVE. THE FIRST MACHINE IS A TWO-POLE ALTERNATOR WITH POWER REMOVED FROM THE ROTOR THROUGH SLIP RINGS. THE ROTATING FIELD IN THE STATIONARY COILS OF THE STATOR IS CONTROLLED BY THE MICRO-CIRCUITS. LATER, ALTERNATORS MAY WELL HAVE THE CONTROL CIRCUITS AND ROTATING FIELD IN THE ROTOR WHICH WOULD BE A SIGNIFICANT IMPROVEMENT SINCE POWER WOULD NOT NEED TO BE REMOVED THROUGH SLIP RINGS. EXCEPT FOR THE POWER AMPLIFIERS WHICH DRIVE THE STATOR WINDINGS, THE CONTROL AND THE COMPARISON CIRCUITRY IS CONSTRUCTED WITH AVAILABLE LOW COST, LOW POWER INTEGRATED CIRCUITS (IC'S).

1979-0400 GREGORY S E, SCHURIG A K
APPARATUS AND METHOD OF GENERATING ELECTRICITY FROM WIND ENERGY.
U.S. PATENT NO. 4,146,800, MARCH 27, 1979. 16 P.

THE INVENTION RELATES TO APPARATUS FOR AND METHOD OF GENERATING ELECTRICITY FROM WIND ENERGY. THE METHOD COMPRISES OPERATIONS CORRESPONDING TO THE MEANS, VIZ., PRODUCING AN ELECTROSTATIC FIELD IN THE OPEN THROUGH WHICH WIND CAN BLOW, GENERATING CHARGED PARTICLES TO BE ENTRAINED IN AND CARRIED BY THE WIND AGAINST THE

DIRECTION OF MOVEMENT IMPOSED ON THE PARTICLES BY THE FIELD, RESULTING IN AN INCREASE OF THE CHARGED PARTICLES AND MAKING THE INCREASED POTENTIAL AVAILABLE FOR UTILIZATION.

1979-0401 GROSSMAN W C
ENERGY CONVERSION SYSTEM USING WINDMILL.
U.S. PATENT NO. 4,137,015, JANUARY 30, 1979. 6 P.

A SYSTEM IS DESCRIBED FOR RECOVERING THE ENERGY FROM ATMOSPHERIC WIND WHEREIN A WINDMILL OPERATES A COMPRESSOR FOR COMPRESSING AIR WHICH IS STORED IN ONE OR MORE TANKS. THE COMPRESSED AIR IS USED TO DRIVE A PRIME MOVER COUPLED BY GEAR MEANS TO AN ELECTRICAL GENERATOR OR OTHER WORK-PRODUCING APPARATUS. THE PRIME MOVER IS OPERATED BY HYDRAULIC FLUID RESPONSIVE TO THE APPLICATION OF THE COMPRESSED AIR TO FLUID TANKS BY VALVE MEANS RESPONSIVE TO THE OPERATION OF THE PRIME MOVER. THE COMPRESSOR HAS A UNIQUE MEANS FOR LUBRICATING THE SAME. ALTERNATIVELY, THE PRIME MOVER CAN BE OPERATED BY CONVENTIONAL WATER PRESSURE DURING PERIODS OF LITTLE OR NO WIND.

1979-0402 GROWIAN WINDMILL WILL PRODUCE 3MW.
INT. POWER GENERATICN 2(6): 21-23, SEPTEMBER 1979.

THE GROWIAN PLANT WAS DESIGNED WITH REFERENCE TO A PLANT SITE IN THE NORTH GERMAN COASTAL AREA. A TWO-BLADED ROTOR MOUNTED ON A TOWER IS ROTATED BY THE ACTION OF THE WIND AND TRANSFERS ITS POWER VIA A GEARBOX TO A GENERATOR. THE ELECTRICAL ENERGY THUS OBTAINED IS THEN FED DIRECTLY INTO THE EXISTING SUPPLY NETWORK. THE DESIGN OF THE PLANT PERMITS LONG-TERM OPTIMUM EXPLOITATION OF WIND ENERGY THROUGH THE USE OF ADVANCED, PROVEN ENGINEERING TECHNIQUES.

1979-0403 GUILD D H
WIND ENERGY CENTRAL STATION POWER GENERATION IN THE SOUTHWEST AND SOUTHEAST.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 158-169.
CONF-790352

THE INFORMATION PRESENTED IS ABSTRACTED FROM TWO MUCH BROADER STUDIES. THE FIRST STUDY TO BE REFERENCED FORMS THE BASIS FOR MOST OF THE INFORMATION TO BE PRESENTED AND IS ENTITLED, "THE SOUTHWEST PROJECT." THIS STUDY WAS UNDERTAKEN BY STONE AND WEBSTER, A STATE POWER AUTHORITY AND 12 ELECTRIC UTILITIES IN THE SOUTHWEST TO INVESTIGATE WAYS TO ACCELERATE THE COMMERCIALIZATION OF SOLAR ELECTRIC GENERATING PLANTS AND THEIR EXPECTED MARKET PENETRATION INTO THE ELECTRIC UTILITY NETWORK OF THE SOUTHWESTERN UNITED STATES THROUGH THE YEAR 2000. THE SOUTHEAST REGIONAL ASSESSMENT STUDY, LIKE THE SOUTHWEST PROJECT, FOCUSED ON SOLAR ELECTRICAL POWER GENERATION. IT WAS DIFFERENT FROM THE SOUTHWEST STUDY, HOWEVER, IN THAT CONTRACTURAL REQUIREMENTS PLACED EQUAL EMPHASIS ON CENTRAL STATION AND ON-SITE POWER GENERATION. THE STATED OBJECTIVE OF THE SOUTHEAST STUDY WAS TO IDENTIFY AND EVALUATE OPPORTUNITIES FOR DEMONSTRATION AND LARGE SCALE DEPLOYMENT OF SOLAR ELECTRIC CENTRAL STATIONS AND ON-SITE SOLAR ELECTRIC FACILITIES THROUGH THE YEAR 2000.

1979-0404 HABOECK A, SCHMALZL F
POWER SUPPLIES FOR TELECOMMUNICATIONS IN REMOTE AREAS.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 30-37.

REPEATER STATIONS IN TELECOMMUNICATION NETWORKS ARE OFTEN LOCATED IN UNPOPULATED AREAS WITHOUT A DEVELOPED INFRASTRUCTURE OR A PUBLIC POWER SUPPLY. DC POWER MUST BE SUPPLIED BY ELECTRIC POWER GENERATING EQUIPMENT AT EACH STATION. IN ADDITION TO THE WELL ESTABLISHED MEANS OF GENERATION, NEW METHODS ARE FINDING INCREASING APPLICATION. PHOTOVOLTAIC, WIND ENERGY, AND FUEL CELL SYSTEMS ARE DESCRIBED, AND THEIR SUITABILITY FOR USE FOR TELECOMMUNICATIONS IS DISCUSSED.

1979-0405 HALL O P, KUNZ G E
EMERGING ENERGY TECHNOLOGIES FOR INDUSTRIAL APPLICATIONS.
AIPE NEWSL. 6(2): 6-10, SUMMER 1979.

IT APPEARS THAT CONSERVATION REPRESENTS THE QUICKEST AND CHEAPEST APPROACH FOR REDUCING FOREIGN OIL IMPORTS. THE STATUS OF SEVEN EMERGING ENERGY TECHNOLOGIES WHICH HOLD PROMISE FOR DIRECT INDUSTRIAL APPLICATIONS IS DISCUSSED. THEY ARE: ATMOSPHERIC FLUIDIZED BED COMBUSTION, MAGNETOHYDRODYNAMICS, FUEL CELLS, SOLAR THERMAL ELECTRIC, WIND, WASTE HEAT MACHINES, AND ENERGY STORAGE. MOST OF THE TECHNOLOGIES POSSESS THE POTENTIAL FOR ON-SITE COGENERATION. IT USES FUEL MORE EFFICIENTLY THAN IN THE INDEPENDENT GENERATION OF POWER AND HEAT. COAL-BASED COGENERATION APPEARS ATTRACTIVE IN CONCERT WITH THE DEVELOPMENT OF ENERGY PARKS WHERE INDUSTRIAL PLANTS WITH VARYING ENERGY DEMANDS ARE CLUSTERED.

1979-0406 HANES D G
TAX LEGISLATION AFFECTING ENERGY.
ENERGY USERS, 1979: A COMPREHENSIVE ANALYSIS OF THE NATIONAL ENERGY ACT. VOLUME 4. ENERGY USERS LAW SEMINAR, WASHINGTON, D.C., JAUNARY 11, 1979. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., 1979. P. 126-137.

NEW TAX REVISIONS THAT RELATE TO ENERGY WERE PASSED IN TWO SEPARATE BILLS: THE REVENUE ACT AND THE ENERGY TAX ACT. BOTH WILL BE REFLECTED IN REVISED EDITIONS OF THE INTERNAL REVENUE CODE. AFTER REVIEWING THE INVESTMENT TAX CREDITS OF THESE TWO ACTS, MISCELLANEOUS PROVISIONS ARE DISCUSSED. THESE ARE COVERED IN SUBJECTS ENTITLED: GEOTHERMAL AND GEOPRESSURIZED GAS AND TRANSPORTATION TAX PROVISIONS. RESIDENTIAL ENERGY TAX CREDITS ARE DISCUSSED IN THE FOLLOWING: INSULATION AND ENERGY-CONSERVING COMPONENTS AND RENEWABLE ENERGY SOURCE PROPERTY.

1979-0407 HANKS D J
NEW ENERGY SOURCE IS WRITTEN ON THE WIND.
SPECIF. ENG. 42(2): 60-62, AUGUST 1979.

AN INEXHAUSTIBLE ENERGY SOURCE THAT IS FAST GAINING ATTENTION OF GOVERNMENT AND PRIVATE ENTERPRISE ALIKE IS WIND POWER. MODERN TECHNOLOGY AND THE GROWING NEEDS FOR NEW ENERGY SOURCES CAN BRING WIND POWER BACK INTO WIDESPREAD USE. THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS AND ENABLE THE EARLIEST POSSIBLE COMMERCIALIZATION OF WIND POWER.

1979-0408 HANLEY J
WIND WHEEL APPARATUS FOR USE WITH A HYDRO-ELECTRIC DAM.
U.S. PATENT NO. 4,166,222, AUGUST 28, 1979.

DISCLOSED HEREIN IS AN APPARATUS FOR FASHIONING A WIND WHEEL APPARATUS THAT UTILIZES THE WHEAT FIELD PRINCIPLE IN ASSOCIATION WITH A POWER GENERATING STATION TO PROVIDE BACK PUMPING IN A DAM ENVIRONMENT TO PROVIDE A

GREATER EFFICIENCY. A DOUBLE ARRAY OF WIND WHEELS IS DISPOSED IN A MATRIX ON THE HORIZONTAL PLANE ORIENTED TO ADDRESS THE ANGLE OF ATTACK OF THE WIND REGARDLESS OF WIND DIRECTION AND IS FURTHER PROVIDED WITH MEANS TO DEVELOP ELECTRICAL CURRENT THEREFROM TO BE USED IN MOTIVATING PUMPING MEANS FOR RETURNING WATER THAT HAS GENERATED ELECTRICITY DUE TO POTENTIAL ENERGY BACK INTO A RESERVOIR AS A POTENTIAL ENERGY. BECAUSE OF ITS LOW COST AND ABUNDANCE THIS ENERGY TO INDUSTRIES OR MUNICIPALITIES ENGAGED IN PROCESSING AND PUMPING LARGE QUANTITIES OF OCEAN WATER TO ANY DESIRABLE ELEVATION.

1979-0409 HANSEN A C
RANDOM DATA ANALYSIS IN WTG TESTING.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 221-232.
RFP-3014(VOL.1)

SOME OF THE EFFORTS UNDERWAY AND PRELIMINARY FINDINGS OF THE STUDY OF TURBULENCE EFFECTS IN PERFORMANCE TESTING ARE DESCRIBED. MORE SPECIFICALLY, THREE RANDOM DATA ANALYSIS METHODS IN USE AT THE WIND SYSTEMS TEST CENTER ARE DISCUSSED.

1979-0410 HARDELL R, LJUNGSTROM O
OFF-SHORE BASED WIND TURBINE SYSTEMS (OS-WTS) FOR SWEDEN--A SYSTEM CONCEPT STUDY.
WIND ENG. 3(1): 23-51, 1979.

OFF-SHORE SITING SURVEYS ALONG SWEDEN'S COASTS, UTILIZING DEPTHS LESS THAN 30 M, SHOW AVAILABILITY OF 5000 KM**2 AREAS, WITH LIKELY POTENTIAL FOR 3300 KM**2 IN GOOD WIND AREAS SUITABLE FOR WTS-INSTALLATION. IN TYPICAL CASES, WHEN MOVING A WTS SITE FROM A NEAR-SHORE, OR GOOD COASTAL, LAND AREA TO AN OFF-SHORE LOCATION, 10-20 KM, THE MEDIAN WIND INCREASES FROM 8.5 TO 9.5 M/S (H=100 M) AND THE SPECIFIC ENERGY OUTPUT (PER TURBINE DISC AREA) INCREASES BY 40%. DESIGN AND INSTALLATION OF OS-WTS ALLOWS THE FREEDOM OF USING MUCH LARGER UNIT SIZES THAN ON LAND, ASSEMBLED COMPLETE AND TOWED TO SITES, WITH OPTIONS OF RELOCATION. THIS SHOULD ENHANCE ENERGY ECONOMY, SYSTEM FLEXIBILITY, AND OUTPUT PER AVAILABLE GROUP STATION AREA. EXAMPLES OF HORIZONTAL- AND VERTICAL-AXIS TURBINES OF 7-14 MW UNIT CAPACITY ARE GIVEN, WITH ASSOCIATED COST ESTIMATES AND PROSPECTS OF MUCH BIGGER SECOND-GENERATION DESIGNS OF 20-30 MW UNITS.

1979-0411 HARDELL R, OLSSON C, LJUNG L
OFF-SHORE WIND POWER PLANTS.
NTIS, 1979. 192 P. (IN SWEDISH)
NE-25173

INFORMATION IS PRESENTED CONCERNING THE OFFSHORE WIND POWER AVAILABILITY IN THE BALTIC SEA; THE ECONOMICS, SPECIFICATIONS, AND ENVIRONMENTAL CONSIDERATIONS FOR LARGE OFFSHORE WIND POWER PLANTS.

1979-0412 HARKARE W P, GOVINDAN K P, VAIDYA V H, MAJEETHIA K M, GOHIL H M
DESALTING BY ELECTRODIALYSIS USING WIND POWER.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. NTIS, 1979. P. 448-453.
CONF-791229

DESALINATION OF WATER BY ELECTRODIALYSIS IS AN ESTABLISHED PRACTICE ESPECIALLY FOR BRACKISH WATERS. ELECTRICAL ENERGY IS THE DRIVING FORCE AND THE ENERGY REQUIREMENT FOR THIS PROCESS IS OF A LOW ORDER. IN THE PRESENT INVESTIGATION AN ATTEMPT HAS BEEN MADE TO USE THE WIND POWER FOR THE GENERATION OF ELECTRICITY AND USE IT FOR ELECTRODIALYSIS WITHOUT AN ENERGY STORAGE SYSTEM. THE POTENTIAL OF THE PROCESS FOR THE DESALINATION OF BRACKISH WATER FOR DRINKING PURPOSE OF ALL SMALL COMMUNITIES IN ISOLATED AREAS WHERE ELECTRIC POWER SUPPLY IS NOT AVAILABLE HAS BEEN DISCUSSED. THE VIABILITY AND ECONOMICS OF THE PROCESS FOR USE IN SMALL COMMUNITIES HAVE BEEN WORKED OUT. COMPARISON OF DESALINATION BY ELECTRODIALYSIS USING SOLAR POWER AND WIND POWER AS SOURCES OF ELECTRICAL ENERGY HAS BEEN PRESENTED GIVING WEIGHTAGE TO ECONOMIC CONSIDERATION.

1979-0413 HARNER K I, KOS J M, PATRICK J P
WIND TURBINE GENERATOR PITCH CONTROL SYSTEM.
U.S. PATENT NO. 4,160,170, JULY 3, 1979. 24 P.

WIND ENERGY IS USED TO DRIVE A WIND TURBINE, WHICH IS IN TURN CONNECTED TO AN ELECTRICAL GENERATOR TO PRODUCE ELECTRICAL POWER. THE PITCH ANGLE OF THE WIND TURBINE BLADES IS CONTROLLED IN A CLOSED LOOP MANNER TO MAINTAIN EITHER A CONSTANT GENERATOR SPEED FOR ISOLATED POWER GENERATING STATIONS OR WHEN THE GENERATOR IS SYNCHRONIZED TO THE LOAD, OR CONSTANT GENERATOR OUTPUT POWER OR SHAFT TORQUE WHEN THE GENERATOR IS CONNECTED TO AN ELECTRICAL GRID. OPEN LOOP ACCELERATION AND DECELERATION SCHEDULES ARE PROVIDED TO MINIMIZE BLADE STRESS AND SHAFT TORQUE VARIATIONS DURING START UP AND SHUTDOWN TRANSIENTS, LIMITING BLADE ANGLE EXCURSIONS AS A FUNCTION OF WIND VELOCITY AND SPEED. THE SCHEDULES MAY BE IMPLEMENTED EITHER ELECTRONICALLY OR BY A SUITABLY PROGRAMMED DIGITAL COMPUTER.

1979-0414 HASBROUCK T M
COST OF ENERGY EVALUATION.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 397-402.
NASA-CP-2106

THE COST OF ENERGY OF A WIND TURBINE GENERATOR SYSTEM CONTAINS THE THREE-ELEMENTS OF CAPITAL COST, OPERATION AND MAINTENANCE COST, AND ENERGY CAPTURE. EVALUATING THE DESIGN PARAMETERS OF A WIND POWER PLANT UTILIZING THESE COST FACTORS IS PRESENTED.

1979-0415 HASLETT J, KELLEDY E
ASSESSMENT OF ACTUAL WIND POWER AVAILABILITY IN IRELAND.
INT. J. ENERGY RES. 3(4): 333-348, OCTOBER-DECEMBER 1979.

DATA ON ACTUAL WIND ENERGY AVAILABILITY IN IRELAND ARE SPARSE. THIS IS BECAUSE (A) RELATIVELY LITTLE DATA ON WIND SPEEDS HAVE BEEN COLLECTED IN IRELAND AT SITES OF INTEREST FOR WIND EXPLOITATION, AND (B) SUCH DATA NEED IN ANY CASE BE INTEGRATED WITH THE CHARACTERISTICS OF ACTUAL WINDMILLS WHICH RESPOND MORE EFFICIENTLY TO CERTAIN WIND SPEED THAN TO OTHERS. THE AUTHORS DESCRIBE A METHODOLOGY FOR PERFORMING SUCH AN INTEGRATION, AND OFFER TABLES OF SPECIFIC OUTPUT FOR WINDMILLS OF DIFFERENT CHARACTERISTICS LOCATED AT DIFFERENT SITES IN IRELAND. THE VARIATIONS IN THIS SPECIFIC OUTPUT ARE DISCUSSED.

1979-0416 HAYES D
SOLAR POSSIBILITIES.

ENERGY 4(5): 761-768, OCTOBER 1979. (SPECIAL ISSUE: RENEWABLE ENERGY PROSPECTS, PROCEEDINGS OF A CONFERENCE ON NON-FOSSIL FUEL AND NON-NUCLEAR FUEL ENERGY STRATEGIES, HONOLULU, JANUARY 9-12, 1979).

THIS PAPER DISCUSSES THE UTILISATION OF SOLAR-BASED RENEWABLE ENERGY RESOURCES, INCLUDING SOLAR HEATING, WIND POWER, HYDRO-POWER, PHOTOVOLTAICS AND BIO-ENERGY IN ORDER TO EFFECT A WORLD-WIDE ENERGY TRANSITION FROM OIL-BASED RESOURCES.

1979-0417 HEAD W
GREENHOUSE AQUACULTURE.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 336-339.
CONF-790845

A 350 SQUARE FOOT SOLAR GREENHOUSE HAS BEEN BUILT IN EUGENE, OREGON, TO TEST TWO METHODS OF GROWING FISH IN THE WATER HEAT STORAGE TANKS. THE FISH ARE RAISED IN TWO 1,700 GALLON CONCRETE TANKS AND THE WATER IS KEPT HEALTHY BY WINDMILL AERATION AND BIOLOGICAL FILTRATION. ONE TANK USES A TRICKLING FILTER AND THE OTHER AN AIR-LIFT FILTER. FROM JUNE 1978 TO JULY 1979 THE AVERAGE MONTHLY WATER TEMPERATURE IN THE TANKS RANGED FROM A HIGH OF 84 DEGREES F TO A LOW OF 67 DEGREES F. THE AVERAGE MONTHLY GREENHOUSE AIR TEMPERATURE RANGED FROM A HIGH OF 89 DEGREES F TO A LOW OF 72 DEGREES F. MIRROR CARP AND TWO SPECIES OF TILAPIA WERE RAISED. EACH TANK WAS HARVESTED SEVEN TIMES FOR A TOTAL YIELD OF 167 LBS 9 OZ. TWENTY-FIVE PERCENT MORE POUNDS OF FISH HAVE BEEN HARVESTED FROM THE TRICKLING FILTER TANK THAN THE AIR-LIFT TANK.

1979-0418 HELLHAKE G P
ADVANCED ENERGY PROGRAMS.
DOE-SOLAR EXPORT OPPORTUNITIES WORKSHOP, ATLANTA, GEORGIA, JANUARY 8, 1979. NTIS, APRIL 1979. P. 155-166.
SERI/TP-49-186

IN ORDER TO DISCUSS THE GENERAL ELECTRIC ADVANCED ENERGY PROGRAMS, SLIDES WERE USED. COMPANY COMPONENTS CONSIST OF THE R AND D CENTER, STUDY CENTER, AND PRODUCT AND ADVANCED ENERGY DEPARTMENTS. ADVANCED ENERGY PROGRAMS INCLUDE SOLAR, WIND, PHOTOVOLTAIC, AND NUCLEAR. INTERNATIONAL ACTIVITIES IN THE ADVANCED ENERGY DEPARTMENT INCLUDE ACTIVITIES IN SPAIN, WESTERN EUROPE, AND THE MIDEAST.

1979-0419 HERBERT F P, OTTENHEIMER J
PANEMONE WINDMILL.
U.S. PATENT NO. 4,142,822, MARCH 6, 1979. 6 P.

A WINDMILL WITH A VERTICAL-AXIS ROTOR IS DESCRIBED WHICH HAS THRUST VANES SURROUNDED BY A STATIONARY CAGE HAVING GUIDE VANES TO CHANNEL THE WINDSTREAM TO THE ROTOR. IN THE PREFERRED EMBODIMENT THE ROTOR IS A FLOW-THROUGH TYPE WITH AIRFOIL VANES.

1979-0420 HERNANDEZ E, BEST G
PASSIVE AIR CONDITIONING OF STABLES IN TROPICAL HOT HUMID CLIMATES.
NATIONAL PASSIVE SOLAR CONFERENCE, 3RD, SAN JOSE, CALIFORNIA, JANUARY 11-13, 1979. PROCEEDINGS. PASSIVE SOLAR TAKES OFF. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC., 1979. P. 330-338. AVAILABLE: NEW YORK, UNIPUB.

DUE TO THE STRONG DEPENDENCE OF MILK PRODUCTION ON THE TEMPERATURE-HUMIDITY INDEX, A NATURAL VENTILATION SYSTEM IS PROPOSED TO ACHIEVE THE SUITABLE THERMAL COMFORT CONDITIONS FOR CATTLE IN HOT HUMID CLIMATES. THE PASSIVE DESIGN CONSISTS OF A SOLAR ROOF AIR COLLECTOR WHICH BY THERMOSYPHON EFFECT ALLOWS THE ENTRANCE AND CIRCULATION OF FRESH AIR INTO THE STABLE PRODUCING THE APPROPRIATE NUMBER OF AIR CHANGES PER HOUR NEEDED TO EVACUATE THE HEAT RELEASED BY THE COWS IN THEIR METABOLIC ACTIVITY. ROOF WIND TURBINES ARE SUGGESTED FOR NOCTURNAL VENTILATION AND TO OPERATE TOGETHER WITH THE SOLAR ROOF WHEN INSOLATION CONDITIONS ARE RELATIVELY WEAK DUE TO THE DIFFUSE NATURE OF GLOBAL RADIATION IN THIS TYPE OF CLIMATE. A PROTOTYPE HAS BEEN DESIGNED FOR THE CLIMATOLOGICAL CHARACTERISTICS OF VERACRUZ, MEXICO.

1979-0421 HERTER E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,745,862/A/, APRIL 19, 1979. 16 P. (IN GERMAN)

THE CLAIM CONCERNS A WIND TURBINE TO DRIVE MACHINES WITH A ROTOR WHICH CAN ROTATE AROUND A VERTICAL AXIS AND HAVING AT LEAST TWO ROTOR BLADES. THE ROTOR BLADES MUST BE TURNED LIKE SAILS INTO THE CORRECT ANGLE BETWEEN FORWARD MOVEMENT AND DIRECTION OF THE WIND. PAIRS OF ROPES ARE USED FOR THIS PURPOSE, WHICH ARE FIXED TO THE ROTOR BLADE. THE PAIR OF ROPES CAN BE TAKEN INSIDE A HOLLOW SUPPORTING BRACKET FOR THE ROTOR BLADE, WHILE THE ECCENTRIC CONTROL IS SITUATED INSIDE A HOLLOW ROTOR HUB.

1979-0422 HEWSON E W, WADE J E, BAKER R W
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. FINAL REPORT, JUNE 15, 1978-JUNE 14, 1979.
NTIS, JUNE 1979. 50 P.
RLO/2227-T24-79/1

TO USE WIND ENERGY THE RESOURCE MUST FIRST BE IDENTIFIED. THIS REPORT DESCRIBES TECHNIQUES FOR USING TWO WIDELY DISTRIBUTED SPECIES OF CONIFEROUS TREES--DOUGLAS-FIR AND PONDEROSA PINE--AS AIDS IN WIND-POWER PROSPECTING. THE REPORT DESCRIBES THE NEED FOR THE RESEARCH, THE EFFECTS OF WIND ON TREES, DEVELOPMENT OF THE INDICES OF WIND DEFORMATION AND CALIBRATION OF THESE INDICES TO THE MEAN ANNUAL WIND SPEED. RESULTS UP TO THIS TIME INDICATE TREES CAN BE USED TO ESTIMATE MEAN ANNUAL WIND SPEED AND THESE ESTIMATES, ALTHOUGH SUBJECT TO SOME UNCERTAINTY (ABOUT +- 20%), ARE SUFFICIENTLY SENSITIVE TO BE USED AS AN INITIAL CRITERION FOR RANKING POTENTIAL SITES IN TERMS OF WIND-POWER POTENTIAL PRIOR TO INSTRUMENTATION WITH ANEMOMETERS.

1979-0423 HIESTER T R
SITING MANUAL/SHORT COURSE FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 75-78.
CONF-790845

IMPROPER SITING THAT CAUSES LESS-THAN-EXPECTED ENERGY OUTPUT IS A COMMON CAUSE OF DISSATISFACTION AMONG SMALL WIND MACHINE USERS. TO ASSIST IN PROPER SITING, THE PACIFIC NORTHWEST LABORATORY (PNL), AS PART OF THE FEDERAL WIND ENERGY PROGRAM, PREPARES INFORMATION, SUCH AS A SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS (WEGLEY ET AL., 1978). THIS HANDBOOK IS DESIGNED FOR THE LAYMAN INTERESTED IN WIND ENERGY CONVERSION. A SHORT COURSE IS BEING DEVELOPED TO PREPARE EXTENSION AGENTS, DEALERS' REPRESENTATIVES, ETC. TO HELP USERS SITE THEIR MACHINES. A SECOND SHORT COURSE IS ALSO BEING DEVELOPED TO PROVIDE WECS CONSUMERS WITH PERTINENT INFORMATION ON SITING WIND MACHINES.

1979-0424 HIGASHI K K, CARR M J, BROTSKY V K
DUNLITE-MODEL 81/002550 WIND TURBINE GENERATOR. FAILURE ANALYSIS.
NTIS, JUNE 1, 1979. 22 P.
RFP-3028-3533/79-12

OPTICAL AND SCANNING ELECTRON MICROSCOPE EXAMINATIONS OF A FAILED BLADE FROM A DUNLITE WIND TURBINE GENERATOR WERE MADE TO DETERMINE THE MODE OF FAILURE. THE FAILURE WAS A FATIGUE FAILURE WHICH BEGAN ON THE FLAT OR UPWIND SIDE OF THE BLADE. THE MODE OF LOADING THIS AREA WAS REVERSED BENDING ABOUT AN AXIS PERPENDICULAR TO THE LONG AXIS OF THE BLADE AND IN THE PLANE OF THE SHEET. THE FATIGUE CRACK PROPAGATED AROUND THE BLADE UNTIL THE BLADE FINALLY FAILED BY DUCTILE OVERLOAD PROCESSES.

1979-0425 HIGASHI K K
DUNLITE MODEL 81/002550. PERFORMANCE REPORT.
NTIS, JULY 1979. 12 P.
RFP-3026/3533/79-6

THIS REPORT IS DESIGNED TO PROVIDE DATA WHICH GIVE AN ACCURATE PICTURE OF THE PERFORMANCE OF THE DUNLITE MODEL 81/002550 UNDER CONDITIONS OF NORMAL USE. EVERY EFFORT HAS BEEN MADE TO ENSURE THAT THE DATA PROVIDED IN THIS REPORT ARE ACCURATE. THE CALIBRATION OF ALL INSTRUMENTS IS CONTINUOUSLY MAINTAINED. THE TESTS FOR THE DUNLITE WIND SYSTEM ARE DESIGNED TO DETERMINE THE POWER CURVE UNDER VARIOUS LOAD (APPLICATION) CONFIGURATIONS AND DETERMINE THE ABILITY OF THE MACHINE TO SURVIVE HIGH WINDS (85 MPH OR GREATER). INTERFACE WITH ENERTECH CORPORATION OCCURRED ONLY WHEN REPLACEMENT PARTS WERE REQUIRED. THE MANUFACTURER HAS BEEN PROVIDED WITH MONTHLY PRELIMINARY DATA REPORTS FROM ROCKY FLATS.

1979-0426 HIGASHI K K
ALTOS-MODEL 8B WIND TURBINE GENERATOR. PERFORMANCE REPORT.
NTIS, JULY 1979. 13 P.
RFP-3033/3533/79-4

THIS INTERIM REPORT IS DESIGNED TO PROVIDE PRELIMINARY DATA ON THE PERFORMANCE OF THE ALTOS, MODEL 8B, UNDER CONDITIONS TO WHICH IT IS LIKELY TO BE SUBJECTED WHILE IN NORMAL USE. ALL INSTRUMENTS USED DURING THE TESTING OF THE ALTOS WERE MAINTAINED IN CALIBRATION AND IN ACCORDANCE WITH ROCKY FLATS CALIBRATION PROCEDURES. THE DATA PROVIDED IN THIS REPORT ARE ACCURATE WITHIN THE CALIBRATION SPECIFICATIONS. THE TESTS FOR THE ALTOS WIND SYSTEM ARE DESIGNED TO DEVELOP POWER CURVES UNDER VARIOUS LOAD CONFIGURATIONS AND DETERMINE THE ABILITY OF THE MACHINE TO SURVIVE HIGH WINDS (85 MPH OR GREATER). CONTACT WITH ALTOS CORPORATION CONCERNING MACHINE PERFORMANCE AND REPAIRS HAS BEEN ACCOMPLISHED WITH RELATIVE EASE. RESPONSE TIMES HAVE BEEN GOOD, AND SYSTEM MODIFICATIONS HAVE BEEN ACCOMPLISHED IN A TIMELY MANNER. THE MANUFACTURER HAS BEEN PROVIDED WITH MONTHLY PRELIMINARY DATA REPORTS.

1979-0427 HIGASHI K K, CARR M J
ALTOS-MODEL 8B WIND TURBINE GENERATOR. FAILURE ANALYSIS.
NTIS, JUNE 18, 1979. 20 P.
RFP-3035/3533-79/10

A BRITTLE FAILURE OF A HUB ON AN ALTOS WIND TURBINE GENERATOR TESTED AT THE ROCKY FLATS SMALL WIND SYSTEM TEST CENTER WAS CAUSED BY THE COMBINATION OF A POOR QUALITY (POROUS) CASTING AND A SHARP CORNER IN A MACHINED KEYWAY.

1979-0428 HIGASHI K K
SENCENBAUGH: MODEL 1000-14 WIND TURBINE GENERATOR. PERFORMANCE REPORT.
NTIS, JULY 1979. 14 P.
RFP-3034/3533/79-5

DATA IS PROVIDED WHICH GIVES AN ACCURATE PICTURE OF THE PERFORMANCE OF THE SENCENBAUGH MODEL 1000-14 UNDER CONDITIONS APPROXIMATING NORMAL USE. EVERY EFFORT HAS BEEN MADE TO ENSURE THAT THE DATA PROVIDED ARE ACCURATE. THE CALIBRATION OF ALL INSTRUMENTS IS CONTINUOUSLY MAINTAINED. THE TESTS FOR THE SENCENBAUGH MODEL 1000-14 WIND SYSTEM ARE DESIGNED TO DEVELOP A POWER CURVE FOR A KNOWN LOAD (APPLICATION) AND DETERMINE THE ABILITY OF THE MACHINE TO SURVIVE HIGH WINDS (85 MPH OR GREATER). THE SENCENBAUGH HAS BEEN TESTED UNDER A VARIETY OF TAIL ASSEMBLY ADJUSTMENT MODES. THESE ADJUSTMENTS WERE POSSIBLE ON ALL EARLY MODELS OF THE SYSTEM. PERFORMANCE DATA WERE COLLECTED FOR THE VARIOUS ADJUSTMENTS, AND SOME OF THESE DATA ARE PRESENTED. HOWEVER NEWER MODELS OF THE SENCENBAUGH NO LONGER PERMIT THESE ADJUSTMENTS.

1979-0429 HOA S V
VIBRATION OF A ROTATING BEAM WITH TIP MASS.
J. SOUND VIB. 67(3): 369-381, DECEMBER 8, 1979.

THE VIBRATION FREQUENCY OF A ROTATING BEAM WITH TIP MASS IS INVESTIGATED. THE FINITE ELEMENT METHOD IS USED, A THIRD ORDER POLYNOMIAL BEING ASSUMED FOR THE VARIATION OF THE LATERAL DISPLACEMENT. THE EFFECTS OF THE ROOT RADIUS, THE SETTING ANGLE AND THE TIP MASS ARE INCORPORATED INTO THE FINITE ELEMENT MODEL. THE RESULTS ARE COMPARED WITH RESULTS FROM PREVIOUS AUTHORS UTILIZING MYKLESTAD AND EXTENDED GALERKIN METHODS. THE RESULTS SHOW THAT THE SETTING ANGLE HAS A SIGNIFICANT EFFECT ON THE FIRST MODE FREQUENCIES BUT NOT ON THE HIGH FREQUENCIES. THE TIP MASS TENDS TO DEPRESS THE FREQUENCIES AT LOW SPEEDS OF ROTATING BUT IT TENDS TO INCREASE THE FREQUENCIES AT HIGH SPEEDS OF ROTATION. THE RESULTS OF THIS WORK HAVE APPLICATIONS IN WIND TURBINE ROTORS, HELICOPTER ROTORS, ETC., AND THE METHOD USED HERE CAN BE EXTENDED TO INVESTIGATE THE VIBRATION FREQUENCY OF FLEXIBLE BLADE AUTO COOLING FANS.

1979-0430 HOFFMANN I
SOLADATA VERZEICHNIS '79. SOLARTECHNIK-MARKETFUEHRER. (SOLADATA CATALOGUE 79. SOLAR TECHNOLOGY-MARKET GUIDE.)
KARLSRUHE, GERMANY, F.R., C.F. MUELLER, 1979. 100 P. (IN GERMAN)

THE FIRM CATALOGUE COMPRISES THE PRODUCERS OF SOLAR PLANTS AND THEIR ACCESSORIES. TECHNICAL DETAILS OF THE PRODUCTS ARE GIVEN. THE FOLLOWING PARTICULAR FIELDS ARE MENTIONED: 1) SOLAR COLLECTORS, 2) SOLAR COLLECTOR COMPONENTS, 3) STORAGES, 4) STORAGE COMPONENTS, 5) SOLAR PLANTS, 6) HEAT PUMPS, 7) WIND ENERGY PLANTS, 8) SOLAR CELLS AND GENERATORS, 9) SOLAR ABSORPTION REFRIGERATORS, 10) ELECTRONICS FOR MEASUREMENT AND CONTROL, 11) SUNDRIES, 12) ACCESSORIES, AND 13) INNOVATIONS/LICENCES.

1979-0431 HOHENEMSER K H, SWIFT A H P, PETERS D A
DEFINITIVE GENERIC STUDY FOR SAILWING WIND ENERGY SYSTEMS. NON-TECHNICAL SUMMARY REPORT. FINAL REPORT.
NTIS, OCTOBER 1979. 247 P.

SERI/TR-8003-02, SERI/SP-8003-01, SERI/TR-98003-05

INFORMATION IS PRESENTED CONCERNING THE AERODYNAMICS OF SAILWINGS; TESTS WITH SAILWING MODEL ROTORS; PERFORMANCE AND INITIAL COST OPTIMIZATION OF SAILWING WIND MACHINES; STRUCTURAL INTEGRITY AND DURABILITY OF ROTARY SAILWINGS, DYNAMICS OF SAILWING WIND MACHINES; CONFIGURATIONS OF SAILWING MACHINES; POTENTIAL IMPROVEMENTS OF ROTARY SAILWINGS; AND COST EFFECTIVENESS OF SAILWING WIND MACHINES.

1979-0432 HOHENEMSER K H
SAILWING WIND ENERGY SYSTEMS ASSESSMENT.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, COLORADO, MAY 1979. NTIS, DECEMBER 1979. P. 283-294.
SERI/TP-245-184

THE SAILWING WINDMILL WAS CONCEIVED BY T.E. SWEENEY AT PRINCETON UNIVERSITY. PERFORMANCE MEASUREMENTS WERE MADE WITH SAILWING WIND ROTOR MODELS ON A MOVING TEST BED. A 7.6 METER (25 FT.) DIAMETER MACHINE WAS BUILT BY GRUMMAN ENERGY SYSTEMS AND IS PRESENTLY TURNING ESSENTIALLY WITHOUT POWER EXTRACTION AT A SITE ADMINISTERED BY PRINCETON UNIVERSITY. IT IS ESTIMATED THAT THE COST OF ENERGY FROM THIS WINDMILL IS COMPARABLE TO THAT OF GOOD CONVENTIONAL WIND MACHINES OF ITS SIZE, NAMELY 0.09 TO 0.12 $/KWH FOR LOW QUANTITY PRODUCTION AND 0.06 TO 0.07 $/KWH FOR ADVANCED VERSIONS IN HIGH QUANTITY PRODUCTION. THE SAILWING ROTOR HAS FOUR TIMES THE BLADE AREA OF A CONVENTIONAL WINDMILL WITH FIBERGLASS BLADES WITHOUT AN INCREASE IN BLADE WEIGHT OR BLADE COST.

1979-0433 HOLLANDSWORTH R P, ADAMS G B
ROLE OF MICROCOMPUTERS IN SECONDARY BATTERY DEVELOPMENT AND TESTING.
NTIS, DECEMBER 11, 1979. 138 P.
LMSC-D-681058, UCRL-15171

THE DEVELOPMENT AND APPLICATION OF A LOW-COST DEDICATED MICROCOMPUTER SYSTEM TO SECONDARY BATTERY DEVELOPMENT AND TESTING ARE DESCRIBED. AN OVERVIEW OF COMPUTERS, HARDWARE, AND SOFTWARE IS GIVEN, AND THE PARTICULAR APPLICATION DISCUSSED IS THE ZINC/FERRICYANIDE HYBRID REDOX BATTERY. HOWEVER, MODIFICATIONS ARE EXAMINED WHICH THEN ENABLE ITS USE IN OTHER SECONDARY BATTERY TEST PROGRAMS. THE SYSTEM IS CAPABLE OF CONTROLLING THE CHARGE AND DISCHARGE CYCLES OF SIX OR MORE SECONDARY BATTERIES BASED UPON FIVE OR MORE OPERATOR-DETERMINED CELL PARAMETERS, AND COMPUTING AT THE END OF EACH CYCLE THE VOLTAIC, COULOMBIC, AND ENERGY-CONVERSION EFFICIENCIES FOR EACH CELL. THE SYSTEM DESCRIBED FULFILLS THE OBJECTIVE OF ENABLING ONE PERSON TO CONTROL, COLLECT, AND INTERPRET CYCLIC DATA FROM MANY CELLS WITH A MINIMUM OF EFFORT.

1979-0434 HOWE R R
WIND OPERATED POWER GENERATING APPARATUS.
U.S. PATENT NO. 4,179,007, DECEMBER 18, 1979. 6 P.

A WIND OPERATED ELECTRICAL POWER GENERATING DEVICE MOUNTED ON A SELF-PROPELLED VEHICLE COMPRISES A WIND ROTATED ROTOR MOUNTED ON A FLYWHEEL AND AT LEAST ONE GENERATOR WHICH IS POWERED BY THE ROTATING FLYWHEEL. THE OPERATIVE CONNECTION BETWEEN THE GENERATOR AND FLYWHEEL, IN THE PREFERRED EMBODIMENT, COMPRISES A WHEEL MOUNTED ON THE GENERATOR SHAFT AND TRACKING WITHIN A CONTINOUS GROOVED CHANNEL FORMED IN THE INNER OR OUTER PERIPHERY OF THE FLYWHEEL.

1979-0435 HUANG C H, FICHTL G H
GUST-RISE EXCEEDANCE STATISTICS FOR WIND TURBINE DESIGN.
NTIS, JULY 1979. 36 P.
PNL-2530

WHEN DESIGNING A WIND MACHINE, THE NUMBER OF LARGE AMPLITUDE GUSTS FOR THE DESIGN-LIFE EXPOSURE OF A WIND MACHINE SHOULD BE ESTIMATED, BECAUSE VELOCITY CHANGE CONTROLS THE ACCELERATION RATE OF A ROTOR. SINCE THE RECORD LENGTH OF DATA IS INSUFFICIENT, THE THEORETICAL STUDY OF GUST RISE MAY SHED SOME LIGHT ON THE EMPIRICAL FORMULATION IN WHICH SOME IMPORTANT PARAMETERS MAY HAVE BEEN IGNORED. FICHTL DEVELOPED AN EQUATION BASED ON RICE'S THEORY (1944, 1945), WHICH ESTIMATES THE TOTAL NUMBER OF CROSSINGS WITH POSITIVE SLOPE PER UNIT OF TIME THAT EXCEEDS A PRESCRIBED LEVEL OF VELOCITY CHANGE. THE ANALYTICAL REPRESENTATION OF FICHTL'S FORMULATION IS PRESENTED, AND USEFUL RESULTS OF THE VELOCITY CHANGE FOR THE DESIGN LIFE OF A WIND ENERGY CONVERSION SYSTEM (WECS) ARE INCLUDED.

1979-0436 WORLD ENERGY DATA SYSTEM (WENDS). VOLUME VI. INTERNATIONAL AGREEMENT PROFILES.
NTIS, JUNE 1979. 202 P.
ANL-PMS-79-2(V.6)

THE WORLD ENERGY DATA SYSTEM CONTAINS ORGANIZED DATA ON THOSE COUNTRIES AND INTERNATIONAL ORGANIZATIONS THAT MAY HAVE CRITICAL IMPACT ON WORLD ENERGY. THE INTERNATIONAL AGREEMENT PROFILES IN WENDS ARE ALL ENERGY-RELATED AND ARE ORGANIZED BY ENERGY TECHNOLOGY. THESE ARE: COAL; CONSERVATION; FUSION; GEOTHERMAL; NUCLEAR FISSION; OIL, GAS AND SHALE; SOLAR, WIND AND OCEAN THERMAL; AND OTHER (COOPERATION IN ELECTRICAL POWER EQUIPMENT ACQUISITION, ENERGY, ENERGY RESEARCH, ETC.). THE AGREEMENT PROFILES ARE ACCESSIBLE BY ENERGY TECHNOLOGY AND ALPHABETICALLY BY COUNTRY.

1979-0437 HUEBNER R
WIND POWER PLANTS. THE NECESSITY TO DEVELOP NEW AND INEXHAUSTIBLE ENERGY SOURCES.
ELEKTR. ENERG. TECH. 24(3): 104-107, APRIL 1979. (IN GERMAN)

AFTER A BRIEF OUTLINE OF ADVANTAGES AND DRAWBACKS AND THE HISTORY OF WIND POWER PLANTS SO FAR, THE CONDITIONS FOR THE CONSTRUCTION OF LARGE WIND POWER PLANTS ARE ASSESSED, THE HONNEF AND ECKERT WIND POWER PLANTS ARE DESCRIBED--AS WELL AS TESTS WITH OTHER LARGE WIND POWER PLANTS--AND EXAMPLES ARE GIVEN OF SMALL AND MEDIUM-SIZED WIND POWER PLANTS.

1979-0438 HUGOSSON S
SPECIFICATION, SITING AND SELECTION OF LARGE WECS PROTOTYPES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 89-102.
NASA-CP-2106

THE SWEDISH WIND ENERGY PROGRAMME WAS STARTED IN 1974 WITH PRELIMINARY FEASIBILITY STUDIES. THESE INDICATED THAT WIND POWER COULD BECOME AN ECONOMIC REALITY IN SWEDEN, AND THAT THE TECHNICAL PROBLEMS WOULD NOT BE UNSURMOUNTABLE. THIS LED TO A DECISION BY NE IN 1975 TO DESIGN AND INSTALL A WIND POWER RESEARCH UNIT TO STUDY THE TECHNICAL PROBLEMS ASSOCIATED WITH WIND POWER AT A SEMI-SCALE LEVEL. THE CONTRACT FOR THIS UNIT WAS GIVEN TO SAAB-SCANIA CO. THE UNIT WAS OPERATIVE IN APRIL 1977, UNDERWENT DELIVERY TESTS AND DEBUGGING DURING 1977

AND BEGAN GIVING TEST DATA FOR THE ALUMINIUM BLADE/RIGID HUB COMBINATION LATE IN 1977. THAT COMBINATION ACCUMULATED 846 HOURS OF OPERATION BEFORE THE HUB WAS CHANGED IN MAY 1978. THE COMBINATION ALUMINIUM BLADE/FLAPPING HUB IS NOW OPERATIVE, ACCUMULATING ABOUT 1200 HOURS IN EARLY APRIL 1977, TOTAL HOURS OF OPERATION NOW BEING ABOVE 2000. ROTOR BLADES WILL BE CHANGED INTO A GRP-SET IN MAY 1979, AND LATE IN 1979 INTO A CRP + GRP-SET WITH INCREASED DIAMETER (24 M).

1979-0439 HULTGREN L S
TORSIONAL OSCILLATIONS OF THE ROTOR DISC FOR HORIZONTAL AXIS WIND TURBINES WITH HINGED OR TEETERED BLADES. PART 12.
NTIS, AUGUST 23, 1979. 39 P.
FFA-TN-AU-1499-PT-12, N80-21881/1

THE COUPLING OF TORSIONAL OSCILLATIONS OF THE ROTOR DISC AND THE BLADE MOTIONS WAS ANALYZED FOR HORIZONTAL AXIS WIND TURBINE HINGED OR TEETERED BLADES. THE BLADES AND THE TOWER WERE ASSUMED TO BE PERFECTLY RIGID. THE VIBRATIONAL ANALYSIS WAS LINEAR AND THE ANTISYMMETRIC BLADE FLAPPING MOTION WAS FOUND TO BE DECOUPLED. EXPRESSIONS FOR THE EIGENFREQUENCIES OF THE SYSTEM WERE OBTAINED.

1979-0440 HULTGREN L S, DUGUNDJI J
DYNAMICS OF A FLEXIBLE ROTOR-TOWER SYSTEM.
NTIS, AUGUST 1979. 99 P.
ASRL-TR-194-1, FFA-AU-1499, N80-23862/9

THE DYNAMICS OF A HORIZONTAL AXIS WIND TURBINE WERE ANALYZED. BOTH THE BLADES AND THE TOWER ARE TAKEN TO BE FLEXIBLE. THE ANALYSIS IS LINEAR AND MODAL. FOR A THREE-BLADED ROTOR, NUMERICAL RESULTS WERE OBTAINED FOR FREE VIBRATIONS AND FORCED OSCILLATIONS DUE TO STATIC UNBALANCE. ANALYTICAL SOLUTIONS WERE CONSTRUCTED FOR FORCED VIBRATIONS DUE TO GRAVITY AND WIND SHEAR.

1979-0441 HURWOOD D L
ELEVENTH STREET AND BRONX FRONTIER: URBAN PIONEERING WITH WIND POWER.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 565-567.

WIND ENERGY IS BEING APPLIED TO ELECTRICITY GENERATION AT TWO LOCATIONS IN NEW YORK CITY. THESE SMALL-SCALE SYSTEMS ARE PIONEERING EFFORTS CONTRASTING WITH LARGE WIND TURBINES IN THAT THEY ARE LOCATED IN AN URBAN SETTING, SEEK TO EXPLOIT RELATIVELY LOW-VELOCITY WINDS, AND REPRESENT INITIATIVES BY NEIGHBORHOOD ASSOCIATIONS AND COMMUNITY GROUPS RATHER THAN BY GOVERNMENT OR UTILITIES. HOWEVER, THEY DRAW FINANCIAL ASSISTANCE FROM GOVERNMENT, AND INTERFACE WITH THE ELECTRIC UTILITY SERVING THE AREA. FOR THESE AND OTHER REASONS THE PROJECTS RAISE QUESTIONS OF ENERGY TECHNOLOGY, FINANCE AND POLICY, AND THUS ASSUME IMPORTANCE EXCEEDING THEIR TINY SIZE IN CAPACITY AND ENERGY SUPPLY.

1979-0442 HUTTER U
WIND ENERGY CONVERTOR.
GERMAN (FRG) PATENT NO. 2,655,026/C/, JANUARY 18, 1979. 12 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND ENERGY CONVERTOR, I.E. A WIND POWER MACHINE, WITH A ROTOR WITH AIR FLOWING OVER IT AND TWO BLADES WHICH CAN ROTATE AROUND THEIR LONGITUDINAL AXIS. THE BEARINGS FOR THE ROTOR SHAFT CAN ROTATE AROUND ITS VERTICAL AXIS IN ORDER TO BE ABLE TO TURN THE ROTOR INTO THE WIND. IT IS THE PURPOSE OF THE INVENTION TO REDUCE THE TURBULENCE RESULTING FROM DIFFERENT INCOMING AIR VELOCITIES NEAR THE ROTOR SURFACE.

1979-0443 ICERMAN L, MYERS K, SWIFT A
POTENTIAL OF COMBINED WIND-SOLAR ENERGY CONVERSION SYSTEM FOR ELECTRIC UTILITY CAPACITY DISPLACEMENT.
ANNUAL CONFERENCE ON ENERGY, 6TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 16-18, 1979. PROCEEDINGS. JEFFERSON CITY, MISSOURI, MISSOURI DEPARTMENT OF NATURAL RESOURCES, 1979. P. 399-406.

AN HOURLY COMPUTER SIMULATION MODEL IS DEVELOPED TO EVALUATE THE PERFORMANCE OF COMMERCIAL-SCALE COMBINED WIND-SOLAR SYSTEMS AND TO MAKE COMPARISONS WITH SIMULATED PERFORMANCE DATA FOR SOLAR-ONLY SYSTEMS. A MAJOR FEATURE OF THE MODEL IS THE CAPABILITY TO CONDUCT A FIRST-ORDER ASSESSMENT OF THE POTENTIAL FOR ELECTRIC UTILITY CAPACITY DISPLACEMENT BY THE INTRODUCTION OF COMBINED WIND-SOLAR SYSTEMS.

1979-0444 INHABER H
IS SOLAR POWER MORE DANGEROUS THAN NUCLEAR?
INT. AT. ENERGY AGENCY BULL. 21(1): 11-17, 1979.

AN ANALYSIS OF THE RISKS INVOLVED IN THE PRODUCTION AND GENERATION OF CONVENTIONAL AND NONCONVENTIONAL TYPES OF ENERGY WAS PERFORMED. THE RISK ACCOUNTING CONSIDERS THE NET ENERGY OUTPUT AND THE DEATHS, INJURIES, AND DISEASES ASSOCIATED WITH THE PRODUCTION OF THE ENERGY SOURCE. INITIAL AND INTERMEDIATE STAGES OF ENERGY PRODUCTION ARE CONSIDERED AS WELL AS FINAL STAGES. THE CALCULATION OF TOTAL RISK PER ENERGY OUTPUT INDICATED THAT NATURAL GAS AND NUCLEAR POWER HAD LESS TOTAL RISK THAN OTHER CONVENTIONAL AND RENEWABLE ENERGY SOURCES. MATERIAL AND CONSTRUCTION TIME REQUIREMENTS ARE GREATER FOR NON-CONVENTIONAL SYSTEMS THAN FOR CONVENTIONAL SYSTEMS. THE OVERALL RISK IS DIVIDED INTO THE CATEGORIES OF OCCUPATIONAL AND PUBLIC RISK. NATURAL GAS HAS THE LOWEST OCCUPATIONAL RISK WHILE METHANOL PRODUCTION HAS THE HIGHEST, NATURAL GAS HAS THE LOWEST PUBLIC RISK WHILE COAL HAS THE HIGHEST.

1979-0445 INHABER H
RISK WITH ENERGY FROM CONVENTIONAL AND NONCONVENTIONAL SOURCES.
SCIENCE 203: 718-723, FEBRUARY 23, 1979.

RISK TO HUMAN HEALTH WAS COMPARED FOR FIVE CONVENTIONAL AND SIX NONCONVENTIONAL ENERGY SYSTEMS. THE ENTIRE CYCLE FOR PRODUCING ENERGY WAS CONSIDERED, NOT JUST PART. THE MOST IMPORTANT CONCLUSION DRAWN IS THAT THE RISK TO HUMAN HEALTH FROM NONCONVENTIONAL SOURCES CAN BE AS HIGH AS, OR EVEN HIGHER THAN, THAT OF CONVENTIONAL SOURCES. THIS RESULT IS PRODUCED ONLY WHEN THE RISK PER UNIT ENERGY IS CONSIDERED, RATHER THAN THE RISK PER SOLAR PANEL OR WINDMILL. THE RISK FOR NONCONVENTIONAL ENERGY SOURCES DERIVES FROM THE LARGE AMOUNT OF MATERIAL AND LABOR NEEDED, ALONG WITH THEIR BACKUP AND STORAGE REQUIREMENTS.

1979-0446 INTEGRATED COMMUNITY ENERGY PLAN FOR RIVERSIDE, CALIFORNIA. PHASE I. FINAL REPORT.
NTIS, JANUARY 1979. 338 P.
DOE/TIC-10117

THIS APPENDIX TO THE FEASIBILITY STUDY OF AN INTEGRATED ENERGY PLAN FOR THE CITY OF RIVERSIDE, CONTAINS INFORMATION ON ALTERNATIVE ENERGY SUPPLIES, INCLUDING COAL, SOLAR, GEOTHERMAL, NUCLEAR, BIOMASS, WIND, AND

HYDROGEN ENERGY SOURCES IN CALIFORNIA; PURCHASED FUEL PRICES, AN ANALYSIS OF VARIOUS OPTIONS FOR AN INTEGRATED COMMUNITY ENERGY SYSTEM (ICES), AND AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF AN ICES; LEGAL AND INSTITUTIONAL ASPECTS OF ICES; ENVIRONMENTAL QUALITY REGULATIONS; PUBLIC OPINION AND COMMUNITY INVOLVEMENT ACTIVITIES; AND RESULTS OF AN INFRARED PHOTOGRAPHIC SURVEY OF RIVERSIDE.

1979-0447 ISSHIKI N, TAKEUCHI M, NIKAI I, KAMOSHIDA J, AKUTA T
DEVELOPMENT OF CDE (CONCENTRATION DIFFERENCE ENERGY) SYSTEM AND ENGINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, CAT. NO. 79CH1477-9, 1979. P. 1998-2003.

THIS SYSTEM OFFERS A KIND OF GENERAL METHOD OF ENERGY CONVERSION, STORAGE AND UTILIZATION OF THERMAL AND MECHANICAL ENERGY OF ALTERNATIVE RESOURCES AS SOLAR, OCEANIC HEAT AND WIND POWER USING CYCLIC CHANGE OF CONCENTRATION OF SOLVENT IN ANY SOLUTIONS. THE AQUEOUS SOLUTION OF MIXTURE OF CACL2, AND LICL IS SELECTED HERE AS THE MOST SUITABLE SOLUTION, AND NICKEL COPPER ALLOY, OF LOW NICKEL CONTENT, IS SELECTED TO BE THE BEST MATERIAL AGAINST THE ABOVE SOLUTION. A MANNED TRY-WHEEL CDE CAR IS DRIVEN FOR MORE THAN 15 MINUTES, AND 1 KW CDE ENGINE IS EXPERIMENTED SUCCESSFULLY.

1979-0448 JESCH L F, WALTON D
PERFORMANCE MODELING OF THE VERTICAL AXIS WIND TURBINE.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2277-2281.

THE AERODYNAMIC PERFORMANCE OF THE VERTICAL AXIS WIND TURBINE (VAWT) USING TROPOSKIEN SHAPED BLADES IS ANALYZED. THE EFFECTS OF BLADE NUMBERS, BLADE GEOMETRY, CHORD LENGTH, ROTOR SOLIDITY AND PARASITIC DRAG ON PERFORMANCE ARE INVESTIGATED SINGLY AND IN COMBINATIONS. A FEATURE OF THE COMPUTER MODEL IS THAT IT CONSIDERS THE EFFECT OF VARIABLE REYNOLDS NUMBER ON PERFORMANCE.

1979-0449 JOHANSON E E, GOLDENBLATT M K
WIND ENERGY SYSTEMS APPLICATIONS TO REGIONAL UTILITIES.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 127-154.
CONF-790352

THE PRIME THRUST OF THE WORK WAS TO DEVELOP A GENERIC PLANNING PROCESS THAT ANY UTILITY COULD USE TO DETERMINE THE FEASIBILITY OF UTILIZING WECS AS PART OF THEIR FUTURE MIX OF EQUIPMENT. WHILE THIS IS PRIMARILY AN ECONOMIC PROCESS, OTHER QUESTIONS DEALING WITH WECS AVAILABILITY, CAPACITY CREDIT, OPERATING RESERVE, PERFORMANCE OF WECS ARRAYS, ETC., HAD TO BE ADDRESSED. SINCE THE MATURE PRODUCT COST OF WECS IS UNCERTAIN AT THIS TIME, THE APPROACH USED WAS TO ESTABLISH THE WORTH, OR VALUE, OF WECS BY ADDING THEM TO THE UTILITY MIX AT ZERO COST AND DETERMINING WHAT SAVINGS THE UTILITY WOULD REALIZE FROM ITS CONVENTIONAL SOURCES, DUE TO THE PRESENCE OF THE WECS. THESE SAVINGS COULD THEN BE USED TO ESTABLISH WHAT THE UTILITY COULD PAY FOR THE WECS, AND BREAK EVEN.

1979-0450 JOHANSSON T B
SOLAR SWEDEN.
BULL. AT. SCI. 35(8): 19-22, OCTOBER 1979.

THE POSSIBLE TRANSITION FROM FOSSIL FUELS TO RENEWABLE RESOURCES BY THE YEAR 2015 IN SWEDEN IS DISCUSSED. THE ALTERNATIVE SOURCES OF FUELS CONSIDERED HIGHLY FEASIBLE FOR SWEDEN AND THEIR USAGE PERCENTAGES BY 2015 INCLUDE: FORESTS (46%), MARINE BIOMASS (3%), FOREST WASTES (12%), HYDRO POWER (12%), WIND POWER (5%), SOLAR CELLS (9%), AND SOLAR HEATING (13%). IN 1978, OIL PROVIDED 72% OF SWEDEN'S ENERGY REQUIREMENTS. THE FEASIBILITY STUDY DISCUSSES THE RATE OF INTRODUCTION, THE ECONOMIC ASPECTS OF THE PROPOSED ENERGY SYSTEM, AND OPPOSING INTERESTS IN LAND USE POLICIES.

1979-0451 JOHN V I
OPERATIONAL CHARACTERISTICS OF AN AC COMMUTATOR GENERATOR FOR WIND POWER CONVERSION.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2262-2266.

A THREE PHASE COMMUTATOR MOTOR OF THE SCHRAGE TYPE IS USED IN THE GENERATING MODE TO PRODUCE CONSTANT VOLTAGE, CONSTANT FREQUENCY POWER OUTPUT. A DIGITALLY OPERATED AUTOMATIC CONTROL SYSTEM IS USED TO ASSURE GENERATOR OPERATION FOR A WIDE RANGE OF SPEEDS.

1979-0452 JUSTUS C G, MIKHAIL A S
COMPUTER MODEL FOR LARGE ARRAYS OF WIND TURBINES. FINAL REPORT.
NTIS, MAY 1979. 46 P.
DOE/ET/20355-79/4

A SYNTHESIS OF THE EARLIER STUDIES OF WIND AND POWER DISTRIBUTIONS FOR LARGE ARRAYS OF WIND TURBINES IS FORMULATED IN A COMPUTER MODEL PROGRAM. THE PROGRAM CAN BE RUN WITH INTERACTIVE (COMPUTER TERMINAL) OR BATCH INPUT (CARD FILES, ETC.). BASED ON A GENERIC WIND TURBINE POWER MODEL, INPUT CHARACTERISTICS AT A SINGLE REPRESENTATIVE SITE, AND DATA SPECIFYING THE SIZE OF THE ARRAY TO BE SIMULATED, THE PROGRAM COMPUTES WIND SPEED AND WIND POWER OUTPUT STATISTICS FOR THE MODEL ARRAY.

1979-0453 KAHN E
COMPATIBILITY OF WIND AND SOLAR TECHNOLOGY WITH CONVENTIONAL ENERGY SYSTEMS.
ANNU. REV. ENERGY 4: 313-352, 1979.

NEW TOOLS ARE NEEDED FOR MAKING ENGINEERING ECONOMICS ANALYSES TO DETERMINE THE COMPATIBILITY OF RANDOMLY AVAILABLE WIND AND SOLAR ENERGY WITH CONVENTIONAL ENERGY SYSTEMS, SPECIFICALLY ELECTRIC UTILITIES. PRESENT ANALYTIC TOOLS CAN BE APPLIED TO IMMEDIATE ISSUES, SUCH AS ELECTRIC BACKUP FOR SOLAR HEATING, TO SOME OF THE ENGINEERING CONSTRAINTS, AND TO SEPARATE ISSUES INTO SHORT-TERM ISSUES OF RESOURCE ASSESSMENT AND APPROPRIATE SCALE AND LONG-TERM ISSUES OF STRUCTURAL OPTIMALITY. COMPATIBILITY ANALYSIS SHOULD FIRST ADDRESS FINANCIAL RISK, FOLLOWED BY RELIABILITY CRITERIA AND REGULATORY STRUCTURE AS MORE RESEARCH IS DONE.

1979-0454 KANT M, BERNA M, VIDONI E
WIND ENERGY CONVERSION SYSTEM WITH ELECTROMAGNETIC STABILIZER.
INST. ELECTR. ENG. PROC. 126(11): 1201-1203, NOVEMBER 1979.

THE DEVELOPMENT OF A NOVEL MEDIUM-POWER (LESS THAN 50 KW) WECS IS OUTLINED. THIS DEVICE, COMPOSED OF A CONSTANT-PITCH RIGID ROTOR AND A DOUBLE-STAGE GENERATOR, USES A PARTICULAR ELECTROMAGNETIC BRAKING TO ASSURE

SPEED STABILIZATION.

1979-0455 KATZENBERG R
REVIEW OF THE SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 155-158.
RFP-3014(VOL.2)

THE PURPOSE OF THE PRESENTATION IS TO DISCUSS THE NATIONAL PROGRAM FOR THE SOLAR HEATING AND COOLING OF BUILDINGS WHICH THE AWEA IS REVIEWING, UNDER CONTRACT TO ROCKWELL-INTERNATIONAL, ROCKY FLATS DIVISION. THE PURPOSE OF THIS PROJECT IS TO REVIEW THE SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM, TO IDENTIFY THE MANAGEMENT, TECHNICAL, INSTITUTIONAL AND FINANCIAL ISSUES ENCOUNTERED. THESE ISSUES ARE ANALYZED FOR THEIR APPLICABILITY TO DESIGNING A WIND ENERGY DEMONSTRATION PROGRAM.

1979-0456 KAWAMOTO H
A PRIMARY POWER SUPPLY SYSTEM FOR COMMUNICATIONS USING A DARRIEUS WIND TURBINE.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 445-452.

SYSTEM DESIGN METHODS OF PRIMARY POWER SUPPLY SYSTEMS USING A WIND TURBINE ARE GIVEN AND COMPARED WITH VARIOUS PRIMARY POWER SUPPLY SYSTEMS. THEN, A DESIGN METHOD FOR SPOILER FLAPS IN THE DARRIEUS WIND TURBINE IS GIVEN. LASTLY THE TESTED POWER SUPPLY SYSTEM, USING A WIND TURBINE AND A DIESEL GENERATOR, IS INTRODUCED.

1979-0457 KAWAMOTO H
PRIMARY POWER SUPPLY SYSTEM FOR COMMUNICATIONS USING A VERTICAL-AXIS WIND TURBINE.
DENSHI TOKYO NO. 18: 120-121, 1979.

IMPROVEMENTS IN COMMUNICATION EQUIPMENT THROUGH SOLID STATE CONSTRUCTION HAVE REDUCED POWER CONSUMPTION IN MICROWAVE REPEATER STATIONS TO ABOUT 100 W, THUS MAKING SOLAR BATTERIES AND SMALL WIND TURBINES PRACTICAL AS THE POWER SUPPLY FOR REPEATER STATIONS. A PRIMARY POWER SUPPLY SYSTEM USING A VERTICAL-AXIS WIND TURBINE IS DESCRIBED.

1979-0458 KELLN K, FLUDE E
THE ANSWERS ARE BLOWING IN THE WIND AT SASKATCHEWAN TEL (WIND GENERATOR).
TELEPHONY 197(25): 32-33, 36, 38, 133, DECEMBER 17, 1979.

THE SASKATCHEWAN TELECOMMUNICATIONS INSTALLATION MARKS THE BEGINNING OF A ONE YEAR FIELD TRIAL, IN WHICH A C SYSTEM LICUS VERTICAL AXIS WIND GENERATOR WILL BE EVALUATED. SOME OF THE RESULTS ARE DISCUSSED.

1979-0459 KENNELL E
EXPERIENCE WITH SMALL WECS IN WESTERN WASHINGTON.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 79-80.
CONF-790845

THE QUALITATIVE ASPECTS OF WIND ENERGY CONVERSION GAINED THROUGH SIX YEARS OF WIND RESOURCE EVALUATION, SWECS DESIGN, APPLICATION AND MAINTENANCE IN THE STATE OF WASHINGTON ARE DISCUSSED.

1979-0460 KENTFIELD J A C
THE CHARACTERISTICS OF TWO, SIMPLE, AUTOMATIC SPEED-CONTROL DEVICES FOR HORIZONTAL AXIS WIND-TURBINES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 674-676.

THE NEED FOR SPEED-CONTROL DEVICES, TO PREVENT ROTOR OVERSPEEDING IN STRONG WINDS, IS EXAMINED AND THE FEATURES OF CLASSICAL BLADE-FEATHERING SYSTEMS FOR HORIZONTAL AXIS WIND-TURBINES ARE REVIEWED BRIEFLY. IT IS EXPLAINED THAT BLADE FEATHERING TENDS TO BECOME COMPLICATED AND COSTLY WHEN APPLIED TO MEDIUM AND LOW SPEED MACHINES BECAUSE OF THE LARGE NUMBER OF ROTOR BLADES INVOLVED AND SECONDLY BECAUSE OF THE LOSS OF ROTOR RIGIDITY ASSOCIATED WITH SUCH AN ARRANGEMENT. IT IS ALSO EXPLAINED THAT MEDIUM AND LOW SPEED MACHINES FIND APPLICATION FOR SUCH TASKS AS THE DIRECT DRIVE OF WATER PUMPS ETC.

1979-0461 KIEBLING F
AEROELASTIC MODELING OF THE COUPLED WIND TURBINE ROTOR/TOWER SYSTEM.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 161-179.
JUEL-SPEZ-28

VIBRATION AND AEROELASTIC STABILITY ANALYSES OF WIND TURBINES GENERALLY CANNOT NEGLECT THE INTERACTION BETWEEN ROTOR AND TOWER. SO AT LEAST FINALLY AN AEROELASTIC MODEL OF THE COMPLETE SYSTEM MUST BE CONSIDERED. THE DERIVATION OF THE CORRESPONDING EQUATIONS OF MOTION IS DESCRIBED TOGETHER WITH THE MORE IMPORTANT PARAMETERS OF THE WIND TURBINE SYSTEM.

1979-0462 KILAR L A
DESIGN STUDY AND ECONOMIC ASSESSMENT OF A MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME I. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, JUNE 14, 1979. 59 P.
WASH-2330-78/4(VOL.1)

INFORMATION IS PRESENTED CONCERNING METEOROLOGICAL AND OCEANOGRAPHIC SURVEYS OF THE US OFFSHORE; APPARATUS DESIGNS AND COSTS; AND OWECS SYSTEM ECONOMICS.

1979-0463 KILAR L A
DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME II. APPARATUS DESIGNS AND COSTS. FINAL REPORT.
NTIS, JUNE 14, 1979. 310 P.
WASH-2330-78/4(VOL.2)

PARAMETRIC DESIGNS AND COMPANION COST FUNCTIONS ARE PRESENTED FOR EACH MAJOR COMPONENT OF AN OFFSHORE WIND ENERGY CONVERSION SYSTEM (OWECS). THESE ARE (1) THE SUPPORT PLATFORMS, (2) THE WIND TURBINE GENERATOR (WTG) PLANTS, AND (3) THE ELECTRICAL ENERGY COLLECTION AND TRANSMISSION SYSTEM INCLUDING (4) SUBSTATIONS. A BACKUP HYDROGEN ENERGY DELIVERY SYSTEM FOR EXTREMELY REMOTE OR DEEP WATER SITES WAS ALSO EVALUATED. COSTS ARE

PRESENTED FOR FABRICATING, TRANSPORTING, INSTALLING, OPERATING, AND MAINTAINING EACH OF THESE COMPONENTS.

1979-0464 KILAR L A
DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT OFFSHORE WIND ENERGY CONVERSION SYSTEMS APPLICATION. VOLUME IV. METEOROLOGICAL AND OCEANOGRAPHIC SURVEYS. FINAL REPORT.
NTIS, JUNE 14, 1979. 344 P.
WASH-2330-78/4(VOL.4)

THE RESULTS ARE PRESENTED OF A SURVEY OF THE METEOROLOGY AND OCEANOGRAPHY OF THE UNITED STATES OFFSHORE AS THEY PERTAIN TO THE DESIGN, COST, EMPLACEMENT, OPERATION AND MAINTENANCE OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS (OWECS). THIS REPORT IS INTENDED TO DEFINE THE ENVIRONMENT IN WHICH OWECS ARE TO BE CONSIDERED.

1979-0465 KIRCHHOFF R H
MEASUREMENTS OF THE WIND FIELD INTERACTION WITH THE UMASS 25 KW WIND TURBINE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 179-188.
RFP-3014(VOL.1)

THE FIELD INSTRUMENTATION, DATA ACQUISITION SYSTEM, DATA PROCESSING METHODS, AND THE RESULTS OF TEST ON THE UMASS 25 KW WIND TURBINE ARE DESCRIBED. THE OBJECTIVE IS TO DETERMINE THE NATURE OF THE DYNAMIC INTERACTION BETWEEN THE FLUCTUATING WIND VELOCITY FIELD AND THE INSTANTANEOUS POWER GENERATED. RESULTS ARE PRESENTED IN TERMS OF THE MEASURED STATISTICAL PROPERTIES OF THE WIND FIELD AND THE TRANSFER FUNCTION OF THE WIND TURBINE.

1979-0466 KLEIN W E
MODIFIED AEROSPACE RELIABILITY AND QUALITY ASSURANCE METHOD FOR WIND TURBINES.
NTIS, 1979. 8 P.
DOE/NASA/20370-79/18. NASA-TM-79284

THE SAFETY, RELIABILITY AND QUALITY ASSURANCE (SR AND QA) APPROACH DEVELOPED FOR THE FIRST LARGE WIND TURBINE GENERATOR PROJECT, MOD-0A, IS DESCRIBED. THE SR AND QA APPRAOCH TO BE USED HAD TO ASSURE THAT THE MACHINE WOULD NOT BE HAZARDOUS TO THE PUBLIC OR OPERATING PERSONNEL, WOULD OPERATE UNATTENDED ON A UTILITY GRID, WOULD DEMONSTRATE RELIABLE OPERATION AND WOULD HELP ESTABLISH THE QUALITY ASSURANCE AND MAINTAINABILITY REQUIREMENTS FOR FUTURE WIND TURBINE PROJECTS. SINCE THE ULTIMATE OBJECTIVE OF THE WIND ENERGY PROGRAM IS TO PROVIDE WIND POWER AT A COST COMPETITIVE WITH OTHER ENERGY SOURCES, THE FINAL SR AND QA ACTIVITIES WERE TO BE ACCOMPLISHED AT A MINIMUM OF COST AND MANPOWER. THE FINAL APPROACH CONSISTED OF A MODIFIED FAILURE MODES AND EFFECTS ANALYSIS (FMEA) DURING THE DESIGN PHASE, MINIMAL HARDWARE INSPECTIONS DURING PARTS FABRICATION, AND THREE SIMPLE DOCUMENTS TO CONTROL ACTIVITIES DURING MACHINE CONSTRUCTION AND OPERATION.

1979-0467 KOBYLARZ T, AL-SHEHRI A
THE APPLICATION OF WIND ENERGY TO A SYSTEM WITH AN INHERENT ENERGY STORAGE MEDIUM.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 312-318.

WIND ENERGY COULD BE UTILIZED BY SYSTEMS HAVING AN INHERENT STORAGE MEDIUM. ONE SUCH SYSTEM IS A CHLORINE AND CAUSTIC SODA PRODUCTION FACILITY FROM THE ELECTROLYSIS OF BRINE. BY USING WIND SPEED DATA FOR DHAHRAN, SAUDI ARABIA, AND PUBLISHED DATA FOR THE SYSTEM COMPONENTS, YIELDS OF CHEMICALS AND POWER ARE PREDICTED.

1979-0468 KORBER F, THIELE H A
LARGE WIND ENERGY CONVERTER: GROWIAN 3 MW.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 121-131.
NASA-CP-2106

THE LARGE WIND ENERGY CONVERTER GROWIAN HAS THE FUNCTION OF PRODUCING ELECTRICAL ENERGY FROM THE NATURAL MOVEMENTS OF THE WIND. A TWO-BLADE ROTOR MOUNTED ON THE TOWER IS ROTATED BY THE ACTION OF WIND AND TRANSFERS ITS POWER VIA A GEARBOX TO A GENERATOR. THE ELECTRICAL ENERGY THUS OBTAINED IS THEN FED DIRECTLY INTO THE EXISTING SUPPLY NETWORK. THE PLANT WAS DESIGNED WITH REFERENCE TO A PLANT SITE IN THE NORTH GERMAN COASTAL AREA. THE DESIGN OFTHE PLANT PERMITS A LONG-TERM OPTIMAL EXPLOITATION OF WIND ENERGY THROUGH THE USE OF ADVANCED, PROVEN ENGINEERING TECHNIQUES.

1979-0469 KOENRAADS A J T M, OFFRINGA J J, DE ZEEUW W J, SCHELLENS F J C
SOME ASPECTS OF THE DUTCH NATIONAL RESEARCH PROGRAMME FOR WIND ENERGY.
J. "A" 20(3): 151-159, JULY 1979.

A PROJECT PREPARATION GROUP FOR WIND ENERGY WAS SET UP IN JANUARY 1975 TO FORMULATE A PROPOSAL FOR A NATIONAL WIND ENERGY RESEARCH PROGRAMME. THE AUTHORS DISCUSS THIS PROGRAMME WHICH SHOULD LEAD WITHIN 5 YEARS TO A DECISION WHETHER THE DUTCH ENERGY SUPPLY SYSTEM COULD BE STRENGTHENED APPRECIABLY BY THE APPLICATION OF WIND ENERGY.

1979-0470 KORNREICH T R, KOTTLER R J
ENVIRONMENTAL ISSUES ASSESSMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 95-108.
CONF-790352

THE DEVELOPMENT AND COMMERCIALIZATION OF WIND TURBINE SYSTEMS PRESENT A NUMBER OF ENVIRONMENTAL PROBLEMS THAT MUST BE SOLVED BEFORE WIDESPREAD IMPLEMENTATION OF THESE SYSTEMS CAN OCCUR. THE MAJOR AREAS THAT HAVE BEEN INVESTIGATED INCLUDE: INTERFERENCE WITH ELECTROMAGNETIC TRANSMISSIONS (AIR NAVIGATION SYSTEMS, MICROWAVE COMMUNICATIONS LINKS, RADIO AND TELEVISION BROADCAST); SOUND INTENSITY; SAFETY; SITING PROBLEMS; ECOLOGICAL CONCERNS; PUBLIC ACCEPTANCE; AND LEGAL AND INSTITUTIONAL ISSUES. EACH OF THESE POTENTIAL PROBLEM AREAS IS DISCUSSED. THE COMPLETED AND ACTIVE RESEARCH PROJECTS IN EACH AREA ARE IDENTIFIED. AN OVERVIEW OF THE CURRENT STATUS OF ENVIRONMENTAL BARRIERS TO THE COMMERCIALIZATION OF LARGE SCALE WIND TURBINE SYSTEMS IS PRESENTED.

1979-0471 KOTTAPALLI S B R, FRIEDMANN P P, ROSEN A
AEROELASTIC STABILITY AND RESPONSE OF HORIZONTAL AXIS WIND TURBINE BLADES.
AIAA J. 17(12): 1381-1389, DECEMBER 1979.

COUPLED FLAP-TORSION EQUATIONS OF MOTION OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE (HAWT) BLADE HAVE BEEN FORMULATED. THE ANALYSIS NEGLECTS BLADE-TOWER COUPLING. THE FINAL NONLINEAR EQUATIONS HAVE PERIODIC COEFFICIENTS. A NEW AND CONVENIENT METHOD OF GENERATING AN APPROPRIATE TIME-DEPENDENT EQUILIBRIUM POSITION,

REQUIRED FOR THE STABILITY ANALYSIS, HAS BEEN IMPLEMENTED AND FOUND TO BE COMPUTATIONALLY EFFICIENT. STEADY-STATE RESPONSE AND STABILITY BOUNDARIES FOR AN EXISTING (TYPICAL) HAWT BLADE ARE PRESENTED.

1979-0472 KOVACS I
DYNAMIC DESIGN OF A MEDIUM STIFF WIND ENERGY TOWER.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 191-196.
JUEL-SPEZ-28

AS A RULE, WIND ENERGY TOWERS ARE DESIGNED FOR HIGH EIGENFREQUENCIES, WHICH CAN BE OBTAINED ONLY THROUGH HIGH STIFFNESSES. AGAINST THIS, A DESIGN CONCEPT WITH ONLY MEDIUM STIFFNESSES IS PRESENTED. THE FIRST EIGENFREQUENCIES OF THE TOWER ARE DESIGNED TO LIE BETWEEN THE LOWER ROTOR FREQUENCY AND THE HIGHER BLADE-PASSAGE FREQUENCY. THEREBY ALL SENSITIVE SYSTEM RESONANCES CAN BE ISOLATED. THE FREQUENCY BANDS IN WHICH THE EIGENFREQUENCIES OF THE TOWER CANNOT BE EXCITED ARE EXTREMELY NARROW. THEREFORE THE TOWERS MUST BE PREPARED FOR A SUPPLEMENTARY TUNING FOR CASES IF THEIR ACTUAL EIGENFREQUENCIES DEVIATE FROM THE PREDETERMINED VALUES. THE CABLE-STAYED MASTS AS PROPOSED HAVE DIFFERENT ADVANTAGES FOR WIND ENERGY TOWERS. AMONG OTHERS, THEY ARE MOST SUITABLE FOR THE MEDIUM STIFFNESS CONCEPT AND THEIR ACTUAL EIGENFREQUENCIES CAN BE EASILY TUNED AFTERWARDS.

1979-0473 KOVARIK T J, PIPHER C, HURST J
WIND ENERGY.
NORTHBROOK, ILL., DOMUS BOOKS, 1979. 128 P.

1979-0474 KRAUSE P C
ANALYSIS AND SIMULATION OF WIND ENERGY SYSTEMS.
NTIS, NOVEMBER 1979. 60 P.
NASA-CR-162538, N80-14487/6

USING A WIND FLUCTUATION MODEL, SIMULATION RESULTS OF THE MECHANICAL AND ELECTRICAL SYSTEMS WERE OBTAINED FOR THE MOD-2 WIND TURBINE GENERATOR SYSTEM. THE DYNAMIC PERFORMANCE OF THE MOD-2 WAS STUDIED DURING WIND GUSTS OF THE 1-COS FORM FROM A CONSTANT WIND VELOCITY. IF THESE ARE THE TYPE OF WIND FLUCTUATIONS TO WHICH THE WIND SYSTEMS WILL BE SUBJECTED TO, THEN THE DESIGN OF THE MOD-2 APPEARS ADEQUATE. THERE WAS ONE EXCEPTION TO THIS; WITH A RATE LIMIT INCORPORATED IN THE PITCH CONTROLLER, AN INSTABILITY OCCURRED DURING A 'DOWN' GUST WHICH CAUSED CONTINUOUS, UNBOUNDED SWITCHING BETWEEN THE HIGH AND LOW MODES. THIS IS A CONTROL DESIGN PROBLEM WHICH APPEARS TO BE CORRECTABLE.

1979-0475 KRONER W M
BARRIERS TO THE APPLICATION OF WIND ENERGY CONVERSION SYSTEMS IN URBAN SETTINGS.
ALBANY, NEW YORK, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, DECEMBER 1979. 174 P.
NYSERDA-79-5

URBAN AREAS IN THE NORTHEAST REGION OF THE UNITED STATES, AND SPECIFICALLY, THOSE IN NEW YORK STATE ARE UNIQUE IN MANY RESPECTS AND TEND NOT TO MATCH URBAN CHARACTERISTICS IN OTHER AREAS OF THE COUNTRY. THE INSTALLATION OF WECS IN THESE URBAN AREAS COULD CREATE TECHNICAL, COMMUNITY, ECONOMIC, INDUSTRIAL, LEGAL AND OWNERSHIP RELATED PROBLEMS WHICH, IN TURN, COULD CONSTITUTE A SERIES OF BARRIERS PREVENTING OR DISCOURAGING THE IMPLEMENTATION OR USE OF WECS. A STUDY OF THESE BARRIERS IS PRESENTED.

1979-0476 KUECKEN J A
HOW TO MAKE HOME ELECTRICITY FROM WIND, WATER & SUNSHINE.
BLUE RIDGE SUMMIT, PENNSYLVANIA, TAB BOOKS, 1979.

1979-0477 KUSSMANN A, MOLLY J, MUSER D
COMPOSITE ROTOR BLADES FOR LARGE WIND ENERGY INSTALLATIONS.
DFVLR-NACHR. 40-44, JUNE 1979. TRANSL.: NTIS, APRIL 1980. 14 P.
NASA-TM-75822, N80-31881/9

THE DESIGN OF LARGE WIND POWER SYSTEMS IN GERMANY IS REVIEWED WITH ATTENTION GIVEN TO ELABORATION OF THE TOTAL WIND ENERGY SYSTEM, AERODYNAMIC DESIGN OF THE ROTOR BLADE, AND WIND LOADING EFFECTS. PARTICULAR CONSIDERATION IS GIVEN TO THE DEVELOPMENT OF COMPOSITE GLASS FIBER/PLASTIC OR CARBON FIBER/PLASTIC ROTOR BLADES FOR SUCH INSTALLATIONS.

1979-0478 LAITNER S
IOWA SOLAR APPLICATIONS: HOLDING AT THE DO-IT-YOURSELF LEVEL.
DES MOINES, IOWA, IOWA SOLAR OFFICE, 1979. 84 P.
IOWA SOLAR OPERATIONAL RESULTS CONFERENCE, 1ST ANNUAL, CEDAR RAPIDS, IOWA, JUNE 21, 1979.

A SERIES OF 10 CASE STUDIES OF REPRESENTATIVE SOLAR TECHNOLOGIES OPERATING IN IOWA IS PRESENTED. THE FOLLOWING ARE INCLUDED: A SOLAR HEATED BANK USING SALT STORAGE, AN AGRICULTURAL WASTE DIGESTION SYSTEM PRODUCING BOTH FUEL AND FERTILIZER, AND INTEGRATED SOLAR/WOOD HEATING SYSTEM VIRTUALLY FREE OF UTILITY BILLS, A SOLAR GRAIN DRYER DESIGNED BY AN IOWA LEGISLATOR, A SOLAR WATER HEATING AND WOOD-FUEL OIL SPACE HEATING SYSTEM, AN UNDERGROUND HOME WITH SOLAR ATRIUM, A SOLAR-HEATED UPHOLSTERY SHOP, A SOLAR-HEATED SCHOOL AND GRAIN DRYER, AND A FARM THAT NEVER SWITCHED FROM WINDPOWER TO ELECTRIC UTILITIES.

1979-0479 LAMB C S J
CONNECTING NEW ENERGY SOURCES TO SUPPLY SYSTEMS.
HONG KONG ENG. 7(6): 7-11, JUNE 1979.

THIS PAPER DESCRIBES METHODS OF COUPLING MAGNETOHYDRODYNAMIC GENERATORS TO A GRID VIA A PARALLEL-CONNECTED ROTARY MOTOR AND THYRISTOR-BASED OR INDUCED-EMF COMMUTATION. OTHER SOURCES CONSIDERED INCLUDE SOLAR ENERGY SYSTEMS, WIND GENERATORS AND FUEL CELLS.

1979-0480 LANDAHL M T
MOMENTUM THEORY ANALYSIS OF UNCONVENTIONAL WIND EXTRACTION SCHEMES, PART 10.
NTIS, OCTOBER 12, 1979. 23 P.
ASRL-TR-194-2-PT-10, FFA-AU-1499-PT-10, N80-28932/5

A MOMENTUM THEORY ANALYSIS WAS CARRIED OUT FOR IDEALIZED WIND ENERGY EXTRACTION DEVICES UNDER THE ASSUMPTION OF UNIFORM WAKE VELOCITY. THE WIND ENERGY EXTRACTION PROBLEM WAS ANALYZED ON THE BASIS OF SOME SIMPLE IDEALIZED FLOW MODELS WHICH DEMONSTRATE THAT THE "BERTZ LIMIT" CAN BE EXCEEDED WITH THE AID OF SOME UNCONVENTIONAL

EXTRACTION SCHEMES.

1979-0481 LANGHAM R, WILLIAM F L
OPTIMAL DESIGN METHODOLOGY FOR A WIND POWER SYSTEM.
MATH PROGRAM STUDY NO. 11: 135-149, OCTOBER 1979.

THE MAIN PROBLEM WITH THE UTILIZATION OF WIND POWER IS THAT IT IS MORE EXPENSIVE THAN CONVENTIONAL ENERGY PRODUCTION SYSTEMS. HOWEVER, DUE TO THE ESCALATING COST OF FOSSIL FUELS AND THE REDUCTION OF WIND ENERGY COSTS AS A RESULT OF OPTIMUM SYSTEM DESIGN AND MASS PRODUCTION, WIND POWER MAY BECOME A VIABLE ALTERNATIVE IN THE FUTURE. THE OBJECTIVE OF THIS PAPER IS TO PRESENT A DESIGN METHODOLOGY FOR DETERMINING THE OPTIMAL DESIGN PARAMETERS OF A WIND POWER SYSTEM.

1979-0482 LARSON D L, SANDS C D, DUTT G R
SOLAR AND WIND POWERED PUMPING WITH WATER HARVESTING.
ASAE PAPER 79-2574, 1979. 9 P.

THIS PAPER REPORTS ON THE DEVELOPMENT OF A SOLAR AND WIND POWERED SYSTEM TO PUMP WATER FROM WATER HARVESTING STORAGE RESERVOIRS TO AN IRRIGATION STORAGE TANK. IRRIGATION IS VIA GRAVITY ON DEMAND. THE WIND POWERED PUMP AND WATER DELIVERY SYSTEM PERFORM SATISFACTORILY, BUT THE EXPERIMENTAL SOLAR POWERED PUMPING UNIT HAS EXPERIENCED A SERIES OF MECHANICAL PROBLEMS.

1979-0483 LAUER H, MACHENS U
A 15 KW WIND POWER PLANT COUPLED TO THE SUPPLY NETWORK.
ELEKTROTECH. Z. 100(21): 1203-1205, OCTOBER 1979. (IN GERMAN)

THIS ARTICLE DESCRIBES A 15 KW WIND POWER PLANT CONSISTING OF A 3-ARMED, HIGH-SPEED, 15 M DIAMETER ROTOR WITH WEIGHT-BALANCED AEROFOILS COUPLED TO TWO 3-PHASE INDUCTION MOTORS. THE LARGER OF THESE (15 KW AT 1500 RPM) OPERATES AT HIGH WIND SPEEDS, WHILE THE SMALLER (5.5 KW AT 1000 RPM) COMES INTO ACTION IN LIGHT WINDS. THE ELECTRICAL CONTROL GEAR AND CAPACITATIVE EXCITATION ARE DESCRIBED, AS IS EXPERIENCE IN SERVICE OBTAINED SINCE 1978.

1979-0484 COROTIS R B
SIMULATION OF CORRELATED WIND SPEEDS FOR SITES AND ARRAYS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2257-2261.

THE HORIZONTAL WIND SPEED COMPONENTS AT A SITE ARE OFTEN MODELLED AS INDEPENDENT, IDENTICALLY DISTRIBUTED, ZERO-MEAN, GAUSSIAN RANDOM VARIABLES. THE EFFECTS OF UNEQUAL VARIANCES AND OF CORRELATED COMPONENTS ARE INVESTIGATED AND SEEN TO NOT SUBSTANTIALLY ALTER THE BASIC RAYLEIGH FORM OF THE SPEED DISTRIBUTION. TEMPORAL CORRELATION AND ARRAY CONSIDERATIONS ARE DISCUSSED BRIEFLY. DATA WITH VARIOUS AVERAGING TIMES AND SAMPLING RATES ARE USED TO COMPARE WIND CHARACTERISTICS WITH THOSE FOUND FROM NATIONAL WEATHER SERVICE DATA. SPECIFICALLY, SAMPLING RATE DOES NOT SIGNIFICANTLY AFFECT VARIANCES AND AUTOCORRELATIONS, WHILE THE LATTER IS VERY SENSITIVE TO AVERAGING TIME.

1979-0485 LEWIN L, BAER C A, PRYOR D V, PARKINSON B W, WINN C B
RAPAD: REAL-TIME ACCURATE PERFORMANCE ANALYSIS OF DATA.
ASME PAPER 79-WA/SOL-1, 1979. 7 P.

AN INNOVATIVE METHOD FOR THE REAL-TIME ESTIMATION OF GENERIC PERFORMANCE CHARACTERISTICS BASED ON RECURSIVE LEAST SQUARES FILTERING IS DEVELOPED. AFTER PRESENTING THE THEORETICAL BASIS FOR THE ALGORITHM, ITS USE ILLUSTRATED BY APPLYING IT BY COMPUTER SIMULATION TO A WIND ENERGY CONVERSION SYSTEM (WECS) WHOSE TRUE PERFORMANCE CHARACTERISTICS ARE ASSUMED KNOWN. IT IS SHOWN THAT GOOD AGREEMENT BETWEEN ESTIMATED AND TRUE PERFORMANCE IS OBTAINABLE WITH AS LITTLE AS 1000 DATA SAMPLINGS USING A REALISTIC LEVEL OF INSTRUMENTATION NOISE.

1979-0486 LIEBLEIN S
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS.
NTIS, 1979. 464 P.
CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, APRIL 24, 1979.
CONF-7904111, NASA-CP-2106

29 PAPERS WERE PRESENTED CONCERNING THE DEVELOPMENT STATUS OF LARGE WIND TURBINES, AND WIND TURBINE BLADE DESIGN CHARACTERISTICS AND OPERATING EXPERIENCE.

1979-0487 LINDLEY C A, MELTON W C
ELECTRIC UTILITY APPLICATION OF WIND ENERGY CONVERSION SYSTEMS ON THE ISLAND OF OAHU. VOL. 1.
NTIS, FEBRUARY 23, 1979. 48 P.
ATR-78(7598)-1

THE OBJECTIVE OF THIS STUDY WAS TO ASSESS THE POTENTIAL FOR THE APPLICATION OF WIND ENERGY CONVERSION SYSTEMS (A FIELD OF INTERCONNECTED WTGS DENOTED IN THIS REPORT BY THE ACRONYM WECS) IN A SPECIFIC UTILITY CONTEXT TO GAIN ADVANCE INFORMATION CONCERNING THEIR ECONOMIC FEASIBILITY; THEIR OPTIONAL PROBLEMS; THE CRITERIA AND PROCEDURES FOR SITE SELECTION; ENVIRONMENTAL IMPACTS; LEGAL, SOCIAL, AND OTHER PROBLEMS; AND THE BALANCE OF COST AND BENEFITS FROM THE POINT OF VIEW OF THE CONSUMER AND THE UTILITY. THIS STUDY ADDRESSES THE CIRCUMSTANCES OF THE HAWAIIAN ELECTRIC COMPANY OPERATIONS ON THE ISLAND OF OAHU.

1979-0488 YORK W L
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES, 1978 SURVEY.
NTIS, MAY 1979. 195 P.
EPRI-ER-966-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. BRIEF DESCRIPTIONS OF 600 PROJECTS BEING CONDUCTED BY 165 UTILITY COMPANIES ARE GIVEN. ALSO INCLUDED ARE A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, A LIST OF UTILITIES ORGANIZED BY STATES, AND A LIST OF AVAILABLE REPORTS ON UTILITY-SPONSORED PROJECTS.

1979-0489 LINDLEY C A
ELECTRIC UTILITY APPLICATION OF WECS IN AN ISLAND LOCATION.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA,

MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 171-187.
CONF-790352

THE RESULTS REPORTED WERE OBTAINED AS PART OF A DOE WIND OFFICE CONTRACT STUDY INTENDED TO ASSESS THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS (WECS) FOR APPLICATION ON OAHU. THE DOE RESULTS WERE INTENDED TO BE VERY GENERAL, AS A GUIDE TO DOE'S FUTURE DESIGN AND APPLICATION PLANNING FOR WECS. THE STUDY WAS SUPPORTED BY SUBCONTRACTS WITH THE UNIVERSITY OF HAWAII (UOH) AND THE HAWAIIAN ELECTRIC COMPANY (HECO), AND BY UNCONTRACTED ASSISTANCE FROM THE HAWAII DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT (DPED), ALL OF WHOM PROVIDED SIGNIFICANT INPUT DATA AND BACKGROUND.

1979-0490 LINSCOTT B S
BLADE DESIGN AND OPERATING EXPERIENCE ON THE MOD-0A 200 KW WIND TURBINE AT CLAYTON, NEW MEXICO.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 225-238.
NASA-CP-2106

A 200 KW WIND TURBINE CALLED MOD-0A IS LOCATED IN CLAYTON, NEW MEXICO. THE MOD-0A WIND TURBINE BLADE IS A 60 FOOT LONG ALUMINUM STRUCTURE, SIMILAR IN APPEARANCE TO AN AIRPLANE WING, THAT WEIGHS 2360 LBS. THE BLADES, SN-1004 AND SN-1005, ACCUMULATED OVER 3000 HOURS OF OPERATING TIME BETWEEN NOVEMBER 1977 AND APRIL 1979. SIGNS OF BLADE STRUCTURAL DAMAGE WERE FIRST OBSERVED AFTER 400 HOURS OF WIND TURBINE OPERATION. THE BLADES WERE REMOVED FROM THE WIND TURBINE FOR REPAIRS IN JUNE 1978. REPAIRS WERE COMPLETED AND THE BLADES WERE INSTALLED ON THE WIND TURBINE FOR RENEWED OPERATION IN SEPTEMBER 1978. DETAILS OF THE BLADE DESIGN, LOADS, COST, STRUCTURAL DAMAGE AND THE BLADE REPAIR ARE DISCUSSED.

1979-0491 LIPPERT J
WIND ROTOR AUTOMATIC AIR BRAKE.
U.S. PATENT NO. 4,180,372, DECEMBER 25, 1979. 8 P.

A SPRING-LOADED PIVOTING END PLATE IS DESCRIBED THAT IS HINGED SUCH THAT IT IS DEPLOYED BY CENTRIFUGAL FORCE INTO THE AIR-STREAM TO THEREBY ACT AS AN AERODYNAMIC BRAKE FOR WIND TURBINES IN OVERSPEED CONDITIONS. THE BRAKE HAS A STATIONARY PORTION FIXED ON THE TIP OF THE TURBINE ROTOR AND A PIVOTING PORTION HINGED FOR MOVEMENT WITH RESPECT TO THE FIXED PORTION. THE LONGITUDINAL CENTERLINE OF THE BRAKE COINCIDES WITH THE CHORD LINE OF THE TURBINE BLADE AND THE PIVOTING MOVEMENT IS ABOUT A HINGE AXIS THAT IS NORMAL TO THE ROTATIONAL PLANE OF THE TURBINE. THE PLANFORM OF THE BRAKE HAS A LOW ASPECT RATIO SHAPE WITH THE RATIO OF THE FORE AND AFT CHORDWISE LENGTH TO THE WIDTH BEING ONE OR GREATER. THE EDGES OF THE BRAKE IN THE NORMAL RUNNING CONDITION EXTEND BEYOND THE CONTOUR OF THE TURBINE BLADE TO SERVE AS AN END PLATE SUCH THAT THE AERODYNAMIC EFFICIENCY OF THE BLADE IS IMPROVED THEREBY. 13 CLAIMS.

1979-0492 LISSAMAN P B S
ENERGY EFFECTIVENESS OF ARBITRARY ARRAYS OF WIND TURBINES.
J. ENERGY 3(6): 323-328, NOVEMBER-DECEMBER 1979.

DETERMINATION OF POWER DEGRADATION DUE TO INTERFERENCE BETWEEN WIND TURBINES IN AN ARRAY IS OF IMPORTANCE IN THE ENGINEERING AND ECONOMIC PLANNING OF WIND FARMS. A COMPUTER MODEL FOR AN ARBITRARY ARRAY OF TURBINES IS DESCRIBED.

1979-0493 LISSAMAN P B S, HIBBS B, WALKER S N, ZAMBRANO T
DEFINITIVE GENERIC STUDY OF AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, APRIL 1979. 75 P.
SERI/TR-98003-1

A METHOD OF INCREASING THE POWER OUTPUT OF A WIND TURBINE IS TO ADD AN AUGMENTOR SYSTEM WHICH WILL ACT LIKE A CONVERGING DUCT TO INCREASE THE VELOCITY AT THE TURBINE DISK AND THUS INCREASE THE ENERGY FLUX THROUGH THE POWER EXTRACTION DEVICE. THE COST-EFFECTIVENESS OF SUCH SYSTEMS DEPENDS UPON THE TRADE-OFF BETWEEN THE ADDITIONAL ENERGY OUTPUT AND THE ADDED COST OF THE AUGMENTOR SYSTEM. THE REPORT STUDIES THE COST-EFFECTIVENESS OF THREE DIFFERENT TYPES OF AUGMENTORS.

1979-0494 LISSAMAN P B S, WILSON R E, THRESHER R W, WALKER S N
DEFINITIVE GENERIC STUDY FOR THE EFFECT OF HIGH LIFT AIRFOILS ON WIND TURBINE EFFECTIVENESS. EXECUTIVE SUMMARY. FINAL REPORT.
NTIS, MAY 1979. 93 P.
SERI/TR-98003-2

THE PURPOSE OF THIS PROJECT WAS TO STUDY THE EFFECT OF HIGH LIFT AIRFOILS ON THE COST-EFFECTIVENESS OF HAWT AND VAWT (HORIZONTAL AND VERTICAL AXIS WIND TURBINE) MACHINES. THE SCOPE INVOLVED FIRST STUDYING MODERN TWO-DIMENSIONAL AIRFOILS, AND DEVELOPING A GENERALIZED FORMULATION FOR THEIR PERFORMANCE IN TERMS OF LIFT, DRAG, AND THICKNESS AT APPROPRIATE REYNOLDS NUMBERS.

1979-0495 LISSAMAN P B S, WILSON R E, THRESHER R W, WALKER S N
DEFINITIVE GENERIC STUDY FOR THE EFFECT OF HIGH LIFT AIRFOILS ON WIND TURBINE COST EFFECTIVENESS.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 301-314.
SERI/TP-245-184, CONF-790501

THE EFFECT OF HIGH LIFT DEVICES ON THE SYSTEM COST-EFFECTIVENESS OF WIND TURBINES WAS STUDIED FOR THE CASE OF BOTH HORIZONTAL AXIS AND VERTICAL AXIS MACHINES. A COMPREHENSIVE REVIEW OF THE VARIOUS TYPES OF HIGH LIFT AIRFOIL SECTIONS WAS PERFORMED WITH RESPECT TO GENERALIZED AERODYNAMIC PERFORMANCE AND STRUCTURAL CONSIDERATIONS. AIRFOILS HAVING PROMISE INCLUDED HIGH LIFT INCIPIENT SEPARATION SECTIONS, SYMMETRICAL HIGH LIFT AIRFOILS, AND EXTRA THICK DESIGNS.

1979-0496 LISSAMAN P B S, HIBBS B, WALKER S N, ZAMBRANO T G
A DEFINITIVE GENERIC STUDY OF AUGMENTED HORIZONTAL AXIS WIND ENERGY SYSTEMS.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 201-216.
SERI/TP-245-184, CONF-790501

AUGMENTOR SYSTEMS ARE INTENDED TO INCREASE THE ENERGY FLUX THROUGH A CONVENTIONAL WIND POWER EXTRACTION MACHINE ABOVE THAT ASSOCIATED WITH THE FREE-FLOW CONDITION. THE ULTIMATE COST-EFFECTIVENESS OF SUCH AUGMENTED SYSTEMS DEPENDS UPON THE TRADE-OFF BETWEEN ANY RESULTING INCREASE IN ENERGY OUTPUT AND THE ADDED COSTS ASSOCIATED WITH THE INSTALLATION OF THE AUGMENTORS THEMSELVES. TWO BASIC DESIGN CONSIDERATIONS ARE COMMON TO THE INSTALLATION AND OPERATION OF ALL AUGMENTORS. THESE ARE THE INCREASED FLOW SPEED (MASS FLUX) THROUGH THE POWER EXTRACTION DEVICE, AND THE AERODYNAMIC FORCE ON THE AUGMENTOR. TWO FUNDAMENTAL TYPES OF AUGMENTORS WERE CONSIDERED:

DYNAMIC, AND PASSIVE.

1979-0497 LITTLER J G F
THE AUTARKIC HOUSE (SOLAR ENERGY UTILISATION).
ELECTRON. POWER 25(7): 489-493, JULY 1979.

BY SYSTEMATICALLY INTRODUCING THE PRINCIPLES OF ENERGY CONSERVATION AND RECOVERY, AND THE USE OF SOLAR AND WIND POWER, ENERGY INDEPENDENT HOUSES CAN BE BUILT, EVEN IN CLOUDY BRITAIN. IN FACT, A CAMBRIDGE TEAM HAVE DESIGNED A HOUSE THAT WOULD BE COMPLETELY INDEPENDENT OF ALL MAIN SERVICES.

1979-0498 LOIS L
WIND ENERGY CONVERSION IN THE MW RANGE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 672-673.

THIS PAPER SUGGESTS THAT CERTAIN WIND PATTERNS ABOVE THE CONTINENTAL U.S. ARE PARTICULARLY SUITED FOR ELECTRIC POWER GENERATION USING WIND POWER PLANTS IN THE MW(E) RANGE. THE AUTHOR DESCRIBES A SYSTEM SPECIFICALLY DESIGNED FOR SUCH A PLANT AND PRESENTS CALCULATIONS TO SHOW THAT SUCH A SYSTEM IS WITHIN THE RANGE OF EXISTING TECHNOLOGY.

1979-0499 LOTH J L
TILTING WING OVERSPEED CONTROL FOR VERTICAL AXIS WIND TURBINES.
J. ENERGY 3(6): 375-377, NOVEMBER-DECEMBER 1979.

A SPEED CONTROL TECHNIQUE IS DESCRIBED FOR STRAIGHT BLADES WHICH ARE HINGED TO TILT IN THE PLANE PERPENDICULAR TO THE RADIAL ARM.

1979-0500 LOTKER M, SHAW R W, ADOLFSON W F, BERNARDI R P
ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, CO., FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 99-141.
RFP-3014(VOL.2)

THE PURPOSE OF THIS ASSESSMENT OF ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION IS TO: PROVIDE THE ANALYST WITH A SET OF TOOLS BY WHICH HE CAN ASSESS THE QUANTITATIVE IMPACT OF A WIDE VARIETY OF ECONOMIC INCENTIVES ON WECS USER ECONOMICS AND ON THE GOVERNMENT; AND UTILIZE THE TECHNIQUES DEVELOPED IN ORDER TO ANALYZE VARIOUS INCENTIVES AND PROVIDE RECOMMENDATIONS TO THE DEPARTMENT OF ENERGY (DOE) CONCERNING THE EFFECTIVENESS OF OPTIONS.

1979-0501 LOWE J E
THE MOD-2 WIND TURBINE.
AM. NUCL. SOC. TRANS. 33: 21-22, 1979.

THE MOD-2 IS A 300-FT-DIAM, 2.5 MW WIND TURBINE SYSTEM. THE OBJECTIVE OF THE PROGRAM IS TO DESIGN, FABRICATE, INSTALL, CHECK OUT, AND DELIVER A MEGAWATT-SIZE WIND TURBINE WHICH WILL BE ECONOMICALLY COMPETITIVE WITH CONVENTIONAL POWER GENERATING EQUIPMENT OPERATING IN UTILITY NETWORKS. SINCE THE START OF THE PROGRAM THE CONCEPTUAL, PRELIMINARY, AND DETAIL DESIGN PHASES HAVE BEEN COMPLETED AND FABRICATION HAS STARTED. INITIAL ROTATION WILL TAKE PLACE IN MID-1980.

1979-0502 LOWE J E, ENGLE W W
MOD-2 WIND TURBINE--STATUS AND OUTLOOK.
ENERGY TECHNOLOGY CONFERENCE, 6TH, WASHINGTON, D.C., FEBRUARY 26-28, 1979. ENERGY TECHNOLOGY VI: ACHIEVEMENTS IN PERSPECTIVE. WASHINGTON, D.C., GOVERNMENT INSTITUTES, 1979. P. 982-991.

A DESCRIPTION IS GIVEN OF THE DEVELOPMENT OF THE MOD-2 WIND TURBINE, AND THE OUTLOOK FOR ITS FUTURE COMMERCIAL APPLICATION.

1979-0503 LOWE J E, ENGLE W W
MOD-2 WIND TURBINE.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 318-331.
CONF-790352

A DESCRIPTION IS PRESENTED OF THE DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM, AND THE OUTLOOK FOR ITS FUTURE COMMERCIAL APPLICATION IS DISCUSSED.

1979-0504 LUDWIG D
DYNAMICS OF WIND TURBINE ROTOR BLADES.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 139-159.
JUEL-SPEZ-28

BASED ON THE EIGENANALYSIS OF WIND TURBINE ROTOR BLADES STABILITY AND RESPONSE CHARACTERISTICS CAN BE DETERMINED. THE STRUCTURE IS MODELED BY FINITE BEAM ELEMENTS, WHICH ARE SPECIALLY DEVELOPED FOR ROTATING BLADES. THE P-K METHOD WAS USED TO DETERMINE THE FLUTTER STABILITY. FINALLY, THE PROBLEM OF DISCRETE GUST LOADING IS CONSIDERED.

1979-0505 LUMSDAINE E, TAG I
500 GALLONS PER DAY HYBRID DESALINATION PLANT USING WIND/SOLAR ENERGY.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1512-1516.

AN ANALYSIS OF A MODULAR WIND/SOLAR DISTILLATION PLANT IS PRESENTED. THE DESIGN IS BASED ON A CONSTANT YEAR-ROUND DEMAND OF 500 GALLONS PER DAY. IN ARID AREAS WHERE WIND POWER IS AVAILABLE, COST ANALYSIS SHOWS THAT THE HYBRID SYSTEM IS ECONOMICALLY FEASIBLE COMPARED WITH ELECTRICITY WHICH COULD ONLY BE GENERATED FROM A CONVENTIONAL SOURCE SUCH AS A DIESEL ENGINE.

1979-0506 LUNDSAGER P, ASKEGAARD V, BJERREGAARD E
MEASUREMENTS OF PERFORMANCE AND STRUCTURAL RESPONSE OF THE DANISH 200 KW GEDSER WINDMILL.

IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 51-94.
JUEL-SPEZ-28

STATIC AND DYNAMIC MEASUREMENTS BEING PERFORMED ON THE 20 YEAR OLD DANISH GEDSER WINDMILL AS A PART OF THE DANISH GOVERNMENT AND UTILITY SPONSORED WIND POWER PROGRAM ARE DESCRIBED. THE DESIGN OF THE MILL, WHICH IN SEVERAL POINTS DIFFERS ESSENTIALLY FROM MOST MODERN DESIGNS, IS STILL OF INTEREST SINCE THE MILL HAS BEEN IN OPERATION DURING A 10 YEAR PERIOD WITHOUT MAJOR MECHANICAL TROUBLES. THE MAIN OBJECTIVES OF THE MEASUREMENTS ARE THE DETERMINATION OF THE POWER CURVE, THE STRUCTURAL RESPONSE ESPECIALLY OF THE ROTOR AND THE POWER QUALITY, BUT THE INSTRUMENTATION LAY-OUT ALSO AIMS AT OBTAINING RESULTS WHICH SHOULD BE USEFUL IN THE VERIFICATION OF MODELS FOR WINDMILL ANALYSIS.

1979-0507 LUNDSAGER P, CHRISTENSEN C J
INVESTIGATIONS OF STRUCTURAL DYNAMICS ON THE GEDSER WTG AND ON NEW DANISH WIND TURBINES.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 1-49.
JUEL-SPEZ-28

A SURVEY IS GIVEN ON ACTIVITIES OF RISOE NATIONAL LABORATORY RELATED TO STRUCTURAL DYNAMICS OF LARGE WTG'S. SINCE ONLY A FEW OF THE ACTIVITIES HAVE YET BEEN COMPLETED, THE PRESENTATION IS A REVIEW OF STATUS, PRELIMINARY CONCLUSIONS AND EXPERIENCE. THE TOPICS DEALT WITH IN THE PRESENTATION ARE: ANALYSIS OF PROTOTYPE WTG ROTORS; ANALYSIS OF THE GEDSER WTG ROTOR; AND MEASUREMENTS ON THE GEDSER WTG. INVESTIGATIONS BEING MADE OF THE POWER TRAIN OSCILLATIONS IN THE GEDSER WTG ARE DEALT WITH IN SOME DETAIL.

1979-0508 LUNDSAGER P
MEASUREMENT SYSTEM USED AT THE GEDSER WINDMILL. PURPOSE, PERFORMANCE AND EXPERIENCE.
RISO NATL. LAB. REP. RISO-M-2197, DECEMBER 1979. 38 P.
RISO-M-2197

THE PAPER SUMMARIZES THE EXPERIENCE GATHERED WITH THE MEASUREMENT SYSTEM USED IN A SERIES OF MEASUREMENTS MADE ON THE GEDSER WINDMILL DURING THE PERIOD OCT. 1977-APR. 1979. THE LAYOUT OF THE SYSTEM AND THE MEASUREMENT PROCEDURES USED ARE DESCRIBED, AND THE PERFORMANCE OF THE SYSTEM IS EVALUATED.

1979-0509 LYNETTE R, POORE R
MOD-2 FAILURE MODE AND EFFECTS ANALYSIS.
NTIS, JULY 1979. 300 P.
DOE/NASA/0002-79/1, NASA-CR-159632, N79-30415

THE REPORT CONTAINS THE RESULTS OF A FAILURE MODE AND EFFECTS ANALYSIS OF THE MOD-2 WIND TURBINE. THIS WORK WAS PERFORMED BY THE BOEING ENGINEERING AND CONSTRUCTION COMPANY, A DIVISION OF THE BOEING COMPANY, AS A PART OF CONTRACT DEN 3-2 TO DESIGN AND BUILD THREE 300 FOOT DIAMETER, 2500 KWE, WIND TURBINES.

1979-0510 MASEC SETS UTILITY SWECS STUDIES.
WIND ENERGY REP.: 12, OCTOBER 1979.

1979-0511 MW-SCALE TURBINE FOR MEDICINE BOW.
WIND POWER DIG. NO. 17: 16-17, FALL 1979.

1979-0512 MCCONNELL R D
GIROMILL OVERVIEW.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 319-334.
SERI/TP-245-184, CONF-790501

THE GIROMILL IS A VERTICAL AXIS WIND TURBINE HAVING STRAIGHT AIRFOILS WHOSE ANGLES OF ATTACK ARE CONTROLLED SO AS TO MAXIMIZE WIND ENERGY CONVERSION. EACH AIRFOIL IS ROCKED DURING A REVOLUTION IN ORDER TO MAINTAIN A CONSTANT POSITIVE ANGLE OF ATTACK OVER ONE HALF REVOLUTION AND A CONSTANT NEGATIVE VALUE OVER THE OTHER HALF REVOLUTION. THIS PAPER PRESENTS AN EVALUATION OF THE GIROMILL CONCEPT IN TERMS OF SOME WIND ENERGY RULES-OF-THUMB.

1979-0513 MCEVILY A J
FRETTING AND FATIGUE IN WIND ENERGY SYSTEMS.
RELIABILITY OF MATERIALS FOR SOLAR ENERGY WORKSHOP. DENVER, COLORADO, DECEMBER 18, 1979. NTIS, OCTOBER 1979. VOL. 2, PT. 2, P. 587-597.
SERI/TP-31-248(VOL.2)(PT.2)

THE SUCCESSFUL DESIGN OF A WIND ENERGY SYSTEM MUST TAKE INTO ACCOUNT THE FRETTING AND FATIGUE RESISTANCE OF THE MATERIALS UTILIZED. IN ORDER TO ILLUSTRATE THE NATURE OF THE DESIGN PROCEDURE AND THE TYPES OF MATERIALS INVOLVED, A PARTICULAR EXAMPLE WILL BE USED, NAMELY THE 150 FT WIND TURBINE BLADES DESIGNED AND FABRICATED BY THE KAMAN AEROSPACE CORPORATION FOR THE NASA LEWIS RESEARCH CENTER.

1979-0514 MCEWEN L B, SWAIN J W
INDUSTRIAL COMPRESSED AIR APPLICATIONS FOR SOLAR ENERGY CONVERSION/STORAGE DEVICES.
MECHANICAL AND MAGNETIC ENERGY STORAGE CONTRACTORS' REVIEW MEETING, WASHINGTON, D.C., AUGUST 19, 1979. NTIS, AUGUST 1979. P. 303-308.
CONF-790854

THE PURPOSE OF THIS STUDY WAS TO DETERMINE THE FEASIBILITY OF UTILIZING SOLAR ENERGY DEVICES AND COMPRESSED AIR ENERGY STORAGE TO SUPPLY POWER FOR INDUSTRIAL COMPRESSED AIR SYSTEMS. THE FULFILLMENT OF THIS EFFORT ENTAILED THE INDUSTRIAL COMPRESSED AIR CAPACITY, THE AMOUNT OF PLANT AIR NORMALLY USED, AND THE ENERGY REQUIRED TO PRODUCE THIS AIR. THE RESULTS PROVIDED A PERSPECTIVE FOR THE POTENTIAL ENERGY SAVINGS THAT MIGHT ACCRUE FROM SUBSEQUENT WORK.

1979-0515 MCGOWAN J G, MANWELL J F
ECONOMIC POTENTIAL OF RESIDENTIAL HEATING APPLICATIONS FOR WIND HEATING SYSTEMS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 159-174.
RFP-3014(VOL.2)

THE INITIAL RESULTS ARE PRESENTED OF AN ECONOMICS BASED STUDY TO DETERMINE THE FEASIBILITY OF USING WIND POWER FOR RESIDENTIAL HEATING APPLICATIONS FOR VARIOUS LOCATIONS AND WIND REGIMES IN THE UNITED STATES. THE WORK IS BASED ON ONGOING ANALYTICAL AND EXPERIMENTAL WORK CARRIED OUT AT THE UNIVERSITY OF MASSACHUSETTS/AMHERST. IN ADDITION TO SPECIALIZED CAPITAL COSTS AND LIFE CYCLE ECONOMICS REQUIRED FOR WIND HEATING SYSTEMS, A KEY INPUT TO THE ANALYSIS IS THE DETERMINATION OF THE FRACTION OF ENERGY THAT CAN BE SUPPLIED FROM THE WIND TURBINE COMPONENT. THE RESULTS PRESENTED IN THIS WORK ARE BASED ON THE USE OF DETAILED AND SIMPLIFIED WIND HEATING SIMULATION MODELS THAT ALLOW THE CALCULATION OF THE PERCENTAGE OF HEATING ENERGY SUPPLIED FROM THE WIND WITH A MINIMUM OF DESIGN SITE VARIABLES.

1979-0516 MCLENDON B D, ALLISON J M, RICE C E
TOTAL ENERGY MANAGEMENT SYSTEM.
ASAE PAPER 79-3001, 1979. 15 P.

A CONCEPTUAL MODEL OF AN ENERGY MANAGEMENT SYSTEM THAT PRIMARILY UTILIZES RENEWABLE ENERGY RESOURCES IS EVALUATED FOR A POULTRY PRODUCTION SYSTEM. IT IS SHOWN THAT A THERMAL STORAGE SYSTEM USING SOLAR ENERGY, WIND ENERGY, OFF-PEAK ELECTRICAL ENERGY AND DIRECT BIOMASS COMBUSTION CAN PROVIDE AN ECONOMICAL ALTERNATIVE TO LIQUIFIED PETROLEUM GAS.

1979-0517 MCPHILLIPS M, ANDERSON B
THE SOLAR AGE RESOURCE BOOK.
NEW YORK, EVEREST HOUSE, 1979. 242 P.

A SERIES OF ARTICLES ON A VARIETY OF ASPECTS OF SOLAR ENERGY UTILIZATION ACCOMPANIES BUYERS GUIDES TO WOOD STOVES, WIND PRODUCTS, AND SOLAR ENERGY PRODUCTS. THE ARTICLES DISCUSS MICROCLIMATE, VARIOUS SOLAR HEATING DESIGNS, AND STORAGE DESIGNS, SOLAR ENERGY EDUCATION, REQUIRED CALCULATIONS, GLAZING MATERIALS, SOLAR WATER HEATING, AND PHOTOVOLTAICS. THE BUYER'S GUIDE SECTION INCLUDES PURCHASING INFORMATION ON ALL THE COMPONENTS OF SOLAR ENERGY SYSTEMS, WIND POWER, AND WOOD STOVES.

1979-0518 MA F S
DISTRIBUTION PLANNING PERSPECTIVE ON THE INTERCONNECTION OF SMALL WIND SYSTEMS WITH AN ELECTRIC UTILITY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES. BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 34-44.
RFP-3014(VOL.2)

SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) INTERCONNECTED WITH A UTILITY GRID MAY SIGNIFICANTLY AFFECT THE NEED FOR TRANSMISSION AND DISTRIBUTION SYSTEMS INVESTMENT. THE STUDY OF THE INTERCONNECTION IMPACT ON UTILITY SYSTEMS IS NOT ONLY IMPORTANT TO THE UTILITY PLANNERS AND OPERATORS BUT ALSO CRUCIAL TO THE DEVELOPMENT OF EQUITABLE RATE STRUCTURES FOR SWECS USERS WHO MAY REQUIRE UTILITY BACKUP POWER. THE INTEGRATION PROBLEMS AND ISSUES FROM A DISTRIBUTION PLANNING PERSPECTIVE ARE DESCRIBED. A METHODOLOGY WAS DEVELOPED AND APPLIED ON DISTRIBUTION SYSTEMS IN AN EARLIER STUDY TO EVALUATE THE IMPACT OF DISPERSED STORAGE AND GENERATION (DSG) ON DISTRIBUTION SYSTEM PLANNING AND OPERATIONS.

1979-0519 MACHENS U
MEASUREMENTS ON A 15-KW WIND POWER INSTALLATION.
BRENNST.-WAERME-KRAFT 31(11): 437-440, NOVEMBER 1979. (IN GERMAN)

THE BW 150 INSTALLATION WHICH IS COUNTED IN THE SMALL WIND POWER INSTALLATIONS RANGE PRODUCES THE ELECTRICAL ENERGY WITH ASYNCHRONOUS GENERATORS AND SUPPLIES IT INTO THE GRID, WHEN WIND CONDITIONS ARE SUFFICIENT. THE FAST ROTOR WITH THREE WINGS ON HORIZONTAL AXIS AND 15 M WING CIRCLE DIAMETER HAS BEEN INVESTIGATED IN AN EXTENSIVE MEASUREMENT PROGRAM. THE ARTICLE DESCRIBES THE WIND POWER INSTALLATION, THE METER EQUIPMENT AND FIRST MEASURING RESULTS AFTER 300 HOURS OPERATION.

1979-0520 MACKLIS S L, OPLINGER J L
ASSESSMENT OF WIND ENERGY SYSTEMS IN A UTILITY FRAMEWORK.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 319-324.

THIS PAPER EXAMINES THE TECHNICAL AND ECONOMIC ASPECTS OF THE APPLICATION OF WIND ENERGY SYSTEMS IN A UTILITY GRID. EMPHASIS IS PLACED ON WIND CHARACTERISATION FOR SPECIFIC SITES, CHARACTERISATION OF OPTIMIZED WIND TURBINES FOR SPECIFIC SITES, THE INTERFACE WITH THE UTILITY IN TERMS OF MATCHING LOAD AND WIND AVAILABLE ENERGY PROFILES, AND THE TECHNICAL AND ECONOMIC ANALYSIS OF THE UTILITY SYSTEM INCORPORATING VARIOUS PERCENTAGES OF WIND ENERGY. RESULTS ARE SHOWN IN TERMS OF FUEL SAVINGS AND ECONOMIC BENEFIT FOR THE DIFFERENT UTILITIES AND WIND REGIMES.

1979-0521 MAHRT L, HEALD R C
ANALYSIS OF STRONG NOCTURNAL SHEARS FOR WIND MACHINE DESIGN. PROGRESS REPORT.
NTIS, DECEMBER 1979. 64 P.
DOE/ET/23116-79-1

ANALYSIS OF DATA AT WANGARA AND SEVERAL SITES OVER THE PLAINS REGIONS OF THE U.S. INDICATES THAT WIND SPEEDS AND SHEARS IN THE NOCTURNAL BOUNDARY LAYER ARE CONSIDERABLY GREATER THAN EARLIER ESTIMATES FROM SURFACE OBSERVATIONS AND FROM USE OF THE CONVENTIONAL POWER LAW. A NEW FORMAT FOR REPRESENTATION OF STATISTICS OF THE VERTICAL STRUCTURE OF WINDS IS DEVELOPED AND FOUND TO SUCCESSFULLY DESCRIBE MEAN PROFILES FOR THE VARIOUS STABILITY CLASSES. DATA IS ALSO ANALYZED TO DETERMINE THE PHYSICAL CAUSES OF THE STRONG NOCTURNAL ACCELERATIONS AND ATTENDANT LOW-LEVEL JET.

1979-0522 MANSOUR W M, HIRATE M H
DESIGN AND PERFORMANCE OF BICYCLE WIND TURBINE ROTORS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 308-311.

A NEW ARRANGEMENT OF THE SPOKES IS PRESENTED AND COMPARED WITH THE CURRENTLY AVAILABLE BICYCLE ROTORS. THE NEW ARRANGEMENT ALLEVIATES THE PROBLEMS EXISTING IN THE PRESENT DESIGN. A STRESS AND AERODYNAMIC ASSESSMENT IS FULLY DEVELOPED FOR THE NEW CONFIGURATION. THE BICYCLE ROTOR IS TO OPERATE ON A VERTICAL-AXIS MACHINE. THE WIND-DEFLECTOR IS DESIGNED AND TESTED IN THE WIND TUNNEL. SAMPLE RESULTS ARE PRESENTED WITH AN OVERALL ASSESSMENT OF THE PERFORMANCE. QUALITATIVE TUFT-TESTS SHOWS THE EXISTENCE OF A BACK FLOW WHICH ENHANCES THE PERFORMANCE.

1979-0523 MANSURE A J
FEASIBILITY STUDY OF A SMALL PUMPED AQUIFER STORAGE SYSTEM FOR SOLAR AND WIND ENERGY.

MECHANICAL AND MAGNETIC ENERGY STORAGE CONTRACTORS' REVIEW MEETING, WASHINGTON, D.C., AUGUST 19, 1979. NTIS, AUGUST 1979. P. 295-302.
CONF-790854

THE TECHNICAL AND ECONOMIC FEASIBILITY OF STORING SURPLUS SOLAR AND WIND ENERGY IN RURAL LOCATIONS IS BEING INVESTIGATED FOR A SMALL HYDRO-MECHANICAL SYSTEM THAT PUMPS WATER FROM A SUBSURFACE AQUIFER TO A SURFACE RESERVOIR AND THEN RECOVERS THE ENERGY BY ALLOWING THE WATER TO RETURN TO THE AQUIFER. AN ANALYSIS OF RURAL USER ENERGY DEMANDS, INSTITUTIONAL AND LEGAL ISSUES, AND AQUIFER CHARACTERIZATION HAS BEEN COMPLETED.

1979-0524 MANWELL J F, MCGOWAN J G
DESIGN PROCEDURE FOR WIND POWERED HEATING SYSTEMS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2296-2300.

THIS PAPER PRESENTS A GENERALIZED DESIGN PROCEDURE FOR THE MONTH-BY-MONTH PREDICTION OF PERFORMANCE OF WIND POWERED RESIDENTIAL HEATING SYSTEMS. IN ITS INITIAL FORM, THE TECHNIQUE IS RESTRICTED TO THE SIMULATION OF RESIDENTIAL HEATING SYSTEMS USING CONVENTIONAL HORIZONTAL AXIS WIND TURBINES THAT DISSIPATE THEIR OUTPUT INTO WATER BASED THERMAL STORAGE SYSTEMS (VIA ELECTRICAL RESISTANCE HEATERS OR FLUID DISSIPATION DEVICES).

1979-0525 MARKS A M
WIND/ELECTRIC POWER TRANSDUCTION USING CHARGED AEROSOLS UNDER VARIOUS ATMOSPHERIC CONDITIONS.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 103-118.
SERI/TP-245-184, CONF-790501

EXPERIMENTAL DATA IS PRESENTED ON TWO METHODS OF PRODUCING A CHARGED AEROSOL UNDER ATMOSPHERIC CONDITIONS. A FIRST CHARGING METHOD UTILIZED A WATER JET IN AN ELECTRIC FIELD, ISSUING FROM A SMALL ORIFICE AND IMPACTED BY AN AIR JET ISSUING FROM ANOTHER SMALL ORIFICE. A SECOND PREFERRED CHARGING METHOD UTILIZED A WATER JET ONLY IN AN ELECTRIC FIELD. A CHARGED AEROSOL WAS PRODUCED IN A WIND TUNNEL USING THE FIRST METHOD AND MEASUREMENTS WERE TAKEN. THE ELECTRIC EFFICIENCY WAS 75 TO 97% WITH ATMOSPHERIC RELATIVE HUMIDITIES OF 25 TO 95% AND AIR TEMPERATURES OF 20 TO 40 DEGREES C, AT WIND SPEEDS OF 2.5 TO 15 M/S. THESE RESULTS DEMONSTRATE THE FEASIBILITY OF THE TRANSDUCTION OF WIND POWER TO ELECTRIC POWER USING A CHARGED AEROSOL.

1979-0526 MARLATT W E, TIERNEY P, MEILKE P, BAER M, CHILDS J
ASSESSMENT OF THE APPLICABILITY OF THE NATIONAL FIRE WEATHER DATA LIBRARY TO WIND ENERGY ANALYSES. FINAL REPORT.
NTIS, MAY 1979. 115 P.
PNL-2538

THE SPECIFIC SCOPE OF WORK FOR THIS EFFORT FOLLOWED THIS SEQUENCE: REVIEW OF THE FIRE WEATHER LIBRARY FOR STATIONS WITH USABLE RECORDS; DEVELOPMENT OF STATISTICAL SUMMARIES FOR SELECTED INDIVIDUAL STATIONS; SCREEN SUMMARIES FOR COMMON WINDY AREAS; DEVELOP STATISTICAL COMPARISONS OF FIRE WEATHER OBSERVATIONS PER DAY; DEVELOP FREQUENCY SPECTRA OF WIND PERIODS ABOVE THRESHOLD VALUES; AND ESTIMATE SEASONAL AND GEOGRAPHIC DISTRIBUTIONS OF WIND ENERGY. FOLLOWING DISCUSSIONS WITH THE PNL, EFFORTS FOR OBJECTIVE FOUR, THE COMPARISON OF ONE OBSERVATION PER DAY TO MULTIPLE OBSERVATIONS FOR THE SAME STATION, WERE DEFERRED UNTIL THE RESULTS FROM A SIMILAR STUDY AT NORTHWESTERN UNIVERSITY WERE AVAILABLE.

1979-0527 MARRS R W, GAYLORD D R
GUIDE TO THE INTERPRETATION OF WINDFLOW CHARACTERISTICS FROM EOLIAN LANDFORMS.
NTIS, APRIL 1979. 48 P.
RLO-2343-79/2

THIS GUIDE TO INTERPRETING EOLIAN LANDFORMS SUMMARIZES TECHNIQUES USED IN INTERPRETING WIND PATTERNS FROM EOLIAN FEATURES WHICH CAN BE REMOTELY IDENTIFIED AND MAPPED. THEY INCLUDE: INTERPRETATION OF WIND DIRECTION, WIND ENERGY, AND WIND VELOCITY FROM SAND DUNES AND DUNE FIELDS; INTERPRETATION OF WIND DIRECTION AND WIND VELOCITY FROM PLAYAS; AND INTERPRETATION OF WIND DIRECTION AND RELATIVE WIND VELOCITY FROM SCOUR STREAKS, DUST AND SMOKE PLUMES, VEGETATION STREAKS, AND SNOWDRIFTS.

1979-0528 MARSH W D, OPLINGER J L, DEMEO E A
A VALUE ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS.
AM. POWER CONF. PROC. 41: 507-514, 1979.

THIS PAPER IS BASED ON AN ELECTRIC POWER RESEARCH INSTITUTE RESEARCH PROJECT (RP740-1), BEGUN IN JULY OF 1976. THE INTENT OF THE STUDY WAS TO CONSIDER WIND POWER FROM THE PERSPECTIVE OF THE ELECTRIC UTILITY INDUSTRY, AND TO INVESTIGATE ITS POTENTIAL FOR BECOMING ULTIMATELY A VIABLE ADJUNCT TO CONVENTIONAL ELECTRIC POWER SOURCES. ONLY UTILITY OWNERSHIP AND CONTROL OF FACILITIES WAS ANALYZED. THE STUDY WAS CONDUCTED IN TWO PHASES: FIRST, A CONSIDERATION OF MANY WIND TURBINE-GENERATOR (WTG) TYPES LEADING TO FIVE CANDIDATE MACHINES STUDIED IN DETAIL IN ONE UTILITY SITE; SECOND, THE EXTENSION OF THE STUDY TO TWO ADDITIONAL UTILITIES AND THREE SITES USING TWO OF THE FIVE CANDIDATE WTGS AS REFERENCE DESIGN. THE SPECIFIC STUDY OBJECTIVES ARE DETAILED.

1979-0529 MARSH W D
REQUIREMENTS ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS. VOL. 1: SUMMARY REPORT; VOL. 2: FINAL REPORT; VOL. 3: APPENDIXES.
SCHENECTADY, N.Y., GENERAL ELECTRIC (FOR ELECTRICAL POWER RESEARCH INSTITUTE), JANUARY 1979. ALSO: VOL.2, NTIS, JANUARY 1979. 339 P. VOL.3, NTIS, JANUARY 1979. 95 P.
EPRI-ER-978(V.1-3)

CONVENTIONAL UTILITY LOSS-OF-LOAD PROBABILITY AND PRODUCTION SIMULATION METHODS WERE USED, TOGETHER WITH A WIND TURBINE GENERATOR (WTG) PERFORMANCE MODEL DEVELOPED FOR THE STUDY. EVALUATIONS WERE BASED ON COMPARISON OF TOTAL UTILITY GENERATION SYSTEM COSTS WITH AND WITHOUT WIND PLANTS, AND WERE EXPRESSED IN TERMS OF WIND POWER PLANT VALUE AND COSTS. ENERGY VALUE IS PREDOMINANT. IN SOME FAVORABLE CONDITIONS OF WIND REGIME, UTILITY CHARACTERISTICS, AND ECONOMIC FRAMEWORK, IT IS ALONE SUFFICIENT TO OVERCOME ESTIMATED COST. THE VALUE OF WIND POWER PLANTS IS WIDELY VARIABLE. IT DEPENDS UPON WIND REGIME, WTG DESIGN, UTILITY SYSTEM CHARACTERISTICS, AND ECONOMIC FACTORS. THE EXISTENCE OF SYSTEM ENERGY STORAGE HAS LITTLE EFFECT ON WIND POWER PLANT VALUE. OF THE GENERIC MACHINE DESIGNS IN STUDY, THE LARGE (1500-2000 KW), HORIZONTAL AXIS, CONSTANT SPEED WTG IN A CENTRAL STATION CONFIGURATION APPEARED TO HAVE THE MOST POTENTIAL FOR VIABILITY IN ELECTRIC UTILITY SYSTEMS.

1979-0530 MARSH W D
REQUIREMENTS ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 110-124.

CONF-790352

A BRIEF REPORT IS PRESENTED FOR THE PROCEDURES AND RESULTS OF A STUDY PERFORMED BY THE ELECTRIC UTILITY SYSTEMS ENGINEERING DEPARTMENT OF THE GENERAL ELECTRIC COMPANY FOR THE ELECTRIC POWER RESEARCH INSTITUTE UNDER CONTRACT RP740-1. THE MAJOR OBJECTIVE WAS TO DEVELOP A METHODOLOGY FOR STUDYING THE PERFORMANCE AND ECONOMIC REQUIREMENTS OF WIND PLANTS WHEN APPLIED TO ELECTRIC UTILITY POWER SYSTEMS. THE METHODOLOGY WAS THEN EXERCISED IN SEVERAL ACTUAL UTILITY SYSTEMS TO CONFIRM AND DEMONSTRATE ITS CAPABILITY. THIS STUDY HAS DEMONSTRATED THAT ESTABLISHED UTILITY GENERATION PLANNING METHODS CAN SUCCESSFULLY BE ADAPTED TO THE STUDY OF WIND POWER PLANTS. THE PROPER CRITERION FOR COMPARISON OF GENERATING UNITS IS TOTAL UTILITY SYSTEM COSTS, RECOGNIZING UNIT OPERATING FLEXIBILITY.

1979-0531 MARTIN P, BALMA M, CROOKS G
A FEASIBILITY STUDY OF WINDPOWER FOR THE NEW ENGLAND AREA.
NTIS, OCTOBER 1979. 244 P.
AD-A076614

SRI INTERNATIONAL EXAMINED THE APPLICABILITY OF LARGE-SCALE WINDPOWER ELECTRICITY GENERATING SYSTEMS (WEGS) AS AN ALTERNATIVE SOURCE OF ENERGY FOR THE NEW ENGLAND STATES IN GENERAL AND FOR THE U.S. NAVY PORTSMOUTH SHIPYARD AT KITTERY, MAINE, IN PARTICULAR. THE BOEING MOD 2 WIND MACHINE WAS SELECTED AS REPRESENTATIVE OF CURRENT TECHNOLOGY IN THE APPROPRIATE SIZE RANGE OF 2.5 MEGAWATTS (MW) RATED CAPACITY. PARAMETRIC ECONOMIC ANALYSES LED TO THE CONCLUSION THAT WEGS ELECTRICITY CAN BE AT ECONOMIC PARITY WITH THE INCREMENTAL ELECTRICITY FROM CONVENTIONAL GENERATORS USING OIL OR GAS WITHOUT ANY ALLOWANCE FOR A CAPACITY CREDIT, PROVIDED THAT THE ANNUAL UTILIZATION FACTOR FOR THE WEGS IS AT LEAST 50%. SUCH UTILIZATION APPEARS TO BE ACHIEVABLE AT ELEVATIONS BETWEEN 620 AND 1,240 M (2,000 AND 3,000 FT). ABOUT ONE-EIGHTH OF THE 35,500 SQ KILOMETERS OF AIR SPACE REVIEWED IN NEW HAMPSHIRE IS AT SUCH ELEVATIONS. NONUTILITY FINANCING AND CAPITALIZATION CAN HALVE THE COSTS OF WEGS ELECTRICITY. NONUTILITY OWNERSHIP OF WEGS IS ENCOURAGED BY RECENT STATE AND FEDERAL LEGISLATION. THE PRIMARY POTENTIAL WEGS ENVIRONMENTAL IMPACT, INTERFERENCE WITH TELEVISION RECEPTION, CAN BE MITIGATED BY INSTALLATION OF CABLE TV SERVICES.

1979-0532 MARWITZ J D, GILKEY K B
CATALOG OF AVAILABLE WIND DATA IN IDAHO, MONTANA AND WYOMING.
NTIS, FEBRUARY 1979. 42 P.
RLO-2343-79/1

A CATALOG OF AVAILABLE WIND DATA HAS BEEN ASSEMBLED FOR THE STATES OF IDAHO, MONTANA AND WYOMING. HOWEVER, THIS DATA SUMMARY DOES NOT INCLUDE THOSE DATA WHICH ARE IN THE NATIONAL CLIMATIC CENTER ARCHIVES NOR DOES IT INCLUDE THOSE WIND DATA COLLECTED BY THE U.S. FOREST SERVICE. SINCE 1970, APPROXIMATELY 100 NEW SURFACE ANEMOMETERS AND 12 TO 15 INSTRUMENTED TOWERS HAVE BEEN OPERATED FOR VARIOUS LENGTHS OF TIME. MOST OF THESE DATA ARE AVAILABLE FROM AREAS OF HIGH WIND AND AREAS WITH SIGNIFICANT NUMBERS OF EOLIAN FEATURES. ONLY A MINIMUM AMOUNT OF THESE DATA HAS BEEN ANALYZED AND THEN ONLY FOR SINGLE STATION CLIMATOLOGY.

1979-0533 MAUMUS J P
NEW ENERGIES IN TELECOMMUNICATIONS. AEROSOLEC STATION (SOLAR-WIND POWER).
PHOTOVOLTAIC SOLAR ENERGY CONFERENCE, 2D, BERLIN, APRIL 23-26, 1979. DORDRECHT, NETHERLANDS, D. REIDEL PUBL. CO., 1979. P. 1081-1086.

THIS PAPER DESCRIBES THE OPERATING PRINCIPLES AND COST ESTIMATES OF THE COMBINED SOLAR-WIND POWER STATION AEROSOLEC, DESIGNED FOR POWERING REMOTE MICROWAVE RELAY STATIONS.

1979-0534 MAUREL A
DESALINATION AND NOVEL ENERGY SOURCES.
DESALINATION 31(1-3): 489-499, OCTOBER 1979. (IN FRENCH)

THIS ARTICLE INVESTIGATES THE FEASIBILITY OF USING SOLAR OR WIND POWER FOR DESALINATION PLANTS USING THE REVERSE OSMOSIS PROCESS. TWO EXPERIMENTAL INSTALLATIONS ARE DESCRIBED. ONE HAS A CAPACITY OF 2.5 CU. METRES PER HOUR PRODUCTION FROM BRACKISH WATER AND UTILISES A SOLAR POWERED PUMP OF 2.5 KW. THE OTHER HAS A CAPACITY OF 0.5 CU. METRES PER HOUR FROM SEA WATER, AND USES A WIND POWERED PUMP WITH A 4 KW. MOTOR.

1979-0535 MAYER D J
DEVELOPMENT OF STANDARDS FOR PROFESSIONAL PRACTICE IN THE WIND INDUSTRY.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 175-180.
RFP-3014(VOL.2)

AT PRESENT, THERE ARE FOUR GROUPS DIRECTLY OR INDIRECTLY INVOLVED IN ESTABLISHING STANDARDS FOR SMALL WIND SYSTEMS. IN ADDITION TO STATE AND FEDERAL AGENCIES, THERE IS THE AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), AND THE AMERICAN WIND ENERGY ASSOCIATION (AWEA). EACH BRINGS UNIQUE CHARACTERISTICS TO THE STANDARDS DEVELOPMENT PROCESS AND, WHILE THEIR RELATIONSHIP IS STILL EVOLVING, IT PROMISES TO BE COMPREHENSIVE AND MUTUALLY SUPPORTIVE.

1979-0536 MAYS I D, HOLMES B A
COMMERCIAL DEVELOPMENT OF THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
INT. POWER GENERATION 2(6): 33-37, SEPTEMBER 1979.

WINDMILLS WERE ONCE A COMMON SIGHT ON LANDSCAPES THROUGHOUT THE WORLD. THE DAWN OF THE 20TH CENTURY WITH CHEAP FOSSIL FUELS, COAL AND OIL, TOGETHER WITH THE EXPANSION OF THE ELECTRICITY NETWORK BROUGHT A NEW WAY OF LIFE AND WINDMILLS DECLINED. WITH THE ENERGY CRISIS, HOWEVER, THERE HAS BEEN A RAPID INCREASE IN INTEREST IN RENEWABLE SOURCES OF ENERGY--SUN, WIND AND WAVES. THE U.K. FIRM OF P.I. SPECIALIST ENGINEERS HAS TAKEN A CONSIDERABLE INITIATIVE BY PRODUCING THE FIRST COMMERCIAL VARIABLE GEOMETRY VERTICAL AXIS WIND TURBINE (VGVAW) IN THE WORLD.

1979-0537 MEHRKAM 2 MW TO BE ERECTED IN PENNSYLVANIA.
WIND ENERGY REP.: 1, 7-10, DECEMBER 1979.

1979-0538 MEIER R W, MERSON T J
TECHNOLOGY ASSESSMENT OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, SEPTEMBER 1979. 48 P.
LA-8044-TASE, DOE/EV-0103

ENVIRONMENTAL DATA FOR WIND ENERGY CONVERSION SYSTEMS (WECS) HAVE BEEN GENERATED IN SUPPORT OF THE TECHNOLOGY

ASSESSMENT OF SOLAR ENERGY (TASE) PROGRAM. TWO CANDIDATES HAVE BEEN CHOSEN TO CHARACTERIZE THE WECS THAT MIGHT BE DEPLOYED IF THIS TECHNOLOGY MAKES A SIGNIFICANT CONTRIBUTION TO THE NATIONAL ENERGY REQUIREMENTS. ONE WECS IS A LARGE MACHINE OF 1.5-MW-RATED CAPACITY THAT CAN BE USED BY UTILITIES. THE OTHER WECS IS A SMALL MACHINE THAT IS CHARACTERISTIC OF UNITS THAT MIGHT BE USED TO MEET RESIDENTIAL OR SMALL BUSINESS ENERGY REQUIREMENTS. ENERGY STORAGE SYSTEMS ARE DISCUSSED FOR EACH MACHINE TO ADDRESS THE INTERMITTENT NATURE OF WIND POWER. MANY TYPES OF WECSS ARE BEING STUDIED AND A BRIEF REVIEW OF THE TECHNOLOGY IS INCLUDED TO GIVE BACKGROUND FOR CHOOSING HORIZONTAL AXIS DESIGNS FOR THIS STUDY. COST ESTIMATES HAVE BEEN MADE FOR BOTH LARGE AND SMALL SYSTEMS AS REQUIRED FOR INPUT TO THE STRATEGIC ENVIRONMENTAL ASSESSMENT SIMULATION (SEAS) COMPUTER PROGRAM. MATERIAL REQUIREMENTS, BASED ON CURRENT GENERATION WECSS, ARE DISCUSSED AND A GENERAL DISCUSSION OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH WECS DEPLOYMENT IS PRESENTED.

1979-0539 MENZIES R W, MATHUR R M
ALTERNATOR DESIGNS FOR DIRECT COUPLING TO VERTICAL AXIS WIND TURBINES.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXPOSITION, TORONTO, OCTOBER 2-4, 1979. CONFERENCE DIGEST. NEW YORK, IEEE, 1979. P. 32-33.

THE AUTHOR EXAMINES THE DESIRABLE PERFORMANCE SPECIFICATIONS OF DIRECT-DRIVE ALTERNATORS SUITABLE FOR MEETING DIVERSE LOAD REQUIREMENTS AND COMPARES ADAPTATIONS OF SEVERAL CONVENTIONAL ALTERNATORS WITH SEVERAL NOVEL DESIGNS.

1979-0540 MEYERER W, PAPROCKI S
GRAPHITE-ALUMINUM COMPOSITE TECHNOLOGY.
RELIABILITY OF MATERIALS FOR SOLAR ENERGY WORKSHOP, DENVER, COLORADO, DECEMBER 18, 1978. NTIS, OCTOBER 1979. VOL. 2, PT. 2, P. 599-612.
SERI/TP-31-248(VOL.2)(PT.2)

CONVENTIONAL AND ADVANCED FIBER-REINFORCED-NONMETAL MATRIX COMPOSITES ARE, AT PRESENT, HIGHLY COMPETITIVE WITH METAL-MATRIX COMPOSITES (MMCS) FROM THE STANDPOINTS OF DESIGN, CONFIDENCE, AND COST. THE SPECIFIC PROPERTIES OF TENSILE STRESS AND ELASTIC MODULUS OF CERTAIN FIBER-REINFORCED EPOXY COMPOSITES ARE EXTREMELY HIGH AND CAN BE EASILY UTILIZED IN APPLICATIONS IN WHICH AMBIENT TEMPERATURES PREVAIL AND IN ENVIRONMENTS OF LIMITED SEVERITY. METAL-MATRIX-COMPOSITE TECHNOLOGY IS PRESENTLY AT A POINT THAT IS COMPARABLE TO THE EARLY 1960S DEVELOPMENT OF NONMETALS COMPOSITES. IT IS IN ITS INFANCY, BUT IT IS RAPIDLY EMERGING FROM THAT STAGE AND DESERVES ATTENTION AS COMPLEMENTARY TECHNOLOGY. THE FACT OF ITS BEING COMPLEMENTARY IS OF GREAT IMPORTANCE. METAL-MATRIX-COMPOSITE TECHNOLOGY IS AN OFFSHOOT OF THE SAME DEVELOPMENT THAT PRODUCED GRAPHITE-EPOXY COMPOSITES AND IN THE FUTURE, MAY VERY WELL CARRY COMPOSITES INTO APPLICATIONS NOT FEASIBLE FOR PLASTICS.

1979-0541 MIKHAIL A S, JUSTUS C G
ANALYTICAL STUDIES OF WIND TURBINE TURNING CHARACTERISTICS.
NTIS, JUNE 1979. 26 P.
RLO-2439-79/3

DATA FROM 14 SITES WERE ARRANGED IN TIME-SERIES FORMAT FOR WIND SPEED AND DIRECTION. THE SITES WERE CHOSEN BASED ON THE AVAILABILITY OF HOURLY OBSERVATIONS AND SUITABILITY OF THE SITES FOR WIND ENERGY APPLICATIONS (HIGH WIND REGIMES). THE HOURLY TURNS OF THE WIND WERE SUMMED VECTORIALLY (CYCLONIC, OR COUNTERCLOCKWISE, TURNING DEFINED AS POSITIVE). MONTHLY AND ANNUAL CUMULATIVE TURNS AT EACH SITE WERE COMPUTED. TO SIMULATE THE PERFORMANCE OF ACTUAL WIND TURBINES, THRESHOLD WIND SPEED VALUES OF 0, 1, 2, 3, 4, 5, AND 6 M/S WERE CHOSEN. A THRESHOLD WIND SPEED IS DEFINED AS WIND SPEED BELOW WHICH THE WIND TURBINE IS NOT EXPECTED TO TURN WITH THE WIND.

1979-0542 MIKHAIL A S, JUSTUS C G
HEIGHT PROJECTION METHODS AND SENSITIVITY STUDY. TECHNICAL REPORT.
ATLANTA, GEORGIA, GEORGIA INSTITUTE OF TECHNOLOGY, 1979. 91 P. ALSO: NTIS, JUNE 1979. 91 P.
RLO/2439-79/2, DOE/ET/20355-T1

A BRIEF DESCRIPTION IS GIVEN OF THE DIFFERENT TECHNIQUES FOR HEIGHT PROJECTION OF WIND SPEED THAT HAVE BEEN DEVELOPED AT GEORGIA TECH. ONE OF THESE TECHNIQUES, THE SIMILARITY MODEL, IS BASED ON MONIN-OBUKHOV SIMILARITY THEORY. OTHER MODELS EXAMINED ARE THE EMPIRICAL VELOCITY-DEPENDENT POWER LAW MODEL (POWER LAW MODEL) AND THE SEMI-EMPIRICAL MODIFIED VELOCITY-DEPENDENT POWER LAW MODEL (MODIFIED POWER LAW MODEL). A DETAILED DESCRIPTION OF THE METHODOLOGIES IS GIVEN AND EXAMPLE APPLICATIONS ARE ILLUSTRATED, WITH ALL THE NECESSARY INPUT PARAMETERS TO THE MODELS.

1979-0543 MILLER D L
ESTIMATING THE WIND'S POTENTIAL FOR SMALL SCALE ENERGY GENERATION USING AVAILABLE LOCAL CLIMATOLOGICAL DATA.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 669-671.

1979-0544 MILLNER A R
FLYWHEELS FOR ENERGY STORAGE.
TECHNOL. REV. 82(2): 32-40, NOVEMBER 1979.

THE USE OF FLYWHEELS TO STORE SOLAR AND WINDPOWER ENERGY DURING OFF-PEAK PERIODS IS COMPATIBLE WITH THE CYCLICAL NATURE OF ELECTRIC POWER DEMAND. THE STORED ENERGY CAN BE DRAWN AS NEEDED AND ALLOW UTILITIES TO SHAVE THEIR PEAK DEMANDS. NONGRID-FLYWHEEL APPLICATIONS ARE APPROPRIATE FOR DEVELOPING COUNTRIES AND AS A WAY TO INTRODUCE AND COMMERCIALIZE SOLAR AND WIND SYSTEMS. THE USE OF CHEAP MATERIALS FOR STATIONARY DESIGNS IMPROVES THE ECONOMICS OF THESE APPLICATIONS. DESIGNS, MATERIALS, AND CONSTRUCTION DETAILS OF FLYWHEELS ARE GIVEN, USING SCHEMATIC AND BREAK-AWAY DIAGRAMS. THE LIFE-CYCLE COSTS FOR RESIDENTIAL USE OF FLYWHEELS ARE ESTIMATED FOR 1980 AND 1985 AND ARE SHOWN TO COMPARE FAVORABLY WITH THE COST OF BATTERY SYSTEMS.

1979-0545 MILLER R H
ON THE WEATHERVANING OF WIND TURBINES.
J. ENERGY 3(5): 319-320, SEPTEMBER-OCTOBER 1979.

THE ARTICLE DISCUSSES THE STATIC STABILITY CHARACTERISTICS OF HORIZONTAL-AXIS WIND TURBINES FREE TO PIVOT ABOUT A VERTICAL AXIS. THE STATIC STABILITY DETERMINES WHETHER THE WIND TURBINE WILL WEATHERVANE (HEAD INTO THE DIRECTION OF THE AMBIENT WIND) WHEN FREELY PIVOTED.

1979-0546 MINARDI J E, LAWSON M O, WATTENDORF F L
THIRD ANNUAL PROGRESS REPORT ON THE ELECTROFLUID DYNAMIC WIND GENERATOR. FINAL REPORT, SEPTEMBER 15, 1977 - SEPTEMBER 30, 1978.
NTIS, MAY 1979. 74 P.

COO-4130-2

THIS REPORT COVERS WORK DONE PRIMARILY DURING THE THIRD YEAR OF THE RESEARCH PROGRAM TITLED "ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATORS." THE OBJECTIVE OF THE PROGRAM IS TO CONDUCT RESEARCH LEADING TO THE DEVELOPMENT OF EFD WIND DRIVEN GENERATORS. IN SUCH GENERATORS, THE WIND BLOWS THROUGH SUITABLY ORIENTED ARRAYS OF ELECTRODES, TRANSPORTS CHARGED PARTICLES AGAINST AN ELECTRICAL POTENTIAL GRADIENT, AND THEREBY GENERATES ELECTRICAL POWER DIRECTLY WITHOUT MOVING PARTS. THIS CONCEPT PROMISES A SIMPLER, LESS EXPENSIVE SYSTEM, FREE OF FRONTAL AREA AND VELOCITY LIMITATIONS OF CONVENTIONAL ROTATING WECS. FOR THE EFD WIND DRIVEN GENERATOR, THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE CAN BE REALIZED.

1979-0547 MINARDI J E, LAWSON M O
ELECTROFLUID (EFD) WIND DRIVEN GENERATOR.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 89-102.
SERI/TP-245-184, CONF-790501

THE ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS. CONVENTIONAL WIND TURBINES ARE CURRENTLY LIMITED IN SIZE, WITH THE GREATEST DIAMETER PRESENTLY ENVISAGED BEING 300-400 FEET. FOR THE EFD WIND DRIVEN GENERATOR THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE AND FAR LARGER POWERS THAN FROM CONVENTIONAL SYSTEMS CAN BE REALIZED. ANALYSES PREDICT FAVORABLE PERFORMANCE CHARACTERISTICS FOR EFD WIND GENERATORS; HOWEVER, SPECIFIC EXPERIMENTAL DATA HAVE BEEN LACKING. RESEARCH AREAS PRESENTLY BEING EMPHASIZED ARE DISCUSSED AND PERFORMANCE OF EXPERIMENTAL ARRAYS UNDER TEST IN AN EIFFEL-TYPE WIND TUNNEL ARE ALSO DISCUSSED.

1979-0548 MOBERG E
EVALUATION OF THE WORK WITHIN THE FIELD OF WIND ENERGY.
NTIS, MARCH 1979. 111 P. (IN SWEDISH)

A CAREFUL ANALYSIS OF THE WORK GOING ON DURING 1975 TO 1978 WITHIN THE FIELD CONCERNING THE INTRODUCTION OF WIND ENERGY IN SWEDEN IS MADE. SUGGESTIONS FOR THE PLANNING AND PERFORMANCE OF FUTURE WORK IN THIS FIELD ARE ALSO GIVEN.

1979-0549 MOD 1 WIND TURBINE GENERATOR FAILURE MODES AND EFFECTS ANALYSIS.
NTIS, FEBRUARY 1979. 99 P.
NASA-CR-159494, DOE/NASA/0058-79/1

A FAILURES MODES AND EFFECTS ANALYSIS (FMEA) WAS PERFORMED FOR THE MOD 1 WIND TURBINE GENERATOR. THE ANALYSIS WAS DIRECTED PRIMARILY AT IDENTIFYING THOSE CRITICAL FAILURE MODES THAT WOULD BE HAZARDOUS TO LIFE OR WOULD RESULT IN MAJOR DAMAGE TO THE SYSTEM. EACH SUBSYSTEM WAS APPROACHED FROM THE TOP DOWN, AND BROKEN DOWN TO SUCCESSIVE LOWER LEVELS WHERE IT APPEARED THAT THE CRITACALITY OF THE FAILURE MODE WARRANTED MORE DETAIL ANALYSIS. THE RESULTS WERE REVIEWED BY KNOWLEDGEABLE SPECIALISTS FROM OUTSIDE THE MOD 1 PROGRAM, AND CORRECTIVE ACTION TAKEN WHENEVER RECOMMENDED.

1979-0550 MOD-1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT.
NTIS, MARCH 1979. 320 P.
DOE/NASA/0058-79/2 - VOL. I, NASA-CR-159495

THE MOD 1 PROGRAM IS BEING CONDUCTED IN SIX PHASES: ANALYSIS AND PRELIMINARY DESIGN (CULMINATING IN A PRELIMINARY DESIGN REVIEW), DETAIL DESIGN (ENDING WITH A FINAL DESIGN REVIEW), FABRICATION AND ASSEMBLY, SYSTEM TESTING, SITE PREPARATION, AND INSTALLATION AND CHECKOUT. MAJOR MILESTONE DATES FOR THESE PHASES ARE SHOWN IN TABLE 1-1. THIS REPORT IS INTENDED TO DESCRIBE ONLY THE RESULTS OF THE FIRST TWO PHASES; THAT IS, ACTIVITIES LEADING TO THE COMPLETION OF DETAIL DESIGN. ALTHOUGH THIS REPORT PLACES EMPHASIS ON A DESCRIPTION OF THE DESIGN AS IT FINALLY EVOLVED, IT ALSO TRACES THE STEPS THROUGH WHICH THE DESIGN PROGRESSED IN ORDER TO UNDERSTAND THE MAJOR DESIGN DECISIONS.

1979-0551 MOD 1 WIND TURBINE GENERATOR ANALYSIS AND DESIGN REPORT: EXECUTIVE SUMMARY.
NTIS, MAY 1979. 61 P.
NASA-CR-159497, DOE/NASA/0058-79/3

THE MOD 1 PROGRAM IS BEING CONDUCTED IN SIX PHASES: ANALYSIS AND PRELIMINARY DESIGN (CULMINATING IN A PRELIMINARY DESIGN REVIEW), DETAIL DESIGN (ENDING WITH A FINAL DESIGN REVIEW), FABRICATION AND ASSEMBLY, SYSTEM TESTING, SITE PREPARATION, AND INSTALLATION AND CHECKOUT. MAJOR MILESTONE DATES FOR THESE PHASES ARE SHOWN. THIS REPORT IS INTENDED TO DESCRIBE ONLY THE RESULTS OF THE FIRST TWO PHASES; THAT IS, ACTIVITIES LEADING TO THE COMPLETION OF DETAIL DESIGN. ALTHOUGH THIS REPORT PLACES EMPHASIS ON A DESCRIPTION OF THE DESIGN AS IT FINALLY EVOLVED, IT ALSO TRACES THE STEPS THROUGH WHICH THE DESIGN PROGRESSED IN ORDER TO UNDERSTAND THE MAJOR DESIGN DECISIONS.

1979-0552 MOD-2 WIND TURBINE SYSTEM CONCEPT AND PRELIMINARY DESIGN REPORT. VOLUME 2: DETAILED REPORT.
NTIS, JULY 1979. 269 P.
NASA-CR-159609, DOE/NASA-0002-80/2(VOL.2), N80-26775/0

THE CONFIGURATION DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM (WTS) IS DOCUMENTED. THE MOD-2 WTS PROJECT IS A CONTINUATION OF DOE PROGRAMS TO DEVELOP AND ACHIEVE EARLY COMMERCIALIZATION OF WIND ENERGY. THE MOD-2 IS DESIGN OPTIMIZED FOR COMMERCIAL PRODUCTION RATES WHICH, IN MULTIUNIT INSTALLATIONS, WILL BE INTEGRATED INTO A UTILITY POWER GRID AND ACHIEVE A COST OF ELECTRICITY AT LESS THAN FOUR CENTS PER KILOWATT HOUR.

1979-0553 MOD-2 WIND TURBINE SYSTEM CONCEPT AND PRELIMINARY DESIGN REPORT. VOLUME 1. EXECUTIVE SUMMARY.
NTIS, JULY 1979. 27 P.
DOE/NASA/0002-80/2, NASA-CR-159609

THE CONFIGURATION DEVELOPMENT OF THE MOD-2 WIND TURBINE SYSTEM IS PRESENTED. THE MOD-2 IS DESIGN OPTIMIZED FOR COMMERCIAL PRODUCTION RATES WHICH, IN MULTIUNIT INSTALLATIONS, WILL BE INTEGRATED INTO A UTILITY POWER GRID AND ACHIEVE A COST OF ELECTRICITY AT LESS THAN 4 CENTS PER KILOWATT HOUR.

1979-0554 MODARRESS D
RURAL ELECTRIFICATION: A CASE STUDY FOR WIND ENERGY IN IRAN.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 684-686.

1979-0555 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. WIND STATISTICS SUMMARIES FOR THE WIND POWER DATA STATIONS.

NTIS, OCTOBER 1979. 79 P.
DOE/BP/01310-T1(APP.2)

DATA ARE PRESENTED FROM WIND MONITORING STATIONS LOCATED IN WASHINGTON AND OREGON.

1979-0556 MOMENT R L
NEW DEVELOPMENTS IN WIND SYSTEMS TECHNOLOGY.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 551-554.

THIS PAPER DESCRIBES THE DESIGN CRITERIA AND DEVELOPMENT OF SMALL WIND ENERGY CONVERSION SYSTEMS. DESIGN DETAILS, GENERAL APPLICATIONS AND REQUIREMENTS ARE PRESENTED ON THE 1-2 KW, 8 KW AND 40 KW SYSTEMS.

1979-0557 MOMENT R L
NEW DEVELOPMENTS IN WIND SYSTEMS TECHNOLOGY.
NTIS, 1979. 22 P.
CONF-791204-20, RFP-3000

THIS PAPER DESCRIBES THE DEVELOPMENT PROGRAMS FOR U.S. WIND TURBINES UNDER 100 KW OUTPUT.

1979-0558 MOURNING P, GLENN B, RUBIN S A, SHOEMAKER F F, SOTO R
TECHNICAL INFORMATION DISSEMINATION PLAN FOR THE U.S. DEPARTMENT OF ENERGY, ETS/SOLAR DIVISIONS.
NTIS, JANUARY 1979. 74 P.
SERI/SP-69-071

A PLAN FOR A TECHNICAL INFORMATION DISSEMINATION (TID) PROGRAM FOR THE U.S. DEPARTMENT OF ENERGY ETS/DIVISION OF RESOURCE MANAGEMENT IS PRESENTED. THIS PLAN'S PURPOSE IS TO BUILD THE MOST EFFECTIVE INFORMATION TRANSFER MECHANISMS POSSIBLE TO SUPPORT THE EARLIEST APPROPRIATE COMMERCIALIZATION OF SOLAR RESEARCH AND DEVELOPMENT (R AND D) RESULTS IN FIVE TECHNOLOGIES: PHOTOVOLTAICS, SOLAR THERMAL POWER, BIOMASS, OCEAN THERMAL ENERGY CONVERSION, AND WIND ENERGY CONVERSION.

1979-0559 MYSELS K J
WIND DRIVEN POWER APPARATUS.
U.S. PATENT NO. 4,164,382, AUGUST 14, 1979. 10 P.

A WIND DRIVEN POWER APPARATUS FOR CONVERTING WIND TO MECHANICAL ENERGY IS DISCLOSED WHICH INCLUDES A FIXED AXIS TURBINE SUPPORTED CENTRALLY OF A FIXED AIR GUIDE DEFINING A PLURALITY OF HORIZONTAL AIR PASSAGES DISPOSED CIRCUMFERENTIALLY OF THE TURBINE AND EACH BEING ADAPTED TO RECEIVE AN AIR STREAM THEREIN COMING FROM A LIMITED RANGE OF WIND DIRECTIONS AND EFFECT ACCELERATED AIR FLOW TOWARD THE TURBINE. IN ONE EMBODIMENT, AN AIR GUIDE BLOCK IS DISPOSED CIRCUMFERENTIALLY OF THE TURBINE AND IS ROTATABLE ABOUT THE AXIS OF THE TURBINE TO DIRECT ACCELERATED AIR FLOW TO THE TURBINE FROM THE WINDWARDLY FACING ONES OF THE AIR PASSAGES, WHILE IN ALTERNATIVE EMBODIMENTS MEANS ARE PROVIDED FOR SELECTIVELY CLOSING OFF THE AIR PASSAGES SO THAT ACCELERATED AIR FLOW FROM SELECTED AIR PASSAGES IS DIRECTED TO THE TURBINE.

1979-0560 NARAYANAN M A B
TWIN TURBINE VORTEX WIND MILL.
NTIS, AUGUST 1979. 8 P.
NP-24105

THE TWIN TURBINE VORTEX WIND MILL CONSISTS OF A PAIR OF MULTIBLADED ROTORS PLACED AT THE ENDS OF A HOLLOW CYLINDRICAL CAGE WHICH IS SPECIALLY DESIGNED TO PRODUCE VORTEX MOTION. BOTH THE TURBINES ARE COUPLED TO A SINGLE VERTICAL SHAFT FROM WHICH ROTARY MECHANICAL POWER COULD BE EXTRACTED. ON ACCOUNT OF THE REASONABLY HIGH ROTATIONAL SPEED, THIS WIND MILL IS SUITABLE FOR DIRECT GENERATION OF ELECTRICITY.

1979-0561 NEAL D
WIND FLOW AND STRUCTURE OVER GEBBIES PASS, NEW ZEALAND: A COMPARISON BETWEEN A WIND TUNNEL SIMULATION AND FIELD MEASUREMENTS. VOLUMES 1 AND 2. PH.D THESIS.
CHRISTCHURCH, NEW ZEALAND. UNIVERSITY OF CANTERBURY. DECEMBER 1979. VOLUME 1-249 P. VOLUME 2-263 P.

PRESENTED HERE ARE THE RESULTS OF A STUDY TO SHOW THE VALIDITY OF USING WIND TUNNEL MODELLING TO PREDICT THE WIND FLOW OVER A COMPLEX TERRAIN SITUATION. A WIND TUNNEL TRAVERSING SYSTEM WHICH IS PARTICULARLY SUITABLE FOR FLOW MEASUREMENTS OVER TOPOGRAPHICAL MODELS IS DESCRIBED. THE MODEL WAS TESTED IN THREE FORMS OF CONSTRUCTION; TERRACED, CONTOURED, AND WITH SHELTERBELTS AND SCRUB AREAS ADDED. THE RESULTS OF THE WIND TUNNEL TESTS ARE PRESENTED IN THE FORM OF ISOTACH AND ISOTURB CONTOURS FOR LATERAL AND LONGITUDINAL CROSS SECTIONS THROUGH THE MODELS.

1979-0562 NELLUMS R O, WORSTELL M H
TEST RESULTS OF THE DOE-SANDIA 17 METER VAWT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 173-184.
NASA-CP-2106

THE DOE-SANDIA 17 METER WIND TURBINE BEGAN COLLECTING OPERATIONAL DATA ON MARCH 29, 1977. SINCE THEN, OPERATION HAS BEEN CONDUCTED ON A VARIETY OF ROTOR AND DRIVE TRAIN CONFIGURATIONS. THE PRESENT LOG OF OVER 530 HOURS IS AN IMPORTANT MEANS OF VALIDATING THEORETICAL CALCULATIONS AND PROVIDING OPERATING EXPERIENCE. THIS REPORT WILL CONTAIN A BRIEF REVIEW OF THE TEST PROGRAM FOLLOWED BY A PRESENTATION OF THE PERFORMANCE RESULTS AND THEIR SIGNIFICANCE. THEN, IN ORDER TO PROVIDE THE READER WITH AN APPRECIATION OF THE 17 METER OPERATING EXPERIENCE, THIS REPORT WILL CLOSE WITH A DISCUSSION OF THE OPERATIONAL DIFFICULTIES OCCURRING SINCE THE FIRST TURN 2 YEARS AGO.

1979-0563 NEW FLUID BATTERY PROMISES CHEAPER ELECTRICITY STORAGE.
PUBLIC UTIL. FORTN. 103(9): 65-66, 68, APRIL 26, 1979.

THE REDOX ENERGY STORAGE SYSTEM PROMISES MAJOR COST REDUCTIONS IN THE STORING OF ELECTRICAL ENERGY AS WELL AS LONG-TERM RELIABILITY AND MINIMAL ENVIRONMENTAL IMPACT. THE NEW NASA SYSTEM COULD BE SCALED UP IN THE NEXT SEVERAL YEARS, DEPENDING ON FUNDING, TO PROVIDE ELECTRICAL POWER COMPANIES WITH AN EFFICIENT MEANS OF LOAD LEVELING--THE STORING OF THOUSANDS OF KWH OF ENERGY DURING LOW DEMAND PERIODS FOR USE LATER DURING PERIODS OF MAXIMUM POWER CONSUMPTION. MORE IMMEDIATELY, REDOX SYSTEMS IN THE KILOWATT RANGE COULD HELP TO SPEED THE GROWTH OF SOLAR ELECTRIC (PHOTOVOLTAIC) AND WIND-ENERGY SYSTEMS WHERE THE COST OF ELECTRICAL STORAGE HAS BEEN AN IMPORTANT CONSIDERATION SINCE STORAGE IS NECESSARY FOR THE TIMES THE SUN IS NOT SHINING AND THE WIND IS NOT

BLOWING.

1979-0564 NGUYEN D V
COMPARATIVE PERFORMANCE MEASUREMENTS ON A SAVONIUS ROTOR WITH ANCILLARY SURFACES.
WIND ENG. 3(2): 115-120, 1979. (IN FRENCH AND ENGLISH)

IN AN ATTEMPT TO IMPROVE THE PERFORMANCE OF THE CONVENTIONAL SAVONIUS ROTOR, A MODEL ROTOR WAS FITTED WITH ANCILLARY SURFACES OF AEROFOIL AND "UMBRELLA" FORM TO PRODUCE SIX ALTERNATIVE CONFIGURATIONS. WIND TUNNEL TESTS ON THE MODELS SHOWED THE PERFORMANCE TO BE IMPROVED IN ONLY ONE CASE; IN THE OTHER UNITS TESTED THE DRAG EFFECT OF THE ANCILLARY SURFACES APPEARED TO PREDOMINATE OVER ANY POSSIBLE FLOW IMPROVEMENT.

1979-0565 NIBE WINDMILLS NEAR COMPLETION.
INT. POWER GENERATION 2(6): 15-19, SEPTEMBER 1979.

THE DANISH WIND POWER PROGRAMME WILL DEVELOP LARGE-SCALE ELECTRICITY-PRODUCING WIND POWER PLANTS. ATTENTION IS BEING PAID TO FINDING PRACTICAL SOLUTIONS TO THE TECHNICAL PROBLEMS INVOLVED. IT IS HOPED THAT THE PRESENT PROGRAMME WILL LEAD TO FURTHER ADVANCED STUDIES INTO TECHNOLOGICAL, ECONOMIC AND ENVIRONMENTAL ASPECTS.

1979-0566 NIGHTENGALE M E
DOE FIELD EVALUATION PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 11-15.
RFP-3014(VOL.2)

THE DEPARTMENT OF ENERGY (DOE) HAS RECOGNIZED THE IMPORTANCE OF SMALL WIND SYSTEMS AND HAS INITIATED A NUMBER OF PROGRAMS DESIGNED TO ACCELERATE THE COMMERCIALIZATION OF THEM. A FIELD EVALUATION PROGRAM HAS BEEN DESIGNED AS A PART OF THIS PROGRAM TO ACCELERATE THE COMMERCIALIZATION PROCESS FOR SWECS. THE PROGRAM GOAL IS TO PROVIDE NEAR-TERM RESOLUTION OF EXISTING TECHNICAL AND INSTITUTIONAL CONSTRAINTS IN ORDER THAT WIND ENERGY CAN EFFECT MAXIMUM IMPACT ON THE NATION'S ENERGY NEEDS. THE OVER-ALL OBJECTIVE OF THE FIELD EVALUATION PROGRAM IS TO ADVANCE THE FEDERAL WIND PROGRAM EFFORTS TO IDENTIFY AND REMOVE THESE BARRIERS. STIMULATION TO THE VARIOUS SEGMENTS OF THE SWECS INDUSTRY WILL ALSO BE AN IMPORTANT BENEFIT OF THE PROGRAM.

1979-0567 NILBERG R H
WINDMOTOR AS A WINDBREAK.
U.S. PATENT NO. 4,175,910, NOVEMBER 27, 1979. 4 P.

THIS INVENTION RELATES TO A WINDMOTOR AS A WINDBREAK FENCE. THE WINDMOTOR SERVES AS A SHELTER FROM THE WIND BY CONVERTING PART OF THE WIND ENERGY INTO USEFUL ENERGY AND PART OF IT INTO WHIRLING MOVEMENTS. THE WINDMOTOR LOOKS SIMILAR TO A CONVEYOR AS USED FOR A SKIER'S CHAIRLIFT. THE CHAIRLIFT HAS ONE CLOSED CABLE, WITH CHAIRS ATTACHED, RUNNING FROM THE ONE END TO THE OTHER END OF THE LIFT. THE CONVEYOR TYPE WINDMOTOR HAS ADDITIONALLY ANOTHER CABLE RUNNING AT A LOWER LEVEL PARALLEL TO THE UPPER CABLE. BOTH CABLES RUN AT THE SAME VELOCITY IN THE SAME DIRECTION OVER A PAIR OF WHEELS AT EACH END OF THE WINDMOTOR. UPPER AND LOWER CABLES, ON WINDSIDE AND LEESIDE, ARE INTERCONNECTED BY A NUMBER OF VANES IN SUCH A MANNER THAT THE WIND BLOWING ON THESE VANES WILL FORCE THE WINDSIDE CABLES WITH THE VANES TO MOVE IN ONE DIRECTION AND THE LEESIDE CABLES WITH THE VANES IN THE OPPOSITE DIRECTION, WHEREBY GENERATING A ROTATIONAL MOVEMENT OF THE WHEELS.

1979-0568 NORTON J H
DEVELOPMENT AND TESTING OF A VARIABLE AXIS ROTOR CONTROL SYSTEM WITH 5 METER ROTOR AND DIRECT-DRIVE ALTERNATOR.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 31-64.
RFP-3014(VOL.1)

THE PURPOSE OF THE 1-2 KW HIGH RELIABILITY RFP ISSUED IN MAY OF 1977 WAS TO DEVELOP A SMALL WIND SYSTEM CAPABLE OF PROVIDING RELIABLE LOW VOLTAGE (24V) DC POWER IN REMOTE AND EXTREME ENVIRONMENTS AT A COST COMPETITIVE WITH CURRENT SOURCES AVAILABLE TO COMMERCIAL USERS (E.G., THERMO-ELECTRIC PROPANE GENERATORS). A THREE-BLADE, HORIZONTAL AXIS, DIRECT-DRIVE SYSTEM WITH FIXED PITCH BLADES IS DESCRIBED. ROTATIONAL SPEED IS CONTROLLED BY PITCHING THE ROTOR TIP PATH FROM THE VERTICAL TO THE HORIZONTAL PLANE. THE DEVELOPMENT OF THIS DESIGN INCLUDES THREE MAJOR AREAS REQUIRING EXTENSIVE ANALYSIS AND TESTING: THE ROTOR, THE DIRECT-DRIVE GENERATOR, AND THE VARIABLE AXIS ROTOR CONTROL SYSTEM, OR VARCS. DESIGN CHARACTERISTICS AND TEST RESULTS ARE INCLUDED.

1979-0569 NOUN R J
PRODUCT LIABILITY INSURANCE FOR WECS.
BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 4TH, WASHINGTON, D.C., OCTOBER 28, 1979. NTIS, OCTOBER 1979. 6 P.
SERI/TP-354-466

PRELIMINARY FINDINGS FROM A SAMPLING OF MANUFACTURERS INDICATE THAT PRODUCT LIABILITY INSURANCE FOR WECS IS STILL DIFFICULT TO OBTAIN IN MANY CASES. ABOUT HALF OF THE 21 WECS MANUFACTURERS CONTACTED DO NOT HAVE PRODUCT LIABILITY INSURANCE AT THIS TIME. ABOUT ONE MANUFACTURER IN THREE WHO HAS ATTEMPTED TO OBTAIN INSURANCE HAS BEEN REJECTED BY AT LEAST ONE INSURANCE COMPANY. IN SOME INSTANCES, ALTHOUGH AN INSURER HAD OFFERED TO PROVIDE COVERAGE, THE MANUFACTURER FOUND THE RATES QUOTED TO BE PROHIBITIVELY EXPENSIVE.

1979-0570 NOUN R J
PRODUCT LIABILITY AND SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS): AN ANALYSIS OF SELECTED ISSUES AND POLICY ALTERNATIVES.
NTIS, DECEMBER 1979. 49 P.
SERI/TR-354-365

AN OVERVIEW IS PRESENTED OF THE VARIOUS LEGAL ISSUES REGARDING SWECS PERFORMANCE AND SAFETY, ACCORDING TO WHEN SUCH ISSUES MAY ARISE DURING THE SWECS MANUFACTURING AND MARKETING PROCESSES. NEXT, THE MOST SIGNIFICANT ISSUES ARE TRANSLATED INTO A SERIES OF QUESTIONS, FOLLOWED BY A LEGAL ANALYSIS THAT ADDRESSES THESE QUESTIONS WITHIN THE FRAMEWORK OF THE PRESENT PRODUCT LITIGATION SYSTEM. THE SPECIAL PROBLEMS PRESENTED TO SWECS BY JUDICIAL TREATMENT OF DESIGN DEFECT CASES AND THE RELEVANCE OF INDUSTRY STANDARDS IN RPODUCT CASES ARE EMPHASIZED. FINALLY, A NUMBER OF POLICY ALTERNATIVES FOR DOE AND OTHERS TO CONSIDER ARE EXAMINED CONCERNING THEIR RELATIVE ADVANTAGES AND DISADVANTAGES IN DEALING WITH SELECTED ISSUES.

1979-0571 OBERMEIER J L, TOWNES H W
ECONOMIC EVALUATION OF SMALL-SCALE WIND-POWERED GENERATION SYSTEMS.
ASME TRANS. J. ENG. PCWER 101(2): 213-216, APRIL 1979.

1979-0572 O'BRIEN W F, HINERMAN J M
HORIZONTAL-AXIS WIND GENERATOR PERFORMANCE WITH VARYING TIP SPEED RATIO AND ROTOR ORIENTATION.
ASME PAPER 79-WA/SOL-2, 1979. 7 P.

AN EXPERIMENTAL INVESTIGATION OF THE PERFORMANCE OF A HORIZONTAL-AXIS WIND GENERATOR WAS CONDUCTED WITH VARYING ROTOR TIP SPEED RATIO AND ORIENTATION RELATIVE TO WIND DIRECTIONS. THE MACHINE TESTED HAD A ROTOR DIAMETER OF 6.6 M, AND A THREE-PHASE ALTERNATOR WITH DIODE-RECTIFIED OUTPUT. ROTOR SPEED WAS CONTROLLED BY CHANGING THE VOLTAGE LEVEL OF THE BATTERY LOAD. OPERATION AT VARYING TIP SPEED RATIO (BLADE TIP SPEED/WIND SPEED) WAS THUS PRODUCED. ROTOR ORIENTATION RELATIVE TO WIND DIRECTION (YAW) WAS CONTROLLED BY ADJUSTING THE POSITION OF A STEERING TAIL MOUNTED ON THE WIND GENERATOR. VALUES OF PERFORMANCE COEFFICIENT ARE CALCULATED FOR THE VARIOUS DATA POINTS, USING AN ELLIPTICAL MODEL FOR PROJECTED ROTOR AREA.

1979-0573 OFFSHORE WIND ENERGY: IS IT AN OPPORTUNITY?
WIND ENERGY REP.: 7-11, OCTOBER 1979.

PROS AND CONS OF OFF-SHORE WIND ENERGY SYSTEMS ARE DISCUSSED IN A SYNOPSIS OF A MAJOR STUDY FROM THE WESTINGHOUSE ELECTRIC CORP. TITLED: DESIGN STUDY AND ECONOMIC ASSESSMENT OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATIONS: FINAL REPORT.

1979-0574 OGUCHI K, OUCHI N
CHARACTERISTICS OF EXPERIMENTAL SELF-CASCADED INDUCTION MOTORS.
FAC. ENG. IBARAKI UNIV. J. NO. 27: 67-74, 1979. (IN JAPANESE)

THE DETAILS AND EXPERIMENTAL RESULTS OF EXPERIMENTAL SELF-CASCADED INDUCTION MOTORS ARE DESCRIBED WHICH HAVE SINGLE WINDING ON THE STATOR AND ROTOR. THE PRINCIPLE OF OPERATION IS DESCRIBED. THE EFFECTS OF THE SPACE HARMONICS OF THE AIR-GAP FLUX ON THE MOTOR CHARACTERISTICS ARE DISCUSSED. THE TWO PROTOTYPE MOTORS WERE CONSTRUCTED WHICH HAD 36-SLOT STATOR CORE AAND 54-SLOT ROTOR CORE AVAILABLE READILY. THE NUMBER OF POLES WAS CHOSEN AS THE COMBINATION OF 12/6-POLE. THE ROTOR HAD NINE CLOSED-WINDINGS. THE EXPERIMENTAL MOTOR I HAD THE UNSATISFACTORY PERFORMANCE, BUT THE MOTOR II SATISFACTORY. THE MOTOR II HAD AN IMPROVED ROTOR WINDING FACTOR FOR 12-POLE EMFS BY A DECREASE OF COIL PITCH AND AN INCREASE OF THE NUMBER OF DUMMY COILS. THE MOTOR II HAD THE TORQUE-SPEED CHARACTERISTICS SIMILAR TO CONVENTIONAL EXTERNAL CASCADED INDUCTION MOTORS. THE PRACTICAL APPLICATION EXAMPLES OF SELF-CASCADED MOTORS ARE PRESENTED; BRUSHLESS VARIABLE SPEED DRIVES CONNECTED WITH A STATIC POWER CONVERTER AND VARIABLE SPEED CONSTANT FREQUENCY GENERATORS FOR WIND POWER CONVERSION.

1979-0575 OLGAARD P L
ON THE NUMBER OF WIND MACHINES IN DENMARK FROM 1900 TO 1950.
SOL. ENERGY 22(5): 477-478, 1979.

INFORMATION, BASED ON DANISH SOURCES, IS PRESENTED ON THE NUMBER OF WIND MACHINES USED IN DENMARK IN THE PERIOD FROM AROUND 1900 TO AROUND 1950.

1979-0576 OLIVER T K, GROVES W N, GRUBER E L, CHEUNG A
ENERGY FROM HUMID AIR.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 267-282.
SERI/TP-245-184, CONF-790501

THIS IS A SUMMARY OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT BY COMPUTER MODELING.

1979-0577 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
ENERGY FROM HUMID AIR. FINAL REPORT.
NTIS, FEBRUARY 1979. 87 P.
DSE-2553-79/1

THIS IS A REPORT OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT BY COMPUTER MODELING. RESULTS FOR A NATURAL DRAFT TOWER SHOW THAT IT IS NOT A COST-EFFECTIVE WAY TO GET ENERGY FROM HUMID AIR. PARAMETRIC STUDIES ARE PRESENTED FOR EXPANSION-COMPRESSION CYCLES. WITH SUITABLE CONDITIONS, INCLUDING LARGE AMOUNTS OF COOLING DURING COMPRESSION, THIS CYCLE HAS AN ATTRACTIVE NET WORK OUTPUT. TO AVOID USING ALL THE OUTPUT POWER TO OVERCOME MACHINE LOSSES, IT APPEARS NECESSARY TO USE A ONE-MACHINE MECHANIZATION. THE MOST PROMISING USES VORTEX FLOW TO ACHIEVE THE NECESSARY EXPANSION AND SUBSEQUENT COMPRESSION WITH COOLING. POWER OUTPUT AND COSTS HAVE BEEN ESTIMATED FOR A VORTEX PLANT LOCATED IN PUERTO RICO.

1979-0578 OPLINGER J L
DISTRIBUTED WIND GENERATION ASSESSMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 205-214.
CONF-790352

THE OVERALL OBJECTIVE OF THIS PROJECT IS TO DEVELOP A METHODOLOGY FOR UTILITY EVALUATION OF DISTRIBUTED WIND POWER SYSTEMS IN THEIR RESPECTIVE SERVICE AREAS. THE METHODOLOGY WILL ALLOW COMPARISON OF DISTRIBUTED WIND POWER SYSTEMS WITH CENTRAL STATION WIND PLANTS AND CONVENTIONAL CENTRAL STATION GENERATION, AS WELL AS WITH OTHER TYPES OF DISTRIBUTED GENERATION. SITE SPECIFIC ANALYSES WILL BE PERFORMED ON THREE UTILITY SYSTEMS TO ASSESS IMPACTS OF DISTRIBUTED WIND POWER PLANTS ON UTILITY SYSTEMS. PREFERRED DISTRIBUTED WIND POWER SYSTEMS WILL BE SELECTED BASED ON THE SITE SPECIFIC ANALYSES. THE PREFERRED DISTRIBUTED WIND SYSTEMS WILL FORM THE BASIS FOR AN IMPACTS AND PENETRATION ANALYSIS. THE IMPACTS TO BE EVALUATED ARE BOTH THOSE WHICH DIRECTLY AFFECT UTILITY OPERATIONS OR COSTS AND THOSE WHICH ARE EXPERIENCED INDIRECTLY AS, FOR EXAMPLE, THROUGH COMMUNITY RESPONSE TO PROPOSED INSTALLAIONS.

1979-0579 OTAWA T
WIND ENERGY PLANNING: A BIBLIOGRAPHY.
CHICAGO, ILLINOIS, COUNCIL OF PLANNING LIBRARIANS, 1979. 31 P.

THE TIME PERIOD COVERED IN THIS BIBLIOGRAPHY IS FROM JANUARY 1948 TO JUNE 1979; HOWEVER, MAJOR EMPHASIS IS PLACED ON THE PERIOD AFTER THE ARAB OIL EMBARGO (I.E., 1973). THIS BIBLIOGRAPHY IS DIVIDED INTO TEN SECTIONS: PROSPECTS OF WIND ENERGY USE; WIND RESOURCE ANALYSIS; TECHNOLOGY DEVELOPMENT; ECONOMICS OF WIND ENERGY; SITE

SELECTION FOR WIND ENERGY CONVERSION SYSTEMS; LEGAL, SOCIAL AND INSTITUTIONAL ISSUES; ENVIRONMENTAL ISSUES; APPLICATIONS OF WIND ENERGY; SMALL-SCALE APPLICATIONS; AND OTHER PERTINENT BIBLIOGRAPHIES AND REFERENCES TO WIND ENERGY PLANNING. PUBLICATION AVAILABILITY IS DESIGNATED.

1979-0580 OTNES K
A LITTLE ABOUT WIND POWER STATIONS.
FRA FYS. VERDEN 41(4): 89-92, 1979. (IN NORWEGIAN)

WIND POWER IS REVIEWED. WINDMILLS WHICH WERE IN USE UP TO THE YEAR 1900 HAD A LOW EFFICIENCY. APPLICATION OF THE RANKINE-FROUDE THEORY (CA. 1890) GAVE IMPROVED EFFICIENCY. A WIND POWER STATION WAS BUILT IN DENMARK IN 1892 BY LA COUR FOR THE PRODUCTION OF HYDROGEN AND OXYGEN BY THE ELECTROLYSIS OF NAOH. NEW TYPES OF WINDMILL, WITH HIGHER EFFICIENCIES (E.G., SAVONIUS AND DARRIEUS WINDMILLS) ARE DISCUSSED AND ILLUSTRATED. DATA ARE PRESENTED FOR WIND ENERGY AVAILABLE AT SIX DANISH OBSERVATIONS STATIONS. A PRACTICAL CALCULATION SHOWS THAT 500-1200 KWH/ANNUM PER SQUARE METRE OF PROJECTED WIND-SAIL SURFACE ARE AVAILABLE.

1979-0581 OTTOSEN G O
WIND MILLS.
U.S. PATENT NO. 4,180,369, DECEMBER 25, 1979. 4 P.

A WIND MILL CONSTRUCTION IS DISCLOSED, INCLUDING A RIGID TOWER STRUCTURE TO THE UPPER END OF WHICH IS CONNECTED FOR ROTATION ABOUT A VERTICAL AXIS A WIND TURBINE HOUSING TO WHICH IS JOURNALLED FOR ROTATION ABOUT A HORIZONTAL AXIS A PROPELLER OF THE TWO-BLADE OR THREE-BLADE TYPE, CHARACTERIZED IN THAT A STRIP MEMBER EXTENDS GENERALLY HELICALLY ABOUT THE TOWER STRUCTURE FOR COUNTERACTING THE EFFECTS OF WIND UPON THE TOWER AND THE BLADES. THE STRIP MAY BE MOUNTED ON THE UPPER PORTION OF A TOWER THE BASE PORTION OF WHICH HAS A FRUSTOCONICAL CONFIGURATION. THE PITCH OF THE HELICAL STRIP IS PREFERABLY NO GREATER THAN THREE TIMES THE MAXIMUM DIAMETER OF THE UPPER TOWER PORTION.

1979-0582 PALMA F N
WIND TURBINE.
U.S. PATENT NO. 4,168,439, SEPTEMBER 18, 1979. 6 P.

THE FOLLOWING SPECIFICATION DISCLOSES AN IMPROVEMENT IN VERTICAL AXIS WIND MACHINES HAVING UPSTANDING BLADES. THE BLADES ARE ATTACHED TO A ROTATABLE RING WHICH SUPPORTS THE BLADES AT AN ANGLE OF 45 DEGREES TO THE HORIZONTAL PLANE OF THE RING. ASSOCIATED WITH THE WIND MACHINE IS A WIND VELOCITY SENSING DEVICE PRODUCING ELECTRICAL SIGNALS RESPONSIVE TO THE WIND VELOCITY. MEANS IS PROVIDED THE BLADES ATTACHED TO THE RING TO ADJUST THE ANGLE OF ATTACK OF THE BLADES IN RESPONSE TO THE MAGNITUDE OF THE SIGNALS.

1979-0583 PANEL REPORT ON CORROSION IN ENERGY SYSTEMS.
NTIS, JUNE 1979. 135 P.
DOE/ER/01198-1310

CORROSION PROBLEMS IN HIGH-TEMPERATURE (NON-AQUEOUS) ENERGY SYSTEMS, CORROSION IN AQUEOUS ENERGY SYSTEMS AND INSTITUTIONAL PROBLEMS INHIBITING THE DEVELOPMENT OF CORROSION SCIENCE AND ENGINEERING ARE DISCUSSED.

1979-0584 PARK G L
PLANNING MANUAL FOR UTILITY APPLICATION OF WECS.
NTIS, JUNE 1979. 245 P.
COO-4450-79/1

AN APPROACH FOR EVALUATING THE FEASIBILITY OF WIND ELECTRIC CONVERSION SYSTEMS (WECS) FOR UTILITY APPLICATION IS PRESENTED AND EXPLAINED. ASSESSMENT OF WIND ENERGY POTENTIAL, SITES, INTERCONNECTION, AND CAPITAL AND PRODUCTION COSTING IS INCLUDED.

1979-0585 PARK G L, KRAUSS O, ASMUSSEN J, LAWLER J
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977.
JOINT POWER GENERATION CONFERENCE, CHARLOTTE, NORTH CAROLINA, OCTOBER 7-11, 1979. NEW YORK, IEEE, NO. CH1464-7/79, 1979. PAP. A79816-0. 5 P.

THIS PAPER REVIEWS THE FEASIBILITY OF WIND POWER APPLICATION FOR A SMALL MUNICIPAL ELECTRIC SYSTEM. IT ANALYZES AND EVALUATES THE LOCAL WIND ENERGY RESOURCE, WIND-TURBINE SITES AND HYDRO-STORAGE AS RELATED TO THE EXISTING ELECTRIC SYSTEM. COMMERCIAL AVAILABILITY OF 500-KW AND 1,500-KW WIND TURBINE GENERATORS WAS ASSUMED. CAPITAL AND PRODUCTION-COST MODELS YIELDED BUS-BAR-COST ESTIMATES FOR WIND-GENERATED ELECTRICITY WHICH ARE COMPARED WITH THE COST OF OIL-FUELED DIESEL GENERATION. DEVELOPMENT OF A SIMPLIFIED PRODUCTION-COST MODEL, TO SIMULATE THE HOURLY BEHAVIOR OF SMALL ELECTRIC SYSTEMS, WAS PART OF THE TASK. THEREFORE, ONE IMPORTANT PRODUCT OF THE STUDY IS A PROCESS FOR EVALUATING FEASIBILITY OF WIND-ENERGY GENERATION FOR SMALL UTILITIES. THIS PAPER DESCRIBES THE PROCESS BY MEANS OF ITS APPLICATION TO HART, MICHIGAN. A SUPPLEMENTAL TASK INCLUDED IN THE PROJECT WAS THE ASSESSMENT OF THE WIND-HYDROELECTRIC POTENTIAL COMBINED WITH HYDRO-STORAGE IN WESTERN MICHIGAN AS IT RELATES TO WIND POWER UTILIZATION.

1979-0586 PARTHE A C
ENERGY TECHNOLOGY AND COMMERCIALIZATION ISSUES.
WIND ENERGY INNOVATIVE SYSTEMS. CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 25-40.
SERI/TP-245-184, CONF-790501

THIS PAPER REVIEWS THE CURRENT DOE WIND ENERGY PROGRAM. REFERENCES ARE MADE TO PREVIOUS GOVERNMENT SPONSORED DEVELOPMENT AND DEMONSTRATION PROJECTS; WHERE APPROPRIATE, ANALOGIES AND EXPERIENCE ARE RELATED TO THE WIND ENERGY PROGRAM. COMMERCIALIZATION REQUIREMENTS, AS VIEWED BY THE SUPPLY AND MARKET SECTORS, ARE EMPHASIZED.

1979-0587 PATNAIK P C
A PRELIMINARY USER'S GUIDE FOR THE SIGMET MESOSCALE METEOROLOGY CODE. SPECIAL REPORT FOR PERIOD JUNE 15, 1977--JUNE 15, 1978.
NTIS, JUNE 1979. 140 P.
DOE/ET/20280-2

THE SIGMET COMPUTER CODE IS A DETAILED PHYSICS MESOSCALE METEOROLOGY MODEL. THE CODE SIMULATES THE TRANSIENT EVOLUTION OF THE ATMOSPHERE IN A THREE-DIMENSIONAL MESOSCALE REGION INCLUDING EFFECTS OF COMPLEX TERRAIN, NON-LINEAR ATMOSPHERIC STABILITY, PLANETARY BOUNDARY LAYER TURBULENCE, AND THERMAL FORCING DUE TO SURFACE HEAT TRANSFER AND SOLAR/TERRESTRIAL RADIATION. THIS DOCUMENT IS A PRELIMINARY USER'S GUIDE, NOT A COMPREHENSIVE AND DETAILED USER'S MANUAL.

1979-0588 PATRICK J P
WIND TURBINE GENERATOR HAVING INTEGRATOR TRACKING.
U.S. PATENT NO. 4,161,658, JULY 17, 1979. 18 P.

A POWER GENERATING SYSTEM IS DESCRIBED WHICH INCLUDES A WIND TURBINE DRIVEN GENERATOR. THE WIND TURBINE HAS A WIND DRIVEN ROTOR WITH A PLURALITY OF VARIABLE PITCH ANGLE BLADES. THE BLADE ANGLE IS SCHEDULED DURING ACCELERATION AND DECELERATION OF THE WIND TURBINE BY OPEN LOOP CONTROLS TO MINIMIZE STRESSES, AND IS SCHEDULED DURING POWERED OPERATION BY CLOSED LOOP CONTROLS TO MAINTAIN DESIRED TORQUE OR SPEED. THE CLOSED LOOP CONTROLS CONTAIN AN INTEGRATOR WHICH PRODUCES AN INTEGRAL BLADE ANGLE CONTROL SIGNAL. THE SCHEDULED BLADE ANGLE IS FED BACK TO THE INTEGRATORS THROUGH AN INTEGRATOR TRACKING NETWORK TO MAINTAIN THE INTEGRAL BLADE ANGLE CONTROL SIGNAL AT ALL TIMES WITHIN A PRESELECTED RANGE RELATIVE TO THE SCHEDULED BLADE ANGLE.

1979-0589 PAYNE P E, SHEEHAN J L
HYBRID ALTERNATE ENERGY SYSTEM (SOLAR-WIND).
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 251-254.

THE HYBRID COMBINATION OF PHOTOVOLTAIC (P/V) SYSTEMS AND WIND ENERGY CONVERSION SYSTEMS (WECS) WHICH FORMS A HYBRID ALTERNATE ENERGY SYSTEM (HAES) INCREASES OVERALL ENERGY OUTPUT AND DECREASES ENERGY STORAGE REQUIREMENTS. CLIMATOLOGICAL DATA FROM VARIOUS NEVADA SITES SHOW THAT COST-EFFECTIVE APPLICATION OF HAES AT REMOTE LOCATIONS IMPROVES THE UTILIZATION OF THE SOLAR ENERGY RESOURCE. WHILE THE TOTAL SYSTEM OUTPUT MAY BE LESS THAN THE SUM OF THE HYBRID COMPONENTS' INDIVIDUAL CAPABILITY, THE REDUCTION OF BATTERY SIZE BECOMES SIGNIFICANT. THE CLIMATOLOGY INTUITIVELY LEADS DESERT DWELLERS TO THE CONCLUSION THAT THE WIND OFTEN BLOWS AT NIGHT WHEN THE SUN DOESN'T SHINE AND THE SUN OFTEN SHINES BRIGHTLY WHEN THE DESERT IS STILL DURING THE DAY. THE DATA CONFIRM THESE INTUITIVE OBSERVATIONS AND QUANTIFY HOW MUCH THE HAES CAN DECREASE OVERALL COSTS. THE DESIGN STUDIES PERFORMED HAVE BEEN FOR REMOTE LOCATIONS FOR INDEPENDENT AND UTILITY BACK-UP HAES APPLICATIONS. THE APPLICATIONS SO FAR HAVE BEEN FOR REMOTE DESERT COMMUNICATIONS, RANCHES, AND REMOTE EQUIPMENT. THE COST IMPROVEMENT VARIES WITH EACH LOCALE AND THE COST RATIOS OF P/V, WECS, AND STORAGE. THE DATA TAKEN PREDICT AN OVERALL SYSTEM COST IMPROVEMENT IN THE RANGE OF 10% TO 40%. THE DRIVING CONSIDERATIONS ARE LOAD PROFILE, PEAK DEMAND, BACK-UP POWER, LOW MAINTENANCE, COSTS, AND POWER MANAGEMENT.

1979-0590 PEDERSON B M
DANISH LARGE WIND TURBINE PROGRAM.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 103-120.
NASA-CP-2106

A SHORT ACCOUNT OF THE DANISH WIND ENERGY PROGRAM AND ITS PRESENT STATUS IS GIVEN. RESULTS AND EXPERIENCES FROM TESTS ON THE GEDSER WINDMILL (200 KW) ARE PRESENTED. THE KEY RESULTS ARE PRESENTED FROM THE PRELIMINARY DESIGN STUDY AND DETAILED DESIGN OF TWO NEW WECS (630 KW EACH). THESE TWO NEW WECS ARE PLANNED TO GO INTO OPERATION IN MID-1979 THE TVIND PROJECT (2 MW) IS BRIEFLY MENTIONED.

1979-0591 PENNELL W T, WEGLEY H L
SITING SMALL WIND TURBINES.
NTIS, MARCH 1979. 16 P.
PNL-SA-7603

A RECENT SURVEY HAS INDICATED THAT IMPROPER SITING HAS BEEN A COMMON CAUSE OF DISSATISFACTION AMONG USERS OF SMALL WIND TURBINES. THAT IS, THE USER HAS NOT RECEIVED THE POWER OUTPUT OR MACHINE LIFE HE EXPECTED. MOST POTENTIAL PURCHASERS WILL NEED TO BE REASONABLY CERTAIN OF THE COST OF WIND POWER FOR THEIR PARTICULAR APPLICATION BEFORE THEY DECIDE TO BUY A WIND ENERGY CONVERSION SYSTEM (WECS). SUCH AN ASSESSMENT REQUIRES AN ACCURATE KNOWLEDGE OF WIND CHARACTERISTICS AT THE TURBINE SITE. A PROCEDURE IS PRESENTED FOR CHOOSING THE BEST AVAILABLE SITE FOR A WIND TURBINE. A METHOD FOR ESTIMATING THE PERTINENT WIND CHARACTERISTICS ONCE THE SITE IS CHOSEN IS ALSO DESCRIBED. IN SOME CASES, EXTENSIVE ONSITE MEASUREMENTS MAY BE REQUIRED BEFORE AN ACCURATE ANALYSIS OF TURBINE PERFORMANCE CAN BE MADE.

1979-0592 PETERSEN D
MODES AND FREQUENCIES OF GROWIAN ROTOR BLADES.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 105-138.
JUEL-SPEZ-28

DUE TO THE KNOWN CONSTRUCTION OF GROWIAN ROTOR BLADES, MODES AND FREQUENCIES WERE CALCULATED. THE COMPUTER PROGRAM USED TAKES INTO ACCOUNT CENTRIFUGAL FORCE EFFECT, THE OFFSETS OF SHEAR CENTER, CENTER OF BENDING STIFFNESSES, AND CENTER OF GRAVITY. FURTHERMORE, THE EFFECTS OF PRE-LOADING AND PRE-TWIST ARE INDUCED WITHIN THE CURRENT VERSION. THUS, MODES AND FREQUENCIES OF A REFERENCE VERSION COULD BE CALCULATED, AND REGIONS WHERE THE MATHEMATICAL MODELLING WAS UNCERTAIN DUE TO A LACK OF INFORMATION OR DIFFICULTIES OF MODELLING ARE DISCUSSED.

1979-0593 PETERSEN G, FRIES S, MOHN J, MULLER A
WIND AND SOLAR-POWERED REVERSE OSMOSIS DESALINATION UNITS-- DESCRIPTION OF TWO DEMONSTRATION PROJECTS.
DESALINATION 31(1-3): 501-509, OCTOBER 1979.

THE ENGINEERING DESIGN, THE SITE CONDITIONS AND THE PROVIDED OPERATION MODE OF TWO RO-DESALINATION PLANTS WITH THE GKSS PLATE MODULE SYSTEM SUPPLIED BY A 6 KW WIND ENERGY CONVERTER AND A 2.5 KW SOLAR GENERATOR RESPECTIVELY, ARE DESCRIBED. THE MAIN OBJECTIVE OF THESE PROJECTS IS THE OPERATION OF TWO PROTOTYPE PLANTS TO DEMONSTRATE THE RELIABILITY AND THE LOW MAINTENANCE REQUIREMENTS FOR THESE PLANTS, WHEN THEY ARE LOCATED IN REMOTE AREAS WITH INSUFFICIENT INFRASTRUCTURE.

1979-0594 PETERSEN H
SOME DATA FOR THE 12-M LONG WIND TURBINE BLADE MANUFACTURED BY VOLUND A/S AND O.L. BOATS, DENMARK.
RISO NATL. LAB. REP. RISO-M-2194, OCTOBER 1979. 23 P.
RISO-M-2194

THE REPORT DESCRIBES THE GLASS-FIBRE BLADES DESIGNED FOR THE USE AS OUTER WING PANELS FOR THE TWO DANISH NIBE WINDMILLS. HOWEVER, THE BLADES MAY FIND APPLICATION IN OTHER WINDMILL DESIGNS, FOR WHICH REASON THEY ARE DESCRIBED HERE INDEPENDENTLY OF THEIR ORIGINAL APPLICATION.

1979-0595 PHILBRICK D, KIPHUT A, MORGAN R

WIND ANEMOMETER LOAN PROGRAM.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2287-2290.

THE PROBLEM OF OBTAINING ADEQUATE, SITE-SPECIFIC WIND DATA HAS PROMPTED THE OREGON DEPARTMENT OF ENERGY TO ESTABLISH AN ANEMOMETER LOAN PROGRAM. THIS PAPER PROVIDES A DESCRIPTION OF OREGON'S WIND ANEMOMETER LOAN PROGRAM INCLUDING AN EVALUATION OF THE EQUIPMENT, DIFFERENT MECHANISMS FOR DISTRIBUTING THE EQUIPMENT, AND PRELIMINARY WIND DATA.

1979-0596 PHILBRICK D, KIPHUT A
WIND ANEMOMETER LOAN PROGRAM.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 72-74.
CONF-790845

THE PROBLEM OF OBTAINING ADEQUATE WIND DATA IN RESIDENTIAL AREAS HAS PROMPTED THE OREGON DEPARTMENT OF ENERGY TO ESTABLISH AN ANEMOMETER LOAN PROGRAM. UNDER THIS PROGRAM, TWELVE STEWART ANEMOMETERS WERE INSTALLED IN SIX COUNTIES BETWEEN NOVEMBER 1978 AND JANUARY 1979. A DETAILED DESCRIPTION OF OREGON'S WIND ANEMOMETER LOAN PROGRAM INCLUDING AN EVALUATION OF THE EQUIPMENT, DIFFERENT MECHANISMS FOR DISTRIBUTING THE EQUIPMENT, AND PRELIMINARY WIND DATA IS PRESENTED.

1979-0597 PHILLIPS G T
A PRELIMINARY USER'S GUIDE FOR THE NOABL OBJECTIVE ANALYSIS CODE. SPECIAL REPORT, JUNE 15, 1977-JUNE 15, 1978.
NTIS, JULY 1979. 117 P.
DOE/ET/20280-T1

THE NOABL CODE WAS DEVELOPED TO PROVIDE THE USER WITH AN ECONOMICAL WINDFIELD PREDICTOR. THE MODEL PRODUCES THREE DIMENSIONAL, TERRAIN-DEPENDENT, DIVERGENCE-FREE WINDFIELDS GIVEN OBSERVED SURFACE AND/OR UPPER-AIR DATA AS INPUT.

1979-0598 PHILLIPS P D
NEPA AND ALTERNATIVE ENERGY: WIND AS A CASE STUDY.
SOL. LAW REP. 1(1): 29-54, MAY 1979.

THIS ARTICLE ANALYZES THE PROBLEM OF WHETHER AND WHEN THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA) APPLIES TO ALTERNATIVE ENERGY SOURCES, USING WIND ENERGY AS A CASE STUDY. THE THREE ISSUES WHICH DETERMINE WHETHER AND WHEN AN ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED CAN BE SUMMARIZED AS FOLLOWS: (1) IS THERE A RECOMMENDATION OR REPORT ON A PROPOSAL FOR (2) FEDERAL ACTION (3) THAT IS MAJOR AND WILL SIGNIFICANTLY AFFECT THE ENVIRONMENT. A LIVELY AWARENESS OF HOW NEPA WORKS SERVES TWO IMPORTANT FUNCTIONS. FIRST, AN AGENCY OR INDIVIDUAL ATTUNED TO THE REQUIREMENTS OF NEPA IS MORE LIKELY TO TAKE THE NECESSARY PROCEDURAL STEPS TO COMPLY WITH THE STATUTE AND LESS LIKELY TO SEE A WORTHWHILE PROJECT MIRED IN LITIGATION, AS LAWYERS QUARREL OVER THE PRECISE MEANING OF A FEDERAL OR SIGNIFICANT ACTION. SECOND, THE PROCESS OF PREPARING AN ENVIRONMENTAL ASSESSMENT (AND, IF NECESSARY, AN ENVIRONMENTAL IMPACT STATEMENT) CAN SERVE IMPORTANT ENDS. BY FORCING PROJECT PROPONENTS TO CONFRONT THE FULL RANGE OF POSSIBLE ENVIRONMENTAL IMPACTS, BALANCE COMPETING VALUES AND SEARCH OUT MITIGATING ACTIONS, NEPA PROMOTES DECISION MAKING BY FEDERAL AGENCIES WHICH WILL BE ENVIRONMENTALLY MORE SENSITIVE AND ULTIMATELY MORE WISE. WIND MAY WELL BE ONE OF THE MOST ENVIRONMENTALLY SOUND ENERGY ALTERNATIVES AVAILABLE. NEVERTHELESS, AS THE INVENTORIES OF IMPACTS IN THIS ARTICLE ILLUSTRATE, EVEN WIND ENERGY HAS ITS ENVIRONMENTAL EFFECTS.

1979-0599 PIEPER W M
THE KIRSTEN-ROTOR AS A WIND-WHEEL.
BRENNST.-WAERME-KRAFT 31(11): 441-445, NOVEMBER 1979. (IN GERMAN)

THE PERFORMANCE OF THE KIRSTEN-ROTOR IS CALCULATED FOR VARIOUS CONDITIONS OF CIRCUMFERENTIAL SPEED AND VARIOUS BLADE WIDTHS. THE KINEMATICS AND DYNAMICS OF THE KIRSTEN-ROTOR AS WELL AS THE NUMERICAL EVALUATION OF THE EQUATION FOR THE ROTOR PERFORMANCE ARE DESCRIBED IN DETAIL.

1979-0600 PIEPERS G G
POTENTIAL FOR STORAGE OF ELECTRICITY PRODUCED BY WIND ENERGY CONVERSION SYSTEMS.
ENERGY. MEETING ON PROSPECTS FOR BATTERY APPLICATIONS AND SUBSEQUENT R AND D REQUIREMENTS, BRUSSELS, JANUARY 17, 1979. PROCEEDINGS. LUXEMBOURG, COMM. EUROPEAN COMMUNITIES, 1979. P. 159-162.

THOUGH IT IS DIFFICULT TO ESTIMATE THE POTENTIAL OF USING BATTERIES AS A STORAGE SYSTEM IN COMBINATION WITH THE SUCCESS OF DEVELOPING MORE RELIABLE AND ECONOMICAL STORAGE, BATTERIES WILL CERTAINLY HAVE A SIGNIFICANT EFFECT ON ECONOMICS.

1979-0601 PIEPERS G G
THE NETHERLANDS WIND ENERGY RESEARCH PROGRAMME.
INT. POWER GENERATION 2(6): 27-28, SEPTEMBER 1979.

HOLLAND IS KNOWN TRADITIONALLY AS A WINDMILL COUNTRY, WHICH MAY SUGGEST THAT THERE IS A GREAT DEAL OF KNOWLEDGE AVAILABLE REGARDING WIND ENERGY. THIS IS UNFORTUNATELY NOT THE CASE, AS THE OLD WINDMILLS ARE OF NO USE IN TERMS OF MODERN TECHNOLOGY. THE DUTCH GOVERNMENT'S NATIONAL FIVE YEAR RESEARCH DEVELOPMENT PROGRAMME ON WIND ENERGY IS NOW IN ITS THIRD AND FINAL STAGE.

1979-0602 PLACE T W
RESIDENTIAL FLYWHEEL WITH TURBINE SUPPLY.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 395-398.

A FLYWHEEL SYSTEM THAT STORES ENERGY FROM A WIND TURBINE SOURCE AND CONVERTS THE ENERGY TO A 60-HZ, 220-V OUTPUT FOR RESIDENTIAL USE IS DESCRIBED. THE TYPICAL RESIDENCE HAS A 1500-SQ FT FLOOR AREA, WITH A MAXIMUM POWER LEVEL OF 5 KW. THE FLYWHEEL SYSTEM WAS DEFINED IN A STUDY TO DETERMINE THE COST BENEFITS OF STORING WIND ENERGY IN A FLYWHEEL AND USING IT ON A DEMAND BASIS. THE SYSTEMS AND THE FLYWHEEL ROTOR MATERIALS THAT OFFER THE GREATEST PROMISE IN REDUCING INITIAL COSTS WERE EXAMINED.

1979-0603 PLACE T W
RESIDENTIAL FLYWHEEL WITH WIND TURBINE SUPPLY.
MECHANICAL AND MAGNETIC ENERGY STORAGE CONTRACTORS' REVIEW MEETING, WASHINGTON, D.C., AUGUST 19, 1979. NTIS, AUGUST 1979. P. 287-293.
CONF-790854

A FLYWHEEL SYSTEM THAT STORES ENERGY FROM A WIND TURBINE SOURCE AND CONVERTS THE ENERGY TO A 60-HZ, 220-V OUTPUT FOR RESIDENTIAL USE IS DESCRIBED. THE TYPICAL RESIDENCE HAS A 1500-SQ FT FLOOR AREA, WITH A MAXIMUM POWER LEVEL OF 5 KW. THE FLYWHEEL SYSTEM WAS DEFINED IN A STUDY TO DETERMINE THE COST BENEFITS OF STORING WIND ENERGY IN A FLYWHEEL AND USING IT ON A DEMAND BASIS. THE SYSTEMS AND THE FLYWHEEL ROTOR MATERIALS THAT OFFER THE GREATEST PROMISE IN REDUCING INITIAL COSTS WERE EXAMINED. THIS PAPER DESCRIBES THE PROGRESS TO DATE ON THIS PROGRAM AND THE WORK PLANNED TO COMPLETE THE STUDY.

1979-0604 POOR R H, HOBBS R B
GENERAL ELECTRIC MOD-1 TURBINE GENERATOR PROGRAM.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 35-59.
NASA-CP-2106

THE MOD-1 WTG IS THE FIRST MEGAWATT CLASS MACHINE IN THE NATIONAL WIND PROGRAM. THE MOD-1 PROGRAM WHICH STARTED IN SEPTEMBER OF 1976 HAS AS ITS OBJECTIVES THE DESIGN, FABRICATION, INSTALLATION AND TEST OF A MEGAWATT CLASS WIND TURBINE GENERATOR (WTG) WHICH GENERATES UTILITY GRADE ELECTRICAL POWER. THE PROGRAM IS NEARING THE FINAL PHASE OF INSTALLATION AND CHECKOUT. THE BLADES ARE THE ONLY COMPONENTS REMAINING TO BE INSTALLED. NASA-LERC IS MANAGING THE MOD-1 PROGRAM FOR DOE. GENERAL ELECTRIC'S SPACE DIVISION LOCATED IN VALLEY FORGE, PA., IS THE PRIME CONTRACTOR, WITH GE ELECTRICAL EQUIPMENT PRODUCT DEPARTMENTS SUPPLYING COMPONENTS RANGING FROM SWITCHGEAR TO THE SYNCHRONOUS GENERATOR.

1979-0605 POWER H M
WINDMILLS ON THE MIND: A STUDY IN DYNAMICS AND CONTROL.
ELECTRON. POWER 25(4): 262-268, APRIL 1979.

A DYNAMICAL ANALYSIS OF WINDMILL PERFORMANCE TOGETHER WITH CONTROL STRATEGIES ARE PRESENTED. SOME UNCONVENTIONAL WINDMILLS THAT ARE CANDIDATES FOR POWER STATION APPLICATIONS ARE REVIEWED.

1979-0606 PRATT M
A TURN TO THE WIND.
AGRIC. ENG. 60(9): 11-14, SEPTEMBER 1979.

A SUMMARY OF THE WORKSHOP ON WIND ENERGY APPLICATIONS IN AGRICULTURE IS GIVEN. PAPERS WERE PRESENTED ON: (1) A WIND-ASSIST METHOD FOR DEEP WELL IRRIGATION PUMPING; (2) RESIDENTIAL HEATING USING A GRUMMAN WINDSTREAM 25; (3) HEATING WATER WITH A "WIND CHURN"; (4) APPLE STORAGE AND COOLING USING A 10 KW HORIZONTAL AXIS TURBINE.

1979-0607 PRICE W W, MACKLIS S L
WIND ENERGY CONVERSION SYSTEM TRANSIENT PERFORMANCE ANALYSIS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 366-376.
CONF-790352

WIND TURBINE GENERATORS (WTG'S) ARE SUBJECT TO CONTINUOUS TORQUE DISTURBANCES DUE TO GUSTING WIND CONDITIONS, AS WELL AS TOWER SHADOW AND WIND SHEAR EFFECTS. THIS UNIQUE FEATURE OF WTG'S HAS LED TO A CONCERN OVER THE VOLTAGE FLUCTUATIONS AND POSSIBLE STABILITY PROBLEMS WHICH MAY RESULT WHEN WIND ENERGY CONVERSION SYSTEMS (WECS) ARE APPLIED TO ELECTRIC UTILITY SYSTEMS. SPECIFICALLY, THE QUESTION IS WHETHER OBJECTIONABLE VOLTAGE FLUCTUATIONS OR STABILITY PROBLEMS WILL PRECLUDE CERTAIN WECS APPLICATIONS OR LIMIT THE SIZE OF WTG'S FOR CERTAIN APPLICATIONS AND WHETHER SPECIAL SYSTEM DESIGNS WILL BE NECESSARY TO ENSURE SUCCESSFUL OPERATION.

1979-0608 PURPA, WINDFARMS AND THE FINANCING OF WIND POWER.
WIND ENERGY REP.: 3-5, 10, DECEMBER 1979.

1979-0609 PYKKONEN K
STUDY OF DISPERSED SMALL WIND SYSTEMS INTERCONNECTED WITH A UTILITY DISTRIBUTION SYSTEM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 22-23.
RFP-3014(VOL.2)

THE GOAL OF THIS STUDY IS TO SUPPLY UTILITIES, SWECS DESIGNERS, SWECS OWNERS AND ELECTRICAL INTERCONNECTION EQUIPMENT MANUFACTURERS WITH SUFFICIENT INFORMATION TO PROMOTE THE DEVELOPMENT OF PROCEDURES AND HARDWARE FOR THE SAFE INTERTIE OF SIGNIFICANT NUMBERS OF SWECS WITH AN ELECTRICAL UTILITY DISTRIBUTION SYSTEM. THE CONTRACTOR WILL USE A SINGLE REPRESENTATIVE UTILITY FOR PURPOSES OF ANALYSIS, AND WILL PROVIDE BROADLY APPLICABLE (I.E. GENERIC) INFORMATION WHICH CAN BE USED BY DOE, SWECS MANUFACTURERS, UTILITIES AND SWECS OWNERS IN ASSESSING THE FEASIBILITY OF DISPERSED SWECS AT ANY LOCATION IN THE UNITED STATES. THIS STUDY WILL NOT CONSIDER THE ECONOMIC ASPECTS OF DISPERSED SWECS, EXCEPT AS THE ECONOMICS OF WIND POWER LIMIT THE TYPE AND COMPLEXITY OF INTERCONNECTION EQUIPMENT AND THE EXPENSES BORNE BY A UTILITY IN SWECS MANAGEMENT PROCEDURES.

1979-0610 RAAB A
COMBINED EFFECTS OF PERIODIC AND STOCHASTIC LOADS ON THE FATIGUE OF WIND TURBINE PARTS, PART 6.
NTIS, OCTOBER 29, 1979. 60 P.
FFA-AU-1499-PT-6, N80-28732/9

SELECTED TOPICS ON SIMULATION OF TURBULENCE AND FATIGUE EVALUATION OF WIND TURBINES ARE PRESENTED. THE IMPORTANCE OF CORRECT APPLICATION OF RANDOM LOADS AND THE MATHEMATICAL DESCRIPTION OF NONSTATIONARY PROCESSES (GENERAL THEORY) ARE DISCUSSED. THE TWO POINT CROSS SPECTRA OF TURBULENCE, WITH REGARD TO SHEAR FLOW IN THE BOUNDARY LAYER OF THE EARTH AND TO THE INCLINATION OF WIND GUSTS, IS DETERMINED. THE TWO POINT CORRELATION FUNCTIONS OF TURBULENCE WHEN THESE POINTS ARE SITUATED ON ROTATING BLADES IS EVALUATED. THE DISCRETE FORM OF THE CORRELATION FUNCTIONS GIVING THE CORRELATION MATRIX AND THE PROPERTIES OF THIS MATRIX IN THE CASE OF BAND LIMITED PROCESSES ARE GIVEN. BAND LIMITED, GAUSSIAN, MULTIVARIATE RANDOM PROCESSES, HAVING A PRESCRIBED CORRELATION MATRIX, ARE SIMULATED WITH THE AID OF CHOLESKI'S ALGORITHM. THE APPLICATION OF THE DESCRIBED THEORY TO THE EVALUATION OF FATIGUE IN THE CASE OF WIND TURBINES IS SHOWN.

1979-0611 RAMAGE C S
PROSPECTING FOR METEOROLOGICAL ENERGY IN HAWAII.
AM. METEOROL. SOC. BULL. 60(5): 430-438, MAY 1979.

HAWAII, WITH NO INDIGENOUS FOSSIL FUEL RESOURCES, IS PARTICULARLY SUSCEPTIBLE TO OIL SHORTAGES; HENCE, SURVEYS HAVE BEEN UNDERWAY FOR SOME TIME TO EVALUATE THE POTENTIAL OF WIND AND INSOLATION AS ALTERNATE ENERGY SOURCES. FIXED AND MOBILE STATIONS HAVE BEEN USED TO MONITOR THE WIND DISTRIBUTION, FINDING THAT ON PARTS OF EACH OF THE

MAIN ISLANDS AVERAGE SPEEDS ARE MORE THAN ADEQUATE FOR ECONOMIC POWER GENERATION. A RADIOMETER NETWORK ON OAHU AND SCATTERED MEASUREMENTS ELSEWHERE REVEAL THAT OVER MOST AREAS SHELTERED FROM THE TRADE WINDS, INSOLATION IS AS HIGH AS ANYWHERE IN THE CONTINENTAL UNITED STATES. CLOUDINESS DATA FROM WEATHER SATELLITES ARE USED TO REFINE THE INSOLATION MAPS.

1979-0612 RAMAGE C S, OSHIRO N E, YOKOGAWA S T
HAWAII WIND POWER SURVEY: FIXED STATION DATA.
NTIS, DECEMBER 1979. 66 P.
UHMET-79-15

WINDS ARE MEASURED AT WINDY LOCATIONS IN THE HAWAIIAN ISLANDS FOR PERIODS RANGING FROM 9 TO 40 MONTHS. CAREFUL CALIBRATION AND COMPARISON WITH THE NEAREST AIRPORT MEASUREMENTS ALLOW FOR CORRECTION OR ELIMINATION OF BAD DATA. THE DIFFERENCES WERE SUFFICIENTLY SMALL TO JUSTIFY COMPUTING SPEED DURATION AND POWER DENSITY, AND DIURNAL VARIATIONS OF WIND SPEED AND POWER DENSITY FOR EACH STATION. A SIGNIFICANT AREA ON EACH ISLAND POSSESSES HIGH ANNUAL WIND POWER (POWER DENSITY AT 50 M (164 FT) AGL EXCEEDING 400 W/SQ M). THE MONITORING OF THE STRONG WIND AREA OF NORTHWEST MOLOKAI, UNTIL NOW SAMPLED ONLY DURING MOBILE SURVEY, IS OUTLINED. PLANS INCLUDE MAKING DETAILED MEASUREMENTS OF THE TURBULENCE CHARACTERISTICS AND THE VERTICAL PROFILE OF THE WIND IN EACH OF THE MAJOR STRONG WIND AREAS.

1979-0613 RAMAKUMAR R, DESHMUKH R G
APPLICATION OF PROBABILITY METHODS TO EVALUATE THE RELIABILITY OF A COMBINED WIND-ELECTRIC AND CONVENTIONAL GENERATION SYSTEM.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2282-2286.

THE MODELS, APPROACHES AND THE MAJOR PARAMETERS INFLUENCING THE APPLICATION OF PROBABILITY METHODS TO EVALUATE THE RELIABILITY OF A COMBINED WIND-ELECTRIC AND CONVENTIONAL GENERATION SYSTEM FEEDING A COMMON LOAD ARE DISCUSSED. CAPACITY OUTAGE PROBABILITY TABLES AND MARKOV MODELS ARE PRESENTED FOR A WIND-ELECTRIC CONVERSION SYSTEM.

1979-0614 RAMBO F
THE "EVAC" HOUSE THAT JACK BUILT.
MOTHER EARTH NEWS NO. 58: 106-107, JULY/AUGUST 1979.

THE ARTICLE TELLS OF AN EARTH-SHELTERED, SUN-TEMPERED, NEARLY TOTALLY ENERGY-SELF-SUFFICIENT HOUSE. THE BUILDING INCORPORATES THE USE OF SOLAR HEATING, HOT WATER STORAGE SYSTEM AND A 3-KW WINDPLANT.

1979-0615 RAMSHAW R S, BOWMAN D
HIGH TEMPERATURE STORAGE FOR A WIND ENERGY SYSTEM.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 496-498.

THE SYSTEM IS DESIGNED TO USE WIND ENERGY TO PROVIDE "TOPUP" ENERGY FOR A HOME HEATING SYSTEM. ELECTRIC POWER IS GENERATED BY A WIND TURBINE GENERATOR AND CONVERTED TO HEAT IN A HIGH TEMPERATURE STORAGE UNIT WHICH SUPPLIES THE SPECIFIED LOAD. OPERATING CURVES OF A COMMERCIAL DARRIEUS WIND TURBINE AND GENERATOR ARE USED IN THE SIMULATION FROM WHICH A TRANSFER FUNCTION IS DERIVED. IT RELATES THE ELECTRICAL HEAT ENERGY TO THE WIND SPEED INPUT. THE OUTPUT HEAT ENERGY IS DIRECTED ONLY TO THE STORAGE FROM WHICH THE LOAD ENERGY IS PARTIALLY DERIVED.

1979-0616 REDDOCH T W
THE DISPERSED SCENARIO: A CUSTOMER OR UTILITY OPTION.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 2-10.

THE AUTHOR DESCRIBES SOME OF THE PROBLEMS ENCOUNTERED WHEN TRYING TO INTEGRATE SMALL, ISOLATED, CUSTOMER-OPERATED GENERATING UNITS WITH THE ELECTRIC UTILITY.

1979-0617 REDDOCH T W
FIELD EXPERIENCE WITH WIND TURBINE GENERATOR OPERATION IN UTILITY SYSTEMS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 403-413.
CONF-790352

A VITAL PART OF THE DEVELOPMENT OF WIND TECHNOLOGY IS THE SUCCESSFUL INTEGRATION OF IT INTO ELECTRICAL POWER SYSTEMS. IN ORDER TO ACHIEVE THIS OBJECTIVE, THE FEDERAL WIND ENERGY PROGRAM HAS CHOSEN SEVENTEEN CANDIDATE SITES FOR FIELD TEST STUDIES, THREE OF WHICH WILL BE DISCUSSED IN THIS REPORT. THE SITES ARE CLAYTON, NEW MEXICO; CULEBRA, PUERTO RICO; AND BLOCK ISLAND, RHODE ISLAND. EACH SITE RECEIVES A DOE/NASA MOD-0A WHICH IS RATED AT 200 KW IN A 22.4 MPH WIND AT THE 30 METER HEIGHT. THE CHARACTERISTICS OF EACH SITE ARE SUFFICIENTLY DIFFERENT SUCH THAT THE SUM TOTAL OF INFORMATION PROVIDED BY THE SITES WILL YIELD VITAL DATA FOR BASIC INTEGRATION REQUIREMENTS.

1979-0618 REDDOCH T W, KLEIN J W
NO ILL WINDS FOR NEW MEXICO UTILITY.
IEEE SPECTRUM 16(3): 57-61, MARCH 1979.

A WIND TURBINE LINKED TO THE CLAYTON, N.M. UTILITY SYSTEM IS PROVIDING 15 PERCENT OF THE UTILITY'S OFF-PEAK POWER LOAD. SPONSORED A YEAR AGO AS A FEDERAL TEST PROJECT, THE FACILITY OVERCAME SEVERAL INITIAL PROBLEMS AND IS NOW UNDERGOING TECHNICAL AND ECONOMIC EVALUATION. THE TURBINE WAS ABLE TO OPERATE 80 PERCENT OF THE TIME WHEN WINDS WERE AT ACCEPTABLE LEVELS (WHICH WAS 57 PERCENT OF THE TIME) AND YIELDED AN OVERALL 20 PERCENT EFFICIENCY. PERFORMANCE DATA FOR THE WIND TURBINE AND THE INTEGRATED OPERATION ARE SUMMARIZED AND FUTURE DESIGN CHANGES BASED ON THE EXPERIMENT ARE INDICATED. THE ISOLATED CHARACTER OF CLAYTON WAS FOUND TO MINIMIZE POTENTIAL ENVIRONMENTAL IMPACTS.

1979-0619 REED J W
ANALYSIS OF THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS.
ENERGY 4(5): 811-822, OCTOBER 1979. (SPECIAL ISSUE: RENEWABLE ENERGY PROSPECTS, PROCEEDINGS OF A CONFERENCE ON NON-FOSSIL FUEL AND NON-NUCLEAR FUEL ENERGY STRATEGIES, HONOLULU, JANUARY 9-12, 1979).

WIND ENERGY CONVERSION SYSTEMS (WECS) ARE SOLAR SYSTEMS BECAUSE THE SUN DRIVES THE ATMOSPHERIC CIRCULATION. ABOUT 20 TW OF WIND ENERGY FLOWS POLEWARD ANNUALLY, OVER LAND IN TEMPERATE LATITUDES, IN THE 500 M DEEP

ATMOSPHERIC BOUNDARY LAYER. AN AVERAGE 500 GW OF ELECTRICITY COULD BE GENERATED BY MASSIVE EXPLOITATION OF THE U.S. GREAT PLAINS WIND FIELD. THERE ARE, HOWEVER, LARGE FLUCTUATIONS IN AVAILABLE WIND POWER. THERE ARE FREQUENT 20% VARIATIONS IN ANNUAL SUPPLY; ANNUAL PERIODICITY BRINGS MOST WIND POWER DURING THE SPRING; THERE ARE STORM CYCLES, AND THERE IS A DIURNAL CYCLE. GUSTS AND TURBULENCE ALSO REQUIRE FILTERING TO MEET NORMAL POWER REQUIREMENTS. SEVERAL SCHEMES ARE EVOLVING TO TAME THIS ERRATIC WIND POWER SUPPLY. MODERN TECHNOLOGY IS REFINING HORIZONTAL-AXIS TURBINES OF A WIDE SIZE RANGE. PROGRESS IS ALSO BEING MADE TOWARD PRODUCING AN ECONOMICAL VERTICAL-AXIS TURBINE. STANDARDS FOR TURBINE PERFORMANCE EVALUATION AND INSTALLATION SITE SELECTION ARE NOW BEING DEVELOPED.

1979-0620 REED J W
SOME VARIABILITY STATISTICS OF AVAILABLE WIND POWER.
NTIS, MARCH 1979. 50 P.
SAND-78-1735

THE LONG-TERM VARIABILITY OF AVAILABLE WIND POWER HAS BEEN STUDIED IN TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS AT FIFTEEN SELECTED WEATHER STATIONS. MONTH BY MONTH AND YEAR BY YEAR SUMS OF WIND POWER OCCURRENCES WERE USED TO GENERATE AVERAGE, STANDARD DEVIATION, AND AUTOCORRELATION STATISTICS. THE AMPLITUDE OF THE ANNUAL CYCLE IN AVAILABLE WIND POWER WAS AT LEAST 70% OF THE AVERAGE AT ALL LOCATIONS. LONG TERM INTEGRATED POWER PRODUCTIONS SHOWED MAXIMA AND MINIMA THAT DIFFERED BY 36 TO 91% FROM AVERAGE ANNUAL PRODUCTION.

1979-0621 REGULATIONS FOR THE CALIFORNIA SOLAR ENERGY TAX CREDIT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, JULY 1979. 18 P.
P-500-79-016

GUIDELINES WHICH SPECIFY SOLAR ENERGY SYSTEM AND ENERGY CONSERVATION MEASURES APPLIED IN CONJUNCTION WITH SOLAR ENERGY SYSTEMS WHICH ARE ELIGIBLE FOR CALIFORNIA STATE TAX CREDITS ARE PRESENTED.

1979-0622 THE "RENEWABLES" AND THE ENVIRONMENT.
ATOM NO. 273: 181-186, JULY 1979.

THIS PRELIMINARY REVIEW OF THE ENVIRONMENTAL ISSUES WHICH WOULD BE RAISED BY THE INTRODUCTION OF THE RENEWABLE ENERGY SOURCES INTO THE UK'S ENERGY SUPPLY IS A SHORTENED VERSION OF EVIDENCE SUBMITTED BY THE ENERGY SUPPORT UNIT TO THE COMMISSION ON ENERGY AND THE ENVIRONMENT. THE EVIDENCE, WHICH IS BEING PUBLISHED IN FULL BY THE DEPARTMENT OF ENERGY, WAS PRESENTED BY DR. J.K. DAWSON, HEAD OF ETSU. THE UNIT IS BASED AT AERE, HARWELL. THE RENEWABLE ENERGY SOURCES ARE TAKEN TO BE THE SUN, WHOSE ENERGY CAN APPEAR IN THE FORM OF HEAT, THE WIND, THE WAVES OF THE OCEANS, PLANT MATERIALS (WHICH MAY BE CONVERTIBLE TO LIQUID OR GASEOUS FUELS) AND WATER ABOVE SEA LEVEL (FROM WHICH WE CAN DERIVE HYDRO-POWER) AND THE EARTH'S ROTATION WHICH APPEARS AS TIDAL ENERGY. IN ADDITION GEOTHERMAL ENERGY, WHICH MAY BE RECOVERABLE FROM THE EARTH'S CRUST, IS INCLUDED ALTHOUGH ON A STRICT DEFINITION IT WILL NOT BE RENEWABLE ON HUMAN TIMESCALES AT ANY PARTICULAR LOCATION IN THE UK.

1979-0623 RENEWABLE OCEAN ENERGY SOURCES. PART II. WORKING PAPERS: OCEAN WINDS, CURRENTS, WAVES, TIDES AND SALINITY GRADIENTS.
NTIS, MARCH 1979. 153 P.
PB-295876

THE SIX RENEWABLE OCEAN ENERGY SYSTEMS RECEIVING FEDERAL RESEARCH SUPPORT AT PRESENT ARE: OCEAN THERMAL ENERGY CONVERSION (OTEC), TIDES, OCEAN WINDS, WAVES, CURRENTS, AND SALINITY GRADIENTS. THIS REPORT PROVIDES DETAILED ANALYSES AND DESCRIPTIONS OF FIVE OF THE SIX TECHNOLOGIES. IT COVERS THE SUBJECTS: (A) WINDS, CURRENTS AND WAVES; (B) TIDES; AND (C) SALINITY GRADIENTS.

1979-0624 RENNE D S
WIND CHARACTERISTICS FOR AGRICULTURAL WIND ENERGY APPLICATIONS.
NTIS, JANUARY 1979. 5 P.
CONF-7904120-1, PNL-SA-7270

WIND ENERGY UTILIZATION IN AGRICULTURE CAN PROVIDE A POTENTIALLY SIGNIFICANT SAVINGS IN FUEL OIL CONSUMPTION AND ULTIMATELY A COST SAVINGS TO THE FARMER. A KNOWLEDGE OF THE WIND CHARACTERISTICS WITHIN A REGION AT A LOCATION CAN CONTRIBUTE GREATLY TO A MORE EFFICIENT AND COST-EFFECTIVE USE OF THIS RESOURCE. CURRENT RESEARCH INDICATES THAT THE IMPORTANT WIND CHARACTERISTICS INCLUDE MEAN ANNUAL WIND SPEED AND THE FREQUENCY DISTRIBUTION OF THE WIND, SEASONAL AND DIURNAL VARIATIONS IN WIND SPEED AND DIRECTION, AND THE TURBULENT AND GUSTINESS CHARACTERISTICS OF THE WIND. FURTHER RESEARCH IS UNDERWAY TO PROVIDE A BETTER DEFINITION OF THE TOTAL WIND RESOURCE AVAILABLE, IMPROVED METHODS FOR SITING WECS AND IMPROVED UNDERSTANDING OF THE ENVIRONMENT TO WHICH THE WECS RESPOND.

1979-0625 RENNE D S, ELLIOTT D L
OVERVIEW OF TECHNIQUES FOR ANALYZING THE WIND ENERGY POTENTIAL OVER LARGE AREAS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 181-189.
RFP-3014(VOL.2)

THIS STUDY'S OBJECTIVE IS TO PRODUCE A REFINED ANALYSIS OF WIND ENERGY POTENTIAL OVER LARGE AREAS BY DEVELOPING PROTOTYPE TECHNIQUES FOR IDENTIFYING, SCREENING, AND ANALYZING ALL AVAILABLE WIND DATA WITHIN A GIVEN AREA AND FOR IDENTIFYING, THROUGH OBSERVATION AND ANALYTICAL METHODS, REGIONS OF HIGH WIND ENERGY POTENTIAL WITHIN THAT AREA WHERE NO DATA EXIST. ONCE DEVELOPED AND TESTED IN A SPECIFIC REGION, THESE PROTOTYPE TECHNIQUES WILL BE APPLIED TO OTHER LARGE AREAS OF THE U.S. THIS WORK WILL ULTIMATELY RESULT IN A HIGHLY REFINED NATIONAL WIND ENERGY ASSESSMENT.

1979-0626 REPPERT M H
SUMMER ATTIC AND WHOLE-HOUSE VENTILATION.
NTIS, JULY 1979. 155 P.
SUMMER ATTIC AND WHOLE-HOUSE VENTILATION WORKSHOP, GAITHERSBURG, MARYLAND, JULY 13, 1978.
PB-297497, NBS-SP-548

THIS REPORT CONTAINS THE PROCEEDINGS OF THE SUMMER ATTIC AND WHOLE-HOUSE VENTILATION WORKSHOP. THE PURPOSE OF THE WORKSHOP WAS TO PROVIDE A FORUM FOR TECHNICAL DISCUSSION TO ASSESS SUMMER ENERGY SAVINGS THAT MIGHT BE ACHIEVED FROM THE USE OF STATIC AND POWERED ATTIC VENTILATION AND WHOLE-HOUSE VENTILATION EQUIPMENT. PAPERS ON EXPERIMENTAL AND MATHEMATICAL MODEL STUDIES RELATING TO ATTIC AND WHOLE-HOUSE VENTILATION WERE PRESENTED. IN ADDITION, A PAPER ON ROOF SOLAR ABSORPTANCE AND ITS EFFECT ON THE COOLING REQUIREMENT OF A RESIDENCE WAS PRESENTED.

1979-0627 RILEY J D, ODLAND R, BARKER H
STANDARDS, BUILDING CODES, AND CERTIFICATION PROGRAMS FOR SOLAR TECHNOLOGY APPLICATIONS.
NTIS, JULY 1979. 140 P.
SERI/TR-53-095

THIS REPORT IS A PRIMER ON SOLAR STANDARDS DEVELOPMENT. IT EXPLAINS THE DEVELOPMENT OF STANDARDS, BUILDING CODE PROVISIONS, AND CERTIFICATION PROGRAMS AND THEIR RELATIONSHIP TO THE EMERGING SOLAR TECHNOLOGIES. THESE AREAS ARE IMPORTANT IN THE COMMERCIALIZATION OF SOLAR TECHNOLOGY BECAUSE THEY LEAD TO THE ATTAINMENT OF TWO GOALS: THE DEVELOPMENT OF AN INDUSTRY INFRASTRUCTURE AND CONSUMER CONFIDENCE.

1979-0628 ROAN V P
A NEW CONCEPT IN HORIZONTAL AXIS WIND TURBINE ROTORS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 680.

A NEW CONCEPT HAS BEEN DEVELOPED AT THE UNIVERSITY OF FLORIDA WHEREBY THE ROTOR BLADE IS CONSTRUCTED OF SEGMENTS SEPARATED BY AERODYNAMIC FENCES, WHICH MAY BE INDIVIDUALLY ORIENTED TO ACHIEVE THE SAME EFFECT AS A CONTINUOUSLY CONTOURED BLADE. SEGMENTS MAY BE MADE FROM INEXPENSIVE, LIGHT WEIGHT MATERIAL AND "SANDWICHED" ON THE ROTOR BLADE SHAFTS IN DIFFERENT NUMBERS AND VARIOUS ORIENTATIONS TO ALLOW THE SAME BASIC COMPONENTS TO BE USED FOR ENTIRE FAMILIES OF WIND TURBINES. SEVERAL PROTOTYPES HAVE BEEN BUILT AND TESTED, INCLUDING A 14 FOOT, 3-BLADED, 2 KILOWATT SYSTEM. BOTH POWER COEFFICIENT DATA AND PROJECTED ECONOMICS HAVE BEEN FAVORABLE FOR THE CONCEPTS INVOLVED IN THIS WIND MACHINE.

1979-0629 ROBBINS W H, THOMAS R L
LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 50-70.
CONF-790352

ONE FACET OF THE FEDERAL WIND ENERGY PROGRAM, LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT, IS BEING MANAGED BY THE NASA LEWIS RESEARCH CENTER. THESE ACTIVITIES CONSIST OF SEVERAL ON-GOING WIND SYSTEM DEVELOPMENTS ORIENTED TOWARD UTILITY APPLICATION. IN ADDITION, A COMPREHENSIVE TECHNOLOGY PROGRAM, WHICH SUPPORTS THE WIND TURBINE PROJECTS, IS BEING CONDUCTED. THIS PAPER PRESENTS AN OVERVIEW OF THE NASA ACTIVITIES.

1979-0630 ROBERT J, NEWMAN B G
LIFT AND DRAG OF A SAIL AEROFOIL.
WIND ENG. 3(1): 1-22, 1979.

TESTS HAVE BEEN MADE ON A TWO-DIMENSIONAL SAIL AEROFOIL FORMED BY WRAPPING FABRIC ROUND A CIRCULAR LEADING EDGE AND BRINGING THE TWO SIDES TOGETHER TO FORM A SHARP TRAILING EDGE. FOR MOST OF THE TESTS UNCALENDERED NYLON WAS USED, BUT MORE LIMITED TESTS WERE MADE ON A SLIGHTLY HEAVIER CALENDERED DACRON FABRIC. MEASUREMENTS WERE MADE FOR THREE LEADING-EDGE RADII AND THREE CHORD LENGTHS. IN ADDITION THE PRESSURE INSIDE THE SAIL AND THE FORCE ON THE TRAILING EDGE WERE MEASURED. THE AEROFOILS WERE FOUND TO BE STABLE WITH NO TENDENCY TO FLAP. DUE TO THE INCREASE OF CAMBER WITH ANGLE OF ATTACK THEY GENERALLY HAD A HIGH LIFT-CURVE SLOPE AND A HIGH MAXIMUM LIFT BUT THEIR DRAG WAS ALSO HIGH WHEN COMPARED WITH COMPARABLE RIGID AEROFOILS.

1979-0631 ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. ATMOSPHERIC TEST DATA COLLECTED FROM SMALL WIND ENERGY CONVERSION SYSTEMS. SECOND INTERIM REPORT.
NTIS, JULY 1979. 120 P.
RFP-3004(VOL.1)

VOLUME I OF THE SECOND INTERIM REPORT OF THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) DESCRIBES THE 16 SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TESTED AS OF JUNE 30, 1979, AND PROVIDES THE SIGNIFICANT QUANTITATIVE AND QUALITATIVE DATA COLLECTED TO THAT DATE.

1979-0632 ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. CONTROLLED VELOCITY, VIBRATION AND DYNAMOMETER TESTING OF SMALL WIND ENERGY CONVERSION SYSTEMS. SECOND INTERIM REPORT.
NTIS, JULY 1979. 43 P.
RFP-3004(VOL.2)

VOLUME II OF THE SECOND INTERIM REPORT OF THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) DESCRIBES PROGRESS IN THE DEVELOPMENT OF CONTROLLED VELOCITY, VIBRATION, AND DYNAMOMETER TEST CAPABILITIES. CONTROLLED VELOCITY TEST RESULTS FOR THE AERO POWER SL 1000 WIND SYSTEM AND VIBRATION TEST RESULTS FOR THE GRUMMAN, PINSON, MILLVILLE, KEDCO, AND 1/3 SCALE UNITED TECHNOLOGIES RESEARCH CENTER WIND MACHINES ARE PROVIDED.

1979-0633 RODRIGUEZ D J
COMPARISON OF THE FINITE ELEMENT AND FINITE DIFFERENCE METHODS IN A DIAGNOSTIC REGIONAL WIND FIELD MODEL.
NTIS, MAY 1979. 97 P.
UCRL-52789

A COMPARATIVE STUDY WAS UNDERTAKEN TO INVESTIGATE THE SIMILARITIES AND DIFFERENCES BETWEEN THE FINITE ELEMENT AND FINITE DIFFERENCE METHODS OF NUMERICALLY APPROXIMATING AN OBJECTIVE ANALYSIS EQUATION. BOTH MODELS ARE THREE-DIMENSIONAL, TIME-INDEPENDENT, AND INCORPORATE TERRAIN IN ADJUSTING A FIELD OF OBSERVED THREE-COMPONENT VELOCITIES TO ACHIEVE MASS-CONSISTENCY. PRINCIPLES FROM THE CALCULUS OF VARIATIONS ARE UTILIZED IN DEVELOPING MODEL EQUATIONS. THE VARIATIONAL APPROACH ASSUMES THAT VELOCITIES INPUT TO THE MODELS ARE A FAIR REPRESENTATION OF ACTUAL MEAN WINDS. STARTING WITH METEOROLOGICAL DATA AVAILABLE RANDOMLY ON A REGIONAL SCALE, WIND COMPONENT VALUES ARE INTERPOLATED AND EXTRAPOLATED TO EACH GRID POINT IN THE CALCULATIONAL DOMAIN IN A MANNER CONSISTENT WITH PREVAILING METEOROLOGY. MODEL ADJUSTMENTS ARE MADE IN RESPONSE TO THE ORIGINAL MASS-CONSISTENCY IN THIS FIELD OF DISCRETE VELOCITIES AND TO THE TOPOGRAPHICAL BOUNDARY SURFACE REPRESENTING THE APPLICATION AREA.

1979-0634 ROSE M
CUTTYHUNK ISLAND INSTALLATION WTG ENERGY SYSTEMS, INC. MP1-200 CONTROL SYSTEM DESIGN.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 283-296.
CONF-790352

A CONTROL SYSTEM FOR A WIND GENERATOR MUST SATISFY MANY REQUIREMENTS IF IT IS TO BE INTERCONNECTED TO A UTILITY NETWORK. IT SHOULD BE FULLY AUTOMATIC IN OPERATION AND CONTAIN THE NECESSARY LOGIC FOR STABLE AND ACCURATE

CONTROL OF THE GENERATOR'S FREQUENCY, POWER, VOLTAGE AND VAR OUTPUT. IN ADDITION, IT SHOULD PROVIDE THE NECESSARY PROTECTION FOR THE SYSTEM IN THE EVENT OF A COMPONENT FAILURE. A SYSTEM FOR CONTROLLING THE SPEED OF A WIND GENERATOR HAS BEEN DEVELOPED BY WTG ENERGY SYSTEMS, INC. WHICH UTILIZES LOAD MODULATION WITH A FIXED PITCH ROTOR CONFIGURATION. THE MP1-200 WIND TURBINE (FIGURE 1) PICTURED ON CUTTYHUNK ISLAND, MASSACHUSETTS UTILIZES A THREE BLADED, 80 FEET IN DIAMETER ROTOR OPERATING UPWIND OF THE TOWER. THE MACHINE IS CONSTRUCTED ENTIRELY OF STEEL. THE TOWER HEIGHT, MEASURED FROM GROUND LEVEL TO THE ROTOR'S CENTER LINE, IS 80 FEET. THE ROTOR OPERATES AT A CONSTANT 30 RPM DRIVING A 250 KVA SYNCHRONOUS GENERATOR THROUGH A 40:1 TRANSMISSION. BLADE TIPS ROTATE 60 DEGREES OUT OF PLANE TO PROVIDE AERODYNAMIC BRAKING. A 24 INCH DISC BRAKE MOUNTED ON THE HIGH SPEED SHAFT IS USED FOR PARKING THE ROTOR.

1979-0635 SCI AWARDED 4 KW DESIGN CONTRACT.
WIND ENERGY REP.: 6, OCTOBER 1979.

1979-0636 SACKS T
WORLD'S WINDPOWER PROGRAMMES LEAVE THE UK IN THEIR WAKE.
ELECTR. REV. 205(23): 16-17, DECEMBER 14-21, 1979.

THIS REPORT DISCUSSES HOW BRITAIN IS IN DANGER OF BEING RELEGATED TO THE ROLE OF AN ALSO-RAN IN THE WINDPOWER FIELD. UNLESS AT LEAST ONE (AND PREFERABLY MORE) AEROGENERATOR IN THE MEGAWATT CLASS IS BUILT SOON, THE UK WILL LAG SO FAR BEHIND OTHER COUNTRIES IN OPERATIONAL EXPERIENCE THAT AN UNBRIDGEABLE GAP IN WINDPOWER KNOWLEDGE MAY OPEN.

1979-0637 SANDIA TESTS EXTRUDED BLADES.
WIND POWER DIG. NO. 17: 14-16, FALL 1979.

1979-0638 SANESI N L
WINDPOWER AT BOARDMAN, OREGON, AND BREAK-EVEN ECONOMICS.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 47-50.
CONF-790845-(SUPPL.)

FIVE YEARS OF WIND DATA AT BOARDMAN, OREGON, IS ANALYZED FOR EXPECTED ELECTRIC ENERGY GENERATION FROM LARGE (1 TO 3 MWE) HORIZONTAL AXIS WIND TURBINE GENERATORS. BREAK-EVEN INVESTMENT COSTS REQUIRED FOR WIND TURBINE GENERATORS TO ECONOMICALLY OPERATE IN THE PACIFIC NORTHWEST ARE EXAMINED. THREE VARIABLES CAN IMPROVE THE BREAK-EVEN ECONOMICS: HIGHER AVERAGE ANNUAL CAPACITY FACTORS, HIGHER AMOUNTS OF CAPACITY CREDIT, AND LOWER FIXED COSTS. OTHER UNCERTAINTIES FOR THE WIND ENERGY TECHNOLOGIES TO OVERCOME BEFORE BEING CONSIDERED FOR COMMERCIAL APPLICATIONS ARE DEMONSTRATED OPERATING COMPATIBILITY WITHIN A UTILITY SYSTEM, RELIABLE PERFORMANCE, AND OUTAGE DATA. ONLY YEARS OF ON-SITE TESTING WILL ANSWER THESE QUESTIONS.

1979-0639 SARKISIAN P H, MCGOWAN J G
A PRELIMINARY INVESTIGATION OF THREE ADVANCED WIND FURNACE SYSTEMS FOR RESIDENTIAL AND FARM APPLICATIONS.
VOLUME I. EXECUTIVE SUMMARY.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, APRIL 1979. 21 P.
RFP-3059/67025/3533/80/4-1

THIS REPORT SUMMARIZES THE RESULTS OF AN ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF THREE ADVANCED WIND FURNACE HEATING SYSTEMS. THE WORK REPRESENTS AN EXTENSION OF PREVIOUS WORK ON WIND POWERED HEATING SYSTEMS AND EXTENDS THIS WIND ENERGY APPLICATION TO THE SUPPLY OF ELECTRICITY AS WELL AS SPACE AND HOT WATER ENERGY LOADS FOR RURAL RESIDENCES AND FARMS. DETAILS OF THE PROPOSED SYSTEMS AND THE ANALYTICAL MODELING OF THE OVERALL SYSTEM AND SUBCOMPONENTS ARE PRESENTED AS WELL AS TYPICAL SYSTEM ENERGY AND ECONOMIC PERFORMANCE.

1979-0640 SARKISIAN P H, MCGOWAN J G
A PRELIMINARY INVESTIGATION OF THREE ADVANCED WIND FURNACE SYSTEMS FOR RESIDENTIAL AND FARM APPLICATIONS.
VOLUME II. TECHNICAL REPORT.
GOLDEN, COLORADO, ROCKWELL INTERNATIONAL CORPORATION, ROCKY FLATS WIND SYSTEMS PROGRAM, APRIL 1979. 250 P.
RFP-3059/67025/3533/80/4-2

THIS REPORT IS PRIMARILY CONCERNED WITH AN ANALYSIS OF ADVANCED WIND FURNACE ENERGY SYSTEMS. THREE SUCH SYSTEMS, THE IMPROVED WIND FURNACE SYSTEM AND THE WIND DRIVEN TOTAL ENERGY SYSTEM, TYPES I AND II, FOR THE SUPPLY OF ENERGY TO ELECTRICAL, SPACE HEATING AND DOMESTIC HOT WATER LOADS ARE CONSIDERED FOR NEW ENGLAND RESIDENTIAL AND FARM APPLICATIONS. THESE SYSTEMS ARE STUDIED WITH THE AID OF AN INTERACTIVE DIGITAL COMPUTER SIMULATION (WDTES1) AND AN ECONOMICS PROGRAM (WSDEC0). ALTHOUGH THE PROGRAMS INCORPORATE SOME IDEALIZATIONS, THEY REPRESENT A NECESSARY PRELIMINARY INVESTIGATION OF THE TOTAL SYSTEM AND ITS COMPONENTS. THE COMPUTER MODELS ARE DESIGNED TO BE GENERAL ENOUGH TO ALLOW FOR WIDE VARIATIONS OF LOADS, COMPONENT SIZES, WORKING FLUIDS AND ENERGY COSTS, BUT SPECIFIC ENOUGH TO APPROACH AN OPTIMUM DESIGN POINT BASED ON MAXIMUM ENERGY EFFICIENCY OR MINIMUM TOTAL SYSTEM COSTS.

1979-0641 SCHEFFLER R L
STATUS OF THE SOUTHERN CALIFORNIA EDISON COMPANY 3 MW WIND TURBINE GENERATOR (WTG) DEMONSTRATION PROJECT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 312-315.
CONF-790352

TO DEMONSTRATE THE CONCEPT OF UTILITY SCALE ELECTRICITY PRODUCTION FROM A HIGH WIND ENERGY RESOURCE, SOUTHERN CALIFORNIA EDISON COMPANY (SCE) HAS INITIATED A PROGRAM TO CONSTRUCT AND TEST A 3 MEGAWATT (3,000 KILOWATT) SCHACHLE WIND TURBINE GENERATOR (WTG) AT A SCE-OWNED SITE NEAR PALM SPRINGS, CALIFORNIA. THE BACKGROUND AND CURRENT STATUS OF THIS PROGRAM ARE PRESENTED ALONG WITH A SUMMARY OF FUTURE PLANNED PROGRAM ACTIVITIES.

1979-0642 SCHEFFLER R L
STATUS OF THE SOUTHERN CALIFORNIA EDISON COMPANY 3 MW WIND TURBINE GENERATOR (WTG) DEMONSTRATION PROJECT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 355-362.
NASA-CP-2106

TO DEMONSTRATE THE CONCEPT OF UTILITY SCALE ELECTRICITY PRODUCTION FROM A HIGH WIND ENERGY RESOURCE, SOUTHERN CALIFORNIA EDISON COMPANY (SCE) HAS INITIATED A PROGRAM TO CONSTRUCT AND TEST A 3 MEGAWATT (3000 KILOWATT) SCHACHLE WIND TURBINE GENERATOR (WTG) AT A SCE-OWNED SITE NEAR PALM SPRINGS. THE BACKGROUND AND CURRENT STATUS OF THIS PROGRAM ARE PRESENTED ALONG WITH A SUMMARY OF FUTURE PLANNED PROGRAM ACTIVITIES.

1979-0643 SCHLUETER R A, PARK G L, MODIR H, DORSEY J, LOTFALLIAN M
IMPACT OF STORM FRONTS ON UTILITIES WITH WECS ARRAYS.

WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 378-387.
CONF-790352

THE OBJECTIVES OF THIS DOE SPONSORED RESEARCH PROJECT ARE TO DETERMINE THE IMPACT OF SIGNIFICANT CHANGES IN WECS GENERATION ON AGC REGULATION, ECONOMIC DISPATCH, AND GOVERNOR FREQUENCY REGULATION; AND TO DETERMINE SOLUTIONS FOR SUCH OPERATING PROBLEMS CAUSED BY WECS GENERATION CHANGES. AN AGC SATURATION PROBLEM AND A RESULTANT VIOLATION OF NAPSIC PERFORMANCE REQUIREMENTS WERE SHOWN TO OCCUR FOR LARGE SIMULTANEOUS STORM INDUCED WECS GENERATION CHANGE AND LOAD CHANGE. THIS PROBLEM IS ALLEVIATED IF SPINNING RESERVE MARGINS ARE INCREASED. AN IMPROVEMENT IN RESPONSE TO WECS GENERATION CHANGES IS SHOWN TO BE POSSIBLE BY INCLUDING A HIGHER PERCENTAGE OF FASTER RESPONDING UNITS. FINALLY A CYCLING PHENOMENA WAS SHOWN TO OCCUR ON NUCLEAR UNITS IF THE GENERATION CHANGES ON ECHELONS IS GREAT ENOUGH TO CAUSE FREQUENCY DEVIATIONS THAT EXCEED GOVERNOR DEMAND ON THE UNIT IN QUESTION.

1979-0644 SCHLUETER R A, PARK G L, MODIR H, DORSEY J, LOTFALLIAN M
IMPACT OF STORM FRONTS ON UTILITIES WITH WECS ARRAYS. FINAL REPORT.
NTIS, OCTOBER 1979. 149 P.
COO-4450-79/2

THE EFFECTS OF LARGE RAPID CHANGES IN GENERATION FROM LARGE ARRAYS OF WIND TURBINE GENERATORS ON THE OPERATION OF AUTOMATIC GENERATION CONTROL AND FREQUENCY REGULATION WILL BE ASSESSED. THE MAXIMUM CHANGE AND RATES OF CHANGE OF GENERATION FROM AN ARRAY OF WIND TURBINES DUE TO PASSAGE OF A THUNDERSTORM FRONT IS DETERMINED FIRST. THE ASSESSMENT REQUIRED (1) MODELING AN ARRAY OF WIND TURBINES IN ORDER TO DETERMINE POWER VARIATION FOR CHANGES IN WIND SPEED CAUSED BY A STORM FRONT; (2) SIMULATION OF THE MODEL TO DETERMINE POWER VARIATION FROM A WORST CASE COASTAL FARM DUE TO PASSAGE OF A FRONT; AND (3) ANALYSIS OF THE MAXIMUM CHANGE AND RATES OF CHANGE FROM THE PORTION OF THE ARRAY AFFECTED BY THE FRONT.

1979-0645 SCHMITZ K, TERHORST W, WAGNER H J
SOLAR ENERGY--A COMPETITOR FOR NUCLEAR ENERGY?--SELECTED RESULTS OF ENERGY MODEL ANALYSIS.
ATOMKERNENERG. KERNTECH. 34(3): 177-181, 1979. (IN GERMAN)

NOWADAYS THE DIRECT AND INDIRECT USE OF SOLAR ENERGY IN THE FEDERAL REPUBLIC OF GERMANY SEEMS TO BE ONLY ECONOMICAL WITH THE APPLICATION OF WIND POWER STATIONS, SOLAR COLLECTORS AND HEAT PUMPS. THE CONTRIBUTION OF THESE TECHNOLOGIES TO THE POWER SUPPLY UNTIL 2010 IS EXAMINED BY MEANS OF AN ENERGY MODEL. THIS METHOD OFFERS THE ADVANTAGE OF WORKING WITHIN THE FRAMEWORK OF A CONSISTENT INTEGRATED PERSPECTIVE OF THE ENERGY ECONOMY. IT HAS BEEN SHOWN THAT THE CONTRIBUTION OF WIND POWER STATIONS TO THE OVERALL POWER GENERATION WILL BE MINIMAL UNTIL 2010. SOLAR COLLECTORS AND HEAT PUMPS PREFERABLY SUBSTITUTE LIGHT DISTILLATE OIL AND GAS IN THE RESIDENTIAL SECTOR. MARKET SHARES OF APPROXIMATELY 10 PERCENT SEEM TO BE POSSIBLE UNTIL THE YEAR 2010, CONSIDERING THE PRESENT STATE OF TECHNOLOGY. THE APPLICATION OF SOLAR ENERGY IS, THEREFORE, NO COMPETITOR FOR NUCLEAR ENERGY, WHICH IS ONLY USED FOR POWER GENERATION.

1979-0646 SCHNEIDER A D, CLARK R N
WIND-ASSISTED IRRIGATION PUMPING.
IRRIGATION & DRAINAGE IN THE NINETEEN-EIGHTIES. ASCE IRRIGATION AND DRAINAGE DIVISION SPECIALTY CONFERENCE, ALBUQUERQUE, JULY 17-20, 1979. NEW YORK, ASCE, 1979. P. 115-120.

A WIND-ASSISTED PUMPING SYSTEM HAS BEEN DESIGNED FOR USE WITH AN EXISTING IRRIGATION WELL AND VERTICAL TURBINE PUMP. THE SYSTEM HAS OPERATED SATISFACTORILY AND HAS EFFECTIVELY UTILIZED THE UNSTEADY POWER OUTPUT OF A WIND TURBINE. WIND-ASSISTED POWER SYSTEMS CAN BE UTILIZED IN ANY RURAL OR REMOTE APPLICATION WHERE A SECOND POWER SOURCE IS AVAILABLE.

1979-0647 SCHONBALL W
MECHANICAL OVERLOAD SYSTEMS FOR WIND GENERATORS.
U.S. PATENT NO. 4,142,830, MARCH 6, 1979. 4 P.

MOUNTED ON A VERTICAL AXIS THERE IS A HORIZONTAL AXIS AND, VERTICALLY SPACED THEREFROM, A WIND WHEEL GENERATOR AND COUNTERWEIGHT UNIT. WHEN THE WIND SPEED EXCEEDS A PREDETERMINED LIMIT, THE UNIT IS SWUNG THEREBY, IN A VERTICAL PLANE, DECREASING THE EFFECT OF THE WIND ON THE WHEEL AND PROTECTING IT FROM OVERLOAD.

1979-0648 SEELEY D, EUSER B, JOYCE C, MORGAN G H, LAITOS J G
SOLAR ENERGY LEGAL BIBLIOGRAPHY. FINAL REPORT.
NTIS, MARCH 1979. 169 P.
SERI/TR-62-069

THE SOLAR ENERGY LEGAL BIBLIOGRAPHY IS A COMPILATION OF APPROXIMATELY 160 SOLAR PUBLICATIONS ABSTRACTED FOR THEIR LEGAL AND POLICY CONTENT (THROUGH OCTOBER 1978). EMPHASIS IS ON LEGAL BARRIERS AND INCENTIVES TO SOLAR ENERGY DEVELOPMENT. ABSTRACTS ARE ARRANGED UNDER MANY CATEGORIES, INCLUDING WIND RESOURCES.

1979-0649 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE TO TELEVISION RECEPTION CAUSED BY HORIZONTAL AXIS WINDMILLS.
IEEE PROC. 67(8): 1133-1142, AUGUST 1979.

INTERFERENCE TO TELEVISION RECEPTION PRODUCED BY HORIZONTAL AXIS WIND TURBINE GENERATORS OR WINDMILLS HAS BEEN IDENTIFIED AND QUANTIFIED BY THEORETICAL AND EXPERIMENTAL STUDIES. IT IS FOUND THAT THE ROTATING BLADES OF A WINDMILL CAN PRODUCE PULSE AMPLITUDE MODULATION (PAM) OF THE TOTAL SIGNAL RECEIVED, AND THAT FOR AN ANTENNA SO LOCATED AS TO PICK UP THE SPECULAR OR FORWARD SCATTERING OFF THE BLADES, THIS EXTRANEOUS MODULATION CAN DISTORT THE VIDEO PORTION OF A TV SIGNAL REPRODUCTION IN THE VICINITY OF THE WINDMILL. THE DISTORTION IS WORST AT THE HIGHER FREQUENCIES, AND THEREFORE, POSES MORE OF A PROBLEM AT UHF THAN VHF. BASED ON LABORATORY STUDIES AS WELL AS ON-SITE MEASUREMENTS, A MODULATION LEVEL HAS BEEN ESTABLISHED AT WHICH THE VIDEO INTERFERENCE IS JUDGED "ACCEPTABLE", AND THIS THRESHOLD OF INTERFERENCE IS SUBSTANTIALLY INDEPENDENT OF THE AMBIENT SIGNAL STRENGTH. A THEORY HAS BEEN DEVELOPED TO COMPUTE THE INTERFERENCE REGION ABOUT A WINDMILL FOR ANY GIVEN TV TRANSMITTER, AND THE RESULTS ARE IN GOOD AGREEMENT WITH THOSE OBTAINED FROM ON-SITE MEASUREMENTS.

1979-0650 SENGUPTA D L, SENIOR T B A
WIND TURBINE GENERATOR INTERFERENCE TO TELEVISION RECEPTION.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 213-214.
RFP-3014(VOL.1)

FOR THE PAST THREE YEARS THE RADIATION LABORATORY, UNDER SPONSORSHIP FROM DOE, HAS BEEN STUDYING THE EFFECTS OF

LARGE HORIZONTAL AXIS WIND TURBINE GENERATORS (WTG) OR WINDMILLS ON THE PERFORMANCE OF VARIOUS ELECTROMAGNETIC SYSTEMS. THE INVESTIGATION OF THE PROBLEM OF INTERFERENCE TO TELEVISION (TV) RECEPTION CAUSED BY WINDMILLS IS REVIEWED.

1979-0651 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE CAUSED BY HORIZONTAL AXIS WIND TURBINE GENERATORS.
ENVIRONMENTAL CONTROL SYMPOSIUM, WASHINGTON, D.C., NOVEMBER 28, 1978. NTIS, SEPTEMBER 1979. P. 173-181.
DOE/EV-0046(VOL.3)

SINCE 1976, THE RADIATION LABORATORY, UNDER SPONSORSHIP FROM DOE, HAS BEEN STUDYING THE EFFECTS OF LARGE HORIZONTAL AXIS WIND TURBINE GENERATORS (WTG) OR WINDMILLS ON THE PERFORMANCE OF VARIOUS ELECTROMAGNETIC SYSTEMS, AND THE PRESENT PAPER SUMMARIZES THE INVESTIGATION TO DATE.

1979-0652 SFORZA P M, STASI W J
FIELD TESTING THE VORTEX AUGMENTOR CONCEPT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 171-184.
SERI/TP-245-184, CONF-790501

THIS REPORT CONCERNS THE FIELD TEST OF A LARGE-SCALE VAC MODEL. HERE WE PRESENT THE DETAILS OF A WIND DATA NETWORK, THE PROTOTYPE INSTRUMENTATION, THE DATA ACQUISITION AND PROCESSING SYSTEM, THE RESULTS OF THE FIELD TESTS OF SYSTEM PERFORMANCE, THE COMPARISONS TO THEORETICAL PREDICTIONS, AND A DISCUSSION OF THE PROBLEMS ASSOCIATED WITH FIELD TESTING AS WELL AS RECOMMENDATIONS FOR FURTHER RESEARCH BASED UPON THE EXPERIENCE GAINED IN THE PRESENT PROGRAM.

1979-0653 SHANKAR P N
DEVELOPMENT OF VERTICAL AXIS WIND TURBINES.
INDIAN ACAD. SCI. PROC. C2(1): 49-66, MARCH 1979.

DEVELOPMENT OF VERTICAL AXIS WIND TURBINES BASED ON THE DARRIEUS ROTOR IS DESCRIBED. ON THE ANALYTICAL SIDE, A PERFORMANCE ANALYSIS WAS DEVELOPED WHICH PERMITS THE ESTIMATION OF THE CHARACTERISTICS OF SUCH MACHINES. A 5 M HIGH WIND TURBINE USING CURVED WOODEN BLADES WAS DESIGNED, FABRICATED AND TESTED. BOTH THE THEORY AND INITIAL TESTS CONFIRMED THE LOW STARTING TORQUE OF THE TURBINE. WIND TUNNEL TESTS WERE PERFORMED ON MODEL SAVONIUS ROTORS TO DETERMINE OPTIMUM STARTER BUCKET CONFIGURATIONS. FINALLY A STRAIGHT-BLADED TURBINE WAS DESIGNED AND CONSTRUCTED. IT IS CONCLUDED FROM PRESENT EXPERIENCE THAT DARRIEUS TURBINES ARE LIKELY TO BE USEFUL IN LARGE SYSTEMS USED TO GENERATE ELECTRICAL POWER FOR GRID; FOR DIRECT WATER PUMPING PURPOSES, HOWEVER, THESE TURBINES ARE UNLIKELY TO BE SUITABLE.

1979-0654 SHEPHERD D G
WIND POWER.
ADV. ENERGY SYST. TECHNOL. 1: 1-124, 1978.

A BACKGROUND OF WIND POWER IS PRESENTED IN AN INTRODUCTORY SECTION. THE SUBJECTS COVERED IN ADDITIONAL SECTIONS ARE: ENERGY, POWER, AND MOMENTUM CONSIDERATIONS (ENERGY AVAILABLE, PERFORMANCE BOUNDARIES); TURBINE TYPES AND TERMINOLOGY; AERODYNAMICS OF WIND TURBINES (FLOW THROUGH A ROTOR, AERODYNAMIC ANALYSIS OF PROPELLER TYPE AND CROSS-WIND AXIS TYPE ROTORS); WIND ENERGY CONCENTRATORS AND AUGMENTORS; WIND CHARACTERISTICS AND SITING; ENVIRONMENTAL CONSIDERATIONS; STRUCTURAL CONSIDERATIONS; TESTING AND TEST PROCEDURES; APPLICATIONS AND SYSTEMS; ECONOMICS OF WIND POWER; STATE OF THE ART; AND WIND AND WEATHER PERMITTING.

1979-0655 SHEPHERD D C
ROCKY FLATS SUPPORTING RESEARCH AND TECHNOLOGY (SRT) PROGRAM.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 168-170.
RFP-3014(VOL.1)

THE SUPPORTING RESEARCH AND TECHNOLOGY (SRT) TASK ELEMENT OF THE ROCKY FLATS WIND SYSTEMS PROGRAM ADDRESSES THE NEED FOR DEVELOPING TECHNOLOGY THAT WILL REDUCE SWECS COSTS AND IMPROVE SYSTEM RELIABILITY AND PERFORMANCE. THE FY 1979 ROCKY FLATS PROGRAM PLAN INCLUDES NINE SRT PROJECTS WHICH FOCUS ON THE DEVELOPMENT OF IMPROVED OR SIMPLIFIED ANALYTICAL TECHNIQUES AND THE DETERMINATION OF SPECIFIC COMPONENT PERFORMANCE DATA UNDER SPECIFIC CONDITIONS. A GENERAL STATEMENT FOR EACH PROJECT IS INCLUDED.

1979-0656 SHRINIVASA U, NARASIMHA R, JAJU S P G
PROSPECTS FOR WIND ENERGY UTILIZATION IN KARNATAKA STATE.
INDIAN ACAD. SCI. PROC. C2(4): 521-544, DECEMBER 1979.

THE TOTAL WIND ENERGY POTENTIAL OF THE STATE EXCEEDS THE CURRENT ELECTRICAL ENERGY CONSUMPTION BY AN ORDER OF MAGNITUDE. THERE IS LIKELY TO BE A STRONG NEED FOR MECHANICAL ASSISTANCE TO IRRIGATION FOR THE DRY CROPS OF THE NORTHERN REGION. A SUITABLE WINDMILL WOULD BE ABLE TO LIFT 10000 LITRES OF WATER PER HOUR IN WINDS OF 10 KM/H AND COSTING LESS THAN RS 10000. THE ECONOMIC RETURN FOR A THREE HECTARE FARM GROWING TWO DRY CROPS A YEAR USING A WIND PUMP COSTING ABOUT RS 12000 COULD BE 150 PERCENT ON AN INITIAL INVESTMENT OF RS 15000.

1979-0657 SIGL A B, COROTIS R B, WON D J
RUN DURATION ANALYSIS OF SURFACE WIND SPEEDS FOR WIND ENERGY APPLICATION.
J. APPL. METEOROL. 18(2): 156-166, FEBRUARY 1979.

HOURLY WIND SPEED RECORDS ARE USED TO DEVELOP A MODEL FOR THE PROBABILITY DISTRIBUTION OF WIND SPEED PERSISTENCE ABOVE AND BELOW FIXED REFERENCE SPEEDS. EXAMINATION OF DURATION HISTOGRAMS FROM 19 SITES FOR RECORDS VARYING FROM 5-24 YEARS LEADS TO THE DEVELOPMENT OF A SIMPLE COMPOSITE DISTRIBUTION. ENFORCEMENT OF SMOOTH BEHAVIOR AND A PARAMETER SENSITIVITY ANALYSIS ALLOW THE MODEL TO BE INTERPRETED IN TERMS OF A SINGLE FREE PARAMETER, WHICH IS THEN SHOWN TO BE HIGHLY CORRELATED TO THE SEASONAL MEAN WIND SPEED AT A SITE. COMPARISON OF RUN DURATION RESULTS FOR 1 AND 3 H DATA (THE LATTER BEING THE STANDARD DIGITIZATION PRESENTLY USED BY THE NATIONAL CLIMATIC CENTER) INDICATES A DEFINITE BIAS WITH THE 3 H RECORDS. A CORRECTION SCHEME IS DERIVED TO IMPROVE THE 3 H RESULTS.

1979-0658 SIMONIN J
TURBO-ELECTRIC AND TURBO-PUMP.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, 2ND, MIAMI BEACH, FLORIDA, DECEMBER 10-13, 1979. PROCEEDINGS. CORAL GABLES, FLORIDA, CLEAN ENERGY RESEARCH INSTITUTE, 1979. P. 681-683.

THIS PAPER DESCRIBES A THREE-BLADED WIND TURBINE OF AN ALUMINUM-STAINLESS STEEL ALLOY. THE TURBINE DRIVES A CURRENT GENERATOR (OR PUMP) WHICH IS A TWO OR THREE PHASE ALTERNATOR WITH PERMANENT MAGNETS AND ON ELECTRONIC

REGULATION WITH AN AUTOMATIC LIMITATION OF TENSION. THREE DIFFERENT MODELS WITH POWER BETWEEN 15 W AND 300 AND 12 TO 48 V. THE TURBINE HAS AN EFFICIENCY BASED UPON THE TOTAL WIND ENERGY OF APPROXIMATELY 40 PERCENT. IT CHARGES BATTERIES IN WINDS WITH VELOCITIES BELOW 5 MPH.

1979-0659 SIVASEGARAM S
CONCENTRATION AUGMENTATION OF POWER IN A SAVONIUS-TYPE WIND ROTOR.
WIND ENG. 3(1): 52-61, 1979.

A DETAILED EXPERIMENT WAS UNDERTAKEN, BASED ON MODEL TESTS, FOR DETERMININING THE OPTIMUM DESIGN OF A SYMMETRICAL, STRAIGHT-WALLED CONCENTRATOR. POWER AUGMENTATION BY A FACTOR OF 1.5 OR SLIGHTLY MORE IS POSSIBLE WITH CONCENTRATORS OF MODERATE SIZE. CONCENTRATORS WITH WIDER DUCT ANGLES GIVE BETTER POWER AUGMENTATION THAN THOSE WITH NARROWER ANGLES AND COMPARABLE SIZES. THE OPTIMUM VALUE OF THE MINIMUM WIDTH OF THE CONCENTRATOR IS ABOUT HALF THE ROTOR-WAKE WIDTH, AND THE OPTIMUM POSITION OF THE CONCENTRATOR IS OBTAINED WHEN THE DISTANCE BETWEEN THE ROTOR AXIS AND THE AXIS OF THE DUCT IS ABOUT ONE QUARTER OF THE ROTOR WAKE WIDTH. A REDUCTION IN THE CLEARANCE BETWEEN THE ROTOR AND THE SIDE WALLS OF THE CHAMBER RESULTS IN AN INCREASE IN POWER OUTPUT.

1979-0660 SLATER K, LODGE M
EVALUATION OF THE WORTH OF SYSTEM SCALE WIND GENERATION TO THE PRINCE EDWARD ISLAND ELECTRICAL GRID.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXPOSITION, TORONTO, OCTOBER 2-4, 1979. CONFERENCE DIGEST. NEW YORK, IEEE, 1979. P. 30-31.

THE SCOPE OF THIS SUMMARY IS RESTRICTED TO DESCRIBING THE RESULTS OF A STUDY OF THE UTILITY ASPECTS OF WIND ENERGY CONVERSION.

1979-0661 SMITH D R
WORKSHOP ON POWER CONDITIONING FOR ALTERNATIVE ENERGY TECHNOLOGIES. EXECUTIVE SUMMARY.
NTIS, 1979. 142 P.
SERI/TP-35-217(PT.2)

AS VARIOUS ALTERNATIVE ENERGY TECHNOLOGIES SUCH AS PHOTOVOLTAICS, WIND, FUEL CELLS, AND BATTERIES ARE EMERGING AS POTENTIAL SOURCES OF ENERGY FOR THE FUTURE, THE NEED ARISES FOR DEVELOPMENT OF SUITABLE POWER-CONDITIONING SYSTEMS TO INTERFACE THESE SOURCES TO THEIR RESPECTIVE LOADS. SINCE MOST OF THESE SOURCES PRODUCE DC ELECTRICITY AND MOST ELECTRICAL LOADS REQUIRE AC, AN IMPORTANT COMPONENT OF THE REQUIRED POWER-CONDITIONING UNITS IS A DC-TO-AC INVERTER. THE DISCUSSIONS DEAL WITH THE DEVELOPMENT OF POWER CONDITIONERS FOR EACH ALTERNATIVE ENERGY TECHNOLOGY.

1979-0662 SOCIAL ASSESSMENT OF ON-SITE SOLAR ENERGY TECHNOLOGIES.
NTIS, APRIL 1979. 251 P.
HCP/R4040-02

THE RESULTS OF AN ASSESSMENT OF THE IMPACT OF ON-SITE SOLAR ENERGY TECHNOLOGY UPON SOCIETY ARE PRESENTED. THE ASSESSMENT UTILIZES THE METHODOLOGY OF SOCIAL INDICATORS. TWENTY-FIVE APPROPRIATE SOCIAL DESCRIPTIONS PROVIDE THE FRAMEWORK FOR ASSESSING THE TECHNOLOGIES OF SOLAR SPACE HEATING AND COOLING, SOLAR WATER HEATING, WIND ENERGY CONVERSION, FUELWOOD AND PHOTOVOLTAICS. THE REPORT CONCENTRATES UPON THOSE AREAS WHICH CAUSE CONCERN AS THESE FORMS OF SOLAR ENERGY REALIZE INCREASING ACCEPTANCE AND USAGE BY INDIVIDUAL CITIZENS.

1979-0663 SOLAR ENERGY PROGRAM. ANNUAL REPORT, 1978.
NTIS, FEBRUARY 1979. 95 P.
ANL-79-16

THIS ANNUAL REPORT DESCRIBES THE WORK DONE AT ARGONNE NATIONAL LABORATORY ON THE SOLAR ENERGY PROGRAM DURING FY 1978 (JULY 1, 1977 TO JUNE 30, 1978). AREAS INCLUDED IN THIS REPORT ARE SOLAR ENERGY COLLECTION, HEATING AND COOLING, THERMAL ENERGY STORAGE, OCEAN THERMAL ENERGY CONVERSION, PHOTOVOLTAICS, SATELLITE POWER SYSTEMS, BIOCONVERSION, CENTRAL RECEIVER SOLAR THERMAL POWER, AND WIND ENERGY CONVERSION.

1979-0664 BOLAND J F
DESIGN PARAMETERS FOR SMALL WIND SYSTEMS.
RELIABILITY OF MATERIALS FOR SOLAR ENERGY WORKSHOP, DENVER, COLORADO, DECEMBER 18, 1979. NTIS, OCTOBER 1979, VOL. 2, PT. 2, P. 577-586.
SERI/TP-31-248(VOL.2)(PT.2)

THE ROCKY FLATS WIND SYSTEMS PROGRAM, OPERATED FOR THE DEPARTMENT OF ENERGY BY ROCKWELL INTERNATIONAL, WAS ORGANIZED IN 1976 TO SUPPORT DOE (THEN ERDA) IN ESTABLISHING SMALL WIND ENERGY CONVERSION SYSTEMS AS A VIABLE, COST-EFFECTIVE ALTERNATE ENERGY SOURCE. THESE SMALL SYSTEMS WOULD HAVE OUTPUTS LESS THAN 100 KW AND TYPICAL ROTOR DIAMETERS LESS THAN 30 M (100 FT). TO PROVIDE DATA HELPFUL IN THIS DEVELOPMENT WORK, A TEST CENTER FOR SMALL WIND SYSTEMS HAS BEEN ESTABLISHED AT THE DOE ROCKY FLATS PLANT ABOUT 30 MILES NORTHWEST OF DENVER. WHEN FULLY OPERATIONAL, THIS CENTER WILL BE CAPABLE OF SIMULTANEOUSLY FIELD TESTING UP TO 50 SMALL WIND SYSTEMS. COMMERCIALLY AVAILABLE SYSTEMS ARE NOW BEING TESTED AT THIS FACILITY. IN THE FUTURE, TESTING WILL BE CONDUCTED ON PROTOTYPE SYSTEMS BEING DEVELOPED BY PRIVATE COMPANIES.

1979-0665 ALDER G M
THE AERODYNAMIC PERFORMANCE OF THE SAVONIUS ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E10/119-126.

THIS PAPER DESCRIBES WIND TUNNEL TESTS ON A SAVONIUS ROTOR. THE ROTOR WAS OF HIGH ASPECT RATIO WITH BLADES OF SEMICIRCULAR CROSS-SECTION. THE MEAN AND THE PERIODIC COMPONENTS OF TORQUE, DRAG FORCE AND SIDE FORCE WERE MEASURED. THE RESULTS ARE PRESENTED.

1979-0666 ALEXANDER A J
WIND TUNNEL CORRECTIONS FOR SAVONIUS ROTORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E6/69-80.

THIS PAPER DESCRIBES SOME WORK DONE TO OBTAIN WIND TUNNEL AIR-SPEED CORRECTIONS FOR A SERIES OF SAVONIUS ROTORS. TO CHECK THE VALIDITY OF THESE AIR-SPEED CORRECTIONS POWER-MEASUREMENT TESTS WERE CARRIED OUT IN A LARGER WIND TUNNEL AND THE CORRECTED RESULTS COMPARED WITH THE ORIGINAL WORK. CONSIDERING THE MAGNITUDE OF THE CORRECTIONS AGREEMENT WAS GOOD, PARTICULARLY AT THE POINT OF MAXIMUM EFFICIENCY.

1979-0667 BONTIUS G H, MANDERS A H E, STOOP T

IMPLICATIONS OF LARGE SCALE INTRODUCTION OF POWER FROM LARGE WIND ENERGY CONVERSION SYSTEMS INTO THE EXISTING ELECTRIC POWER SUPPLY SYSTEM IN THE NETHERLANDS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. G3/27-38.

THE DUTCH NATIONAL PROGRAM ON WIND ENERGY INCLUDES A BASIC STUDY OF THE CONSEQUENCES FOR THE NATIONAL ELECTRIC POWER SUPPLY SYSTEM IF A LARGE PROPORTION OF THE ELECTRIC ENERGY PRODUCED WERE DERIVED FROM LARGE WIND ENERGY CONVERSION SYSTEMS (WECS). THE EXISTING MV DISTRIBUTION GRID (10-20 KV) WILL NOT BE SUFFICIENT TO ABSORB THE POWER FROM ARRAYS OR PARKS OF WINDTURBINES. IT CAN BE SHOWN THAT ONLY TRANSMISSION NETWORKS AND SUBSTATIONS WITH VOLTAGES FROM 50 KV UPWARDS CAN BE USED. INTRODUCTION OF WINDTURBINES INTO THE EXISTING SYSTEM DOES NOT LEAD TO SAVINGS WITH REGARD TO THE NECESSARY POWER TO BE INSTALLED IN THE FORM OF CONVENTIONAL PLANT.

1979-0668 BUILTJES P J H
INTERACTION OF WINDMILL WAKES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B5/49-58.

THIS PAPER DESCRIBES HOW THE INTERACTION BETWEEN THE WAKES OF A GROUP OF DARRIEUS-ROTOR TYPE WINDMILLS WAS SIMULATED IN A SERIES OF WIND TUNNEL TESTS TO REACH AN ESTIMATE OF THE ENERGY OUTPUT OF SUCH A GROUP OF WINDMILLS. THE TESTS WERE REPEATED FOR VARIOUS SPACING BETWEEN THE WINDMILLS.

1979-0669 DE LAGARDE J M
A NEW CONCEPT. THE FLEXIBLE BLADE WINDMILL (FBW).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E5/61-68.

MODERN PLASTIC FOAMS AVAILABLE TODAY MAKE IT POSSIBLE TO DEVELOP A NEW CONCEPT FOR WINDMILLS. FLEXIBLE BLADES MADE OF FOAM BONDED TO RIGID LEADING AND TRAILING EDGES AND DRAWN BACKWARD BY A STRAPPING SYSTEM, ACT LIKE A BOAT SAIL CREATING A FORWARD FORCE WHEN SUBMITTED TO A SIDE WIND. BY DISPOSING SUCH BLADES TANGENTIALLY TO A CYLINDER VERY LIGHT, CHEAP AND EFFICIENT WINDMILLS WITH BUILT-IN REGULATION PROPERTIES CAN BE CONSTRUCTED. THE MODULAR CONSTRUCTION OF SUCH MACHINES COULD OPEN THE WAY TO VERY BIG SIZES. THIS KIND OF WINDMILL IS BEING DEVELOPED IN FRANCE THROUGH A JOINT INDUSTRY-UNIVERSITY PROGRAM.

1979-0670 DIVONE L V
RECENT DEVELOPMENTS IN WIND ENERGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A3/17-28.

TESTING PROGRAMS ON SMALL WIND TURBINES AND LARGE UTILITY CLASS MACHINES ARE PRESENTED. DEMAND CHARGES FOR SMALL SYSTEMS AND THE POTENTIAL FOR TV INTERFERENCE WITH LARGE SYSTEMS ARE ADDRESSED. COST REQUIREMENTS OF 1 CENT TO 2 CENTS PER KWH ARE NEEDED TO ACHIEVE A SIGNIFICANT MARKET. PRESENT EXPERIMENTAL AND PROTOTYPE SYSTEMS PRODUCE ENERGY AT 10 CENTS TO 20 CENTS PER KWH.

1979-0671 DREES H M
THE CYCLOTURBINE AND ITS POTENTIAL FOR BROAD APPLICATION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E7/81-88.

THE CYCLOTURBINE IS A VERTICAL AXIS, STRAIGHT BLADED, WIND DRIVEN TURBINE WITH CYCLICALLY PITCHED BLADES. ITS CONSTRUCTION, THE CONSIDERATIONS USED IN THE DESIGN, AND THE TURBINE'S PERFORMANCE CHARACTERISTICS ARE DESCRIBED. THE MACHINE'S PRESENT STATE OF DEVELOPMENT IS ALSO DESCRIBED.

1979-0672 FANTOM I D
PAPERS PRESENTED AT THE SECOND INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS.
CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. 2 VOLS. 690 P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978.

1979-0673 FAXEN T
WAKE INTERACTION IN AN ARRAY OF WINDMILLS. THEORY AND PRELIMINARY RESULTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B6/59-72.

THIS PAPER DESCRIBES A MODEL FOR PREDICTING THE POWER OUTPUT OF A GENERAL ARRAY OF WIND TURBINES WHICH USES A COMPUTER PROGRAM CAPABLE OF HANDLING ANY NUMBER OF IDENTICAL WIND TURBINE UNITS AT ANY POWER COEFFICIENT OR HEIGHT IN AN ARRAY OF ARBITRARY GEOMETRY ON LEVEL TERRAIN, AS THE WIND DIRECTION VARIES THROUGH 360 DEGREES. AN EXAMPLE INDICATES THAT FOR LARGE ARRAYS SIGNIFICANT POWER LOSSES CAN OCCUR FOR IMPROPER GEOMETRY. THE BIGGER THE ARRAY, THE MORE IMPORTANT IS AN ESTIMATE OF TURBULENCE. WAKE PROFILES OBTAINED IN FIELD TESTS AT THE 60 KW TEST UNIT AT KALKUGNEN, SWEDEN, ARE COMPARED TO THOSE PREDICTED BY THE MODEL WITH GOOD CORRELATION.

1979-0674 FRAENKEL P L
AN INTERNATIONAL DEVELOPMENT PROGRAMME TO PRODUCE A WIND-POWERED WATER-PUMPING SYSTEM SUITABLE FOR SMALL-SCALE ECONOMIC MANUFACTURE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. H1/1-16.

THIS REPORT DESCRIBES A HORIZONTAL AXIS WIND-TURBINE PUMPING SYSTEM, WHICH, THROUGH THE SUBSTITUTION OF DIFFERENT ROTORS AND PUMPS ON A STANDARD TRANSMISSION AND TOWER STRUCTURE IS APPLICABLE FOR A VARIETY OF PUMPING DUTIES INCLUDING CROP IRRIGATION AND BORE-HOLE WATER SUPPLIES IN ARID REGIONS. THE SYSTEM IS DESIGNED FOR ECONOMIC LOW-VOLUME MANUFACTURE, USING LIGHT INDUSTRIAL FACILITIES IN THIRD WORLD COUNTRIES. DISCUSSED IS THE RATIONALE FOR DEVELOPING A WIND-PUMP SYSTEM OF THIS KIND. A TECHNICAL DESCRIPTION OF THE CHOSEN SYSTEM IS PRESENTED. ECONOMIES ARE ALSO SOUGHT BY WEIGHT SAVINGS IN THE TRANSMISSION AND ROTOR CONFIGURATIONS.

1979-0675 GARSTANG M, PIELKE R, ASPLIDEN C, SNOW J W
OFFSHORE WIND POWER MODEL ESTIMATES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B4/33-48.

THE DETERMINATION OF WIND POWER POTENTIAL OF COASTAL WIND FIELDS THROUGH CONVERSION BY WINDMILLS IS EXAMINED IN TERMS OF A TWO AND THREE DIMENSIONAL MODEL. A WAVE-CYCLONE MODEL IS USED TO PROVIDE A PRELIMINARY ESTIMATE OF THE FREQUENCY DISTRIBUTION OF LARGE SCALE OR SYNOPTIC CONDITIONS ON THE NORTHEAST COAST OF THE UNITED STATES.

TESTS OF THE SKILL OF THE MODEL DEPEND UPON CAREFULLY DESIGNED MEASUREMENTS. THE POTENTIAL POWER OF COASTAL WIND MODELS IN PREDICTING OPTIMUM LOCATIONS OF WIND ENERGY CONVERSION SYSTEMS IN A REGION OF POOR OBSERVATIONS IS GREAT. APPLICATION, HOWEVER, DEPENDS UPON VERIFICATION OF MODEL PREDICTIONS.

1979-0676 GRYLLS W, DALE B, SARRE P E
A THEORETICAL AND EXPERIMENTAL INVESTIGATION INTO THE VARIABLE PITCH VERTICAL AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E9/101-118.

A COMPUTER MODEL OF THE VARIABLE PITCH VERTICAL AXIS WIND TURBINE IS USED TO INVESTIGATE THE POWER CHARACTERISTICS OF THIS CLASS OF MACHINE. THE PAPER GOES ON TO DESCRIBE THE CONSTRUCTION AND TESTING OF A 2.4 M DIAMETER PROTOTYPE. THE CORRELATIONS BETWEEN THE EXPERIMENTAL AND THEORETICAL FINDINGS ARE DISCUSSED.

1979-0677 GUSTAVSSON B, TORNKVIST G
TEST RESULTS FROM THE SWEDISH 60 KW EXPERIMENTAL WIND POWER UNIT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. D1/1-8.

MEASUREMENT DATA ARE TAPE RECORDED AND PROCESSED IN A COMPUTERIZED DATA REDUCTION AND PRESENTATION SYSTEM. INTERESTING RESULTS HAVE BEEN OBTAINED CONCERNING POWER CHARACTERISTICS, POWER PRODUCTION AND CONTROL, INFRA SOUND LEVEL AND DYNAMICS OF THE SYSTEM. EXPERIENCE OF THE OVERALL PERFORMANCE IS ALSO REPORTED.

1979-0678 HARDELL R, LJUNGSTROM O
OFF-SHORE BASED WIND TURBINE SYSTEMS (OS-WTS) FOR SWEDEN--A SYSTEMS CONCEPT STUDY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B8/85-113.

THE SWEDISH WIND ENERGY PROSPECTING PROGRAM NOW INCLUDES STUDIES OF POTENTIAL OFF-SHORE SITINGS. LAND AREAS WITH HIGH WINDS AND CORRESPONDING LOW COST WIND ENERGY ARE SCARCE IN SWEDEN. OFF-SHORE (OS) SITES MAY PROVE TO BE MORE COST-EFFECTIVE AND WILL REDUCE THE LAND REQUIREMENT FOR A GIVEN NATIONAL WIND ENERGY PRODUCTION. ENVIRONMENTAL, SOCIAL AND INDUSTRIAL ASPECTS AND IMPACTS OF OS-WTS ARE DISCUSSED, IN COMPARISON WITH LAND BASED SYSTEMS. THE GENERAL CONCLUSION IS THAT THE ADVANTAGES OF OS SYSTEMS ARE DOMINANT AND THAT FURTHER OS-SYSTEMS DESIGN, DEVELOPMENT AND PLANNING FOR SWEDEN SHOULD BE STRONGLY ENCOURAGED.

1979-0679 HOLME O
PERFORMANCE EVALUATION OF WIND POWER UNITS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C2/13-30.

THE PERFORMANCE CRITERION FOR A WIND POWER UNIT (WPU) IS THE AMOUNT OF ELECTRIC ENERGY PRODUCED DURING A TIME PERIOD, CONVENIENTLY EXPRESSED AS THE MEAN POWER OUTPUT FOR THE PERIOD. A METHOD IS PROPOSED FOR PRESENTING THE MEAN POWER OUTPUT IN NONDIMENSIONAL FORM AS A FUNCTION OF A FEW NON-DIMENSIONAL PARAMETERS. THE PARAMETER OF DOMINATING INFLUENCE IS THE RATIO BETWEEN THE WPU CHARACTERISTIC WIND SPEED WHICH IS THE WIND SPEED AT WHICH THE WPU WOULD PRODUCE ITS RATED POWER IF THERE WERE NO POWER LOSSES AND THE MEAN WIND SPEED AT THE WPU SITE. THE USE OF THE METHOD IS DEMONSTRATED BY SOME EXAMPLES.

1979-0680 HUGOSSON S
THE SWEDISH WIND ENERGY PROGRAMME.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A2/7-15.

THIS PAPER REVIEWS SWEDISH WIND ENERGY PROGRAMME. FULL SCALE PROTOTYPE LARGE SCALE WIND POWER UNITS ARE PLANNED TO ENTER OPERATION AND EVALUATION IN EARLY 1981. WORK ON SMALL SCALE WIND POWER UNITS IS CENTERED AROUND SPECIFYING A VERY RELIABLE AND SIMPLIFIED UNIT OF 8-10 KW SIZE, EQUIPPED WITH AN INDUCTION GENERATOR FOR STRAIGHTFORWARD CONNECTION TO A STABLE GRID. A COMPREHENSIVE MEASUREMENT PROJECT TO MAP THE WINDS OVER SWEDEN AT 50-100-150 METERS LEVEL HAS STARTED, TOGETHER WITH DEVELOPMENT OF WIND FORECASTING METHODS. LONGER-RANGE TECHNICAL DEVELOPMENT PROJECTS ARE IN HAND.

1979-0681 IGRA O, SCHULGASSER K
DESIGN AND CONSTRUCTION OF A PILOT PLANT FOR A SHROUDED WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. F1/1-12.

THIS REPORT DESCRIBES HOW A SHROUDED WIND TURBINE PILOT PLANT WAS DESIGNED AND CONSTRUCTED FOR USE IN THE OPEN AIR. THE 3 M DIAMETER TURBINE GENERATES ABOUT 1 KW FOR A 5 M/S FREE STREAM WIND. THE PROBLEMS ASSOCIATED WITH THE MAINTENANCE OF THE AERODYNAMICALLY SHAPED SHROUD ARE DISCUSSED.

1979-0682 JENSEN N O, FRANDSEN S
ATMOSPHERIC TURBULENCE STRUCTURE IN RELATION TO WIND GENERATOR DESIGN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C1/1-12.

WIND GENERATOR DESIGN CRITERIA, BOTH FOR STRUCTURAL STRENGTH AND GENERATING PERFORMANCE, DEPEND CRITICALLY UPON THE STRUCTURE OF THE AMBIENT WIND. UNDER CONDITIONS APPROPRIATE FOR WIND POWER GENERATION THE ATMOSPHERIC BOUNDARY LAYER WILL ALWAYS BE IN A TURBULENT STATE. HENCE, GENERATOR DESIGN MUST ACKNOWLEDGE THE STOCHASTIC NATURE OF TURBULENT WIND VARIATIONS. MANY PROPERTIES OF BOUNDARY LAYER TURBULENCE CAN BE USEFULLY PARAMETERIZED IN TERMS OF VARIOUS SPECTRAL DISTRIBUTIONS INCLUDING SPATIAL PHASE AND COHERENCE RELATIONS. THIS PAPER SUMMARIZES THE AUTHOR'S EMPIRICAL KNOWLEDGE OF THESE CONCEPTS.

1979-0683 JOHANSON E E, GOLDENBLATT M K
AN ECONOMIC MODEL TO ESTABLISH THE VALUE OF WECS TO A UTILITY SYSTEM (WIND ENERGY CONVERSION SYSTEMS).
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. G2/9-26.

THIS PAPER DESCRIBES AN ECONOMIC MODEL THAT DETERMINES THE VALUE OF A WECS INSTALLATION WHICH WAS DESIGNED TO BE COMPATIBLE WITH EXISTING UTILITY PRODUCTION COST MODELS AND PLANNING TECHNIQUES. IT PROVIDES THE UTILITY WITH THE CAPABILITY OF REOPTIMIZING THE UTILITY CONVENTIONAL SOURCE MIX SO THAT THE MAXIMUM SAVINGS AND CAPACITY CREDIT ARE OBTAINED. THE MODEL, APPLIED TO A UTILITY IN THE NORTHEASTERN UNITED STATES FOUND THAT EACH WECS HAS LESS VALUE THAN THE FIRST SINCE THE FIRST UNITS REPLACE THE MOST EXPENSIVE FUELS. SENSITIVITY ANALYSES WERE APPLIED TO VARIOUS ECONOMIC FACTORS TO FIND WHICH AFFECTED THE VALUE OF THE WECS TO THE ACTIVITY

MOST.

1979-0684 KOTTAPALLI S B R, FRIEDMANN P P, ROSEN A
AEROELASTIC STABILITY AND RESPONSE OF HORIZONTAL AXIS WIND TURBINE BLADES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C4/49-66.

THE EQUATIONS OF MOTION OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE BLADE ARE FORMULATED. QUASI-STEADY BLADE-ELEMENT STRIP THEORY WAS APPLIED TO DERIVE THE AERODYNAMIC OPERATOR WHICH INCLUDES BOUNDARY LAYER TYPE GRADIENT WINDS. THE FINAL EQUATIONS WHICH HAVE PERIODIC COEFFICIENTS WERE SOLVED TO OBTAIN THE AEROELASTIC RESPONSE AND STABILITY OF LARGE HORIZONTAL AXIS WIND TURBINE BLADE. A NEW METHOD OF GENERATING AN APPROPRIATE TIME-DEPENDENT EQUILIBRIUM POSITION (REQUIRED FOR THE STABILITY ANALYSIS) HAS BEEN IMPLEMENTED. REPRESENTATIVE STEADY-STATE RESPONSES AND STABILITY BOUNDARIES, APPLICABLE MAINLY TO AN EXISTING BLADE DESIGN, ARE PRESENTED.

1979-0685 LODGE M
WIND ENERGY PROSPECTING IN PRINCE EDWARD ISLAND. A PROGRAM OVERVIEW AND STATUS REPORT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B3/21-32.

THE PROGRAM HAS THREE ELEMENTS WHICH ARE: WIND MONITORING DATA ANALYSIS AND SITING; LARGE WIND ENERGY CONVERSION SYSTEMS (WECS), INTEGRATION WITH UTILITY GRID; RURAL AND FARM APPLICATION OF SMALL WECS.

1979-0686 LUNDSAGER P, ASKEGAARD V, BJERREGAARD E
MEASUREMENTS OF PERFORMANCE AND STRUCTURAL RESPONSE OF THE DANISH 200 KW GEDSER WINDMILL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. D2/9-26.

THE INSTRUMENTATION IS DESCRIBED. 84 CHANNELS HAVE BEEN INSTALLED, 46 OF WHICH ARE TELEMETERED FROM THE ROTOR. THE ROTOR INSTRUMENTATION LAYOUT WAS DETERMINED FROM LABORATORY TESTS ON SINGLE BLADES, DURING WHICH THE FINAL INSTRUMENTATION WAS INSTALLED AND CALIBRATED. SHORT TERM MEASUREMENTS WILL BE PERFORMED DURING AUTOMATIC OPERATION AS WELL AS FORCES MANOEUVRES USING SCANNING FREQUENCIES UP TO 50 CPS. LONG TERM POWER/WIND MEASUREMENTS WILL BE CARRIED OUT. EXAMPLES OF RECORDS WILL BE PRESENTED AND DISCUSSED TOGETHER WITH EXPERIENCE WITH THE EQUIPMENT APPLIED.

1979-0687 MATZEN R
WIND ENERGY-HEAT GENERATION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. H2/17-32.

THIS REPORT DISCUSSES THE USE OF FIXED PITCH PROPELLOR WIND-POWER PLANTS FOR WATER HEATING FITTED WITH ADJUSTABLE WATERBRAKES AS A GUST SAFETY MEASURE. IT DESCRIBES SOME EXPERIMENTS ON SIMPLE NON-ADJUSTABLE GENERATORS BUILT INTO A 135 LITRE TANK. TWO MAIN TYPES OF ADJUSTABLE BRAKE ARE ALSO DESCRIBED.

1979-0688 MUSGROVE P J, MAYS I D
DEVELOPMENT OF THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E4/39-66.

THIS PAPER DESCRIBES MEASUREMENTS THAT HAVE BEEN MADE ON A PROTOTYPE. THE PERFORMANCE HAS BEEN MEASURED IN THE OPEN AIR WITH REASONABLE AGREEMENT WITH THEORETICAL PREDICTIONS. IT COMPARES FAVOURABLY WITH AVAILABLE TEST DATA FOR DARRIEUS AND HORIZONTAL AXIS WINDMILLS. THE CHOICE OF OPTIMUM SOLIDITY IS DISCUSSED, AND THE EFFECTS OF LOW ASPECT RATIO CONSIDERED. IT IS SHOWN THAT LOW ASPECT RATIO COMBINED WITH HIGH SOLIDITY CAN BE EXPECTED TO GIVE AERODYNAMIC SELF START WITH ONLY MINOR LOSS OF PERFORMANCE. A LOW ASPECT RATIO, HIGH SOLIDITY VERTICAL AXIS WINDMILL WAS THEREFORE ALSO CONSTRUCTED, AND THESE EXPECTATIONS CONFIRMED.

1979-0689 OTTENS H H, ZWAAN R J
INVESTIGATIONS ON THE AEROELASTIC STABILITY OF LARGE WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C3/31-48.

THIS PAPER PRESENTS A DISCUSSION OF THE AEROELASTIC STABILITY OF WIND TURBINES WITH VERTICAL AXIS (VAWT) AND WITH HORIZONTAL AXIS (HAWT). RESULTS ARE GIVEN FOR AN EXISTING 5 M VAWT TEST-BED WITH AND WITHOUT A TIE-DOWN SYSTEM. DIFFICULTIES IN INTERPRETING PRELIMINARY RESULTS FOR A HAWT ARE DISCUSSED.

1979-0690 PIEPERS G G, SENS P F
THE NETHERLANDS RESEARCH PROGRAM ON WIND ENERGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A1/1-6.

AN OVERVIEW OF THE PRESENT STATUS AND FUTURE PLANS OF THE DUTCH WIND ENERGY PROGRAMME IS PRESENTED.

1979-0691 REICHEL R S
WINDPOWER PROGRAMMES IN TANZANIA.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED... CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A5/45-52.

THE ELECTRICAL ENERGY DEMANDS FOR VILLAGES CAN HARDLY BE MET BY CONVENTIONAL METHODS BECAUSE INITIAL LOADS ARE TOO SMALL TO JUSTIFY THE WIDESPREAD USE OF TRANSMISSION LINES. WINDPOWER BASED VILLAGE POWER CENTRES COULD WELL BE ECONOMICAL, EVEN WITH PRESENT TANZANIAN ELECTRICITY SELLING RATES. INDIVIDUAL AND INSTITUTIONAL WIND POWER PROGRAMMES ARE MAINLY GEARED TOWARDS THE MANUFACTURING OF LOW COST EQUIPMENT WITHIN TANZANIA. SOME PROGRAMMES USING IMPORTED WINDMILLS FOR WATER PUMPING EXIST AS WELL.

1979-0692 ROTHMAN E A
THE EFFECT OF CONTROL MODES ON ROTOR LOADS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C7/107-117.

A LIMITED STUDY OF THE INTERDEPENDENCE OF WIND TURBINE CONTROL MODES IN SEVERE TURBULENCE AND RESULTING COMPONENT LOADING HAS BEEN CONDUCTED. THE STUDY WAS PERFORMED WITH AN AEROELASTIC, GROUNDED MODEL OF THE WIND TURBINE WITH TIME VARIABLE COLLECTIVE PITCH AND ROTOR SPEED. THE RESULTS SHOW THAT TURBINE LOADING IS

SIGNIFICANTLY INFLUENCED BY THE CONTROL MODE WHICH SUGGESTS THAT TURBINE WEIGHT CAN BE INFLUENCED BY THE CONTROL MODE AND, THEREFORE, THAT THE MOST DIRECT AND SECURE ROUTE TO THE LOWEST COST TURBINE IS THROUGH A CONSIDERATION OF THE COMPLETE SYSTEM AND ITS ENVIRONMENT.

1979-0693 SABZEVARI A
POWER AUGMENTATION IN A DUCTED SAVONIUS ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. F3/25-34.

SEVERAL DUCTINGS, CONCENTRATORS AND DIFFUSERS ARE EXAMINED AND THEIR EFFECTS ON THE PERFORMANCE CHARACTERISTICS OF A SPLIT S SAVONIUS ROTOR ARE PRESENTED. THE SYSTEMATIC RESULTS OBTAINED FROM THE PERFORMANCE OF THE SEVERAL MODELS UNDER INVESTIGATION HAVE LED TO THE DESIGN OF A CIRCULARLY DUCTED SAVONIUS ROTOR EQUIPPED WITH A NUMBER OF IDENTICAL WIND CONCENTRATORS AND DIFFUSERS ALONG THE PERIPHERY OF ITS CYLINDRICAL HOUSING. THE NEW DESIGN TAKES ADVANTAGE OF WIND CONCENTRATION, DIFFUSION AND THE GENERATED WIND-DRAUGHT DUE TO THE LOW PRESSURE REGION BEHIND THE CIRCULAR ROTOR HOUSING CYLINDER. WIND TUNNEL RESULTS ARE PRESENTED.

1979-0694 SMEDMAN-HOEGSTROM A S
MEASUREMENT OF WIND SPEED AROUND A WIND POWER PLANT IN SWEDEN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B7/73-84.

THE PAPER DESCRIBES A METEOROLOGICAL FIELD STATION THAT HAS SET UP OPERATION AT A 60 KW WIND POWER TEST STATION AT KALKUGNEN IN SWEDEN. IT CONSISTS OF TWO 42 M MASTS, BOTH EQUIPPED WITH CUP ANEMOMETERS AT 6 LEVELS AND WIND DIRECTION AT TWO LEVELS. TEMPERATURE IS MEASURED AT 6 LEVELS. ON ONE MAST RADIATION, HUMIDITY AND AIR PRESSURE ARE ALSO MEASURED.

1979-0695 SORENSEN B
THE REGULATION OF AN ELECTRICITY SUPPLY SYSTEM INCLUDING WIND ENERGY GENERATORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. G1/1-8.

SIMULATIONS OF A SYSTEM CONSISTING OF A NUMBER OF FUEL-BASED POWER GENERATION UNITS, PLUS WIND ENERGY GENERATORS WITHOUT ENERGY STORAGE FACILITIES ARE DONE. A SIMPLE WIND FORECASTING TECHNIQUE, BASED ON CRUDE EXTRAPOLATIONS, IS USED TO PREDICT THE BASE AND INTERMEDIATE LOAD, THAT WIND GENERATORS CAN BE EXPECTED TO REPLACE. DECISIONS TO START OR STOP FUEL-BASED UNITS ARE MADE ON THE BASIS OF THESE PREDICTIONS. IF THEY ARE WRONG BEYOND THE REGULATING CAPACITY OF THE POWER UNITS ALREADY IN OPERATION, USE OF PEAK LOAD UNITS OR UNPLANNED IMPORT IS REQUIRED. THE OPTIMUM SHARE OF WIND GENERATORS IN SUCH A MODEL SYSTEM IS DISCUSSED.

1979-0696 SOUTH P, RANGI R S, TEMPLIN R J
OPERATING EXPERIENCE WITH THE MAGDALEN ISLANDS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E1/1-10.

THIS PAPER DESCRIBES THE EXPERIENCE OBTAINED ON THE MAGDALEN ISLANDS WIND TURBINE DURING THE FIRST NINE MONTHS AFTER ERECTION. IT EXPLAINS SOME OF THE PROBLEMS ASSOCIATED WITH OPERATING THE MACHINE ON A REMOTE SITE. SOME DATA IS GIVEN ON THE BLADE DYNAMIC STRESSES AND ON THE BLADE NOISE LEVEL PRODUCED BY THE TURBINE.

1979-0697 THORNBLAD P
GEARS FOR WIND POWER PLANTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C6/89-106.

THIS REPORT DISCUSSES THOSE FACTORS WHICH INFLUENCE THE SIZE, WEIGHT AND COST OF GEARS FOR LARGE WIND POWER PLANTS. A COMPARISON BETWEEN SEVERAL DIFFERENT GEARING CONFIGURATIONS IS MADE, WHICH SHOWS CLEARLY THAT PLANETARY GEARS HAVE BIG ADVANTAGES OVER PARALLEL GEARS FOR THIS APPLICATION. A NEW EPICYCLIC GEAR DESIGN BASED ON EXPERIENCE FROM HUNDREDS OF EPICYCLIC GEARS USED FOR MARINE PROPULSION IS PRESENTED. A THREE STAGE VERSION OF THIS DESIGN OFFERS AN ATTRACTIVE SOLUTION TO THE TRANSMISSION PROBLEMS OF LARGE WIND POWER PLANTS.

1979-0698 USHIYAMA I
THE DEVELOPMENT OF WIND POWER PLANTS IN JAPAN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. A4/29-4.

THIS PAPER REVIEWS THE HISTORICAL DEVELOPMENT, THE PRESENT STATUS AND FUTURE PROSPECTS OF WIND POWER PLANTS IN JAPAN. THERE ARE NO LARGE SCALE DEVELOPMENT PROJECTS. A NUMBER OF TRIALS OF SMALL SCALE DEVELOPMENTS HAVE BEEN MADE. ABOUT 10 PERCENT OF JAPAN'S PRESENT TOTAL POWER CONSUMPTION COULD BE OBTAINED FROM WIND POWER.

1979-0699 VAN ESSEN A A, TER BRUGGE R, VAN DEN BERG J M, PIEPERS G G, BONGAARTS A L M
PHYSICAL PLANNING ASPECTS OF LARGE-SCALE WIND ENERGY EXPLOITATION IN THE NETHERLANDS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B1/1-10.

IT HAS BEEN ESTIMATED THAT 5000 WIND ENERGY CONVERSION SYSTEMS (WECS) WITH A DIAMETER OF 50 M COULD PRODUCE 10-20% OF PRESENT DAY ELECTRICITY PRODUCTION IN THE NETHERLANDS OCCUPYING 20% OF THE COASTAL AREA. THE PHYSICAL PLANNING ASPECTS ARE STUDIED. THE COASTAL AREA OF THE NETHERLANDS IS SUBDIVIDED INTO 52 REGIONS WITH AN AVERAGE YEARLY WIND VELOCITY OF MORE THAN 6 M/S AT 40 M HEIGHT, EACH SUFFICIENTLY LARGE TO CONTAIN ONE OR MORE WIND ENERGY PARKS OF MORE THAN 100 WECS. THE SITING OF WECS WILL INVOLVE DECISIONS IN WHICH COMPROMISES BETWEEN VARIOUS INTERESTS WILL HAVE TO BE SOUGHT.

1979-0700 VAN HOLTEN T
TIPVANE RESEARCH AT THE DELFT UNIVERSITY OF TECHNOLOGY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. F2/13-24.

THIS PAPER PRESENTS SOME FIRST RESULTS OF WORK DONE TO VERIFY THE TIPVANE CONCEPT. TIPVANES ARE SMALL AUXILIARY WINGS MOUNTED AT THE TIPS OF TURBINE BLADES SO THAT A DIFFUSER EFFECT IS GENERATED, RESULTING IN A MASS FLOW AUGMENTATION THROUGH THE TURBINE DISC. MASS FLOW AUGMENTATIONS OF 4 OR 5 HAVE BEEN DEMONSTRATED.

1979-0701 VANSANT J H, MCCONNELL R D, WATTS A
A 200 KW VERTICAL AXIS WIND TURBINE--RESULTS OF SOME PRELIMINARY TESTS.

INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E2/11-22.

AN EXPERIMENTAL VERTICAL AXIS WIND TURBINE HAS BEEN INSTALLED IN THE MAGDALEN ISLANDS. A PERFORMANCE EVALUATION PROGRAM IS BEING CARRIED OUT. THROUGH A MECHANICAL DRIVE SYSTEM, IT POWERS A 224 KW INDUCTION GENERATOR WHICH IS CONNECTED TO THE ISLAND'S ELECTRICAL DISTRIBUTION GRID. THE GENERATOR IS USED AS A STARTING MOTOR AND ALSO TO KEEP THE TURBINE RUNNING AT NEAR CONSTANT SPEED. THE TURBINE HAS BEEN OPERATED AT APPROXIMATELY THREE-FOURTHS RATED SPEED. SOME RESULTS OF PERFORMANCE MEASUREMENTS AT THIS SPEED ARE PRESENTED WITH OTHER DATA.

1979-0702 VOLLAN A J
THE AEROELASTIC BEHAVIOUR OF LARGE DARRIEUS-TYPE WIND ENERGY CONVERTERS DERIVED FROM THE BEHAVIOR OF A 5.5 M ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. C5/67-88.

CONDITIONS OF SIMILARITY WERE INVESTIGATED FOR DARRIEUS ROTORS OF VARIOUS SIZES AND TROPOSKIEN SHAPED BLADES. IT IS SHOWN THAT THE ROTORS ARE SIMILAR WITH REGARD TO THEIR AEROELASTIC BEHAVIOUR. SCALING UP A SMALL ROTOR, HOWEVER, LEADS TO A VERY HEAVY STRUCTURE AND THE CONTROL OF THE BENDING STRESSES CREATES PROBLEMS. IT IS NECESSARY THEREFORE TO REDUCE THE STRUCTURAL EXPANSE OF LARGER WIND ENERGY CONVERTERS WHICH RESULTS IN INCREASED DANGER OF AEROELASTIC INSTABILITY.

1979-0703 WARNE D F, KETLEY G R, TYNDALL D H, CROWDER R
DESIGN CONCEPT FOR A 60 M DIAMETER WIND TURBINE GENERATOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. D3/27-37.

THIS PAPER DISCUSSES THE DESIGN OF A LARGE WIND TURBINE GENERATOR SUITABLE FOR NETWORK OPERATION. THE AIM HAS BEEN TO DESIGN A MACHINE FOR MINIMUM ENERGY COST AT HIGH MEAN WIND SPEEDS (10-12 M/S AT 10 M HEIGHT) TYPICALLY FOUND ON HILL SITES ALONG THE NORTH WEST COAST OF SCOTLAND. THE DESIGN PHILOSOPHY HAS BEEN SIMPLICITY AND RUGGEDNESS; IT HAS LED TO THE SELECTION OF A FIXED PITCH, FIXED SPEED TURBINE COUPLED THROUGH A FIXED RADIO TRANSMISSION TO AN INDUCTION GENERATOR.

1979-0704 WENDELL L L, ELDERKIN C E
PROGRAM OVERVIEW FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE UNITED STATES FEDERAL WIND ENERGY PROGRAM.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. B2/11-20.

THE WIND CHARACTERISITCS PROGRAM ELEMENT (WCPE) HAS THE RESPONSIBILITY FOR ASSEMBLING AND DEVELOPING WIND CHARACTERISTICS INFORMATION APPROPRIATE TO THE NEEDS OF THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR WECS INSTALLATION, AND THE OPERATION OF WECS. THE TECHNICAL PROGRAM OF THE WCPE HAS BEEN DIVIDED INTO FOUR AREAS. RESEARCH AND DEVELOPMENT PROGRESS AND PRODUCTS IN EACH OF THESE PROGRAM AREAS ARE SUMMARIZED IN THIS PRESENTATION.

1979-0705 WILSON R E, MCKIE W R
A COMPARISON OF AERODYNAMICS ANALYSES FOR THE DARRIEUS ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, 2ND, AMSTERDAM, OCTOBER 3-6, 1978. PAPERS PRESENTED...CRANFIELD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1979. E8/89-100.

IN THIS REPORT, A COMPARISON IS MADE OF THE SINGLE STREAMTUBE, MULTIPLE STREAMTUBE, FIXED WAKE AND FREE WAKE ANALYSES OF A STRAIGHT BLADED DARRIEUS ROTOR USING POTENTIAL FLOW AERODYNAMICS. THE ANGLE OF ATTACK, LIFT COEFFICIENT, CIRCULATION AND LOADS ARE EXAMINED FOR A ROTOR OPERATING AT MAXIMUM PERFORMANCE. THE UNSTEADY AERODYNAMIC FORCES ARE EVALUATED WITH SPECIAL CONSIDERATION GIVEN TO WAKE CROSSING TRANSIENTS.

1979-0706 SOLAR TAX CREDIT REGULATIONS. INTERIM COMMITTEE REPORT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1979. 17 P.
NP-24048

ON SEPTEMBER 25, 1978, GOVERNOR BROWN SIGNED INTO LAW AB 3623, A MODIFICATION TO EXISTING STATUTES WHICH ALLOW CALIFORNIA TAXPAYERS TO CREDIT UP TO 55 PERCENT OF THE COST OF A SOLAR ENERGY SYSTEM AGAINST THEIR STATE INCOME TAX OBLIGATIONS (REVENUE AND TAXATION CODE, SECTIONS 17052.5 AND 23601). ON OCTOBER 25, 1978, THE ENERGY COMMISSION ADOPTED AN ORDER INSTITUTING HEARINGS TO CONFORM THE COMMISSION'S REGULATIONS (TITLE 20, CHAPTER 2, SUBCHAPTER 8, ARTICLE 1) TO THE STATUTORY CHANGES RESULTING FROM AB 3623. THE ORDER PROVIDED FOR CONSIDERATION OF THE DEFINITION OF SOLAR ENERGY SYSTEM, ADOPTION OF ELIGIBILITY CRITERIA FOR WIND AND SOLAR ELECTRIC SYSTEMS, AND OTHER TECHNICAL OR CLARIFYING CHANGES. A SET OF PROPOSED NEW REGULATIONS, TOGETHER WITH A STAFF REPORT IN SUPPORT OF THE SUGGESTED CHANGES, WAS MADE AVAILABLE TO THE PUBLIC ON DECEMBER 29, 1978. HEARINGS ON THE PROPOSED REVISIONS TO THE REGULATIONS WERE HELD ON JANUARY 15 AND JANUARY 16, 1979, IN SAN FRANCISCO AND LOS ANGELES, RESPECTIVELY. THIS INTERIM COMMITTEE REPORT SUMMARIZES THE ARGUMENTS ON THE PROPOSED REGULATIONS AND THE COMMITTEE'S CONCLUSIONS TO DATE.

1979-0707 SOLAR TAX CREDIT REGULATIONS. FINAL COMMITTEE REPORT.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1979. 5 P.

THIS FINAL COMMITTEE REPORT, TOGETHER WITH THE INTERIM COMMITTEE REPORT AND THE ATTACHED SET OF PROPOSED REGULATIONS, CONSTITUTE RECOMMENDATIONS OF THE SOLAR IMPLEMENTATION AND COORDINATION COMMITTEE TO THE CALIFORNIA ENERGY COMMISSION FOR THE IMPLEMENTATION OF AB 3623. THESE RECOMMENDATIONS WILL BE CONSIDERED FOR ACTION AT THE COMMISSION'S JULY 11, 1979 BUSINESS MEETING IN SACRAMENTO.

1979-0708 SOLBERG J
PASSIVE SOLAR UNDERGROUND: A HYBRID TAKES ROOT.
ALTERN. SOURCES ENERGY NO. 39: 10-12, SEPTEMBER 1979.

TWO EXAMPLES OF EARTH SHELTERED PASSIVE SOLAR HOUSES BUILT IN MINNESOTA ARE DESCRIBED. ONE DESIGN INCORPORATES WIND ENERGY AND PASSIVE SOLAR TO ACHIEVE ENERGY EFFICIENCY, WHEREAS THE OTHER DESIGN RELIES ON PASSIVE SOLAR AND A BACK-UP OIL/WOOD FURNACE.

1979-0709 SOUTH P, WATTS A
MAGDALEN ISLANDS VAWT FIELD TEST.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 334-351.

CONF-790352

AN EXPERIMENTAL VAWT HAS BEEN INSTALLED ON THE MAGDALEN ISLANDS AS A JOINT HYDRO-QUEBEC-NRC VENTURE. THE ROTOR IS 37 M HIGH BY 24 M DIAMETER AND DRIVES A 224 KW INDUCTION GENERATOR WHICH IS CONNECTED TO THE ISLANDS' ELECTRICAL DISTRIBUTION GRID. THE TURBINE HAS BEEN OPERATED AT UP TO APPROXIMATELY 80% OF DESIGN RPM. SOME RESULTS OF PERFORMANCE MEASUREMENTS AT THIS SPEED ARE GIVEN. THE RESULTS INDICATE THAT THE TURBINE PERFORMANCE IS SATISFACTORY AND THAT IT SHOULD PRODUCE ITS FULL RATED POWER. THE TURBINE ROTOR WAS DESTROYED IN AN ACCIDENT AND THE TURBINE IS UNDERGOING EXTENSIVE REPAIRS.

1979-0710 SPAULDING A P
WTG ENERGY SYSTEMS' MP1-200: 200 KILOWATT WIND TURBINE GENERATOR.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 79-88.
NASA-CP-2106

THE AREAS TO BE DISCUSSED ARE RELATED TO THE PRELIMINARY DESIGN CRITERIA AS UTILIZED ON THE MP1-200. THE SIGNIFICANCE OF THESE DESIGN CRITERIA IS BASED ON THE FACT THAT THE MP1-200 IS THE ONLY WIND TURBINE IN OPERATION TODAY THAT IS PRODUCING SYNCHRONOUS ALTERNATING CURRENT USING A FIXED PITCH ROTOR CONFIGURATION. THE MP1-200 IS INSTALLED ON CUTTYHUNK ISLAND, MASSACHUSETTS AS PART OF THE ISLAND'S INDEPENDENT UTILITY GRID SYSTEM.

1979-0711 SPERA D A
DESIGN EVOLUTION OF LARGE WIND TURBINE GENERATORS.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 25-33.
NASA-CP-2106

THE DESIGN OF LARGE WIND TURBINES OF THE HORIZONTAL-AXIS TYPE HAS EVOLVED RAPIDLY DURING THE PAST FIVE YEARS. MAJOR CHANGES HAVE TAKEN PLACE IN THE STRUCTURAL AND MECHANICAL FEATURES OF SECOND GENERATION WIND TURBINES LIKE THE 2.5 MW MOD-2, COMPARED WITH FIRST GENERATION MACHINES LIKE THE 200 KW MOD-0A AND 2.0 MW MOD-1. THESE CHANGES HAVE REDUCED THE PROJECTED COST OF ELECTRICITY PRODUCED BY SECOND GENERATION WIND TURBINES TO ONE-HALF THAT OF FIRST GENERATION SYSTEMS. TO SHOW THE SCOPE AND NATURE OF RECENT CHANGES IN WIND TURBINE DESIGNS, DEVELOPMENTS OF THREE TYPES ARE DESCRIBED: (1) SYSTEM CONFIGURATION DEVELOPMENTS; (2) COMPUTER CODE DEVELOPMENTS; AND (3) BLADE TECHNOLOGY DEVELOPMENTS. DEVELOPMENTS IN SYSTEM CONFIGURATION ARE SHOWN BY DIRECT COMPARISON OF MCD-2 COMPONENTS WITH EQUIVALENT ELEMENTS IN THE EARLIER MOD-0A SYSTEM.

1979-0712 SPERA D A, RICHARDS T R
MODIFIED POWER LAW EQUATIONS FOR VERTICAL WIND PROFILES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 47-56.
ALSO: NTIS, 1979. 11 P.
PNL-3214, N80-13623, NASA-TM-79275, DOE/NASA/1059-79/4

EQUATIONS ARE PRESENTED FOR CALCULATING POWER LAW EXPONENTS FROM WIND SPEED AND SURFACE ROUGHNESS DATA. RESULTS ARE EVALUATED BY COMPARISON WITH WIND PROFILE DATA MEASURED AT A VARIETY OF SITES.

1979-0713 SPERA D A, VITERNA L A, RICHARDS T R, NEUSTADTER H E
PRELIMINARY ANALYSIS OF PERFORMANCE AND LOADS DATA FROM THE 2-MEGAWATT MOD-1 WIND TURBINE GENERATOR.
NTIS, OCTOBER 1979. 16 P.
NASA-TM-81408, DOE/NASA/1010-79/5

PRELIMINARY TEST DATA ON OUTPUT POWER VERSUS WIND SPEED, ROTOR BLADE LOADS, SYSTEM DYNAMIC BEHAVIOR, AND START-STOP CHARACTERISTICS ON THE MOD-1 WIND TURBINE GENERATOR ARE PRESENTED. THESE DATA WERE ANALYZED STATISTICALLY AND ARE COMPARED WITH DESIGN PREDICTIONS OF SYSTEM PERFORMANCE AND LOADS. TO DATE, THE MOD-1 WIND TURBINE GENERATOR HAS PRODUCED UP TO 1.5 MW OF POWER, WITH A MEASURED POWER VERSUS WIND SPEED CURVE WHICH AGREES CLOSELY WITH DESIGN. BLADE LOADS WERE MEASURED AT WIND SPEEDS UP TO 14 M/S AND ALSO DURING RAPID SHUTDOWNS. PEAK TRANSIENT LOADS DURING THE MOST SEVERE SHUTDOWNS ARE LESS THAN THE DESIGN LIMIT LOADS. ON THE INBOARD BLADE SECTIONS, FATIGUE LOADS ARE APPROXIMATELY EQUAL TO THE DESIGN CYCLIC LOADS. ON THE OUTBOARD BLADE SECTIONS, HOWEVER, MEASURED CYCLIC LOADS ARE SIGNIFICANTLY LARGER THAN DESIGN VALUES, BUT THEY DO NOT APPEAR TO EXCEED FATIGUE ALLOWABLE LOADS AS YET.

1979-0714 SPERA D A
STRUCTURAL ANALYSIS CONSIDERATIONS FOR WIND TURBINE BLADES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 211-224.
NASA-CP-2106

ITEMS WHICH SHOULD BE CONSIDERED IN THE STRUCTURAL ANALYSIS OF A PROPOSED BLADE DESIGN ARE BRIEFLY REVIEWED. THESE ITEMS INCLUDE THE SPECIFICATIONS, MATERIALS DATA, AND THE ANALYSIS OF VIBRATIONS, LOADS, STRESSES, AND FAILURE MODES. THE REVIEW IS LIMITED TO THE GENERAL NATURE OF THE APPROACHES USED AND RESULTS ACHIEVED.

1979-0715 SPERA D A
STRUCTURAL DYNAMIC ANALYSIS OF LARGE WIND TURBINES IN THE USA.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 239-269.
JUEL-SPEZ-28

INFORMATION IS PRESENTED CONCERNING COMPUTER CODES USED TO ANALYZE LARGE WIND TURBINES, THE WEST HYBRID WIND TURBINE SIMULATOR, AND BLADE STRESS ANALYSIS AND MODIFICATIONS FOR THE MOD-0A 200 KW WIND TURBINE IN CLAYTON, NEW MEXICO.

1979-0716 SPERO E, DYBBS A
SOLAR ASSISTED AND WIND POWERED HEAT PUMP FOR RESIDENTIAL DWELLINGS.
ASME PAPER 79-WA/HT-33, 1979. 10 P.

THIS PAPER PRESENTS A PRACTICAL AND COST-EFFECTIVE DESIGN OF A RESIDENTIAL ENERGY SYSTEM. THE SYSTEM COMBINES THE USE OF SOLAR COLLECTORS AND A WIND TURBINE WITH A WATER TO AIR HEAT PUMP. THE WIND TURBINE IS DIRECTLY COUPLED TO THE COMPRESSOR OF THE HEAT PUMP AND A THERMAL ENERGY GENERATOR, THUS ELIMINATING INTERMEDIATE STAGES AND IMPROVING ENERGY CONVERSION EFFICIENCY. THE RESULTS INDICATE THAT THE COLLECTOR AND STORAGE ELEMENTS ARE

SMALLER THAN EXPECTED BECAUSE OF THE HIGH DEGREE OF MATCHING BETWEEN THE SOLAR AND WIND ENERGY AVAILABILITY AND DEMAND, ALONG WITH AN INCREASED PROBABILITY THAT ONE OF THESE ENERGY SOURCES WILL BE AVAILABLE.

1979-0717 STATE SOLAR ENERGY INCENTIVES PRIMER: A GUIDE TO SELECTION AND DESIGN.
NTIS, DECEMBER 1979. 38 P.
SERI/SP-434-470

1979-0718 STEVENS M J M, SMULDERS P T
ESTIMATION OF THE PARAMETERS OF THE WEIBULL WIND SPEED DISTRIBUTION FOR WIND ENERGY UTILIZATION PURPOSES.
WIND ENG. 3(2): 132-145, 1979.

THIS PAPER DEALS WITH METHODS FOR ESTIMATING THE PARAMETERS OF THE WEIBULL WIND SPEED DISTRIBUTION FROM A GIVEN SET OF WIND SPEED DATA. OF THE FIVE METHODS PRESENTED, TWO ARE SELECTED FOR WIND ENERGY EVALUATION STUDIES: ONE USES WEIBULL PROBABILITY PAPER, THE OTHER SO-CALLED PERCENTILES. FOR A COMPARISON BOTH METHODS HAVE BEEN APPLIED TO THE DATA FROM SIX METEOROLOGICAL STATIONS. THE SIMPLE GRAPHICAL METHOD USING WEIBULL PROBABILITY PAPER IS PREFERRED TO THAT EMPLOYING PERCENTILE ESTIMATORS.

1979-0719 STOCKETT'S WIND WHEEL.
WIND POWER DIG. NO. 17: 44-47, FALL 1979.

WILEY STOCKETT'S WIND WHEEL IS DESCRIBED: 50-FOOT DIAMETER, FOUR BLADES. A SECOND STOCKETT WIND WHEEL, 40-FOOT, 8 BLADES, IS ALSO DISCUSSED. THE FIRST IS BEING USED IN BUSHLAND FOR WATER PUMPING FOR IRRIGATION; THE SECOND IS INTENDED FOR POWER GENERATION AND HOUSE HEATING.

1979-0720 STODDARD W
WIND TURBINE DYNAMIC BLADE LOADS DUE TO WIND GUSTS AND WIND DIRECTION CHANGES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 141-150.
PNL-3214

A SIMPLE METHODOLOGY HAS BEEN DEVELOPED FOR THE CALCULATION OF BLADE DYNAMICS AND VIBRATION FOR ROTOR-TYPE WIND TURBINES. THE METHOD EMPLOYS EQUATIONS OF MOTION OF THE SLENDER ROTOR BLADE IN THE FLAPPING (OUT OF PLANE), LEAD-LAG (IN PLANE), AND TORSIONAL (FEATHERING) DEGREES OF FREEDOM. BLADE MOTIONS, FORCES AND MOMENTS CAN BE FOUND FOR PERTURBATIONS DUE TO GRAVITY, CROSSWIND, YAW RATE, AND AXISYMMETRIC FLOW.

1979-0721 SULLIVAN W N
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME I. EXECUTIVE SUMMARY.
NTIS, AUGUST 1979. 28 P.
SAND-78-0962(VOL.1)

THE ECONOMIC ANALYSIS OF THE DARRIEUS VERTICAL AXIS WIND TURBINE IS CONTAINED IN FOUR SEPARATE VOLUMES. THIS FIRST VOLUME SUMMARIZES THE COMPLETE STUDY, PRESENTING A DESCRIPTION OF THE TECHNICAL APPROACH USED, KEY RESULTS, AND MAJOR CONCLUSIONS.

1979-0722 SULLIVAN W N
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME II. ECONOMIC OPTIMIZATION MODEL.
NTIS, AUGUST 1979. 100 P.
SAND-78-0962(VOL.2)

THIS REPORT IS PART OF A FOUR-VOLUME STUDY OF DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT) ECONOMICS. THIS VOLUME DESCRIBES A COMPUTER MODEL OF VAWT COST AND PERFORMANCE FACTORS USEFUL FOR SYSTEM DESIGN AND OPTIMIZATION. THE CONTENT AND LIMITATIONS OF THE MODEL ARE OUTLINED. OUTPUT DATA ARE PRESENTED TO DEMONSTRATE SELECTION OF OPTIMA AND TO INDICATE SENSITIVITY OF ENERGY COST TO DESIGN PARAMETER VARIATIONS. OPTIMIZED SPECIFICATIONS GENERATED BY THIS MODEL FOR SIX POINT DESIGNS ARE SUMMARIZED. THESE DESIGNS SUBSEQUENTLY RECEIVE A DETAILED ECONOMIC ANALYSIS DISCUSSED IN VOLUME IV. AN APPENDIX IS INCLUDED WITH A FORTRAN IV LISTING OF THE MODEL AND A DESCRIPTION OF THE INPUT/OUTPUT CHARACTERISTICS.

1979-0723 SULLIVAN W N, NELLUMS R O
ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINE SYSTEMS FOR THE GENERATION OF UTILITY GRID ELECTRICAL POWER. VOLUME IV. SUMMARY AND ANALYSIS OF THE A.T. KEARNEY AND ALCOA LABORATORIES POINT DESIGN ECONOMICS STUDIES.
NTIS, AUGUST 1979. 249 P.
SAND-78-0962(VOL.4)

THE A.T. KEARNEY AND ALCOA ECONOMIC STUDIES ARE TWO INDEPENDENT ATTEMPTS TO ASSESS THE INSTALLED COSTS OF A SERIES OF SIX DARRIEUS VERTICAL AXIS WIND TURBINE DESIGNS. THE DESIGNS COVER A RANGE OF SIZES WITH PEAK OUTPUTS FROM 10 TO 1600 KW. ALL ARE DESIGNED TO PRODUCE UTILITY GRID ELECTRICAL POWER. VOLUME IV OF THIS REPORT SUMMARIZES, COMPARES, AND ANALYZES THE RESULTS OF THESE STUDIES. THE KEARNEY AND ALCOA FINAL REPORTS ARE INCLUDED IN THE APPENDICES.

1979-0724 SULLIVAN W N
ECONOMIC OVERVIEW OF VERTICAL AXIS WIND TURBINES.
NTIS, 1979. 9 P.
CONF-790352-1, SAND-79-0733C

SANDIA LABORATORIES, AS PART OF ITS INVESTIGATION OF THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT), HAS BEEN INVOLVED RECENTLY IN AN ECONOMIC ASSESSMENT OF THE CONCEPT. THE CLASS OF VAWT'S INVESTIGATED USE CURVED, FIXED PITCH BLADES OF CONSTANT SECTION RIGIDLY ATTACHED TO A VERTICAL ROTATING TOWER. QUALITATIVELY, THE MAIN ADVANTAGES OF THE VAWT OVER MORE CONVENTIONAL, PROPELLER-TYPE MACHINES ARE THE ELIMINATION OF YAW CONTROLS, THE PLACEMENT OF MECHANICAL EQUIPMENT AT GROUND LEVEL, ITS AMENABILITY TO SIMPLE, LOW-COST BLADE FABRICATION TECHNIQUES, AND AERODYNAMIC STALL CHARACTERISTICS WHICH ELIMINATE THE NEED FOR ACTIVE PITCH CONTROL DEVICES. THE MAIN DISADVANTAGES RELATIVE TO MODERN PROPELLER MACHINES ARE A SOMEWHAT LOWER AERODYNAMIC EFFICIENCY (ABOUT 10% LOWER), THE LIMITED ABILITY OF THE ROTOR TO SELF-START, AND GENERALLY LOWER ROTOR OPERATING RPM'S, WHICH LEADS TO HIGHER TORQUE CAPACITY REQUIREMENTS FOR THE DRIVE TRAIN.

1979-0725 SULLIVAN W N
ECONOMIC OVERVIEW OF VERTICAL AXIS WIND TURBINES.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA,

MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 73-82.
CONF-790352

SANDIA LABORATORIES, AS PART OF ITS INVESTIGATION OF THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT), HAS BEEN INVOLVED RECENTLY IN AN ECONOMIC ASSESSMENT OF THE CONCEPT. THE CLASS OF VAWT'S INVESTIGATED USE CURVED, FIXED PITCH BLADES OF CONSTANT SECTION RIGIDLY ATTACHED TO A VERTICAL ROTATING TOWER. QUALITATIVELY, THE MAIN ADVANTAGES OF THE VAWT OVER MORE CONVENTIONAL, PROPELLER-TYPE MACHINES ARE THE ELIMINATION OF YAW CONTROLS, THE PLACEMENT OF MECHANICAL EQUIPMENT AT GROUND LEVEL, ITS AMENABILITY TO SIMPLE, LOW-COST BLADE FABRICATION TECHNIQUES, AND AERODYNAMIC STALL CHARACTERISTICS WHICH ELIMINATE THE NEED FOR ACTIVE PITCH CONTROL DEVICES. THE MAIN DISADVANTAGES RELATIVE TO MODERN PROPELLER MACHINES ARE A SOMEWHAT LOWER AERODYNAMIC EFFICIENCY (ABOUT 10% LOWER), THE LIMITED ABILITY OF THE ROTOR TO SELF-START, AND GENERALLY LOWER ROTOR OPERATING RPM'S, WHICH LEADS TO HIGHER TORQUE CAPACITY REQUIREMENTS FOR THE DRIVE TRAIN.

1979-0726 SULLIVAN W N
OPERATIONAL EXPERIENCE WITH VAWT BLADES AT SANDIA LABORATORIES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 205-210.
NASA-CP-2106

SANDIA LABORATORIES HAS OPERATED THREE DARRIEUS TURBINES (2 METER, 5 METER, AND 17 METER DIAMETER ROTORS) AT ITS TEST FACILITY FOR THE LAST SEVERAL YEARS. THROUGH THIS TEST PROGRAM, A VARIETY OF BLADE TYPES AND ROTOR CONFIGURATIONS HAVE BEEN TESTED FOR STRUCTURAL AND AERODYNAMIC PERFORMANCE. THIS PAPER WILL DISCUSS PRIMARILY BLADE STRUCTURAL PERFORMANCE ASPECTS OF THE TESTS ON THE 17 METER ROTOR.

1979-0727 SULLIVAN W N
OVERVIEW OF VERTICAL AXIS WIND TURBINE (VAWT) BLADE DESIGN PROCEDURES.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 185-192.
NASA-CP-2106

THE DESIGN OF A VAWT BLADE SECTION INVOLVES PRIMARILY THE SELECTION OF A MANUFACTURING TECHNOLOGY, ESTABLISHING STRUCTURAL INTEGRITY, AND OBTAINING ACCEPTABLE AERODYNAMIC PERFORMANCE. IN THIS PAPER, A SURVEY IS PRESENTED OF THE PRACTICES WHICH HAVE BEEN APPLIED FOR DESIGNING VAWT BLADES IN THE PAST. THROUGH THIS PRESENTATION AN ATTEMPT IS MADE TO DISCUSS STRENGTHS AND WEAKNESSES OF THE EXISTING PROCEDURES. WHERE APPROPRIATE, DISCUSSION IS PROVIDED ON PLANNED OR SUGGESTED FUTURE WORK IN DEVELOPING IMPROVED DESIGN TOOLS.

1979-0728 SULLIVAN T L, SIROCKY J R, VITERNA L A
DESIGN, FABRICATION, AND TEST OF A STEEL SPAR WIND TURBINE BLADE.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 267-284.
NASA-CP-2106

ONE POTENTIAL MEANS FOR REDUCING THE COSTS OF WIND TURBINE BLADES IS TO USE A MASS PRODUCED STRUCTURE AS THE PRIMARY STRUCTURAL MEMBER OF THE BLADE. TAPERED BEAMS SUCH AS THOSE USED FOR UTILITY POLES ARE THE TYPE OF MASS PRODUCED STRUCTURE ENVISAGED. THE AIRFOIL SHAPE COULD BE FORMED BY LIGHT-WEIGHT FOAM OR LIGHT-WEIGHT RIBS OVERWRAPPED WITH FIBERGLASS CLOTH. IN ORDER TO DETERMINE THE FEASIBILITY OF THIS CONCEPT, A 60 FT. STEEL SPAR BLADE WAS DESIGNED. USING THIS DESIGN, TWO BLADES WERE FABRICATED AT THE LEWIS RESEARCH CENTER AND TESTED ON THE MOD-0 WIND TURBINE. THE DESIGN AND FABRICATION OF THE BLADES ARE DESCRIBED. PERFORMANCE AND BLADE LOAD INFORMATION IS GIVEN AND COMPARED TO ANALYTICAL PREDICTION. IN ADDITION, PERFORMANCE IS COMPARED TO THAT OF THE ORIGINAL MOD-0 ALUMINUM BLADES. COSTS FOR BUILDING THE TWO BLADES IS GIVEN, AND PROJECTION IS MADE FOR THE COST IN MASS PRODUCTION. FINALLY, DESIGN IMPROVEMENTS TO REDUCE WEIGHT AND IMPROVE FATIGUE LIFE ARE SUGGESTED.

1979-0729 SWIFT-HOOK D T
THE UK FIELD MEASUREMENTS COLLABORATION (WIND TURBINES).
COLLOQUIUM ON WINDPOWER, LONDON, NOVEMBER 21, 1979. LONDON, IEE, 1979. P. 4-1 TO 4-4.

THIS PAPER DESCRIBES THE R AND D OF WIND TURBINES IN THE UK. BRIEF DETAILS ON MACHINES BEING DEVELOPED ON SIX SITES ARE PRESENTED. THE R AND D OF TECHNICAL WORKING GROUPS COVERING AERODYNAMICS, WIND DATA, MATERIALS AND STRUCTURES, INSTRUMENTATION AND SYSTEM CONNECTION IS DISCUSSED.

1979-0730 SWISS M
ENERGY ALTERNATIVES FOR THE YEAR 2000.
ENERGY INT. 16(6): 22-24, JUNE 1979.

REMOTE VILLAGES IN DEVELOPING COUNTRIES PRESENTLY RELYING ON OIL FOR A SUBSTANTIAL PART OF THEIR ENERGY SUPPLY COULD FIND THAT IT WOULD BE MORE ECONOMICAL TO INTRODUCE LOCALLY AVAILABLE RENEWABLE RESOURCES THAN TO REPLACE OIL WITH ANOTHER IMPORTED FUEL. TWO POSSIBILITIES ARE WIND AND BIOMASS ENERGY. THE AUTHOR LOOKS AT SOME OF THE PROGRESS THAT HAS BEEN MADE IN THE DEVELOPED WORLD FOR EXPLOITING THESE TWO ENERGY SOURCES. HE CONCLUDES THAT FURTHER DEVELOPMENT IS NEEDED IN MICROBIAL PRODUCTION OF FUELS FROM BIOMASS BEFORE THEY WILL BE ECONOMICALLY FEASIBLE FOR AREAS OF LOW AGRICULTURAL SELF-SUFFICIENCY IN COMPARISON TO METHANE AND ETHANOL PRODUCTION FROM PETROLEUM SOURCES. SEVERAL LARGE-SCALE OFFSHORE WIND PROJECTS ARE EXAMINED AND COMPARED WITH LAND SITES.

1979-0731 SYNERJY: A DIRECTORY OF ENERGY ALTERNATIVES.
NEW YORK, SYNERJY, 1979. 67 P.

THIS DIRECTORY CONTAINS A VARIETY OF INFORMATION ABOUT PRACTICAL, NON-POLLUTING ALTERNATIVES TO FOSSIL FUELS AND NUCLEAR ENERGY. THE 3000 U.S. AND FOREIGN SOURCES INCLUDE PUBLICATIONS, MAJOR ARTICLES (IN ENGLISH), CONFERENCES, RESEARCH ASSOCIATIONS, MANUFACTURERS, AND FACILITIES. MOST OF THE NON-GOVERNMENT PUBLICATIONS ARE AVAILABLE AT MAJOR PUBLIC LIBRARIES. SUBSCRIPTION INFORMATION IS GIVEN. THIS SYNERJY INCLUDES ONLY SOURCES NOT IN SYNERJY VOL. 5 (JULY 1978), SYNERJY VOL. 4 (JULY 1977), SYNERJY VOL. 3 (JULY 1976), SYNERJY VOL. 2 (JULY 1975) OR SYNERJY VOL. 1 (JULY 1974). SINCE THERE IS NO REPETITION, REFERENCE TO THE EARLIER EDITIONS OF SYNERJY IS NECESSARY FOR PREVIOUS INFORMATION. SYNERJY IS UPDATED SEMI-ANNUALLY; JULY ISSUES ARE CUMULATIVE FOR ONE YEAR. THE PURPOSE OF SYNERJY IS TO INCREASE COMMUNICATION AMONG INDIVIDUALS AND GROUPS INTERESTED IN ALTERNATIVE SOURCES OF ENERGY AND TO STIMULATE GROWTH IN THESE AREAS: SOLAR ENERGY, GEOTHERMAL ENERGY AND OTHER STEAM, OTHER THERMAL ENERGY, ELECTRICAL ENERGY, WATER POWER, WIND POWER, AND ENERGY STORAGE.

1979-0732 SYSTEM DYNAMICS OF MULTI-UNIT WECS.
WIND ENERGY REP.: 11-13, DECEMBER 1979.

1979-0733 TAKLE E S, SHAW R H
COMPLIMENTARY NATURE OF WIND AND SOLAR ENERGY AT A CONTINENTAL MID-LATITUDE STATION.
INT. J. ENERGY RES. 3(2): 103-112, APRIL-JUNE 1979.

DAILY VALUES OF SOLAR AND WIND ENERGY HAVE BEEN USED (1) TO STUDY RENEWABLE ENERGY AVAILABILITY AT VARIOUS TIMES OF THE YEAR, (2) TO TEST THE LEVEL OF PERSISTENCE FOR INFERENCES ABOUT THE PRACTICALITY OF ENERGY STORAGE AND (3) TO EXAMINE THE COMPLEMENTARY BEHAVIOR OF THESE TWO DAILY TIME SERIES ON BOTH SEASONAL AND DAILY BASES. RESULTS FOR THE STATION STUDIED (CENTRAL IOWA) SHOW A BIMODAL DISTRIBUTION FOR WINTER SOLAR ENERGY, WHEREAS NON-WINTER SOLAR AND WIND (ALL SEASONS) SHOW UNIMODAL DISTRIBUTIONS. WIND AND SOLAR ENERGY WERE OBSERVED TO BE HIGHLY COMPLEMENTARY ON AN ANNUAL BASIS, BUT ONLY SLIGHTLY COMPLEMENTARY ON A DAILY BASIS.

1979-0734 TAYLOR R H
WIND POWER RESEARCH AND DEVELOPMENT IN THE UK.
ELECTRON. POWER 25(7): 485-488, JULY 1979.

IN THE USA, EXPENDITURE ON WIND POWER RESEARCH AND DEVELOPMENT HAS REACHED $60 MILLION FOR 1979. BRITAIN IS SEVERAL YEARS BEHIND IN TERMS OF EXPENDITURE. THE USA NOW HAS SEVERAL LARGE MACHINES EITHER WORKING OR NEAR COMPLETION. BUT, AS BRITAIN IS CONCENTRATING ITS EFFORTS ON DESIGNS AND SITES, E.G. OFFSHORE PLANT, WHICH THE U.S. PROGRAMME IS NOT COVERING IN GREAT DEPTH, BRITAIN STILL HAS SOMETHING TO OFFER THE INTERNATIONAL RESEARCH EFFORT.

1979-0735 TAYLOR T B
STORAGE OF SOLAR ENERGY.
INDIAN ACAD. SCI. PROC. C2(1): 319-330, SEPTEMBER 1979.

THIS ARTICLE DESCRIBES VARIOUS METHODS FOR SOLAR ENERGY STORAGE, BOTH FROM DIRECT SOLAR ENERGY (SUNLIGHT) AND INDIRECT (E.G. FROM WINDMILLS). METHODS CONSIDERED INCLUDE BATTERIES, HEAT OF HYDRATION OF COMPOUNDS, AND LOW TEMPERATURE STORAGE IN PONDS. ARGUMENTS ARE PRESENTED FOR USING A SYSTEMS APPROACH TO THE SELECTION OF SOLAR ENERGY STORAGE SYSTEMS.

1979-0736 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. FY 1979 REPORT. REPORTING PERIOD OCTOBER 1, 1978-SEPTEMBER 28, 1979.
NTIS, DECEMBER 1979. 126 P.
RFP-3126/3533/80-2

THE FY 1979 ANNUAL REPORT OF THE ROCKY FLATS WIND SYSTEMS PROGRAM DESCRIBES THE OBJECTIVES, APPROACH, AND ACHIEVEMENTS OF THE PROGRAM AND EACH OF ITS TASK AREAS DURING THE PERIOD OCTOBER 1, 1978 - SEPTEMBER 28, 1979. DURING THIS PERIOD, ADDITIONAL TESTING OF 17 SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) WAS CONDUCTED AND THE TEST CENTER'S CAPABILITIES WERE EXPANDED TO INCLUDE CONTROLLED VELOCITY AND VIBRATION TESTING OF SWECS. WORK ON EIGHT DESIGN AND ANALYSIS PROJECTS FOR ADVANCED PROTOTYPES IN THREE SIZE RANGES PROGRESSED THROUGH A SERIES OF DESIGN REVIEWS AND FABRICATION WAS INITIATED.

1979-0737 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS. ANNUAL REPORT FOR OCTOBER 1, 1977-SEPTEMBER 30, 1978.
NTIS, FEBRUARY 1979. 142 P.
RFP-2974/3533-79-2

THE FY 1978 ANNUAL REPORT OF THE ROCKY FLATS WIND SYSTEMS PROGRAM DESCRIBES THE OBJECTIVES, APPROACH, AND ACHIEVEMENTS OF THE PROGRAM AND EACH OF ITS TASK AREAS DURING THE PERIOD OCTOBER 1, 1977 - SEPTEMBER 30, 1978. DURING THIS PERIOD, ADDITIONAL TESTING OF TEN SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) WAS CONDUCTED AND THE TEST CENTER WAS EXPANDED TO ACCOMMODATE UP TO 30 SWECS. WORK ON NINE DESIGN AND ANALYSIS PROJECTS FOR ADVANCED PROTOTYPES IN THREE SIZE RANGES PROGRESSED THROUGH A SERIES OF DESIGN REVIEWS, WITH PROTOTYPE DELIVERY SCHEDULED TO BEGIN IN MID-1979. SUPPORTING ACTIVITIES INCLUDED A SYSTEMS ENGINEERING PROJECT WHICH ANALYZED THE COST OF SWECS COMPONENTS AND FABRICATION, A TASK EFFORT IN TECHNICAL SUPPORT TO STANDARDS DEVELOPMENT, AND THE DISSEMINATION OF INFORMATION. PLANNING FOR A SWECS FIELD EVALUATION PROGRAM AND TWO NEW TASK AREAS INVOLVING SPECIAL STUDIES AND SUPPORTING RESEARCH AND TECHNOLOGY (SRT) WAS CONDUCTED.

1979-0738 TELFORD J W
PIVOTED BLADE BARREL ROTOR WIND TURBINE.
U.S. PATENT NO. 4,137,009, JANUARY 30, 1979. 42 P.

THE DISCLOSED WIND TURBINE HAS ZERO MEAN CAMBER AIRFOIL BLADES VERTICALLY PIVOTED AT THE OUTER ENDS OF PAIRS OF RADIUS ARMS. THE INNER ENDS OF THE RADIUS ARMS ARE FIXED TO A ROTATING MAST. EACH BLADE IS PROVIDED WITH A STEERING VANE. THE DEFLECTION OF EACH VANE WITH RESPECT TO ITS ASSOCIATED BLADE IS CONTROLLED BY A CAM TOGGLE MECHANISM. THE DISCLOSED CAM TOGGLE MECHANISM INCLUDES A DOUBLE-FACED FACE CAM, HAVING A CLOSED CAM TRACK ON ITS UPPER FACE AND ANOTHER CLOSED CAM TRACK ON ITS LOWER FACE. EACH CAM TRACK CONSISTS OF TWO CIRCULAR DWELL PORTIONS.

1979-0739 TEMPLIN R J, MCCONNELL R D
SUMMARY REPORT ON THE COLLAPSE OF THE MAGDALEN ISLANDS WIND TURBINE.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORMIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 353-365.
CONF-790352

ON THE MORNING OF 6 JULY 1978, HYDRO-QUEBEC PERSONNEL ARRIVED AT THE SITE OF THE MAGDALEN ISLAND 230 KW VERTICAL AXIS WIND TURBINE. THE TURBINE WAS FOUND TURNING, UNATTENDED, AT ABOUT 30 RPM. THE MAIN DISC BRAKE WAS NO LONGER CONNECTED TO THE ROTOR'S DRIVE TRAIN AND THE SPOILERS WERE WORKING INTERMITTENTLY. CLOSE TO 9:30 AM (LOCAL TIME) THE SPOILERS CLOSED COMPLETELY AND THE TURBINE BEGAN AN HOUR OF RUNNING AT 60 RPM TO 70 RPM. THE TURBINE EVENTUALLY SPED UP TO ABOUT 74 RPM, THE EVIDENT LOCATION OF A MECHANICAL RESONANCE, AND TURBINE BLADES BEGAN STRIKING THE ROTOR'S SUPPORT CABLES. FINALLY, A CABLE TURNBUCKLE BROKE AND AT 10:19 (LOCAL TIME) THE TURBINE ROTOR BROKE OFF AND FELL TO THE GROUND. ANALYSIS OF THE TURBINE FAILURE IS PRESENTED.

1979-0740 TEMPLIN R J
DESIGN CHARACTERISTICS OF THE 224 KW MAGDALEN ISLANDS VAWT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 143-154.
NASA-CP-2106

THE EVOLUTION OF THE MAIN DESIGN FEATURES OF THE MAGDALEN ISLANDS VAWT IS DESCRIBED. THE TURBINE HAS A ROTOR HEIGHT OF 120 FT (36.58 M) AND DIAMETER 80 FT (24.38 M). IT WAS OPERATED AS A JOINT PROJECT BETWEEN NRC AND

HYDRO-QUEBEC IN GRID-COUPLED MODE FROM JULY 1977 TO JULY 1978 WHEN THE ROTOR WAS DESTROYED IN AN ACCIDENT. THE ACCIDENT, ALTHOUGH UNFORTUNATE, TESTED THE BASIC INTEGRITY OF THE DESIGN IN A GROSS OVERSPEED CONDITION, AND THE ROTOR IS BEING REBUILT WITH MINOR MODIFICATIONS. SOME DIRECTIONS FOR FUTURE VAWT RESEARCH ARE SUGGESTED.

1979-0741 TENNYSON G P
THE FEDERAL WIND ENERGY PROGRAM: AN OVERVIEW.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 1-13.
SERI/TP-245-184, CONF-790501

THE FEDERAL WIND ENERGY PROGRAM IS REVIEWED. PARTICULAR EMPHASIS IN THE REVIEW IS THAT ATTENTION GIVEN THROUGH FEDERAL FUNDING TO INNOVATIVE SYSTEMS.

1979-0742 TETZLAFF G, BEYER R
WIND ENERGY POTENTIAL IN THE NORTHERN PART OF GERMANY.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 253-259.
PNL-3214

THE GERMAN WIND ENERGY PROGRAM CENTERS AROUND A MAJOR WIND TURBINE TO BE BUILT IN GERMANY. THIS WIND TURBINE IS DESIGNED TO BE INTRODUCED AS A POWER PLANT IN THE MAIN POWER GRID. IT IS IN PARTICULAR MEANT TO BE INTEGRATED IN THE NETWORK OF THE DIFFERENT EXISTING POWER PLANTS. THE GENERAL METEOROLOGICAL CONDITIONS ENCOUNTERED IN GERMANY ARE CHARACTERIZED BY THE TOPOGRAPHY, AS FAR AS WIND IS CONCERNED.

1979-0743 TEWARI S K, NINGAIAH, SUBRAMANYAM D V V, SAMRAJ A C
A HORIZONTAL AXIS SAIL WINDMILL FOR USE IN IRRIGATION.
INDIAN ACAD. SCI. PROC. C2(1): 107-116, MARCH 1979.

SOME BASIC CONSIDERATIONS ARE DESCRIBED IN THE DESIGN AND DEVELOPMENT OF A HORIZONTAL AXIS WINDMILL INTENDED PRIMARILY FOR IRRIGATION IN SMALL FARMS FROM SHALLOW OPEN WELLS. THIS WINDMILL HAS SIX TRIANGULAR SAILS SWEEPING A CIRCLE OF 10 M DIAMETER AND IS AN ADAPTATION FROM GREEK SAIL WINDMILLS. FOR THE CONSTRUCTION OF THIS WINDMILL ALL EFFORTS WERE MADE TO USE MATERIALS AND PARTS READILY AVAILABLE IN THE HARDWARE MARKET EXCEPT FOR THE GEAR BOXES. PRELIMINARY PERFORMANCE TESTS HAVE INDICATED A PUMPING RATE OF 6000-11000 LITRES/HR OVER A HEAD OF 6.85 M IN WIND SPEEDS OF 10-16 KM/HR.

1979-0744 THALLER L H
REDOX FLOW CELL ENERGY STORAGE SYSTEMS.
NTIS, 1979. 12 P.
DOE/NASA/1002-79/3, NASA-TM-79143, CONF-790611-2

NASA-REDOX ENERGY STORAGE SYSTEMS ARE BEING DEVELOPED FOR ULTIMATE USE IN STAND-ALONE VILLAGE POWER APPLICATIONS AND DISTRIBUTED ENERGY STORAGE INSTALLATIONS FOR ELECTRIC UTILITY SERVICE. IN THE FORMER APPLICATION, EITHER SOLAR PHOTOVOLTAIC ARRAYS OR WIND TURBINES SUPPLY THE PRIMARY POWER AND AN ELECTROCHEMICAL STORAGE SYSTEM STORES ENERGY DURING TIMES OF EXCESS POWER GENERATION CAPABILITY AND DELIVERS ENERGY DURING TIMES OF INSUFFICIENT POWER GENERATION.

1979-0745 THARPE B J
CAPACITY CREDITS: AN OVERLOOKED BENEFIT OF SOLAR ENERGY SYSTEMS.
ENERGY TECHNOL. 6: 45-54, APRIL 1979.

GENERAL ELECTRIC RE-EVALUATES ECONOMIC-FEASIBILITY STUDIES MADE OF SOLAR ENERGY SYSTEMS IN 1972 AND REPORTS THAT CAPACITY CREDITS NOW APPEAR TO INCREASE THE VALUE OF THESE SYSTEMS. THE FLEXIBILITY FOR USE IN EITHER ON-SITE OR CENTRALIZED APPLICATIONS IS NOTED, THE CAPACITY CREDITS VARYING BY REGION, UTILITY, AND CHOICE OF SOLAR EQUIPMENT. A SERIES OF 13 CHARTS IS USED TO ILLUSTRATE THESE POINTS AND TO DEMONSTRATE APPLICATIONS OF WIND TURBINES, PHOTOVOLTAICS, AND SOLAR HEATING AND COOLING. THE EVALUATION TOOLS DESCRIBED CAN BE USED FOR EITHER DECENTRALIZED OR CENTRALIZED SOLAR SYSTEMS BUT THE UTILITY AND THE USER MUST BE CONSIDERED IN MAKING THE EVALUATION TO ENSURE THAT THE SOLAR SYSTEMS ARE PROPERLY INTEGRATED WITH THE UTILITY SYSTEM.

1979-0746 THEYSE F H
PLANT FOR GENERATING AND ACCUMULATING ELECTRIC ENERGY WITH THE AID OF WIND POWER OR SOLAR ENERGY.
U.S. PATENT NO. 4,171,491, OCTOBER 16, 1979. 4 P.

AN ELECTRIC SOLAR OR WIND POWER PLANT WITH A FLYWHEEL BATTERY IN WHICH THE ELECTRIC GENERATOR IS IN THE FORM OF A DC GENERATOR IS DESCRIBED. THE GENERATOR IS ELECTRICALLY CONNECTED TO BRUSHLESS DC MOTORS SWITCHED IN PARALLEL, WHICH CAN ALSO ACT AS GENERATORS AND EACH OF WHICH IS COUPLED TO A FLYWHEEL.

1979-0747 THOR S E
COMPUTER METHODS FOR STRUCTURAL WEIGHT OPTIMIZATION OF FIBER REINFORCED PLASTICS.
IMPLEMENTING AGREEMENT FOR CO-OPERATION IN THE DEVELOPMENT OF LARGE SCALE WIND ENERGY CONVERSION SYSTEMS. FIRST MEETING OF EXPERTS: SEMINAR ON STRUCTURAL DYNAMICS, MUNICH, OCTOBER 12, 1978. NTIS, JANUARY 1979. P. 216-237.
JUEL-SPEZ-28

SOME OF FFA'S COMPUTER PROGRAMS FOR ANALYSIS AND OPTIMUM DESIGN OF FIBER REINFORCED PLASTICS ARE DISCUSSED. A GENERAL FLOW CHART FOR ANALYSIS OF FIBER REINFORCED STRUCTURES IS PRESENTED.

1979-0748 THIRD ANNUAL DESKBOOK DIRECTORY OF SOLAR PRODUCT MANUFACTURERS.
SOL. ENG. MAG. 4(12): 19, 21-40, 42-46, 48, DECEMBER 1979.

MANUFACTURERS OF SOLAR COLLECTORS AND COLLECTOR COMPONENTS, SOLAR SYSTEMS, PASSIVE SYSTEMS AND COMPONENTS, ACTIVE SOLAR SYSTEM COMPONENTS, AND SOLAR POWER GENERATION PRODUCTS ARE LISTED. POWER GENERATION SYSTEMS AND COMPONENTS REFER TO PHOTOVOLTAICS, SOLAR THERMAL POWER GENERATION, SMALL HYDRAULIC GENERATORS, OTEC, SPACE POWER SATELLITE, WIND TURBINES, AND ELECTRICAL STORAGE.

1979-0749 THRESHER R W
ATMOSPHERIC CONSIDERATIONS FOR DESIGN OF WECS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 13-27.
PNL-3214

THE KEY OBJECTIVE OF CURRENT WIND TURBINE DESIGN EFFORTS IS TO REDUCE THE COST OF ENERGY TO A MINIMUM, AND

STILL PROVIDE A SAFE AND RELIABLE TURBINE SYSTEM. THE MAJOR THRUST OF SUPPORTING RESEARCH AND TECHNOLOGY DEVELOPMENT PROGRAMS SHOULD BE DIRECTED TOWARD THIS SAME GOAL. TO FOCUS ATTENTION ON THE RELATIONSHIP BETWEEN THE COST OF ENERGY (COE) AND ATMOSPHERIC CONSIDERATIONS, THIS PAPER EXAMINES THE FACTORS INVOLVED TO DETERMINE THE IMPORTANT ATMOSPHERIC CONTRIBUTIONS.

1979-0750 THRESHER R W
WIND SYSTEM DESIGN AND RESEARCH CONSIDERATIONS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1. P. 189-196.
RFP-3014(VOL.1)

THE KEY OBJECTIVE OF CURRENT WIND TURBINE DESIGN EFFORTS IS TO REDUCE THE COST OF ENERGY TO A MINIMUM, AND STILL PROVIDE A SAFE AND RELIABLE TURBINE SYSTEM. THE MAJOR THRUST OF ANY SUPPORTING RESEARCH AND TECHNOLOGY DEVELOPMENT PROGRAM SHOULD BE DIRECTED TOWARD THIS SAME GOAL. THE FACTORS WHICH CONTRIBUTE TO THE COST OF ENERGY, AND WHICH CAN POSSIBLY BE IMPROVED BY RESEARCH AND DEVELOPMENT ARE ANALYZED.

1979-0751 THOMAS J
NAVY ENERGY AWARENESS.
NAVY CIV. ENG. 20(1): 3, 1979.

THE NAVY R AND D PROGRAM IS STRUCTURED TO ACHIEVE MAXIMUM PRACTICAL ENERGY CONSERVATION AND AID IN SUBSTITUTING, WHERE PRACTICAL, ALTERNATE ENERGY SOURCES TO REPLACE PETROLEUM AND NATURAL GAS. PROGRESS AND ACTIVITIES IN THE FOLLOWING AREAS ARE REVIEWED: WIND POWER, GEOTHERMAL ENERGY, SOLAR-GENERATED POWER, PHOTOVOLTAIC POWER SYSTEMS, LIGHTING SYSTEMS, AND RECYCLING EXHAUST GASES. A QUICK, LOW-COST METHOD OF DETERMINING THE AIR-LEAKAGE RATE FROM THE EXTERNAL SURFACES OF BUILDINGS IS BEING RESEARCHED AND DEVELOPED.

1979-0752 THUMANN A
WHAT IS AN ENERGY AUDIT? HOW DOES IT AFFECT THE USE OF SOLAR ENERGY?
SOL. ENG. MAG. 4(7): 15-16, JULY 1979.

ENERGY AUDITS FOR IDENTIFYING ENERGY USES IN BUILDINGS OR PLANT FACILITIES AND POTENTIAL AREAS OF ENERGY CONSERVATION ARE REVIEWED. THE SIMPLEST ENERGY AUDIT IS THE WALK THROUGH IN WHICH A VISUAL INSPECTION EVALUATES LOW- OR NO-COST ENERGY CONSERVATION MEASURES. A MINI-AUDIT UTILIZES TESTS AND MEASUREMENTS TO ASSESS ENERGY LOSSES AND USES AND LIFE CYCLE COSTING METHODS FOR EVALUATING MODIFICATIONS. THE MAXI-AUDIT EVALUATES ENERGY REQUIREMENTS FOR EACH INDIVIDUAL PROCESS OR SERVICE AND MAY UTILIZE COMPUTER SIMULATIONS TO ASSESS ENERGY USE PATTERNS AND ANNUAL PREDICTIONS. THE RESIDENTIAL CONSERVATION SERVICE PROGRAM SEPARATES ENERGY CONSERVATION MEASURES INTO THE CATEGORIES OF ENERGY CONSERVATION WITHOUT UTILIZATION OF A RENEWABLE ENERGY RESOURCE, AND RENEWABLE RESOURCE MEASURES INVOLVING SOLAR AND WIND ENERGY. SOME OF THE ENERGY CONSERVING MEASURES LISTED ARE ELIGIBLE FOR TAX CREDITS.

1979-0753 TODD R W
SMALL SCALE WIND ENERGY SYSTEMS.
COLLOQUIUM ON WINDPOWER, LONDON, NOVEMBER 21, 1979. LONDON, IEE, 1979. P. 2-1 TO 2-2.

THIS PAPER EXAMINES THE DESIGN CHARACTERISTICS AND APPLICATIONS OF SMALL (LESS THAN 50 KW) WINDMILLS.

1979-0754 TRACI R M, PHILLIPS G T, ROCK K C
WIND ENERGY SITING METHODOLOGY WINDFIELD MODEL VERIFICATION PROGRAM. I. OAHU, HAWAII DATA SET. INTERIM REPORT FOR THE PERIOD 15 SEPTEMBER 1978 TO 15 APRIL 1979.
NTIS, APRIL 1979. 171 P.
RLO/2440-79/3, DOE/ET/20280-79/3

AN IMPORTANT LINK IN THE CHAIN OF ACTIVITIES FOR IMPLEMENTING PRACTICAL WIND ENERGY CONVERSION SYSTEMS (WECS) IS THE PROSPECTING OR SITE SCREENING AND SELECTION ACTIVITY. CURRENT TECHNIQUES HAVE PROVEN TO BE INADEQUATE, TIME CONSUMING AND EXPENSIVE. THIS REPORT PROVIDES AN IMPROVED AND MORE ECONOMICAL SITING METHODOLOGY. THE APPROACH IS TO MAKE USE OF MATHEMATICAL WINDFIELD MODELLING TO OBJECTIVELY EXTRAPOLATE CLIMATOLOGICAL DATA FROM A SMALL NUMBER OF SITES IN A REGION OF INTEREST TO OTHER POTENTIALLY "WINDIER" SITES THROUGHOUT THE REGION.

1979-0755 TRACI R M, PHILLIPS G T, ROCK K C
UTILITY AND VERIFICATION OF MATHEMATICAL WINDFIELD MODELS FOR WIND ENERGY REGIONAL SCREENING AND SITE SELECTION.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 381-391.
PNL-3214

A WECS SITING METHODOLOGY HAS BEEN DEVELOPED IN RECENT YEARS WHICH MAKES USE OF NUMERICAL WINDFIELD MODELS TO OBJECTIVELY AND ACCURATELY EXTRAPOLATE HISTORICAL OR FIELD TEST DATA FROM SITES WITHIN A MESOSCALE REGION OF INTEREST TO OTHER POTENTIALLY "WINDIER" SITES THROUGHOUT THE REGION. AS PART OF THE DEVELOPMENT PROGRAM, TWO WINDFIELD MODELS HAVE BEEN DEVELOPED FOR COMPLEMENTARY USE IN THE METHODOLOGY: SIGMET, A PRIMITIVE EQUATION, TERRAIN CONFORMAL, MESOSCALE METEOROLOGY MODEL AND NOABL, A SIMPLIFIED PHYSICS, TERRAIN CONFORMAL WINDFIELD MODEL.

1979-0756 TRENKA A
SWECS TEST ACTIVITIES AT ROCKY FLATS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 216-220.
RFP-3014(VOL.1)

A MAJOR OBJECTIVE IS TO PROVIDE A FACILITY WHERE TESTING OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) CAN BE PERFORMED UNDER ACTUAL ENVIRONMENTAL CONDITIONS. THE DATA COLLECTED FROM THIS TESTING WILL: (1) PROVIDE INFORMATION FOR POTENTIAL BUYERS OF SWECS AND (2) PROVIDE A SOUND TECHNOLOGICAL BASE FOR USE BY THE ENGINEER AND DEVELOPER OF SWECS. EVERY EFFORT IS BEING MADE TO COLLECT ACCURATE DATA IN A SOUND ENGINEERING FASHION AND TO PROVIDE THAT DATA COLLECTED WILL BE USEFUL. THIS EFFORT IS BEING IMPLEMENTED THROUGH CONSISTENT AND MEANINGFUL TEST PROCEDURES SO THAT THE DATA WILL GIVE ACCURATE PERFORMANCE PREDICTIONS FOR CONDITIONS THAT THE CONSUMER IS LIKELY TO SUBJECT A GIVEN MACHINE TO. THE DATA COLLECTED FOR USE BY THE ENGINEER AND/OR MANUFACTURER SHALL BE ACCURATE AND SUFFICIENTLY DESCRIBED, IN ENGINEERING TERMS, SO AS TO BE READILY USEFUL.

1979-0757 TRENKA A R, LIVESAY J C
SWECS/UTILITY INTERFACE AT ROCKY FLATS TEST SITE.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO,

FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 16-21.
RFP-3014(VOL.2)

THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER HAS BEEN DEVELOPED TO PROVIDE THE CAPABILITY TO TEST COMMERCIALLY AVAILABLE AND PROTOTYPE WIND TURBINE GENERATORS (WTG) AND TO ACQUIRE REPRESENTATIVE DATA. OPERATIONS OF THE TEST CENTER INCLUDE ANALYZING ALL DATA, PROVIDING ENGINEERING AND SUPPORT CAPABILITIES, AND DEVELOPING IMPROVED TEST TECHNIQUES. FOUR MAJOR SECTIONS COMPRISE THE TEST CENTER'S OPERATIONS: ATMOSPHERIC TESTING SYSTEM, POWER MANAGEMENT SYSTEM, DATA MANAGEMENT SYSTEM, AND SUPPORT SYSTEM. THIS DISCUSSION IS CONFINED TO THE POWER MANAGEMENT SYSTEM (PMS), THE OBJECTIVE OF WHICH IS TO CONTROL THE UTILIZATION OF SITE POWER RECEIVED FROM THE COLORADO PUBLIC SERVICE COMPANY (PSC) AS WELL AS POWER GENERATED BY THE TEST MACHINES.

1979-0758 TWIDDELL J
ENERGY WITH HARMONY IN THIRD WORLD.
ELECTR. REV. 204(6): 12-13, FEBRUARY 9, 1979.

OIL IS BECOMING TOO EXPENSIVE FOR ENERGY USE IN THIRD WORLD COUNTRIES. A PROGRAM FOR RENEWABLE ENERGY SUPPLIES IN DEVELOPING COUNTRIES IS SUGGESTED THAT COULD PRODUCE A LIFE STYLE FREE FROM EXCESSIVE URBANIZATION. THE POSSIBLE ROLE OF ELECTRICAL ENGINEERS IN ACHIEVING THIS PROGRAM FOR USING HYDRO, SOLAR, WIND, WAVE AND TIDAL POWER AND THE COMBUSTION OF ORGANIC AND BIOMASS MATERIALS TO PRODUCE ELECTRIC POWER IS DISCUSSED.

1979-0759 UPENDRA S S, SAMAGA B S, KRISHNA S S
SOME EXPERIMENTAL STUDIES ON WIND TURBINE MODELS.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. NTIS, 1979. P. 454-459.
CONF-791229

A WIND TUNNEL TEST RIG HAS BEEN CONSTRUCTED IN ORDER TO CARRY OUT MODEL STUDIES ON A FEW WIND MILL DESIGNS AND TO COMPARE THEIR RELATIVE MERITS. A SIMPLE ROPE BRAKE IS USED TO LOAD THE WIND TURBINES EXTERNALLY AND AN ELECTRONIC STROBOSCOPE IS EMPLOYED TO MEASURE THE ROTATIONAL SPEED. THE FOLLOWING MODELS HAVE BEEN STUDIED: VERTICAL SHAFT, TWO BLADE ROTOR WITH VARIABLE CENTER TO CENTER DISTANCE BETWEEN THE BLADES; VERTICAL SHAFT, FOUR BLADE ROTOR AND HORIZONTAL SHAFT, FOUR BLADE FAN TYPE ROTOR WITH VARIABLE BLADE PITCH. THE VERTICAL SHAFT DESIGNS HAVE BEEN TESTED IN CONJUNCTION WITH A BAFFLE IN FRONT OF THE MODEL, WHICH SERVES AS A STATIONARY VANE WITH VARIABLE ANGULAR ORIENTATION. EXPERIMENTS HAVE BEEN CARRIED OUT WITH SIMULATED WIND VELOCITIES IN THE RANGE OF 3 TO 7 M/SEC., WHICH IS THE AVERAGE SURFACE WIND VELOCITY PREVALENT IN THE WEST COAST REGIONS OF KARNATAKA. TYPICAL RESULTS ARE PRESENTED.

1979-0760 URBANEK A
1500 SOLAR PLANTS IN SWITZERLAND.
SONNENENERG. WAERMEPUMPE 4(5/6): 28-35, SEPTEMBER-DECEMBER 1979. (IN GERMAN)

IN SWITZERLAND, IN THE END OF 1980, APPROXIMATELY 1500 SOLAR PLANTS WILL BE OPERATING. SWITZERLAND WAS THE FIRST EUROPEAN COUNTRY TO BEGIN TO TURN TO ALTERNATIVE ENERGY SOURCES, WHICH BEGAN SPONTANEOUSLY BY PRIVATE INITIATIVE AFTER THE OIL CRISIS OF 1973. THEREFORE, TODAY THERE ARE A VARIETY OF PLANTS IN WHICH SOLAR ENERGY, WIND ENERGY AND BIOENERGY ARE USED.

1979-0761 VACHON W A, DOWNEY W T, MARCH F, MADIO F R, SCHIMKE G R
WIND ENERGY IN THE MOUNTAINS OF NEW HAMPSHIRE AS A POTENTIAL ENERGY SOURCE FOR THE PORTSMOUTH NAVAL SHIPYARD.
NTIS, OCTOBER 1979. 189 P.
AD-A076975

A FEASIBILITY STUDY WAS CONDUCTED TO DETERMINE WHETHER THE WIND ENERGY IN THE MOUNTAINOUS REGIONS OF NEW HAMPSHIRE COULD BE USED AS A POSSIBLE ENERGY SOURCE FOR THE PORTSMOUTH NAVAL SHIPYARD IN PORTSMOUTH, NEW HAMPSHIRE. THE RESULTS INDICATE THAT THERE IS ADEQUATE WIND ENERGY AVAILABLE AT MOUNTAIN SITES TO DRIVE EVEN THE LARGEST WIND TURBINE GENERATORS (WT'S) NOW PLANNED, AND THAT MANY POTENTIAL SITES EXIST IN RELATIVELY CLOSE PROXIMITY TO UTILITY LINES.

1979-0762 VALTER G P
ELECTRICAL SYSTEM FOR WIND TURBINE UNITS.
ENERGIESPECTRUM 3(5): 118-123, MAY 1979. (IN DUTCH)

WIND TURBINES ARE CLASSIFIED AS CONSTANT SPEED AND VARIABLE SPEED TYPES. THE FIRST CLASS IS SUBDIVIDED INTO SYNCHRONOUS AND ASYNCHRONOUS TYPES. THE FORMER HAS THREE PHASE WINDING AND VARIABLE COUPLING WITH THE ROTOR. THE ASYNCHRONOUS TYPE WORKS AS A MOTOR AT LOW REVOLUTION RATES AND AS A GENERATOR AT HIGH REVS. THE VARIABLE SPEED TYPES TYPICALLY USE A STATIC CONVERTOR WITH THYRISTOR CONTROL. A DETAILED SCHEME IS DESCRIBED FOR A 25 M DIAMETER WIND TURBINE WITH A NOMINAL SPEED (DC) IN PARALLEL WITH A BALLAST RESISTOR, A 12-PULSE CONVERTOR WITH 600 MW CAPACITY, AND A 350 V/10 KV TRANSFORMER WITH TWO PRIMARIES (ONE STAR, ONE DELTA CONNECTED).

1979-0763 VAN BRONKHORST J
MOD-1 STEEL BLADE.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 325-342.
NASA-CP-2106

SINCE SEPTEMBER OF 1977, DESIGN, DEVELOPMENT, FABRICATION, TESTING AND TRANSPORT OF TWO 100 FOOT METAL BLADES FOR THE MOD-1 WTS HAS BEEN COMPLETED. BECAUSE THE METAL BLADE DESIGN WAS STARTED LATE IN THE MOD-1 SYSTEM DEVELOPMENT, MANY OF THE DESIGN REQUIREMENTS (ALLOCATIONS) WERE RESTRICTIVE FOR THE METAL BLADE CONCEPT, PARTICULARLY THE MAXIMUM WEIGHT REQUIREMENT. THE UNIQUE DESIGN SOLUTIONS REQUIRED TO ACHIEVE THE WEIGHT GOAL RESULTED IN A LABOR INTENSIVE (EXPENSIVE) FABRICATION, PARTICULARLY FOR A QUANTITY OF ONLY TWO BLADES MANUFACTURED USING MINIMAL TOOLING. NEVERTHELESS, THE VERY EXISTENCE OF THE BLADES REPRESENTS A MAJOR ACHIEVEMENT IN LARGE WIND TURBINE SYSTEM DEVELOPMENT.

1979-0764 VANDERELST W J
THE AERODYNAMICS OF AXIAL FLOW WIND POWER TURBINES.
NTIS, JUNE 1979. 37 P.
CSIR-ME-1619, N80-23781/1

A GENERAL ANALYSIS OF THE AERODYNAMICS OF WIND POWER TURBINES OF THE AXIAL FLOW TYPE IS PRESENTED. THE DESIGN PARAMETERS APPEAR IN NONDIMENSIONAL FORM AND ARE PRESENTED GRAPHICALLY. THE THEORY IS APPLICABLE TO ANY TYPE OF WIND POWER GENERATOR, INCLUDING SLOW RUNNING WINDMILLS NORMALLY USED FOR POWERING WATER PUMPS AS WELL AS FAST RUNNING MACHINES WHICH ARE SUITABLE FOR THE GENERATION OF ELECTRIC POWER.

1979-0765 VANDERELST W J
THE AERODYNAMICS OF CONTRA-ROTATING AXIAL FLOW WIND POWER TURBINES.
NTIS, NOVEMBER 1979. 28 P.
CSIR-ME-1638, N80-33868

THE SPECIAL CASE OF A CONTRA-ROTATING, AXIAL FLOW TURBINE IS ANALYZED AND IT IS SHOWN IN WHAT OPERATING REGIME SUCH WIND MACHINES WITH CONTRA-ROTATING ROTORS ARE SUPERIOR TO THE CONVENTIONAL SINGLE ROTOR TURBINE. NONDIMENSIONAL PARAMETERS SUITABLE FOR USE IN DESIGNING CONTRA-ROTATING BLADES ARE PRESENTED BY MEANS OF FORMULAE AND GRAPHS.

1979-0766 VAN WYK J D
ELECTRO--WIND ENERGY SYSTEM WITH OVERSYNCHRONOUS CASCADE AND SIMPLE ADAPTIVE MAXIMAL POWER CONTROL.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2291-2295.

THE CONVERSION OF MECHANICAL ENERGY FROM A WIND TURBINE INTO ELECTRICAL ENERGY BY USING AN INDUCTION GENERATOR WITH FEED BACK OF ITS ROTOR POWER TO THE SUPPLY SYSTEM VIA A SUPPLY COMMUTATED INVERTER IS INVESTIGATED. THE POWER ELECTRONIC EQUIPMENT IN THE PRESENT SYSTEM IS SHOWN TO HAVE ONLY HALF THE RATED POWER.

1979-0767 VAS I E
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE PROCEEDINGS.
NTIS, DECEMBER 1979. 369 P.
WIND ENERGY INNOVATIVE SYSTEMS CONFERENCE, COLORADO SPRINGS, MAY 23, 1979.
CONF-790501, SERI/TP-245-184

22 PAPERS WERE PRESENTED CONCERNING INNOVATIVE WIND TURBINES WHICH VARY IN DESIGN FROM THE STANDARD HORIZONTAL-AXIS PROPELLER-TYPE WIND TURBINES.

1979-0768 VAS I E
A SUMMARY OF THE WIND ENERGY INNOVATIVE SYSTEMS PROGRAM.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 335-344.
SERI/TP-245-184, CONF-790501

SERI FULFILLS THIS FUNCTION IN THE WIND ENERGY AREA BY PROVIDING TECHNICAL MANAGEMENT FOR THE ADVANCED CONCEPTS PROGRAM ENTITLED WIND ENERGY INNOVATIVE SYSTEMS (WEIS) PROGRAM. THE OBJECTIVE OF THIS PROGRAM IS TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF POTENTIALLY COST COMPETITIVE INNOVATIVE SYSTEMS. STUDIES PERFORMED IN THIS PROGRAM ARE SUBCONTRACTED TO SMALL AND LARGE PRIVATE COMPANIES AS WELL AS TO UNIVERSITIES.

1979-0769 VEENHUIZEN S D, LIN J T
WIND RESOURCE ASSESSMENT IN THE OLYMPIC PENINSULA AND THE NORTH CASCADES.
SOLAR '79 NORTHWEST CONFERENCE, SEATTLE, WASHINGTON, AUGUST 10, 1979. NTIS, 1979. P. 19-22.
CONF-790845

NUMERICAL ESTIMATES OF WINDS WERE CONDUCTED IN AREAS OF THE OLYMPIC PENINSULA AND THE NORTH CASCADES OF WASHINGTON TO ASSESS POTENTIAL SITES FOR WIND POWER GENERATION. SINCE THESE AREAS ARE VERY RUGGED AND SPARSELY POPULATED, INSUFFICIENT WIND ANEMOMETER DATA WERE AVAILABLE TO MAKE QUANTITATIVE DETERMINATIONS OF WIND SPEEDS AND DIRECTIONS. FURTHER, IN THESE AREAS, TERRAIN FEATURES AND TOPOGRAPHY PLAY AN IMPORTANT ROLE IN DETERMINING THE LOCATION OF SPECIFIC WIND TURBINE GENERATOR SITES. A NUMERICAL MODEL WAS THEREFORE UTILIZED TO ESTIMATE WIND ENERGY POTENTIAL IN THESE TWO REGIONS.

1979-0770 VERMA L R, LYTLE W F, HELLICKSON M A
WIND ENERGY POTENTIAL FOR AGRICULTURAL APPLICATIONS IN SOUTH DAKOTA.
ASAE PAPER 79-3509, 1979. 20 P.

THE PAPER REPORTS ON A STUDY TO EVALUATE THE POTENTIAL OF WIND ENERGY IN EAST CENTRAL SOUTH DAKOTA. IN ORDER TO ACHIEVE THIS, CLIMATOLOGICAL DATA RECORDS WERE ANALYZED FOR HURON, SOUTH DAKOTA FOR 1965-1976. THE SPECIFICS DESIRED FROM THIS STUDY WERE: WIND ENERGY AVAILABLE IN EAST CENTRAL SOUTH DAKOTA; INTENSITY AND VARIATION IN THIS ENERGY ON A DAILY AND MONTHLY BASIS; RELATIVE POTENTIAL OF WIND ENERGY AS COMPARED TO OTHER SOURCES SUCH AS SOLAR RADIATION ENERGY; COMBINED POTENTIAL OF WIND AND SOLAR ENERGIES IN EAST CENTRAL SOUTH DAKOTA; POTENTIAL OF WIND ENERGY FOR AGRICULTURAL APPLICATIONS. RESULTS INDICATE THAT SIGNIFICANT IMPROVEMENT IN THE UNIFORMITY OF THE ENERGY FLUX IS ACHIEVED BY COMBINING WIND AND SOLAR ENERGIES.

1979-0771 VERMA S D
VERTICAL AXIS WINDMILL AND WIND COLLECTOR.
NATIONAL SOLAR ENERGY CONVENTION 1979 OF SOLAR ENERGY SOCIETY OF INDIA. NATIONAL SOLAR ENERGY CONVENTION, BOMBAY, INDIA, DECEMBER 13, 1979. P. 460-463.
CONF-791229

A VERTICAL AXIS WINDMILL IS DESIGNED IN COMBINATION WITH A WIND COLLECTOR AMPLIFIER. THE COLLECTOR HAS A LARGE ENTRANCE CROSS-SECTION AND A SMALL EXIT PORT. THIS WAY WIND SPEED IS INCREASED AND THE NEEDED SIZE OF THE PADDLES IS DECREASED. THE VERTICAL SHAFT OF THE WINDMILL WAS CONNECTED WITH THE DC CAR GENERATOR VIA STEP-UP OIL-FILLED GEAR WITH GEAR RATIO 1:16. A WORKING MODEL OF THE WINDMILL, COLLECTOR-AMPLIFIER AND DC GENERATOR SYSTEM IS FABRICATED, TESTED AND WAS FOUND TO WORK FOR WIND SPEED > 24 KM/H. BELOW THIS SPEED THE WINDMILL USED TO ROTATE BUT ANGULAR SPEED WAS TOO LOW FOR GENERATOR TO GIVE DC OUT-PUT.

1979-0772 VERMA L R, HELLICKSON M A
WIND AND SOLAR ENERGY COMBINATION FOR AGRICULTURAL APPLICATIONS IN SOUTH DAKOTA.
ANNUAL CONFERENCE ON ENERGY, 6TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 16-18, 1979. PROCEEDINGS. JEFFERSON CITY, MISSOURI, MISSOURI DEPARTMENT OF NATURAL RESOURCES, 1979. P. 407-412.

THE INCREASING SEARCH FOR RENEWABLE ENERGY SOURCES HAS REVIVED INTEREST AND LED TO REEVALUATION OF WIND AND SOLAR ENERGIES TOGETHER WITH SEVERAL OTHER ALTERNATIVES. WIND AND SOLAR ENERGIES ARE FREE, CLEAN AND REPLENISHABLE SOURCES OF ENERGY PARTICULARLY SUITED TO APPLICATIONS ON U.S. FARMS BECAUSE OF ABUNDANT AVAILABILITY OF SPACE FOR SOLAR COLLECTORS AND WIND TURBINES. SUPPLEMENTING THE SOLAR ENERGY WITH WIND ENERGY, WHEN THE SUN IS NOT SHINING, CAN MAKE THE AVAILABLE ENERGY MORE UNIFORM THAN BY EITHER SUN OR WIND ALONE.

1979-0773 VINAYAGALINGAM T, SIVASEGARAM S
A VARIABLE-STROKE, WIND-OPERATED WATER-PUMPING SYSTEM.
WIND ENG. 3(2): 127-131, 1979.

THIS PAPER DESCRIBES THE DESIGN OF A STROKE ADJUSTING MECHANISM FOR RECIPROCATING WATER PUMPS DRIVEN BY A WIND ROTOR. THE DESIGN IS SIMPLE AND IS ESSENTIALLY A CLOSED-LOOP TYPE OF CONTROL DEVICE WHICH ENSURES THAT THE ROTOR OPERATES AT ITS MAXIMUM SPEED AT ANY GIVEN WIND SPEED.

1979-0774 VINAYAGALINGAM T
THE PEDAL WIND TURBINE.
J. ENERGY 3(4): 254-256, JULY-AUGUST 1979.

A NEW TYPE OF VERTICAL AXIS, RESISTANCE-TYPE WIND TURBINE IS PRESENTED. THE ESSENTIAL FEATURES ARE (1) CONSTANT SPEED "BLADE CYCLING" ENABLING A SMOOTH OPERATION AND (2) USE OF SAILS WHICH WILL ASSUME THE DESIRABLE BUCKET SHAPE UNDER WIND PRESSURE. THE OPERATIONAL SPEEDS ARE LOW AND THE TURBINE COULD BE CONSTRUCTED OF LIGHTWEIGHT MATERIALS. THEORETICAL ANALYSIS FOR A FLAT SAIL TURBINE HAS SHOWN THAT THE TORQUE CHARACTERISTICS ARE MUCH MORE UNIFORM THAN IN THE CASE OF THE SAVONIUS ROTOR. THUS THE STALLING PROBLEM IS CONSIDERABLY REDUCED.

1979-0775 VRIES O DE
FLUID DYNAMIC ASPECTS OF WIND ENERGY CONVERSION.
AGARDOGRAPH NO. 243, JULY 1979. ALSO: NTIS, JULY 1979. 150 P.
AGARD-AG-243, AD-A076315

A REVIEW IS MADE OF THE FLUID DYNAMIC ASPECTS OF WIND ENERGY CONVERSION. A SHORT SURVEY OF THE TOTAL FRAMEWORK OF WIND ENERGY CONVERSION IS GIVEN TO BRING THE FLUID DYNAMICS ASPECT IN ITS PROPER DIMENSIONS. NEXT, THE SEVERAL WIND CONCENTRATOR CONCEPTS ARE DISCUSSED, WHILE THE MAIN BODY OF THE REPORT IS FORMED BY A DISCUSSION OF THE THEORY OF WIND-DRIVEN TURBINES, INCLUDING BOTH THE HORIZONTAL-AXIS AND THE VERTICAL-AXIS TURBINES. THE REPORT CONCLUDES WITH A SURVEY OF INHOMOGENEOUS FLOW AND TURBULENCE EFFECTS, TURBINE CONTROL AND WAKE INTERFERENCE EFFECTS. THE AGARDOGRAPH HAS BEEN PRODUCED AT THE REQUEST OF THE FLUID DYNAMICS PANEL OF AGARD.

1979-0776 WADE J E, HEWSON E W
TREES AS AN INDICATOR OF WIND POWER POTENTIAL.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 363-372.
PNL-3214

WITH WIND TURBINES SEVERE WINDS MAY ALSO CAUSE DAMAGE TO BLADES BUT CONTRIBUTE NOTHING TO POWER GENERATED BY THE SYSTEM. EACH GENERIC TYPE OF WIND TURBINE HAS A SPEED AT WHICH IT BEGINS TO PRODUCE POWER. TREES OF DIFFERENT GENERIC TYPES ALSO HAVE DIFFERENT THRESHOLDS AT WHICH THEY BEGIN TO DISPLAY WIND DEFORMATION. THIS PAPER WILL DESCRIBE TECHNIQUES FOR USING TREES AS AN INDICATOR OF WIND POWER POTENTIAL AND THEIR LIMITATIONS AS A WIND PROSPECTING TOOL.

1979-0777 WAHRENBROCK H E
CAN WE AFFORD NOT TO DEVELOP THE HIGH-TOWER WINDMILL NOW?
PUBLIC UTIL. FORTN. 104(7): 42-47, SEPTEMBER 27, 1979.

THE FEDERAL POWER COMMISSION INVESTIGATION IN THE 1940S OF THE POTENTIALITIES OF WIND POWER FOR ELECTRIC UTILITY USE WAS CONDUCTED BY PERCY H. THOMAS. THE AUTHOR HAD PREVIOUSLY PRESENTED THOMAS AS AN EXPERT WITNESS ON TRANSMISSION OF ELECTRIC ENERGY THROUGH AN INTERSTATE POWER POOL IN ONE OF THE EARLIEST FPC JURISDICTIONAL CASES; HERE HE RECALLS HOW THE PLAN WAS SHELVED BY THE NIXON ADMINISTRATION AND LIMITATIONS IMPOSED ON THE NEWLY LAUNCHED PROGRAM TO STALL DEVELOPMENT OF ANY WINDMILL LARGE ENOUGH FOR ECONOMIC UTILITY USE. MR. WAHRENBROCK REVIEWS THE PLANS OF THE HIGH-TOWER WINDMILL, EXPLAINS THE INCREASED EFFICIENCY AVAILABLE FROM THE WINDMILL, AND HOW ELECTRICITY GENERATED BY THE WINDMILL CAN BE FED INTO A UTILITY SYSTEM. AN EXPERIMENT CONDUCTED AT GRANDPA'S KNOB IN VERMONT IN THE 1940S IS REVIEWED.

1979-0778 WAINAUSKI H
WIND TUNNEL TESTS OF A 1/30 SCALE MODEL OF A 3.5 MEGAWATT WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 2053-2058.

A 2.44 M (8.0 FT.) DIAMETER, 2 BLADE WIND TURBINE WAS TESTED IN THE 5.49 M (18 FT.) THROAT OF THE UNITED TECHNOLOGIES LOW SPEED WIND TUNNEL TEST FACILITY. THE APPROXIMATELY 1/30 SCALE MODEL WAS TESTED OVER A RANGE OF VELOCITIES, TIP SPEEDS AND BLADE ANGLES FULLY ENCOMPASSING THE OPERATING SPECTRUM OF A VARIABLE PITCH WIND TURBINE. THE EFFECTS OF SCALE, BLADE SURFACE ROUGHNESS AND BLADE INBOARD PLANFORM AND AIRFOIL MODIFICATIONS (TO FACILITATE DESIGN AND MANUFACTURE) WERE INVESTIGATED. THE RESULTS SHOW THAT THE MEASURED PERFORMANCE OF THE MODEL WIND TURBINE, ADJUSTED FOR SCALE EFFECTS, IS WITHIN ONE PERCENT OF THE PREDICTED PERFORMANCE OF THE FULL SCALE WIND TURBINE WHEN COMPARED ON AN ANNUAL ENERGY OUTPUT BASIS FOR THE 3.5 MEGAWATT RATING.

1979-0779 WAKE S J, BRAUN H R, BRISTOW D J
OPERATION AND ANALYSIS OF A VERTICAL AXIS WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 303-307.

A 15 MINUTES PROTOTYPE VERTICAL AXIS WIND TURBINE (VAWT) LOCATED AT THE DEFENCE RESEARCH ESTABLISHMENT OTTAWA (DREO) HAS BEEN MONITORED FOR THREE YEARS. THE TURBINE IS USED IN COMBINATION WITH STORAGE BATTERIES TO DRIVE A CONTINUOUS 60 W LOAD. THIS SYSTEM IS DESCRIBED AS ARE THE FAILURES AND MODIFICATIONS. A COMPUTER SIMULATION OF THE VAWT/BATTERY STORAGE SYSTEM IS DISCUSSED IN RELATION TO ACTUAL DREO SITE DATA. TEMPERATURE AND WIND DATA FROM A WEATHER STATION AT ALERT NORTHWEST TERRITORIES ARE USED TO ILLUSTRATE HOW THE PROGRAM MIGHT BE UTILIZED TO ASSESS THE SUITABILITY OF THE SYSTEM IN ANOTHER LOCATION.

1979-0780 WALDON C A, CARR M J, GROTZKY V K
MILLVILLE WIND TURBINE GENERATOR: FAILURE ANALYSIS AND CORRECTIVE DESIGN MODIFICATION.
NTIS, JULY 1979. 25 P.
RFP-2992/3533/79-3

FATIGUE CRACKS IN THE BLADE SKINS OF THE MILLVILLE WIND TURBINE GENERATOR WERE FRACTOGRAPHICALLY ANALYZED. IT IS BELIEVED THEY WERE CAUSED BY LARGE FLAPWISE DEFLECTIONS DURING A WIND STORM ON DECEMBER 4, 1978. THE DEFLECTIONS CAUSED THE SKIN TO BUCKLE, WHICH INITIATED RAPIDLY GROWING FATIGUE CRACKS. PROPAGATION CONTINUED TO THE LEADING EDGE, MOVING RADIALLY INWARD AND OUTWARD ALONG THE LEADING EDGE RADIUS. COMMUNICATION BETWEEN ROCKWELL AND MILLVILLE RESULTED IN A MODIFIED BLADE DESIGN WHICH INCORPORATES SEVERAL CORRECTIVE TECHNIQUES.

1979-0781 WALKER S N, ZAMBRANO T G

WIND ENERGY ASSESSMENT OF THE SAN GORGONIO PASS REGION.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 405-415.
PNL-3214

THE SAN GORGONIO PASS REGION HAS BEEN IDENTIFIED AS AN AREA THAT MAY BE SUITED FOR A LARGE ARRAY OF WECS. THIS PAPER REPORTS THE PROGRESS-TO-DATE MADE IN THE SOUTHERN CALIFORNIA EDISON- AND CALIFORNIA ENERGY COMMISSION-SPONSORED FIELD INVESTIGATION OF THE WIND ENERGY POTENTIAL OF THE SAN GORGONIO PASS REGION. THE FIELD PROGRAM IS ORGANIZED TO OBTAIN WIND INFORMATION, WHICH CAN BE DIRECTLY INTERPRETED IN TERMS OF WECS DESIGN REQUIREMENTS.

1979-0782 WALTERS R E, MIGLIORE P G, WOLFE W P
INNOVATIVE STRAIGHT BLADED VERTICAL AXIS WIND TURBINE.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 231-244.
SERI/TP-245-184, CONF-790501

THOSE THEORETICAL AND EXPERIMENTAL STUDIES OF STRAIGHT BLADED DARRIEUS WIND TURBINES WHICH HAVE BEEN CONDUCTED AT WEST VIRGINIA UNIVERSITY (WVU) SINCE 1975 ARE REVIEWED IN THIS PAPER. EMPHASIS IS PLACED ON THE UNUSUAL AERODYNAMIC EFFECTS WHICH RESULT FROM THE ORBITAL MOTION OF THE TURBINE BLADES, AND THE SIGNIFICANCE OF THESE EFFECTS REGARDING TURBINE BLADE DESIGN IS DISCUSSED.

1979-0783 WALTERS R E, FANUCCI J B, HILL P W, MIGLIORE P G
VERTICAL AXIS WIND TURBINE DEVELOPMENT. FINAL REPORT, EXECUTIVE SUMMARY FOR MARCH 1, 1976-JUNE 30, 1977.
NTIS, JULY 1979. 22 P.
ORO-5135-77/5(SUMM.), WVU-AE-TR-58

THE PURPOSE OF THIS WORK IS TO EVALUATE THE POTENTIAL OF A CIRCULATION CONTROLLED VERTICAL AXIS WIND TURBINE (CCVAWT). THIS CONCEPT IS THAT OF A VERTICAL AXIS WIND TURBINE WHICH USES STRAIGHT BLADES COMPOSED OF AIRFOIL SHAPES HAVING HIGH EFFICIENCY, I.E., HIGH LIFT TO DRAG RATIOS. THIS WOULD BE ATTAINED BY USING CIRCULATION CONTROLLED AIRFOILS FOR THE BLADES; THESE AIRFOILS CONTAIN SLOTS NEAR ROUNDED TRAILING EDGES THROUGH WHICH A SMALL AMOUNT OF COMPRESSED AIR IS BLOWN TO OBTAIN HIGH LIFT FORCES. THE STRAIGHT BLADES ALLOW CYCLIC PITCH CONTROL, WHICH COULD BE USED TO FURTHER INCREASE MACHINE EFFICIENCY.

1979-0784 WALTERS R E, FANUCCI J B, HILL P W, MIGLIORE P G
VERTICAL AXIS WIND TURBINE DEVELOPMENT. FINAL REPORT, MARCH 1, 1976-JUNE 30, 1977.
NTIS, JULY 1979. 243 P.
ORO-5135-77/5

THEORETICAL AND EXPERIMENTAL RESEARCH ACCOMPLISHED IN EVALUATING AN INNOVATIVE CONCEPT FOR VERTICAL AXIS WIND TURBINES (VAWT) IS DESCRIBED. THE CONCEPT IS THAT OF USING STRAIGHT BLADES COMPOSED OF CIRCULATION CONTROLLED AIRFOIL SECTIONS. THE THEORETICAL ANALYSIS HAS BEEN DEVELOPED TO DETERMINE THE UNSTEADY LIFT AND MOMENT CHARACTERISTICS OF MULTIPLE-BLADE CROSS-FLOW WIND TURBINES. TO DETERMINE THE DRAG DATA NEEDED AS INPUT TO THE THEORETICAL ANALYSIS, AN OUTDOOR TEST MODEL VAWT HAS BEEN CONSTRUCTED; DESIGN DETAILS, INSTRUMENTATION, CALIBRATION RESULTS, AND INITIAL TEST RESULTS ARE REPORTED. INITIAL TESTING WAS WITH FIXED PITCH BLADES HAVING CROSS-SECTIONS OF CONVENTIONAL SYMMETRICAL AIRFOILS. COSTS OF BUILDING THE TEST MODEL ARE INCLUDED, AS WELL AS COST ESTIMATES FOR BLADES CONSTRUCTED WITH COMPOSITE MATERIALS. THESE COSTS ARE COMPARED WITH THOSE OF OTHER TYPES OF WIND TURBINES.

1979-0785 WAN Y H, DODD C W, EVERS J L
CONTROL OF DISPERSED VERTICAL AXIS WIND TURBINES.
ANNUAL CONFERENCE ON ENERGY, 6TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 16-18, 1979. PROCEEDINGS. JEFFERSON CITY, MISSOURI, MISSOURI DEPARTMENT OF NATURAL RESOURCES, 1979. P. 413-424.

WIND TURBINES USED AS THE PRIMARY SOURCE OF ENERGY IN A REMOTE REGION ARE CALLED DISPERSED WIND ENERGY SYSTEMS. THE USE OF A VERTICAL AXIS WIND TURBINE (VAWT) IN THIS MODE OF OPERATION REQUIRES SPECIAL CONTROL CONSIDERATIONS. A COMPUTER SIMULATION EXAMINING THE TURBINE'S OUTPUT VOLTAGE UNDER TIME VARYING WIND CONDITIONS EVALUATES THREE POSSIBLE CONTROL TECHNIQUES.

1979-0786 WARREN A W
AN EXPANDED SYSTEM SIMULATION MODEL FOR SOLAR ENERGY STORAGE. VOLUME 1.
NTIS, AUGUST 1979. 107 P.
N79-33881, NASA-CR-159601, DOE/NASA/0042-79/1-V-1

THE SIMULATION MODEL FOR WIND ENERGY STORAGE (SIMWEST) PROGRAM NOW INCLUDES WIND AND/OR PHOTOVOLTAIC SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL AND PNEUMATIC) AND IS AVAILABLE FOR THE UNIVAC 1100 SERIES AND THE CDC 6000 SERIES COMPUTERS. THE LEVEL OF DETAIL IS CONSISTENT WITH A ROLE OF EVALUATING THE ECONOMIC FEASIBILITY AS WELL AS THE GENERAL PERFORMANCE OF WIND AND/OR PHOTOVOLTAIC ENERGY SYSTEMS. THE SOFTWARE PACKAGE CONSISTS OF TWO BASIC PROGRAMS AND A LIBRARY OF SYSTEM, ENVIRONMENTAL, AND LOAD COMPONENTS. THE FIRST PROGRAM IS A PRECOMPILER WHICH GENERATES COMPUTER MODELS (IN FORTRAN) OF COMPLEX WIND AND/OR PHOTOVOLTAIC SOURCE/STORAGE/APPLICATION SYSTEMS, FROM USER SPECIFICATIONS USING THE RESPECTIVE LIBRARY COMPONENTS. THE SECOND PROGRAM PROVIDES THE TECHNO-ECONOMIC SYSTEM ANALYSIS WITH THE RESPECTIVE I/O, THE INTEGRATION OF SYSTEM DYNAMICS, AND THE ITERATION FOR CONVEYANCE OF VARIABLES.

1979-0787 WARREN A W, EDSINGER A W
SIMWEST: A SIMULATION MODEL FOR WIND AND PHOTOVOLTAIC ENERGY STORAGE SYSTEMS. (CDC USER'S MANUAL). VOL. 1.
NTIS, AUGUST 1979. 486 P.
N79-33883/6, NASA-CR-159607, DOE/NASA/0042-79/3-V-1

PROCEDURES ARE GIVEN FOR USING THE SIMWEST PROGRAM ON CDC 6000 SERIES COMPUTERS. THIS EXPANDED SOFTWARE PACKAGE INCLUDES WIND AND/OR PHOTOVOLTAIC SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL, AND PNEUMATIC).

1979-0788 WARREN A W, EDSINGER R W, BURROUGHS J D
SIMWEST: A SIMULATION MODEL FOR WIND AND PHOTOVOLTAIC ENERGY STORAGE SYSTEMS. (CDC PROGRAM DESCRIPTIONS). VOL. 2.
NTIS, AUGUST 1979. 247 P.
N79-33884/4, NASA-CR-159608, DOE/NASA/0042-79/4-V-2

THE COMPUTER PROGRAMS FOR THE CDC VERSION OF SIMWEST (1979 REVISION) ARE DESCRIBED. MACRO FLOW CHARTS AND SOURCE CODE LISTINGS FOR EACH MAJOR PROGRAM ENTITY ARE PRESENTED.

1979-0789 WARREN A W
AN EXPANDED SYSTEM SIMULATION MODEL FOR SOLAR ENERGY STORAGE. (UNIVAC OPERATION MANUAL REVISIONS). VOL. 2.
NTIS, AUGUST 1979. 198 P.
N79-33882/8, NASA-CR-159602, DOE/NASA/0042-79/2-V-2

ADDITIONS OR REVISIONS OF COMPONENTS OF THE SIMWEST PROGRAM ARE PROVIDED FOR INSERTION INTO THE MANUAL USED WITH THE UNIVAC 1100 SERIES COMPUTER.

1979-0790 WATSON D B, ARRILLAGA J, DENSEM T
CONTROLLABLE DC POWER SUPPLY FROM WIND-DRIVEN SELF-EXCITED INDUCTION MACHINES.
INST. ELECTR. ENG. PROC. 126(12): 1245-1248, DECEMBER 1979.

A VARIABLE-SPEED GENERATING SYSTEM IS DESCRIBED WHICH USES A 3-PHASE SQUIRREL-CAGE INDUCTION MACHINE WITH SELF-EXCITATION CAPACITORS. THE VARIABLE-FREQUENCY/VARIABLE-VOLTAGE GENERATED IS THEN FED THROUGH A 3-PHASE CONTROLLED RECTIFIER TO PROVIDE A DC SUPPLY AT CONSTANT VOLTAGE. THE PROPOSED SCHEME IS SUITABLE FOR WIND POWER SOURCES AS IT ALLOWS WIDE CHANGES IN WIND TURBINE SPEED. AT ALL SPEEDS, OPTIMUM GENERATING POWER CAN BE SET UP BY RECTIFIER DELAY ANGLE CONTROL.

1979-0791 WATSON G
A NEW TURBINE FOR MAKING USE OF WIND ENERGY.
REV. ELECTROTEC. 65(5): 210-212, SEPTEMBER-OCTOBER 1979. (IN SPANISH)

THIS ARTICLE DESCRIBES THE DESIGN OF A WIND TURBINE BY NEW AGE ACCESS LTD., HEXHAM, ENGLAND. IT IS OF THE VERTICAL AXIS DARRIEUS TYPE, THE ROTOR LOOPS BEING MADE OF HOLLOW FIBRE-GLASS SEGMENTS FILLED WITH POLYURETHANE FOAM, AND EACH HAVING TWO SPRING-CONTROLLED GOVERNING VALVES. THE MAIN ROTOR IS STARTED BY MEANS OF AN AUXILIARY ROTOR MOUNTED ON THE SAME SHAFT; THIS CONSISTS OF TWO SAVONIUS SEMI-CYLINDRICAL ELEMENTS (MADE OF HALVED OIL-DRUMS) MOUNTED AT RIGHT ANGLES.

1979-0792 WATTS A W
WIND/HYDRO GENERATION ASSESSMENT.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 190-203.
CONF-790352

THE BUREAU OF RECLAMATION IS CURRENTLY INVOLVED IN A SPECIAL 3-YEAR STUDY OF THE FEASIBILITY TO INTEGRATE WIND TURBINE GENERATORS WITH AN EXISTING FEDERAL HYDROELECTRIC SYSTEM. RECLAMATION'S INTEREST IS IN IMPLEMENTATION OF THE WIND TURBINE TECHNOLOGY AND NOT THE RESEARCH AND DEVELOPMENT OF THE HARDWARE. THE STUDY STARTED IN OCTOBER 1977 AND IS DESIGNED TO: TEST THE CONCEPT OF INTEGRATING WIND AND HYDROELECTRIC GENERATION FACILITIES FOR PRODUCTION OF WHOLESALE POWER; DETERMINE THE ENVIRONMENTAL IMPACTS OF WIND GENERATION WITHIN THE STUDY AREA; EVALUATE THE FEASIBILITY AND JUSTIFICATION FOR CONSTRUCTING A LARGE-SCALE WIND FARM; AND MEASURE THE ACCEPTANCE AND REACTION OF THE PUBLIC TO THE PLAN.

1979-0793 WATTS A, QURAESHI S, ROWLEY L P
RESULTS OF A UTILITY SURVEY OF THE STATUS OF LARGE WIND TURBINE DEVELOPMENT.
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 363-374.
NASA-CP-2106

A SURVEY OF THE STATUS OF WIND TURBINE DEVELOPMENT HAS BEEN COMMISSIONED BY A UTILITY COMPANY HAVING INTEREST IN THE APPLICATION OF WIND POWER TO THE GENERATION OF ELECTRICITY. THE UTILITY, HYDRO-QUEBEC, IS CONSIDERED ONE OF THE MAJOR UTILITIES IN NORTH AMERICA IN THAT IT SERVICES ONE OF THE LARGEST GEOGRAPHICAL LAND MASSES IN THE CONTINENT. AN INDICATION OF THE SCOPE OF THE UTILITY IS GIVEN.

1979-0794 WE WORK WITH ENERGY.
NTIS, 1979. 46 P. (IN GERMAN)
NP-24030

THIS BROCHURE DEALS WITH CURRENT QUESTIONS IN NATIONAL ECONOMICS AND ECONOMIC AND SOCIAL POLICY. TO ILLUSTRATE THIS COMPLETELY, THE INDIVIDUAL DEPARTMENTS OF THE COMPANY DISCUSS WORK IN THE FIELDS OF GEOTHERMAL HEAT, SOLAR ENERGY, HEAT PUMPS, WIND ENERGY, AND BIOENERGY. THIS IS FOLLOWED BY THE 1978 COMPANY REPORT AND ANNUAL BALANCE.

1979-0795 WEED G D
WIND DRIVEN POWER GENERATION.
U.S. PATENT NO. 4,178,126, DECEMBER 11, 1979. 6 P.

A JOURNALED ROTOR IS PROVIDED FOR ROTATION ABOUT AN AXIS TO BE DISPOSED TRANSVERSE TO A FLUID FLOW PATH AND THE ROTOR INCLUDES A PLURALITY OF MOUNTING PORTIONS SPACED RADIALLY OUTWARDLY FROM AND CIRCUMFERENTIALLY ABOUT THE AXIS GENERALLY PARALLELING THE AXIS OF ROTATION OF THE ROTOR. VANE ASSEMBLY DISPLACEMENT CONTROL STRUCTURE IS OPERATIVELY CONNECTED TO THE VANE ASSEMBLIES FOR ANGULARLY DISPLACING THE VANE ASSEMBLIES RELATIVE TO THE CORRESPONDING MOUNTING PORTIONS 180 DEGREES EACH 360 DEGREES OF ANGULAR DISPLACEMENT OF THE ROTOR AND IN DIRECTIONS OPPOSITE THE DIRECTION OF ANGULAR DISPLACEMENT OF THE ROTOR UPON ROTATION OF THE LATTER. THE VANE ASSEMBLIES ARE VARIOUSLY OPTIMUMLY ANGULARLY POSITIONED RELATIVE TO THE CORRESPONDING MOUNTING PORTIONS AND EACH OTHER TO EFFECT SUBSTANTIALLY MAXIMUM THRUST THEREFROM ON THE ROTOR AS A RESULT OF FLUID FLOW THEREAGAINST FROM ONE SIDE OF THE AXIS OF ROTATION OF THE ROTOR.

1979-0796 WEBSTER G W
DEVICES FOR UTILIZING THE POWER OF THE WIND.
U.S. PATENT NO. 4,154,556, MAY 15, 1979. 6 P.

A WIND POWER DEVICE IS DESCRIBED WHICH USES A CURVED DUCT THROUGH WHICH A ROTATABLE SHAFT PASSES IN A DIRECTION SUCH THAT THE AXIS OF THE SHAFT IS NORMAL TO THE PLANE CONTAINING ONE END OF THE CURVED DUCT AND WHICH CONTINUES THROUGH THE CURVING PORTION OF THE WALL OF THE DUCT OPPOSITE THE END OF THE DUCT TO THE OUTSIDE OF THE DUCT WHERE IT IS CONNECTIBLE TO A POWER-CONSUMING DEVICE. A SET OF RADIALLY EXTENDING HELICALLY CURVED AEROFOIL BLADES IS ATTACHED TO THE SHAFT AT THE END OF THE DUCT. SUPPORT MEANS MOUNTED ON THE BLADES AT THE TIPS THEREOF REST ON A FIXED ANNULAR GUIDE MEANS SURROUNDING THE END OF THE DUCT. MOUNTING MEANS SUPPORTS THE DUCT IN A POSITION IN WHICH THE SHAFT IS VERTICAL.

1979-0797 WEGLEY H L

OVERVIEW OF WIND CHARACTERISTICS FOR OPERATIONS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 161-167.
PNL-3214

1979-0798 WEGLEY H L, PENNELL W T
SITING SMALL WIND MACHINES.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 1, P. 198-212.
RFP-3014(VOL.1)

A RECENT SURVEY INDICATED THAT IMPROPER SITING WAS A COMMON CAUSE OF DISSATISFACTION AMONG SMALL WIND MACHINE USERS. MOST POTENTIAL PURCHASERS WILL NEED TO BE REASONABLY CERTAIN OF THE COST OF WIND POWER FOR THEIR PARTICULAR APPLICATION BEFORE THEY DECIDE TO BUY A WIND ENERGY CONVERSION SYSTEM (WECS). SUCH AN ASSESSMENT REQUIRES AN ACCURATE KNOWLEDGE OF WIND CHARACTERISTICS AT THE MACHINE SITE. A PROCEDURE IS DESCRIBED FOR CHOOSING THE BEST AVAILABLE SITE FOR A WIND MACHINE AND FOR ESTIMATING THE PERTINENT WIND CHARACTERISTICS ONCE THE SITE IS CHOSEN. IN SOME CASES EXTENSIVE ONSITE MEASUREMENTS MAY BE REQUIRED BEFORE AN ACCURATE ANALYSIS OF MACHINE PERFORMANCE CAN BE MADE.

1979-0799 WEGLEY H L
WIND FORECASTING FOR UTILITIES HAVING SIGNIFICANT PENETRATION OF SMALL WIND SYSTEMS.
SWECS 1979: A WORKSHOP ON R AND D REQUIREMENTS AND UTILITY INTERFACE/INSTITUTIONAL ISSUES, BOULDER, COLORADO, FEBRUARY 20, 1979. NTIS, 1979. VOL. 2, P. 24-33.
RFP-3014(VOL.2)

IN RESPONSE TO THE NEED FOR WIND-FORECASTING RELIABILITY DATA, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE FEDERAL WIND ENERGY PROGRAM ESTABLISHED THE WIND CHARACTERISTICS FOR WECS OPERATION PROGRAM AREA IN FISCAL YEAR 1978. THE WORK PERFORMED AND PLANNED IN THIS PROGRAM AREA IS DESCRIBED AS IT RELATES TO THE OPERATION OF A UTILITY HAVING A HIGH PENETRATION OF SWECS, I.E., THOSE UTILITIES THAT USE SWECS FOR PRODUCING AN OPERATIONALLY SIGNIFICANT PERCENTAGE OF THEIR POWER.

1979-0800 WELLMAN C
WIND AND UTILITIES; EXPLORING BLOCK ISLAND.
WIND POWER DIG. NO. 17: 32-35, FALL 1979.

THE DOE PROJECT ON BLOCK ISLAND IS DESCRIBED.

1979-0801 WEINGART O
FABRICATION OF LARGE COMPOSITE SPARS AND BLADES.
ANNUAL CONFERENCE (OF THE) REINFORCED PLASTICS/COMPOSITES INSTITUTE, 34TH, NEW ORLEANS, JANUARY 30-FEBRUARY 2, 1979. NEW YORK, SOCIETY OF THE PLASTICS INDUSTRY, 1979. SECT. 15-B, 4 P.

THIS PAPER IS A CONTINUATION OF A PREVIOUSLY PUBLISHED REPORT DESCRIBING PREPARATIONS FOR THE FABRICATION OF A 20,000 LB. FILAMENT-WOUND D-SPAR FOR THE DOE NASA 150 FOOT COMPOSITE WIND TURBINE BLADE. IN THIS PAPER, THE AUTHOR BRIEFLY SUMMARIZES THE PREVIOUS PAPER AND DESCRIBES THE ACTUAL FABRICATION AND SHIPMENT OF THE 150 FT. SPAR BY STRUCTURAL COMPOSITES INDUSTRIES, INC.

1979-0802 WEINGART O
FABRICATION OF LARGE COMPOSITE SPARS AND BLADES.
U.S. NATIONAL BUREAU OF STANDARDS SPEC. PUBL. NO. 563. ADVANCED COMPOSITES: DESIGN AND APPLICATIONS. PROCEEDINGS OF THE MEETING OF THE MECHANICAL FAILURES PREVENTION GROUP, 29TH, GAITHERSBURG, MARYLAND, MAY 23-25, 1979. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1979. P. 155-172.

A NATIONAL WIND ENERGY PROGRAM HAS BEEN ESTABLISHED TO DEVELOP THE TECHNOLOGY NECESSARY TO ENABLE WIND ENERGY SYSTEMS TO BE COST-COMPETITIVE WITH CONVENTIONAL POWER GENERATION SYSTEMS AND CAPABLE OF RAPID COMMERCIAL EXPANSION FOR PRODUCING SIGNIFICANT QUANTITIES OF ELECTRICAL POWER. WIND TURBINE GENERATORS BEING DEVELOPED UNDER THIS PROGRAM WILL REQUIRE ROTOR DIAMETERS OF UP TO 300 FEET. BECAUSE OF THE CONSIDERABLE EXTENSION IN THE TECHNOLOGY REQUIRED TO DESIGN AND CONSTRUCT BLADES OF THIS SIZE, IT WAS HIGHLY DESIRABLE TO ESTABLISH AN EARLY TECHNOLOGY BASE. TO THAT END, THE DEPARTMENT OF ENERGY, THROUGH NASA-LEWIS RESEARCH CENTER HAS AWARDED SEVERAL CONTRACTS FOR THE DESIGN, FABRICATION AND TEST OF LARGE LOW-COST WIND TURBINE BLADES BUILT OF COMPOSITE MATERIALS.

1979-0803 WENDELL L L
WIND RESOURCE ASSESSMENT STATUS.
WORKSHOP ON ECONOMIC AND OPERATIONAL REQUIREMENTS AND STATUS OF LARGE SCALE WIND SYSTEMS, MONTEREY, CALIFORNIA, MARCH 26, 1979. PROCEEDINGS. NTIS, JUNE 1979. P. 83-93.
CONF-790352

AN ASSESSMENT OF WIND POWER AS AN ENERGY RESOURCE IN THE US IS PRESENTED.

1979-0804 WENDELL L L
WIND RESOURCE ASSESSMENT STATUS.
NTIS, 1979. 13 P.
PNL-SA-6918(REV.1)

THE FIRST OBJECTIVE OF THE WCPE'S REGIONAL ASSESSMENT WAS TO DEVELOP AND TEST PROTOTYPE TECHNIQUES FOR THE ANALYSIS OF WIND-ENERGY POTENTIAL AND DISTRIBUTION OVER A LARGE AREA. THESE TECHNIQUES INVOLVED THE UTILIZATION OF A MUCH LARGER DATA SET, THE APPLICATION OF METEOROLOGICAL AND TOPOGRAPHIC FACTORS IN THE ANALYSIS, AND THE USE OF INDIRECT METHODS OF WIND POWER ESTIMATION IN AREAS WHERE NO WIND MEASUREMENTS EXISTED. FIVE STATES IN THE PACIFIC NORTHWEST WERE SELECTED AS A TEST OF THESE TECHNIQUES.

1979-0805 WENDELL L L
OVERVIEW OF THE WIND CHARACTERISTICS PROGRAM.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 15-24.
SERI/TP-245-184, CONF-790501

WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) HAS BEEN ESTABLISHED TO ASSEMBLE AND DEVELOP WIND CHARACTERISTICS INFORMATION FOR THOSE INVOLVED IN 1) DESIGNING AND EVALUATING THE PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), 2) PLANNING ENERGY PROGRAMS, 3) SELECTING SITES FOR INSTALLING WECS, AND 4) OPERATING WECS. THE TECHNICAL PORTION OF THE WCPE HAS BEEN DIVIDED INTO FOUR PROGRAM

AREAS TO EXPEDITE THE ACCOMPLISHMENT OF THESE TASKS. RESEARCH PLANS AND OVERALL PROGRESS TO DATE ARE PRESENTED WITH EMPHASIS ON THE RESOURCE ASSESSMENT PROGRAM AREA.

1979-0806 WENDELL J
WIND ENERGY CONVERSION. VOLUME 10. AEROELASTIC STABILITY OF WIND TURBINE ROTOR BLADES. ASRL-TR-184-16.
NTIS, SEPTEMBER 1978. 94 P.
COO-4131-T1(VOL.10)

THE NONLINEAR EQUATIONS OF MOTION OF A GENERAL WIND TURBINE ROTOR BLADE ARE DERIVED FROM FIRST PRINCIPLES. THE TWISTED, TAPERED BLADE MAY BE PRECONED OUT OF THE PLANE OF ROTATION, AND ITS ROOT MAY BE OFFSET FROM THE AXIS OF ROTATION BY A SMALL AMOUNT. THE AERODYNAMIC CENTER, CENTER OF MASS, SHEAR CENTER, AND AREA CENTROID ARE DISTINCT IN THIS DERIVATION. THE EQUATIONS ARE APPLICABLE TO STUDIES OF FORCED RESPONSE OR OF AEROELASTIC FLUTTER, HOWEVER, NEITHER GRAVITY FORCING, NOR WIND SHEAR AND GUST FORCING ARE INCLUDED. THE EQUATIONS DERIVED ARE APPLIED TO STUDY THE AEROELASTIC STABILITY OF THE NASA-ERDA 100 KW WIND TURBINE, AND SOLVED USING THE GALERKIN METHOD. THE NUMERICAL RESULTS ARE USED IN CONJUNCTION WITH A MATHEMATICAL COMPARISON TO PROVE THE VALIDITY OF AN EQUIVALENT HINGE MODEL DEVELOPED BY THE WIND ENERGY CONVERSION PROJECT AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

1979-0807 ENERGY FROM THE WIND: BILL SMITH HAS A WINDMILL.
LIVING ALTERN. 1(1): 8-10, SEPTEMBER 1979.

WITH THOUSANDS OF MILES OF OPEN SHORELINES, AND HILLY TERRAIN INLAND, NEW ENGLAND IS PERHAPS THE BEST PLACE IN THE COUNTRY TO PRODUCE ENERGY FROM THE WIND. YET IT IS AN INDUSTRIOUS INDIVIDUAL LIKE BILL SMITH OF JAMESTOWN, RHODE ISLAND, NOT THE GOVERNMENT NOR THE POWER COMPANIES, WHO IS DOING THE PIONEERING WORK AND PAVING THE WAY FOR NEW ENGLAND TO MAKE USE OF ITS OWN NATURAL RESOURCES IN ITS STRUGGLE TOWARD ENERGY INDEPENDENCE. AFTER TRYING SEVERAL DESIGNS THAT PROVED TO BE INEFFICIENT, BILL SMITH VISITED THE MIDWEST WHERE WINDMILLS HAVE BEEN SUCCESSFULLY GENERATING ELECTRICITY SINCE THE 1920'S. HE WAS ABLE TO BUY THE ORIGINAL JACOBS WIND ELECTRIC GENERATOR THAT WAS A PROTOTYPE FOR GENERATORS THAT HAVE OPERATED VIRTUALLY TROUBLE-FREE FOR DECADES. THE JACOBS WIND GENERATOR NOW PROVIDES ALMOST ALL OF THE SMITH'S HOME ELECTRICAL NEEDS, GENERATING 300 TO 600 KILLOWATT HOURS PER MONTH. HE HAS ATTEMPTED OTHER ALTERNATIVE METHODS OF ENERGY USE, INTEGRATING WIND, WOOD, AND SUN IN HIS ATTEMPT TO MOVE TOWARD ENERGY INDEPENDENCE.

1979-0808 WENTINK T
ALASKAN WIND POWER STUDY.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 243-250.
PNL-3214

THE OBJECTIVE OF THIS PAPER IS THE DETERMINATION OF ALASKA'S WIND POWER POTENTIAL (WPP) FOR THE EVENTUAL PRACTICAL APPLICATION OF ITS WIND ENERGY. THE PAPER DEALS ONLY WITH WIND CHARACTERISTICS, NOT APPLICATIONS.

1979-0809 WHITE M L, WEIGEL W D
A LOW COST COMPOSITE BLADE FOR A 300 FOOT DIAMETER WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 14TH, BOSTON, AUGUST 5-10, 1979. PROCEEDINGS. NEW YORK, IEEE, 1979. P. 331-336.

A PROTOTYPE COMPOSITE BLADE FOR A 300 FOOT DIAMETER HORIZONTAL AXIS WIND TURBINE HAS BEEN DESIGNED, FABRICATED AND SUCCESSFULLY SUBJECTED TO STRUCTURAL AND NATURAL FREQUENCY TESTS.

1979-0810 WHITE M L, WEIGEL W D
LOW COST COMPOSITE BLADE FOR A 300 FOOT DIAMETER WIND TURBINE.
ANNUAL CONFERENCE (OF THE) REINFORCED PLASTICS/COMPOSITES INSTITUTE, 34TH, NEW ORLEANS, JANUARY 30-FEBRUARY 2, 1979. NEW YORK, SOCIETY OF THE PLASTICS INDUSTRY, 1979. SECT. 15-C, 6 P.

IN THE REPORTED R AND D WORK, A PROTOTYPE COMPOSITE BLADE FOR A 300 FOOT DIAMETER HORIZONTAL AXIS WIND TURBINE HAS BEEN DESIGNED, FABRICATED AND SUCCESSFULLY SUBJECTED TO STRUCTURAL AND NATURAL FREQUENCY TESTS. THE BLADE CONSISTS OF A FILAMENT WOUND E-GLASS-EPOXY LEADING EDGE SPAR, AN E-GLASS-POLYESTER TRAILING EDGE SPLINE FABRICATED FROM PULTRUSIONS, SANDWICH PANELS CONSTRUCTED OF PHENOLIC RESIN IMPREGNATED KRAFT PAPER HONEYCOMB FACED WITH GLASS CLOTH-EPOXY, AND A STEEL HUB ADAPTER. COMPOSITE COMPONENTS ARE JOINED BY EPOXY ADHESIVE BONDING, AND THE HUB ADAPTER IS MECHANICALLY FASTENED TO THE SPAR AND SPLINE. TOTAL WEIGHT OF THE BLADE IS APPROXIMATELY 36,000 POUNDS, OF WHICH ALMOST 26,000 POUNDS ARE COMPOSITE STRUCTURE AND THE REMAINDER THE STEEL ADAPTER. A WOVEN ROVING MATERIAL HAVING ALMOST ALL FIBERS ORIENTED TRANSVERSE TO ITS LENGTH WAS USED TO WIND THE 19,000 POUND, MONOCOQUE SHELL SPAR, PRODUCING AN EFFICIENT STRUCTURE WITH APPROXIMATELY 90 PERCENT SPANWISE FIBER ORIENTATION AND A STRUCTURAL TAPER IN OVERALL DIMENSIONS AND WALL THICKNESS.

1979-0811 WHITE P W
PROPOSAL FOR GENERATING HEAT FROM WIND ENERGY FOR DOMESTIC AND OTHER USES.
ENERGY FOR INDUSTRY. OXFORD, NEW YORK, PERGAMON PRESS, 1979. P. 141-151.

THE CONCEPT OUTLINED HAS A HEAT PUMP WITH THE COMPRESSOR DRIVEN DIRECTLY BY A WIND-POWERED TURBINE. HEAT IS ABSORBED IN THE EVAPORATOR OF THE HEAT PUMP BY AMBIENT CONVECTION AND SOLAR RADIATION. THE MISMATCH BETWEEN SUPPLY AND DEMAND IS OVERCOME BY PROVIDING A THERMAL STORE USING THE LATENT HEAT OF WATER. THE STRUCTURE OF THIS STORE SERVES THE TWO FURTHER FUNCTIONS OF SUPPORTING THE WIND-POWERED TURBINE AND ABSORBING HEAT FOR TRANSMISSION UNIFORMLY TO THE EVAPORATOR. THE TURBINE IS SHROUDED AND DRIVEN AT HIGH SPEED DUE TO THE SHAPE OF THE INLET DUCT. THE ADVANTAGES FOR THIS ARRANGEMENT ARE LOW TORQUE REACTION, LOW NOISE, HIGH AERODYNAMIC EFFICIENCY AND THE ABILITY TO DRIVE THE COMPRESSOR DIRECTLY.

1979-0812 WHITFORD D H, MINARDI J E
UTILITY-SIZED WIND-POWERED ELECTRIC PLANTS BASED ON THE MADARAS ROTOR CONCEPT.
WIND ENERGY INNOVATIVE SYSTEMS, CONFERENCE PROCEEDINGS. NTIS, DECEMBER 1979. P. 71-88.
SERI/TP-245-184, CONF-790501

THE MADARAS ROTOR POWER PLANT CONCEPT WAS ANALYZED AND UPDATED TO DETERMINE ITS CAPABILITY TO COMPETE TECHNICALLY AND ECONOMICALLY WITH CONVENTIONAL HORIZONTAL AXIS WIND TURBINES (HAWTG). THIS CONCEPT, DEVELOPED IN THE 1930'S, UTILIZES ROTATING CYLINDERS, VERTICALLY MOUNTED ON FLAT CARS, TO REACT WITH THE WIND (MAGNUS EFFECT) AND PROPEL AN ENDLESS TRAIN OF CARS AROUND A CLOSED TRACK AT CONSTANT SPEED. ALTERNATORS GEARED TO THE WHEELS OF EACH CAR GENERATED ELECTRICAL POWER, WHICH WAS TRANSMITTED TO A POWER STATION BY A TROLLEY SYSTEM. THE STUDY CONSISTED OF A WIND TUNNEL TEST SERIES, AN ELECTROMECHANICAL DESIGN, PERFORMANCE ANALYSIS, AND A COST ANALYSIS.

1979-0813 WIEBE B C
WIND POWER--ITS POTENTIAL FOR THE TELECOMMUNICATIONS INDUSTRY.
INTELEC 1979. INTERNATIONAL TELECOMMUNICATIONS ENERGY CONFERENCE, WASHINGTON, D.C., NOVEMBER 26-29, 1979. NEW YORK, IEEE, 1979. P. 434-437.

THIS PAPER REPORTS ON THE PRELIMINARY OPERATIONAL RESULTS OF SYSTEMS UNDERGOING IN SITU FAMILIARIZATION TESTS. THE PROGRAM HAS INVOLVED THE FOLLOWING FIRMS: ALBERTA GOVERNMENT TELEPHONES, SASKATCHEWAN TELECOMMUNICATIONS, MANITOBA TELEPHONES, CN/CP TELECOMMUNICATIONS, CANADIAN BROADCASTING CORPORATION, SHELL CANADA, AND NEWFOUNDLAND TELEPHONES. THE COST BENEFIT POTENTIAL OF A WIND POWER SYSTEM IS EXAMINED, AND A HISTORY OF THE TEST PROGRAM TO DATE INCLUDING INSTALLATION RESULTS, OPERATIONAL RESULTS AND THE REDUCTION OF DIESEL FUEL CONSUMPTION IS PRESENTED. THE FINAL TOPIC LOOKS AT THE GENERAL RESPONSE FROM INDUSTRY INVOLVED IN THE PROGRAM, IN ASSOCIATION WITH A STATEMENT AS TO FUTURE DEVELOPMENTS AND SYSTEM AVAILABILITY.

1979-0814 WIEDEMANN H O
APPARATUS FOR UTILIZING NATURAL ENERGIES.
U.S. PATENT NO. 4,159,427, JUNE 26, 1979. 20 P.

AN APPARATUS WHICH STORES NATURAL ENERGIES AVAILABLE ON AND/OR UNDER THE SURFACE OF THE WORLD'S OCEAN IS DESCRIBED. SUCH ENERGIES INCLUDE SOLAR ENERGY, WAVE ENERGY, WIND ENERGY, AS WELL AS ENERGY STORED IN THE HEAT OF THE SEA WATER. THE ENERGY EXTRACTING AND STORING EQUIPMENT IS INSTALLED ON A FLOATING VESSEL OR RAFT. THE ENERGY STORING EQUIPMENT INCLUDES FLYWHEEL TYPE ROLLERS OR CYLINDERS DRIVEN BY ELECTRIC MOTORS ENERGIZED BY ELECTRIC GENERATORS WHICH IN TURN RECEIVE THEIR ENERGY FROM THE ENERGY EXTRACTING EQUIPMENT. THE FLYWHEEL TYPE ROLLERS OR CYLINDERS INCLUDE A SUPPORTING HOLLOW CYLINDER HAVING A RELATIVELY THIN WALL ONTO WHICH THERE ARE WOUND FIBERS IMPREGNATED OR EMBEDDED IN A SYNTHETIC RESIN.

1979-0815 WIESNER W
MANUFACTURERS' VIEW OF WIND RESOURCE ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 285-290.
PNL-3214

THIS PAPER PRESENTS A BRIEF OUTLINE OF BOEING ENGINEERING AND CONSTRUCTION'S TREATMENT OF THE SEVERAL AREAS OF WIND RESOURCES NOW RAPIDLY BEING EXPLORED AND QUANTIFIED IN THE UNITED STATES. THE SUBJECT MATTER COVERS A BROAD RANGE OF HIGHLY VARIABLE DATA, THUS, THIS PAPER ONLY REVIEWS SOME OF THE ASPECTS OF HOW A MANUFACTURER OF LARGE WIND TURBINES MAKES USE OF WIND RESOURCES.

1979-0816 PUTTING WYOMING WIND TO WORK.
DENVER POST, EMPIRE MAG., JULY 15, 1979. 5 P.

THE WIND FARM PROJECT AT MEDICINE BOW, WYOMING, IS DESCRIBED.

1979-0817 WIND AND UTILITIES.
WIND POWER DIG. NO. 17: 20-29, FALL 1979.

A NUMBER OF IMPORTANT CONSIDERATIONS ABOUT WIND ENERGY AND UTILITIES ARE ADDRESSED.

1979-0818 WIND ENERGY INFORMATION DIRECTORY.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., OCTOBER 1979. 31 P.

"WIND ENERGY INFORMATION" HAS BEEN PREPARED TO PROVIDE RESEARCHERS, DESIGNERS, MANUFACTURERS, DISTRIBUTORS, DEALERS, AND USERS OF WIND ENERGY CONVERSION SYSTEMS WITH EASY ACCESS TO TECHNICAL INFORMATION.

1979-0819 WIND ENERGY SYSTEMS APPLICATION TO REGIONAL UTILITIES. EXECUTIVE SUMMARY.
NTIS, JUNE 1979. 40 P.
DOE/ET/20063-T1(EXEC. SUMM.)

THIS STUDY DEVELOPED A GENERIC PLANNING PROCESS THAT UTILITIES CAN USE TO DETERMINE THE FEASIBILITY OF UTILIZING WECS (WIND ENERGY CONVERSION SYSTEMS) AS PART OF THEIR FUTURE MIX OF EQUIPMENT. WHILE THIS IS PRIMARILY AN ECONOMIC PROCESS, OTHER QUESTIONS DEALING WITH WECS AVAILABILITY, CAPACITY CREDIT, OPERATING RESERVE, PERFORMANCE OF WECS ARRAYS, ETC., HAD TO BE ADDRESSED. THE APPROACH WAS TO ESTABLISH THE WORTH, OR BREAKEVENVALUE, OF WECS TO THE UTILITY AND TO DETERMINE THE IMPACT THAT WECS ADDITIONS WOULD HAVE ON THE UTILITIES MIX OF CONVENTIONAL SOURCE.

1979-0820 WIND ENERGY SYSTEMS APPLICATION TO REGIONAL UTILITIES.
NTIS, SEPTEMBER 1979. 339 P.
DOE/ET/20063-T1(VOL.2)

A METHODOLOGY FOR ANALYZING THE ECONOMIC IMPACT OF WECS ON A UTILITY IS DESCRIBED IN VOLUME I OF THIS REPORT. THE METHODOLOGY REQUIRES EXTRAPOLATING BOTH HISTORICAL UTILITY LOAD DATA AND HISTORICAL WIND POWER INTO A YEAR OF ANALYSIS; CALCULATING THE TOTAL AMOUNT OF FUNDS MADE AVAILABLE IN THAT YEAR, AS A RESULT OF THE INCLUSION OF WIND POWER IN THE UTILITY MIX; AND THEN ESTIMATING THE PRESENT VALUE OF THE TOTAL FUNDS MADE AVAILABLE TO THE UTILITY OVER THE LIFE OF THE WECS. TO APPLY THE METHODOLOGY TO A SPECIFIC CASE, IT WAS NECESSARY TO DEVELOP VARIOUS COMPUTER PROGRAMS. THE FOLLOWING SECTIONS IN THIS REPORT LIST THE PROGRAMS DEVELOPED FOR THIS STUDY, BRIEFLY SUMMARIZE THEIR CONTENTS, AND EXPLAIN HOW THEY ARE USED. WHEREVER POSSIBLE, A TYPICAL INPUT/OUTPUT FILE IS SHOWN.

1979-0821 WIND ENERGY SYSTEMS. QUARTERLY REVIEW, JULY 1, 1979-SEPTEMBER 30, 1979.
NTIS, DECEMBER 1979. 176 P.
SERI/PR-351-480

THE QUARTERLY REVIEW FOR THE WIND ENERGY SYSTEMS (WES) PROGRAM IS A VISUAL PRESENTATION PREPARED BY THE SOLAR ENERGY RESEARCH INSTITUTE (SERI) AS AN OVERVIEW OF THE EFFORTS IN THE PROGRAM. THIS QUARTERLY REVIEW IS DELIVERED TO FULFILL SERI'S ANNUAL OPERATING PLAN (AOP) REPORTING REQUIREMENTS. THE REVIEW PRESENTS THE OBJECTIVES, ACCOMPLISHMENTS, ACTIVITIES, AND OUTPUTS OF EACH OF THE TASKS IN THE WES PROGRAM.

1979-0822 WIND ENTHUSIAST FACES LOCAL OPPOSITION TO INSTALLATION OF 4 KW MACHINE.
WIND POWER DIG. NO. 17: 14, FALL 1979.

1979-0823 WIND POWER.
NAVY CIV. ENG. 20(1): 4, SUMMER 1979.

THE US NAVY RESEARCH AND DEVELOPMENT PROGRAM FOR WIND TURBINES IS DESCRIBED. TESTING STATIONS AND TURBINE SPECIFICATIONS ARE PRESENTED.

1979-0824 WOLFE R, CLEGG P
HOME ENERGY FOR THE EIGHTIES.
CHARLOTTE, VERMONT, GARDEN WAY PUBL. CO., 1979. 272 P.

ALTERNATIVE ENERGY IDEAS AVAILABLE TO THE HOMEOWNER ARE PRESENTED IN A SIMPLE BUT COMPREHENSIVE TREATMENT. COMPLEX FORMULAS HAVE BEEN REDUCED TO SIMPLE RULES-OF-THUMB. PRACTICAL EXPLANATIONS ARE SUPPLEMENTED BY A LIST OF REFERENCES THAT CONTAIN MORE ELABORATE TECHNICAL DATA ON ENERGY CONSERVATION, SOLAR ENERGY, WIND POWER, WATER POWER, AND WOOD HEAT. A COMPLETE CATALOG OF AVAILABLE EQUIPMENT FOLLOWS EACH CHAPTER, SO THAT THE HOMEOWNER CAN SEE HOW THE EQUIPMENT WORKS, WHAT IT LOOKS LIKE, HOW MUCH IT COSTS, AND WHERE TO PURCHASE THE ITEM.

1979-0825 WOOLDRIDGE G L
CHARACTERISTICS OF AIR FLOW OVER CERTAIN TOPOGRAPHIC FEATURES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 329-339.
PNL-3214

1979-0826 AIKEN R
WIND ELECTRIC POWER GENERATION AND CONNECTION TO A RURAL ELECTRIC COOPERATIVE IN NORTHEAST NEBRASKA.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 271-288.
CONF-7905109

THE RESULTS OF THREE YEARS' EXPERIENCE IN FARM ELECTRIC DEMAND RECORDS AND INITIATION OF A WIND ELECTRIC SYSTEM ARE PRESENTED. FARMERS AND RURAL ELECTRIC COOPERATIVES ARE WILLING TO EXPERIMENT WITH WIND ELECTRIC-UTILITY INTERFACE SYSTEMS, THOUGH INITIAL REC RESISTANCE HAD TO BE OVERCOME. WIND GENERATED ELECTRICITY APPEARS TO MATCH FARM DEMAND ON BOTH SEASONAL AND DAILY BASIS THOUGH ELECTRICITY RETURNED TO THE REC POSES UNRESOLVED ISSUES.

1979-0827 ARGYRIS J H, AICHER W, KARL F, JUEMMERLE W, MUELLER M
ROTORMODELL ZUR VERIFIZIERUNG VON RECHNENVERFAHREN. (ROTOR MODEL FOR VERIFICATION OF COMPUTATION METHODS).
NTIS, 1979. 58 P. (IN GERMAN, ENGLISH SUMMARY)
N81-15467, ISD-262

IN ORDER TO PROVE THE QUALITY OF IDEALIZATION AND THE VALIDITY OF COMPUTATION FOR WINDMILLS, A DRIVEN MODEL OF A WINDMILL WITH A 7.4 M DIAMETER ROTOR WAS CONSTRUCTED. NEW DATA ACQUISITION AND DATA TRANSMISSION SYSTEMS WITH 16 CHANNELS AND DIGITIZATION IN THE ROTATING SYSTEM WERE DEVELOPED AND TESTED. THE DYNAMIC RESPONSE OF THE ROTOR BLADES TO THE CYCLIC LOADING OF GRAVITY WAS TAKEN TO COMPARE MEASUREMENTS AND COMPUTATIONS. FOR THE MEASUREMENTS AND EVALUATION WHICH WERE PERFORMED BY A MEASUREMENT SYSTEM AND A COMPUTER, THE NECESSARY SOFTWARE WAS BUILT.

1979-0828 BARCHET W R
OVERVIEW OF WIND ENERGY RESOURCE ASSESSMENT.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 207-211.
PNL-3214

1979-0829 BARCHET W R, ELLIOTT D L
PACIFIC NORTHWEST REGIONAL ASSESSMENT.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 213-226.
PNL-3214

THE WIND ENERGY RESOURCE OF THE UNITED STATES AND ITS TERRITORIES MUST BE DESCRIBED IN ADEQUATE DETAIL TO MEET THE NEEDS OF A VARIETY OF USERS. TO MEET THESE NEEDS, THE WIND CHARACTERISTIC PROGRAM ELEMENT, MANAGED FOR THE U.S. DEPARTMENT OF ENERGY (DOE) BY PACIFIC NORTHWEST LABORATORY (PNL), DEVELOPED, APPLIED AND TESTED TECHNIQUES USING EXISTING WIND INFORMATION TO ASSESS THE WIND ENERGY POTENTIAL OF THE NORTHWEST REGION. THIS ASSESSMENT INCLUDED IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING.

1979-0830 BOWES M A, PERLEY R
ANALYSIS OF WIND SPEED CHARACTERISTICS FOR DESIGN CRITERIA DEVELOPMENT IN THE KAMAN/DOE 40-KW WIND TURBINE GENERATOR PROGRAM.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 31-44.
PNL-3214

THIS PROJECT IS TO DESIGN AND FABRICATE A 40-KW HORIZONTAL AXIS WIND TURBINE GENERATOR. THIS WORK IS PART OF THE SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) DEVELOPMENT PROGRAM THAT IS BEING DIRECTED BY ROCKWELL INTERNATIONAL. THE 40-KW WTG SYSTEM IS THE RESULT OF AN EXTENSIVE ANALYSIS AND DESIGN EFFORT WHICH WAS PREDICATED ON ACHIEVING THE LOWEST SYSTEM COST CONSISTENT WITH THE ESTABLISHED PERFORMANCE REQUIREMENTS. CENTRAL TO THIS EFFORT WERE THE DEVELOPMENT AND APPLICATION OF DESIGN EVALUATION CRITERIA BASED ON STATISTICAL WIND SPEED MODELS.

1979-0831 BUTLER N G
WIND ENERGY FROM A UTILITY PLANNING PERSPECTIVE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 305-310.
PNL-3214

IN ASSESSING THE POTENTIAL FOR THE GENERATION OF ELECTRICAL ENERGY FROM THE WIND, A UTILITY WOULD HAVE TO ADDRESS THE VARIOUS QUESTIONS. THIS PAPER DESCRIBES ONE METHOD A UTILITY COULD USE TO ASSESS THE POTENTIAL FOR WIND GENERATION. THE PRIMARY OBJECTIVE WOULD BE TO EXTRACT THE MAXIMUM AMOUNT OF ENERGY PER YEAR AT THE LOWEST COST.

1979-0832 BUZENBERG R J, DAVID M L, WAGNER J P, GLYNN E F, JOHNSON G L, SHULTIS J K
MARKET POTENTIAL FOR WIND ENERGY APPLICATIONS IN AGRICULTURE.

WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 22-41.
CONF-7905109

THE METHODOLOGY, DATA, ASSUMPTIONS AND ANALYSIS OF THIS STUDY IN CONSIDERING POTENTIAL APPLICATIONS SERVING OVER 2.8 MILLION COMMERCIAL AND NON-COMMERCIAL FARMS IN THE FIFTY STATES, FOUND 991,700 APPLICATIONS LOCATED IN 21 STATES TO BE ECONOMICALLY VIABLE UNDER THE MOST LIBERAL SET OF ASSUMPTIONS, I.E., LOW WIND SYSTEM CAPITAL COSTS AND ALTERNATIVE ENERGY COSTS EQUIVALENT TO $.08 PER KWH. OVER 685,000 ECONOMICALLY VIABLE APPLICATIONS WERE CONCENTRATED IN ONLY SIX STATES--TEXAS, MISSOURI, IOWA, OKLAHOMA, KANSAS AND NEBRASKA. THE TOTAL CAPITAL COST OF THE 991,700 WTGS'S TO PURCHASERS IS ESTIMATED AT $10.0 BILLION FOR AN AVERAGE COST OF $10,084 EACH. THE ANNUAL TOTAL AMOUNT OF UTILIZED WIND ENERGY GENERATED BY THESE WTGS'S IS 21.1 BILLION KWH (ABOUT 18% OF THE POTENTIAL ELECTRICAL FARM LOAD FOR THE 23 STATE AREA) VALUED AT $1.7 BILLION ($.08 PER KWH). AGGREGATE NET ANNUAL SAVINGS TO USERS WAS ESTIMATED TO BE $68.7 MILLION. THE SIZE CHARACTERISTICS OF THE 991,700 WTGS'S FOUND TO BE ECONOMICALLY FEASIBLE WHEN LOW CAPITAL COSTS AND HIGH ALTERNATE ENERGY COSTS ARE ASSUMED IS SHOWN. THE 10 KW GENERATOR WITH A RATED SPEED OF 9 OR 8 M/S (SWEPT AREA EQUAL TO 85 TO 108 SQUARE METERS) ACCOUNTS FOR NEARLY TWO-THIRDS OF THE TOTAL.

1979-0833 CARTER G M, GILHAUSEN D B
THE POTENTIAL IMPACT OF AUTOMATED WIND GUIDANCE ON WIND ENERGY CONVERSION OPERATIONS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 191-203.
PNL-3214

THE NATIONAL WEATHER SERVICE HAS BEEN PRODUCING NUMERICAL-STATISTICAL FORECASTS OF SURFACE WINDS FOR APPROXIMATELY 250 LOCATIONS THROUGHOUT THE UNITED STATES. THESE FORECASTS, MADE BY THE MODEL OUTPUT STATISTICS (MOS) TECHNIQUE, SERVE PRIMARILY AS GUIDANCE FOR AVIATION AND PUBLIC WEATHER FORCASTERS. THIS PAPER DESCRIBES HOW THE VARIOUS MOS WIND FORECASTS ARE PRODUCED AND SHOW VERIFICATION RESULTS TO INDICATE HOW THE QUALITY OF THE GUIDANCE VARIES WITH FORECAST PROJECTION AND GEOGRAPHIC LOCATION. THE ADVANTAGES AND DISADVANTAGES OF USING THE MOS APPROACH FOR FUTURE ENERGY-RELATED APPLICATIONS, SUCH AS PREDICTING HOURLY AVERAGE WINDS OR ESTIMATING WIND POWER OUTPUT, ALSO ARE DISCUSSED.

1979-0834 CHERRY N J
WIND ENERGY RESOURCE ASSESSMENT OF NEW ZEALAND.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 261-271.
PNL-3214

A PROGRAM FOR THE UTILIZATION OF WIND ENERGY ON A LARGE SCALE IN NEW ZEALAND WOULD REQUIRE A PROVEN NEED FOR THE ENERGY: DEMONSTRATION THAT THE WIND IS A PRACTICAL ENERGY RESOURCE AS TO WHERE AND WHEN THE ENERGY WOULD BE AVAILABLE, AND THE CHOICE OF A SMALL NUMBER OF SITES FOR TESTING AND EVALUATING PILOT PLANTS. SUFFICIENT WIND DATA EXISTS IN THE ARCHIVES OF THE NEW ZEALAND METEOROLOGICAL SERVICE TO BROADLY CHARACTERIZE MOST AREAS OF THE COUNTRY AND TO INDICATE A NUMBER OF POSSIBLE PILOT PLANT SITES AS DISCUSSED HEREIN.

1979-0835 CLARK R N, SCHNEIDER A D, NELSON V, GILMORE E, BARIEAU R E
DEEP WELL, WIND ASSISTED IRRIGATION PUMPING.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 67-86.
CONF-7905109

A WIND ENERGY PROJECT FOR IRRIGATION PUMPING WAS STARTED AT THE USDA SOUTHWESTERN GREAT PLAINS RESEARCH CENTER, BUSHLAND, TEXAS, IN 1977. THE PUMPING SYSTEM USES BOTH A WIND TURBINE AND AN ELECTRIC MOTOR TO POWER A CONVENTIONAL VERTICAL-TURBINE IRRIGATION PUMP. THE ELECTRIC MOTOR IS SIZED TO OPERATE THE PUMP ON A STAND-ALONE BASIS AND RUNS CONTINUOUSLY. THE WIND TURBINE IS COUPLED TO THE PUMPING SYSTEM THROUGH AN OVERRUNNING CLUTCH AND COMBINATION GEAR DRIVE, AND FURNISHES POWER TO THE PUMP ONLY WHEN THE WINDSPEED EXCEEDS 6 METERS/SECOND (6 M/S). THE VERTICAL-AXIS, OR DARRIEUS, WIND TURBINE WAS DESIGNED TO PRODUCE 40 KW IN A 15 M/S WIND. THE ROTOR HEIGHT IS 17 M, AND THE MAXIMUM ROTOR DIAMETER IS 11.3 M.

1979-0836 CONNELL J R
OVERVIEW OF WIND CHARACTERISTICS FOR DESIGN AND PERFORMANCE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 5-12.
PNL-3214

1979-0837 COROTIS R B
STATISTICAL RELIABILITY OF WIND POWER ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 311-321.
PNL-3214

THIS PAPER PROVIDES WORKING GUIDELINES FOR THE ANALYSIS OF SITE WIND DATA IN THE DEVELOPMENT OF SITE AND REGIONAL WIND POWER ASSESSMENTS. NO EXTENSIVE SET OF BACKGROUND THEORY AND DATA IS PRESENTED HERE SINCE IT IS AVAILABLE IN PREVIOUSLY PUBLISHED PAPERS AND REPORTS. FOR NATIONAL WEATHER SERVICE SITES HOURLY AND 3-HOURLY DATA ARE NORMALLY AVAILABLE FROM THE NATIONAL CLIMATIC CENTER (NCC). WITH SPECIALIZED COMPUTER ALGORITHMS IT IS POSSIBLE TO ANALYZE THESE DATA TAPES TO DERIVE DESIRED STATISTICS SUCH AS THE MEAN, VARIANCE AND PROBABILITY DISTRIBUTIONS OF HOURLY AND MONTHLY WIND SPEED AND WIND POWER, AND TEMPORAL CORRELATION (AUTOCORRELATION), THE POWER SPECTRAL DENSITY AND THE PERSISTENCE.

1979-0838 DEVELOPMENT, INSTALLATION AND TESTING OF A WIND TURBINE DIESEL HYBRID, 1979.
MISSISSAUGA, ONTARIO, DAF INDAL LTD., 1979. AVAILABLE FROM ONTARIO GOVERNMENT PUBLIC SERVICES, TORONTO. 89 P.

THIS REPORT DEALS WITH A PILOT-SCALE INSTALLATION AND TEST OF WIND-POWER ASSISTANCE TO A DIESEL GENERATOR. THE OBJECTIVE OF THIS PROJECT WAS TO DEMONSTRATE AN ALTERNATIVE MEANS OF PROVIDING ELECTRICAL POWER IN REMOTE AREAS USING RENEWABLE ENERGY RESOURCES.

1979-0839 DORAN J C
WIND DIRECTION VARIATIONS IN STRONG WINDS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 151-158.
ALSO: NTIS, DECEMBER 1979. 9 P.
PNL-3214, PNL-SA-7831, CONF-790665-5

FLUCTUATIONS IN BOTH THE MAGNITUDE AND DIRECTION OF THE WIND MAY BE AN IMPORTANT FACTOR IN THE DESIGN AND PERFORMANCE OF WIND TURBINES. WHILE SOME DATA ARE AVAILABLE ON WIND SPEED CHANGES, RELATIVELY LITTLE IS KNOWN ABOUT THE BEHAVIOR OF WIND DIRECTION FLUCTUATIONS. THE IMPORTANCE OF THIS QUANTITY CAN BE APPRECIATED BY SIMPLY CONSIDERING TWO TYPES OF WIND TURBINES. THIS PAPER DESCRIBES SOME MEASUREMENTS OF WIND DIRECTION FLUCTUATIONS AND PRESENTS A MEANS OF INTERPRETING THEM THAT MAY BE USEFUL TO DESIGNERS.

1979-0840 DUTTON J A, HOJSTRUP J
A MODEL FOR THE PROBABILITY STRUCTURE OF ATMOSPHERIC TURBULENCE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 59-67.
PNL-3214

THIS PAPER DESCRIBES THE INITIAL PHASE OF AN INVESTIGATION INTO THE STATISTICAL STRUCTURE OF TURBULENCE IN THE ATMOSPHERIC BOUNDARY LAYER.

1979-0841 ELLIOTT D L
METEOROLOGICAL AND TOPOGRAPHICAL INDICATORS OF WIND ENERGY FOR REGIONAL ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 273-283.
ALSO: NTIS, DECEMBER 1979. 12 P.
PNL-3214, PNL-SA-7832, CONF-790665-3

EXISTING WIND DATA PROVIDE THE PRIMARY BASIS FOR ASSESSING A REGION'S WIND ENERGY POTENTIAL. HOWEVER, THE EXISTING WIND DATA MUST BE EVALUATED CAREFULLY TO DETERMINE THEIR REPRESENTATIVENESS OF THE SITE AND LOCAL AREA, BECAUSE WIND ENERGY IS VERY SENSITIVE TO VARIATIONS IN TERRAIN, VEGETATION, ROUGHNESS, HEIGHT ABOVE GROUND, AND INSTRUMENT EXPOSURE. IN ANALYZING THE WIND ENERGY IN COMPLEX TERRAIN AND DATA-SPARSE AREAS, THE PAPER RELIES ON THE USE OF VARIOUS INDIRECT INDICATORS OF WIND ENERGY AND AN UNDERSTANDING OF THE PHYSICAL PROCESSES AND FEATURES THAT RESULT IN HIGH WINDS IN SOME AREAS BUT NOT IN OTHER AREAS.

1979-0842 ENERGY SYSTEM FOR THE GEORGETOWN UNIVERSITY ACADEMIC BUILDING. VOLUME III. APPENDICES. FINAL REPORT.
NTIS, DECEMBER 10, 1979. 332 P.
DOE/ET/23136-T1(VOL.3)

RESULTS OF A STUDY TO (1) PROVE THE NEED FOR A NATIONAL EXEMPLAR FOR HIGHER EDUCATION ENERGY SYSTEM, (2) IDENTIFY AN APPROPRIATE SITE, AND (3) SELECT THE OPTIMUM ENERGY SYSTEM ARE PRESENTED. THE SITE SELECTED WAS GEORGETOWN UNIVERSITY AND THE SYSTEM WAS A PHOTOVOLTAIC POWER SYSTEM. THIS VOLUME OF THE REPORT CONTAINS THE APPENDICES: (A) GEORGETOWN UNIVERSITY ACADEMIC BUILDING DESIGN AND REQUIREMENTS; (B) CLIMATE DATA; (C) OPINION SURVEY ON TECHNICAL WEIGHTING FACTORS; (D) CENTRAL RECEIVER/TOWER SOLAR THERMAL ENERGY SYSTEMS; (E) WIND MACHINE STUDY FOR GEORGETOWN UNIVERSITY APPLICATION; (F) SOLAR THERMAL SYSTEM--POINT FOCUS COLLECTOR, STEAM RANKINE CONVERSION SYSTEM; (G) INSTITUTIONAL CRITERIA; (H) RELATIVE IMPORTANCE OF INSTITUTIONAL CRITERIA; (J) PHOTOVOLTAIC CELL AND MODULE COSTS; (K) A PROFILE OF THE ENROLLMENT AND GEOGRAPHIC DISTRIBUTION OF AMERICAN INSTITUTIONS OF HIGHER LEARNING; (L) SHADOWING ANALYSIS STUDY; (M) GEORGETOWN UNIVERSITY ENERGY AUDIT; (N) FEDERAL LEGISLATION RELATED TO GRANTS AND LOANS TO HIGHER EDUCATION; (O) SUMMARY CHARTS FOR SYSTEM RATINGS; AND (P) CONSTRUCTION COST IMPLICATIONS.

1979-0843 ENGSTROM S
THE SWEDISH WIND ENERGY PROGRAM, AS IT APPLIES TO SMALL WIND ENERGY SYSTEMS AND AGRICULTURAL APPLICATIONS.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 247-248.
CONF-7905109

A BRIEF DESCRIPTION IS PRESENTED OF THE WIND ENERGY PROGRAM OF THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT. SMALL WIND ENERGY SYSTEMS AND AGRICULTURAL APPLICATIONS ARE EMPHASIZED.

1979-0844 FAXEN T
SOME METEOROLOGICAL ACTIVITIES IN THE NATIONAL SWEDISH WIND ENERGY PROGRAM.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 113-130.
PNL-3214

TWO MAJOR PROJECTS CONDUCTED BY THE UNVERSITY OF UPPSALA'S DEPARTMENT OF METEOROLOGY ON BEHALF OF THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT ARE DISCUSSED. FIRST, THE METEOROLOGICAL FIELD STATION AT SWEDEN'S 60-KW WINDMILL IS PRESENTED. THEN, THE GOTLAND-SKANE PROJECT, WHICH WAS TO DETERMINE SITES FOR TWO 1- TO 2-MW PROTOTYPE WINDMILLS, IS DESCRIBED.

1979-0845 FINAL ENVIRONMENTAL IMPACT REPORT FOR THE CALIFORNIA ENERGY COMMISSION SOLAR PROGRAM AND WIND PROGRAM.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1979. 203 P.
NP-25204

THIS FINAL ENVIRONMENTAL IMPACT REPORT (FEIR) ANALYZES THE CALIFORNIA ENERGY COMMISSION'S (CEC) SOLAR PROGRAM AND WIND PROGRAM. THE SOLAR PROGRAM IS NOT EXPECTED TO HAVE ANY SIGNIFICANT ENVIRONMENTAL EFFECTS. THE CALIFORNIA WIND PROGRAM WAS DIRECTED TO LOCATE AND VERIFY SITES FOR WIND FARMS, ESTABLISH A WIND INFORMATION CENTER AND TEST A MEDIUM SCALE WIND TURBINE GENERATOR AS A DEMONSTRATION OF THE FEASIBILITY AND RELIABILITY OF WIND ENERGY. CONSTRUCTION IMPACTS FROM TURBINE PAD LEVELING, ACCESS ROADS, AND TRANSMISSION CORRIDORS COULD BE CONSIDERABLE. CONFLICTS WITH EXISTING AND FUTURE LAND USE MAY ALSO OCCUR. OPERATIONAL EFFECTS INCLUDE MINOR CHANGES IN MICROCLIMATE, BIRD COLLISIONS WITH THE TURBINE BLADES, NOISE, INCREASED OFF-ROAD VEHICLE USE, AESTHETICS AND RADIO AND TELEVISION WAVE INTERFERENCE.

1979-0846 FRAENKEL P
POWER GUIDE: A CATALOGUE OF SMALL-SCALE POWER EQUIPMENT.
NEW YORK, CHARLES SCRIBNER'S SONS, 1979. 240 P.

THIS GUIDE IS INTENDED TO HELP THOSE SEEKING TO BUY SMALL-SCALE POWER EQUIPMENT, PARTICULARLY FOR USE IN REMOTE AND UNDERDEVELOPED PARTS OF THE WORLD, BY INDICATING A SELECTION OF APPROPRIATE COMMERCIALLY-AVAILABLE POWER SOURCES. IT GIVES BASIC INFORMATION ON THE PROS AND CONS AND THE CRITERIA FOR CHOOSING A VARIETY OF DIFFERENT ENERGY CONVERSION SYSTEMS, TOGETHER WITH A SELECTION OF INTERNATIONALLY AVAILABLE ITEMS OF EQUIPMENT, AND THE NAMES AND ADDRESSES OF THEIR MANUFACTURERS AND AGENTS. ADDITIONAL MATERIAL ON RELATED CONSULTANCY AND INFORMATION SERVICES, PLUS A LISTING OF ORGANIZATIONS CONCERNED WITH RESEARCH AND DEVELOPMENT IN SMALL-SCALE POWER PRODUCTION IS ALSO INCLUDED.

1979-0847 FRANKLIN R
WIND-DRIVEN REFRIGERATION PROJECT.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 297-298.
CONF-7905109

THIS PAPER IS TO PROVIDE A DESCRIPTION OF THE PROJECT AND AN ACCOUNT OF CONSTRUCTION DETAILS. TESTING OF PERFORMANCE BEYOND PROOF OF CONCEPT HAS NOT BEEN DONE. THEREFORE, THE ONLY REPORT OF PERFORMANCE IS LIMITED TO THE STATEMENT THAT ICE HAS BEEN FROZEN IN THE ICE BUILDER AND THAT SATISFACTORY OPERATION HAS BEEN MAINTAINED FOR APPROXIMATELY 75 HOURS. THE TURBINE IS CAPABLE OF RUNNING THE COMPRESSOR IN A 12 TO 15 MPH WIND.

1979-0848 FRENCH WINDMILL CATCHES ISLAND BREEZES.
ELECTR. REV. INT. 205(22): 62-63, DECEMBER 7, 1979.

ELECTRICITE DE FRANCE HAS HIGH HOPES THAT WIND POWER WILL PROVIDE ELECTRICITY FOR THE ISLE OF USHANT. EDF HAS RECENTLY INSTALLED A 100 KW AEROGENERATOR ON THE ISLAND TO HELP MEET SOME OF THE ENERGY NEEDS OF ITS 1448 INHABITANTS AND POWER WILL BEGIN TO BE FED INTO THE ISLAND'S NETWORK THIS MONTH.

1979-0849 GINOSAR M, COOK C, WACO D
WIND ENERGY RESOURCE DEVELOPMENT IN CALIFORNIA.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 229-239.
PNL-3214

THE CALIFORNIA ENERGY COMMISSION (CEC) STAFF IS ACTIVELY ENGAGED IN WIND RESOURCE DEVELOPMENT THROUGHOUT THE STATE. SINCE THE ECONOMIC FEASIBILITY OF WIND ENERGY CONVERSION SYSTEMS DEPENDS HEAVILY ON THE TOTAL AMOUNT OF POWER AVAILABLE IN A SPECIFIC AREA, THE GOAL IS TO CHARACTERIZE THE NATURE OF THE WIND RESOURCE FOR THE MANY DIVERSE WIND REGIMES IN CALIFORNIA.

1979-0850 GLASGOW J C, ROBBINS W H
UTILITY OPERATIONAL EXPERIENCE ON THE NASA/DOE MOD-0A 200 KW WIND TURBINE.
CECON '79 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 26TH, CLEVELAND, JUNE 5-7, 1979. PISCATAWAY, N.J., IEEE, 79CH1395-3REG 2, 1979. P. 29-37.

THE MOD-0A 200 KW WIND TURBINE WAS DESIGNED AND FABRICATED BY THE LEWIS RESEARCH CENTER OF NASA UNDER THE DIRECTION OF THE U.S. DEPARTMENT OF ENERGY. THE PROJECT IS A PART OF THE FEDERAL WIND ENERGY PROGRAM AND IS DESIGNED TO OBTAIN EARLY WIND TURBINE OPERATIONAL AND PERFORMANCE DATA WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. ON MARCH 6, 1978 THE MOD-0A WIND TURBINE WAS TURNED OVER TO THE TOWN OF CLAYTON LIGHT AND WATER PLANT, CLAYTON, NM, FOR UTILITY OPERATION AND ON DECEMBER 31, 1978, THE MACHINE HAD COMPLETED TEN MONTHS OF UTILITY OPERATION. THIS PAPER DESCRIBES THE MACHINE AND DOCUMENTS THE RECENT OPERATIONAL EXPERIENCE AT CLAYTON, NM.

1979-0851 GOLDENBLATT M
A METHOD FOR ESTIMATING THE IMPACT OF WECS ON UTILITY OPERATING RESERVE REQUIREMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 169-176.
PNL-3214

THE SUBJECT DEALT WITH IN THIS PAPER IS HOW TO DETERMINE THE IMPACT WIND ENERGY CONVERSION SYSTEMS (WECS) WOULD HAVE ON A UTILITY'S GENERATING MIX. THE METHOD UTILIZED FOR DETERMINING THIS IMPACT IS TO ASSUME THAT PRESENT ON-LINE OPERATING RESERVES ARE BASED UPON A UTILITY'S ABILITY TO SATISFY ITS LOAD REQUIREMENTS 99% OF THE TIME.

1979-0852 GUNKEL W W, FURRY R B, LACEY D R, NEYELOFF S, PORTER T G
DEVELOPMENT OF WIND-POWERED WATER HEATING SYSTEM FOR DAIRY APPLICATION.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 124-157.
CONF-7905109

APPROXIMATELY 25% OF THE ELECTRICAL ENERGY CONSUMED ON DAIRY FARMS IS EXPENDED FOR HEATING WATER USED FOR WASHING AND SANITIZING MILK HANDLING EQUIPMENT. THE ELECTRICAL ENERGY FOR THIS OPERATION AVERAGES ABOUT 150 KWH'S PER YEAR FOR EACH MILKING COW. WITH NEARLY 12 MILLION COWS IN THE U.S., THIS ENERGY TOTALS ABOUT 2000 GIGAWATT HOURS ANNUALLY. RESEARCH IS CURRENTLY UNDERWAY AT THE AGRICULTURAL ENGINEERING DEPARTMENT OF CORNELL UNIVERSITY THAT IS INVESTIGATING THE MECHANICAL AND ECONOMIC FEASIBILITY OF SUBSTITUTING WIND ENERGY FOR DAIRY WATER HEATING. AUXILIARY USE OF THE HOT WATER FOR RURAL HOME HEATING IS ALSO BEING CONSIDERED. THIS PROJECT IS PART OF A PROGRAM SPONSORED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE AND DEPARTMENT OF ENERGY TO DEVELOP APPLICATIONS OF WIND ENERGY IN RURAL AREAS.

1979-0853 HANSEN A C
DATA ANALYSIS AT THE ROCKY FLATS WIND SYSTEMS TEST AND DEVELOPMENT CENTER.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 103-110.
PNL-3214

AT THE ROCKY FLATS WIND SYSTEMS TEST AND DEVELOPMENT CENTER, DATA ANALYSIS TECHNIQUES ARE IN USE THAT PERMIT MEANINGFUL AND USEFUL INTERPRETATION OF EVERY INSTANT IN THE OPERATION OF SWECS IN RANDOM WINDS. THIS PAPER WILL DISCUSS THREE OF THE METHODS IN USE AND GIVE EXAMPLES OF THEIR APPLICATION USING SAMPLES OF DATA FROM AN ENERTECH 1500 AND A JACOBS 3 KW-SYSTEM.

1979-0854 HAWORTH W L, MATTILA J M
A CHALLENGE FOR WARRANTIES.
SOL. AGE 4(5): 30-33, MAY 1979.

THE LEGAL ASPECTS OF DEVELOPING AND ENFORCING WARRANTIES FOR SOLAR ENERGY SYSTEMS ARE REVIEWED. THE MAGNUSON-MOSS ACT OUTLINES THE LEGAL REQUIREMENTS THAT MUST BE MET BY ANY CONSUMER EXPRESS WARRANTY AND STATES THE LIMITATIONS THAT MAY BE MADE ON IMPLIED WARRANTIES. THE ACT DOES NOT REQUIRE A WARRANTY ON ANY GIVEN PRODUCT OR SPECIFY THE LEVEL OF PROTECTION UNDER A WARRANTY. A SURVEY OF THE SOLAR INDUSTRY INDICATED THAT LIMITED WARRANTIES WERE FAVORED BUT THAT THE NATURE OF THE WARRANTY BE AN ELEMENT OF MARKETING STRATEGY. VOLUNTARY APPROACHES TO PROVISION OF WARRANTIES BY THE SELLER WERE FOUND NOT TO WORK AND IN HUD'S CYCLE 4 PROGRAM, SELLERS WERE REQUIRED TO COMPLY WITH THE MAGNUSON-MOSS ACT. WARRANTIES FOR PHOTOVOLTAICS, WIND AND

BIOMASS CONVERSION ARE DISCUSSED.

1979-0855 HEALD R C
BOUNDARY LAYER WIND SHEAR.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 343-350.
PNL-3214

THE DEVELOPMENT OF MODERN HORIZONTAL AXIS WIND TURBINES HAS CREATED A NEED TO KNOW THE CHARACTERISTICS OF THE WIND FIELD TO WHICH THE TURBINE IS EXPOSED. VERTICAL WIND SHEAR IS ONE IMPORTANT FACTOR AFFECTING TURBINE DESIGN. AS THE BLADES OF A HORIZONTAL AXIS TURBINE ROTATE, THEY WILL SWEEP THROUGH AIR MOVING AT DIFFERENT SPEEDS AND DIRECTIONS AND THEREBY BE SUBJECTED TO VARIABLE LOADS. THIS STUDY PRESENTS STATISTICS ON BOUNDARY LAYER WIND SHEAR AND ITS DIURNAL VARIATION FROM WIND MEASUREMENTS AT SEVERAL LOCATIONS OVER LEVEL TERRAIN.

1979-0856 HIESTER T R, PENNELL W T
SITING TECHNOLOGIES FOR LARGE WIND TURBINE CLUSTERS.
NTIS, NOVEMBER 1979. 23 P.
PNL-SA-7965

SITE SELECTION FOR LARGE WIND TURBINE CLUSTERS REQUIRES THOROUGH DOCUMENTATION OF THE WIND CHARACTERISTICS AT THE SITE, BECAUSE OF THE INFLUENCE THESE CHARACTERISTICS WILL HAVE ON THE ECONOMICS, OPERATIONS, AND SERVICE LIFE OF THE WIND TURBINES. THE WIND PROSPECTING STRATEGY CAN BE USED BY A UTILITY TO DETERMINE SPECIFIC LOCATIONS FOR EACH WIND TURBINE IN A CLUSTER OF 10 TO 50 MACHINES. THE KEY TO SITE SELECTION IS KNOWING WHAT AND WHERE TO MEASURE. SITING TECHNIQUES TO BE USED AT THE VARIOUS STAGES OF THE WIND-PROSPECTING STRATEGY ARE DISCUSSED. THESE TECHNIQUES HELP DETERMINE WHERE TO MEASURE. WHAT TO MEASURE AT THE SITE IS STILL A MOOT QUESTION. SUGGESTIONS ARE MADE ON WHAT DATA ARE NEEDED AT WHAT SAMPLING RATES. THESE ARE BASED ON THE ASSUMPTION THAT UNTIL FURTHER EXPERIENCE IN SITING LARGE CLUSTERS OF WIND TURBINES IS IN HAND, THOROUGH DOCUMENTATION OF WIND CHARACTERISTICS AFFECTING MACHINE AND CLUSTER OUTPUT CHARACTERISTICS, OPERATION STRATEGIES, AND SERVICE LIFE ARE NECESSARY.

1979-0857 HIESTER T R, PENNELL W T
STATUS OF THE LARGE WIND TURBINE HANDBOOK.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 417-428.
PNL-3214

DOCUMENTATION OF SITING METHODOLOGIES IN HANDBOOK FORM IS A MAJOR PRODUCT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE FEDERAL WIND ENERGY PROGRAM. A SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS (SMALL WECS) (WEGLEY, ET AL., 1978) WAS WRITTEN AND PUBLISHED BY PACIFIC NORTHWEST LABORATORY (PNL). IT IS BEING UPDATED ACCORDING TO REVIEW COMMENTS AND WILL BE REPUBLISHED FOR WIDER DISTRIBUTION. THIS PAPER DESCRIBES THAT DOCUMENT WHICH IS REFERRED TO AS THE LARGE WECS HANDBOOK (LWH).

1979-0858 HOLTER O E, INGEBRETSEN F, PARR H
PHYSICS AND ENERGY RESOURCES.
OSLO, NORWAY, UNIVERSITETSFORLAGET, 1979. 224 P. (IN NORWEGIAN)

THE QUESTION OF ENERGY RESOURCES IS TREATED FROM A PHYSICS VIEWPOINT AT UNIVERSITY LEVEL. FOLLOWING AN INTRODUCTORY CHAPTER ON THE SIZE OF ENERGY RESOURCES AND THEIR DURATION, THE BASIC THERMODYNAMICS OF ENERGY SYSTEMS ARE PRESENTED. FURTHER CHAPTERS DEAL WITH DIRECT SOLAR ENERGY; HYDROELECTRIC ENERGY, WIND AND WAVE ENERGY; BASIC NUCLEAR PHYSICS; FISSION AND NUCLEAR POWER PLANTS; CONTROLLED THERMONUCLEAR FUSION; IONIZING RADIATION, ITS PHYSICAL AND BIOLOGICAL EFFECTS; FISSION, FUSION AND ENVIRONMENTAL PROBLEMS, THE THERMAL BALANCE OF THE EARTH AND CLIMATE.

1979-0859 HOWELL D G
PROCESSING OF ALBERTA WIND DATA AND ITS APPLICATION TO WIND ENERGY SYSTEM DESIGN.
SOLAR ENERGY: BRINGING IT DOWN TO EARTH. NATIONAL CONFERENCE ON SOLAR ENERGY, 5TH, CHARLOTTETOWN, PRINCE EDWARD ISLAND, CANADA, AUGUST 18, 1979. VOLUME 1. NTIS, 1979. PAPER 79-6, 11 P.
CONF-7908116-(VOL.1)

ATMOSPHERIC ENVIRONMENT SERVICE (AES) HAS BEEN GATHERING HOURLY METEOROLOGICAL DATA ACROSS CANADA FOR OVER 60 YEARS. TWENTY YEARS OF DATA FOR FIVE LOCATIONS IN ALBERTA WERE OBTAINED ON MAGNETIC TAPE FROM AES. A COMPUTER WAS USED TO ANALYSE THIS DATA AND PRODUCE TABLES AND GRAPHS USABLE IN DESIGNING WIND ENERGY SYSTEMS. INCLUDED IN THESE GRAPHS ARE HOURLY AND DAILY WIND POWER, DURATION OF LOW WIND SPEEDS, AND DIRECTION FREQUENCY, WIND POWER AND TOTAL ENERGY ROSES. THE METHOD OF DATA ANALYSIS IS DISCUSSED AS WELL AS THE APPLICATION OF THESE GRAPHS TO WIND ENERGY SYSTEM DESIGN. IN ADDITION, THE AUTOMATIC WIND DATA GATHERING SYSTEM PRESENTLY USED IN THE SOLAR AND WIND ENERGY RESEARCH PROGRAM (SWERP) IS HIGHLIGHTED.

1979-0860 HUTTER U
MODERN WIND TURBINES. MODERNITY WITH ROOTS.
VORTRAEGE DER RHEINISCH-WESTFAELISCHEN AKADEMIE DER WISSENSCHAFTEN. NATUR- UND WIRTSCHAFTSWISSENSCHAFTEN. OPLADEN, GERMANY, WESTDEUTSCHER VERLAG, 1979. P. 7-44. (IN GERMAN)

THE LOW ENERGY OF CONPENSATORY ATMOSPHERIC MOVEMENTS NEAR THE SURFACE AND ITS PRONOUNCED INCREASE WITH HEIGHT DICTATE WIND TURBINE SYSTEMS OF A SIZE GREATER THAN ANY PREVIOUSLY PLANNED. INDEPENDENT OF THE BASIC PRINCIPLE SUGGESTED, THE MOST EFFECTIVE METHOD OF MINIMIZING THE TOTAL EXPENDITURE IS TO USE THE HIGHEST POSSIBLE SPECIFIC SPEED. IN CASES WHERE WIND ENERGY SYSTEMS SUPPLY AN APPROPRIATE AMOUNT OF POWER TO A GRID, THE ANALYSIS OF THE DISCREPANCY BETWEEN THE MOMENTARY POWER AVAILABLE AND THE MOMENTARY DEMAND HAS, ASSUMING LARGE-SCALE SEPARATION OF THE WIND TURBINES IN AVAILABLE AREAS, SHOWN SURPRISINGLY GOOD RESULTS. THE COMPLEMENTARY USE OF SOLAR AND WIND ENERGY SYSTEMS, TAKING INTO CONSIDERATION GLOBAL CLIMATIC DATA, ALSO SEEMS VERY PROMISING. THE POTENTIAL AND PRECONDITIONS OF THE USE OF WIND POWER SYSTEMS ARE DISCUSSED.

1979-0861 BLUHM R, FREEBAIRN-SMITH R
COMMUNITY WIND ELECTRICAL POWER CASE STUDY: MUIR BEACH. FINAL REPORT.
NTIS, OCTOBER 1979. 52 P.
DOE/SF/01963-T2

MUIR BEACH EXPERIENCES RELATIVELY STEADY NORTHWEST COASTAL WINDS. RECORDINGS AT ANEMOMETER STATIONS HAVE INDICATED WIND SPEEDS AVERAGING 10 TO 12 MPH OVER THE YEAR. THIS COMPARES FAVORABLY WITH THE MINIMUM OF 8 TO 9 MPH GENERALLY CONSIDERED NECESSARY FOR FEASIBLE WIND-ELECTRIC GENERATION. GIVEN THE TOWN'S WIND ENVIRONMENT, A 100 KW WIND TURBINE OF THE KIND PLANNED COULD PROVIDE AN ANNUAL OUTPUT OF ABOUT 150,000 KWH, OR ABOUT

ONE-EIGHTH OF MUIR BEACH'S PROJECTED NEED. ESPECIALLY PROMISING FOR MUIR BEACH ARE OTHER POTENTIAL SITES AT HIGHER ELEVATIONS ON NEIGHBORING MT. TAMALPAIS, WHERE FEDERAL RECORDS INDICATE ANNUAL AVERAGE SPEEDS OF 18 MPH. EACH 100 KW WIND TURBINE SITED THERE COULD CONSERVATIVELY YIELD AT LEAST DOUBLE AND PERHAPS TRIPLE THE OUTPUT OF THE FIRST SYSTEM.

1979-0862 JACKSON P S
THE INFLUENCE OF LOCAL TERRAIN FEATURES ON THE SITE SELECTION FOR WIND ENERGY GENERATING SYSTEMS.
LONDON, ONTARIO, UNIVERSITY OF WESTERN ONTARIO, BOUNDARY LAYER WIND TUNNEL LABORATORY, MAY 1979. 86 P.
BLWT-1-1979

1979-0863 JOHNSON G L, WAGNER J
AGRICULTURAL APPLICATIONS OF WIND RESOURCE ASSESSMENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 293-301.
PNL-3214

GIVEN THE POTENTIAL AGRICULTURAL, UTILITY AND OTHER MARKETS FOR WIND POWER SYSTEMS THERE EXISTS A NEED FOR RELIABLE INFORMATION FROM WHICH TECHNICAL, FINANCIAL AND ECONOMIC QUESTIONS ABOUT WECS USE CAN BE ANSWERED TO SERVE THE INFORMATION NEEDS OF WECS MANUFACTURERS, DISTRIBUTORS AND POTENTIAL LARGE AND SMALL-SCALE USERS. THE REGIONAL WIND ENERGY RESOURCE ASSESSMENTS ARE BEING DESIGNED TO SATISFY THE NEED FOR ACCESSIBLE, RELIABLE AND USEFUL WIND DATA.

1979-0864 KADLEC E G
CHARACTERISTICS OF FUTURE VERTICAL AXIS WIND TURBINES (VAWTS).
LARGE WIND TURBINE DESIGN CHARACTERISTICS AND R AND D REQUIREMENTS. CONFERENCE ON LARGE WIND TURBINE CHARACTERISTICS AND R AND D REQUIREMENTS, CLEVELAND, OHIO, APRIL 24, 1979. NTIS, 1979. P. 133-141.
NASA-CP-2106

SANDIA LABORATORIES IS DEVELOPING DARRIEUS VAWT TECHNOLOGY WHOSE ULTIMATE OBJECTIVE IS ECONOMICALLY FEASIBLE, INDUSTRY-PRODUCED, COMMERCIALLY MARKETED WIND ENERGY SYSTEMS. THE FIRST FULL CYCLE OF DEVELOPMENT IS COMPLETE, AND RESULTING CURRENT TECHNOLOGY DESIGNS HAVE BEEN EVALUATED FOR COST-EFFECTIVENESS. FIRST-LEVEL AERODYNAMIC, STRUCTURAL, AND SYSTEM ANALYSES CAPABILITIES HAVE EVOLVED DURING THIS CYCLE TO SUPPORT AND EVALUATE THE SYSTEM DESIGNS. THIS REPORT PRESENTS THE CHARACTERISTICS OF CURRENT TECHNOLOGY DESIGNS AND ASSESSES THEIR COST-EFFECTIVENESS. POTENTIAL IMPROVEMENTS IDENTIFIED IN THIS FIRST CYCLE ARE ALSO PRESENTED ALONG WITH THEIR COST BENEFITS.

1979-0865 KAIMAL J C
WIND STATISTICS AT THE BOULDER ATMOSPHERIC OBSERVATORY TOWER.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 81-90.
PNL-3214

THIS PAPER PRESENTS RECENT ANALYSES OF WIND FLUCTUATION DATA OBTAINED FROM THE 300-M TOWER AT THE BOULDER ATMOSPHERIC OBSERVATORY (BAO). THE ANALYSES ARE PART OF AN ONGOING EFFORT TO PROVIDE TURBULENCE STATISTICS FOR USE IN THE DESIGN OF WIND TURBINE GENERATORS. THE PERFORMANCE AND LIFE EXPECTANCY OF LARGE ROTOR BLADES ARE DIRECTLY AFFECTED BY SUCH FACTORS AS THE VERTICAL GRADIENT OF THE HORIZONTAL WIND VELOCITY, WIND DIRECTION VARIABILITY WITH TIME, AND GUST DISTRIBUTION OVER THE PLANE OF THE BLADES.

1979-0866 KEAR E B
PRELIMINARY RESULTS OF A 15-KW WECS OPERATING WITH UTILITY INTERFACE ON A PRIVATE DAIRY FARM.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 249-263.
CONF-7905109

DURING THE WINTER OF 1976, NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AGENCY (NYSERDA), NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (DEC), GRUMMAN AEROSPACE CORPORATION (LATER TO BE NAMED GRUMMAN ENERGY SYSTEMS) AND CLARKSON COLLEGE, MET TO DISCUSS THE POSSIBILITY OF RESPONDING TO THE THEN RECENTLY ISSUED REQUEST FOR PROPOSALS (RFP) FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) ASKING FOR PROOF OF CONCEPT PROJECTS INVOLVING THE UTILIZATION OF WIND ENERGY IN AGRICULTURE. UPON REVIEWING THE RFP, IT APPEARED TO THE GROUP THE BASIC OBJECTIVES WERE QUITE REALISTIC AND A DECISION WAS MADE TO RESPOND UTILIZING A GRUMMAN WINDSTREAM 25 AND LOCATING THE SYSTEM ON AN OPERATING DAIRY FARM IN NORTHERN NEW YORK STATE WHERE IT APPEARS GOOD AVERAGE WIND VELOCITIES OCCUR ACCORDING TO REED'S ANNUAL WIND POTENTIAL FOR THE UNITED STATES. IT WAS DECIDED TO TAKE THE APPROACH OF TYING THE WINDSTREAM 25 DIRECTLY INTO THE POWER GRID ON THE FARMSTEAD SIDE OF THE POWER METERS UTILIZING A GEMINI SYNCHRONOUS CONVERTER WHICH, AT THAT TIME, SEEMED TO BE THE ONLY AVAILABLE OFF THE SHELF STATE-OF-THE-ART CONVERSION SYSTEM.

1979-0867 KIRCHHOFF R H
TURBULENCE AND WTG PERFORMANCE.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979.
PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 131-137.
PNL-3214

THE UNIVERSITY OF MASSACHUSETTS 25-KW WIND TURBINE HAS BEEN INSTRUMENTED TO DETERMINE ITS STEADY STATE AND DYNAMIC OPERATING CHARACTERISTICS. THE RESULTS PRESENTED IN THIS PAPER FOCUS ON THE DYNAMIC RESPONSE OF THE TURBINE. R.M. YOUNG GILL TYPE ANEMOMETERS ARE USED TO MEASURE THE TURBULENT WIND CHARACTERISTICS. GENERATOR OUTPUT AND OTHER RESPONSE CHARACTERISTICS OF INTEREST ARE RECORDED ON FM TAPE.

1979-0868 KLUETER H H
SUMMARY OF WORKSHOP ON WIND ENERGY APPLICATIONS IN AGRICULTURE.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 1-9.
CONF-7905109

ABOUT 100 PARTICIPANTS ATTENDED THE THREE DAY WORKSHOP. THIS SUMMARY COVERS HIGHLIGHTS OF THE PAPERS FOR EACH DAY.

1979-0869 DIESENDORF M
COMMUNITY USE OF WINDPOWER.
ENERGY AND PEOPLE: SOCIAL IMPLICATIONS OF DIFFERENT ENERGY FUTURES. CANBERRA, AUSTRALIA, SOCIETY FOR SOCIAL RESPONSIBILITY IN SCIENCE (A.C.T.), 1979. P. 166-167.

THE AEROGENERATOR AT THE TVIND SCHOOLS, NEAR ULFBORG IN WESTERN DENMARK, IS AT PRESENT THE WORLD'S LARGEST OPERATING WIND MACHINE. DUBBED THE TVINDMILL, IT WAS BUILT BY THE SCHOOL TEACHERS AND VOLUNTEER WORKERS. THE ORIGINAL PURPOSE OF THE PROJECT WAS TWOFOLD: (1) TO PROVIDE ENERGY IN THE FORM OF HEAT AND ELECTRICITY FOR THE THREE SCHOOLS WHICH HAVE A TOTAL POPULATION OF 700 TO 800 PEOPLE; AND (2) TO PRODUCE A DEMONSTRATION MODEL OF THE COMMUNITY USE OF A RENEWABLE ENERGY SOURCE. THE TVINDMILL HAS PRODUCED ONLY A SMALL QUANTITY OF ELECTRICAL ENERGY TO DATE AS IT IS STILL UNDERGOING ITS INITIAL TEST PROGRAM. ACCORDING TO THE AUTHOR, THE PROJECT CURRENTLY IS UNDER ATTACK BY THE ELECTRICITY INDUSTRY, WITH ITS COMMITMENT TO NUCLEAR POWER DESPITE THE ECONOMIC PROBLEMS, BECAUSE IT FEELS THREATENED BY THE SUCCESSFUL CONSTRUCTION OF THE TVINDMILL.

1979-0870 LEE T R
ENERGY SELF-SUFFICIENCY IN MONSOONAL AUSTRALIA.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 173-177.

THIS PAPER DESCRIBES THE DARWIN SOLAR VILLAGE PROJECT, A SMALL RESIDENTIAL DEVELOPMENT NOW BEING CONSTRUCTED ON THE NORTH COAST OF AUSTRALIA. IT SETS OUT THE HISTORY OF THE PROJECT'S CONCEPTUAL DEVELOPMENT AND DESCRIBES THE TECHNOLOGY TO BE EMPLOYED AND THE SOCIAL REQUIREMENTS TO ACHIEVE THE AIM OF ENERGY SELF-SUFFICIENCY AT CURRENT WESTERN AMENITY LEVELS. THE PROJECT IS NOW ONLY NINE MONTHS INTO ITS PLANNED FIVE-YEAR CONSTRUCTION PERIOD. SIGNIFICANT RESULTS WILL NOT BE AVAILABLE FOR YWO YEARS.

1979-0871 LILJEDAHL L A
AGRICULTURAL USE OF WIND POWER.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 12-21.
CONF-7905109

THE FIRST OBJECTIVE OF THIS WORKSHOP IS TO MAKE A PUBLIC PRESENTATION OF THE RESEARCH THAT HAS BEEN CONDUCTED UNDER THE USDA-DOE PROGRAM OF RESEARCH ON THE AGRICULTURAL USE OF WIND POWER IN THE 4 YEARS SINCE THIS WORK BEGAN. SEVERAL STUDIES HAVE BEEN COMPLETED, AND SUBSTANTIAL PROGRESS HAS BEEN MADE IN SEVERAL OTHERS. THEREFORE, THE AGRICULTURAL INDUSTRY, THE AGRICULTURAL EQUIPMENT INDUSTRY, AND THE PUBLIC-AT-LARGE SHOULD BE INFORMED OF WHAT HAS BEEN LEARNED TO DATE. THE SECOND OBJECTIVE OF THIS WORKSHOP IS TO OBTAIN RECOMMENDATIONS, FROM AN INFORMED, BROADLY REPRESENTATIVE GROUP, ON THE FUTURE DIRECTION OF THE USDA PROGRAM ON WIND ENERGY RESEARCH. THESE RECOMMENDATIONS COME FROM THE WORKSHOP DISCUSSION GROUPS.

1979-0872 MA F S, CHAN M L, CURTICE D H
INTERFACING DISPERSED SOLAR AND WIND SYSTEMS WITH ELECTRICAL DISTRIBUTION SYSTEMS.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2138-2142.

THE RESULTS OF A RESEARCH EFFORT TO DEVELOP A METHODOLOGY FOR EVALUATING THE IMPACTS ON THE PLANNING AND OPERATION OF THE ELECTRIC DISTRIBUTION SYSTEMS AS A RESULT OF INCREASED PENETRATION OF DISPERSED SOLAR AND WIND (DSW) ELECTRIC GENERATORS ARE REPORTED. A DISCUSSION OF THE MAJOR CONSIDERATIONS IN THE PLANNING AND OPERATION OF THE DISTRIBUTION SYSTEM WHEN DSW DEVICES ARE INTRODUCED IS PRESENTED. ALL OF THESE CONSIDERATIONS NEED TO BE FACTORED INTO THE COST OF SERVICE DETERMINATION FOR RATE DESIGNS. ALSO, THE METHODOLOGY BEING DEVELOPED FOR THE ANALYSIS IS DESCRIBED.

1979-0873 MARIER D
SPECIAL EDITION: WIND ENERGY.
ALTERN. SOURCES ENERGY NO. 38: 1-56, JULY 1979.

SEVERAL ARTICLES ARE PRESENTED WHICH DISCUSS WIND TURBINE MANUFACTURERS, SYNCHRONOUS INVERTERS, INDUCTION GENERATORS, NEW WIND TURBINE PROJECTS, TAX CREDITS FOR WIND POWERED SYSTEMS, A CONCENTRATED ALTERNATOR DESIGN, THE NEW YORK CITY ENERGY TASK FORCE, AND INSTALLING AND MAINTAINING SMALL WIND TURBINES.

1979-0874 MCKENZIE B A
HOW FARMERS ADOPT NEW PRACTICES AND EQUIPMENT.
WIND ENERGY APPLICATIONS IN AGRICULTURE. PROCEEDINGS. USDA WIND WORKSHOP, MAY 15-17, 1979. NTIS, 1979. P. 299-302.
CONF-7905109

THE UTILIZATION OF WIND TURBINES BY THE FARMING INDUSTRY IS ANALYZED. ECONOMIC CONSIDERATIONS AS WELL AS USABILITY AND RELIABILITY ARE DISCUSSED.

1979-0875 MCPHILLIPS M
WIND PRODUCTS BUYER'S GUIDE.
NEW YORK, EVEREST HOUSE, 1979. P. 115-124.

WIND PRODUCTS ARE LISTED IN ALPHABETICAL ORDER IN THREE CATEGORIES: WIND MACHINES, WATER PUMPING WINDMILLS, AND WIND SYSTEM COMPONENTS AND MANUFACTURERS.

1979-0876 MERONEY R N
WECS SITE SCREENING BY PHYSICAL MODELING.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 393-404.
PNL-3214

THIS PAPER SUMMARIZES THE RESULTS OF A PHYSICAL MODELING PROGRAM TO STUDY THE INTERACTION OF WIND AND TOPOGRAPHY. THE PROGRAM'S PRIMARY PURPOSE WAS TO PROVIDE INFORMATION OF USE TO WIND-POWER SITE SELECTION; HOWEVER, THE RESULTS WILL ALSO BE OF INTEREST TO THOSE INVOLVED IN ARCHITECTURAL PLANNING, WIND LOADING ON BUILDINGS, FOREST BLOWDOWN, BALLISTICS, OR SNOW DRIFTING.

1979-0877 NEUSTADTER H E
USE OF WIND DATA WITH AN OPERATIONAL WIND TURBINE IN A RESEARCH AND DEVELOPMENT ENVIRONMENT.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 179-188.
PNL-3214

THE DEPARTMENT OF ENERGY IDENTIFIED 17 CANDIDATE SITES FOR DETAILED EVALUATION AS POTENTIAL SITES FOR INSTALLATION OF LARGE, HORIZONTAL AXIS WIND TURBINES (WT), AS PART OF ITS WIND ENERGY PROGRAM. FROM THESE

INITIAL SITES, FOUR WERE SUBSEQUENTLY SELECTED FOR INSTALLATION OF THE WT, KNOWN AS MOD-0A. THIS PAPER DESCRIBES THE MOD-0A WT. THE FOLLOWING SECTIONS DESCRIBE THE METEOROLOGICAL DATA COLLECTED, SHOW SOME OF THE ANALYSES BASED ON THESE WIND DATA, AND DISCUSS ADDITIONAL AREAS CURRENTLY BEING INVESTIGATED IN RELATION TO THESE DATA.

1979-0878 PANOFSKY H A, VILARDO J M, SHIRER H N, LIPSCHUTZ R C, LARKO D E
EFFECT OF COMPLEX TERRAIN ON WIND FLUCTUATIONS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 91-100.
PNL-3214

THE PURPOSE OF THIS PAPER IS TO DESCRIBE TECHNIQUES WHICH MAKE POSSIBLE THE ESTIMATION OF CERTAIN STATISTICS OF THE NATURAL WIND FROM EASILY ACCESSIBLE METEOROLOGICAL AND TERRAIN VARIABLES, WITH EMPHASIS ON STRONG WINDS AND ON COMPLEX TERRAIN.

1979-0879 PENNELL W T
OVERVIEW OF WIND ENERGY SITING METHODOLOGIES.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 325-328.
PNL-3214

1979-0880 POWELL D C
REVIEW OF GUST MODEL CONCEPTS.
NTIS, NOVEMBER 1979. 21 P.
PNL-SA-7966

WITHIN THE PAST TWO YEARS PACIFIC NORTHWEST LABORATORY (PNL) HAS BEEN ASSOCIATED DIRECTLY OR INDIRECTLY WITH SEVERAL DOCUMENTS IN WHICH THE AUTHORS SET FORTH THEIR CONCEPT OF A WIND COMPONENT GUST MODEL. IN THIS PAPER THREE MODELS, EACH REPRESENTING A SOMEWHAT DIFFERENT CONCEPT, ARE REVIEWED. A GUST MODEL CAN BE DEFINED AS A MATHEMATICAL MODEL THAT BEGINS BY DESCRIBING WIND FLUCTUATIONS IN TERMS OF DISCRETE EVENTS AND ENDS BY DEFINING STATISTICS OF THOSE EVENTS. IN THE PRESENT MODELS, ALL WIND FLUCTUATION IS DESCRIBED IN TERMS OF EITHER INDIVIDUAL WIND COMPONENTS WITH RESPECT TO A CARTESIAN COORDINATE SYSTEM AT A SINGLE POINT, OR VOLUME AVERAGES OF THESE WIND COMPONENTS.

1979-0881 POWELL D C
WIND FLUCTUATIONS DESCRIBED AS DISCRETE EVENTS.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 71-79.
PNL-3214

THIS PAPER DISCUSSES A WIND FLUCTUATION DESCRIPTION THAT IS EXPRESSED AS THE FREQUENCY OF OCCURRANCE OF SOME SPECIFICALLY DEFINED CLASS OF TURBULENCE EVENTS.

1979-0882 PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979
RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. 479 P.
CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979, PORTLAND, OREGON, JUNE 19-21, 1979.
PNL-3214

THIS CONFERENCE CONTAINS 38 PAPERS, WITH SUBJECT MATTER CONCERNED WITH WIND ENERGY IN TERMS OF CHARACTERISTICS FOR OPERATIONS, RESOURCE ASSESSMENT AND SITING METHODOLOGIES. THE MAIN ENGINEERING DISCIPLINES INVOLVED ARE: MECHANICAL, AERONAUTICAL, ELECTRICAL AND CIVIL.

1979-0883 ROSENFELD C L, MAULE P A
REMOTE SENSING APPLICATIONS TO WIND POWER FACILITY SITING.
PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 375-379.
PNL-3214

PROSPECTING FOR WIND POWER POTENTIAL PROCEEDS FROM A REGIONAL OR LARGE-AREA ASSESSMENT TO THE IDENTIFICATION OF EXPERIMENTAL SITES FOR INSTRUMENTATION WITH ANEMOMETERS. THIS RESEARCH IS CENTERED ON AN EVALUATION OF REMOTE SENSING AND ASSOCIATED INTERPRETATION TECHNIQUES TO ASSIST IN THE RECONNAISSANCE FOR INDICATORS OF WIND POWER POTENTIAL.

1979-0884 SHINN J H, SHERMAN C A, WALTON J J, HILL K L, CLEGG B R, WHISLER D
OAHU SURFACE WIND NETWORK. SUMMARY OF DATA, AUGUST 1976 THROUGH JULY 1978.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JUNE 1979. 469 P.
UCID-18232, E1.28:UCID-18232

A TWENTY-ONE STATION NETWORK OF SURFACE WIND OBSERVATIONS ON OAHU, HAWAII, PROVIDES AN EXTENSIVE DATA BASE FOR CHARACTERIZATION OF MESOSCALE PHENOMENA. THESE DATA ARE AVAILABLE IN HOURLY AVERAGES OF WIND SPEED AND DIRECTION BEGINNING IN AUGUST 1976, AND ARE SUMMARIZED HERE BY MEANS OF AN AUDIT AND STATISTICS. THE AUDIT SHOWS THE AMOUNT OF DATA AVAILABLE FROM EACH STATION, AND THE STATISTICS PROVIDED ARE THE "AVERAGE" DAY (DIURNAL TREND) AND DEVIATION, THE MONTHLY TRENDS OF DAILY MEANS, THE WIND SPEED DURATION CURVE, THE WEIBULL DISTRIBUTION FIT AND A FREQUENCY OF OCCURRENCE HISTOGRAM.

1979-0885 SIM S R
ENVIRONMENTAL AND SOCIOECONOMIC ASPECTS OF SELECTED DISPERSED SOLAR ELECTRIC TECHNOLOGIES.
SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 2047-2051.

THE ENVIRONMENTAL IMPACTS EXPECTED TO RESULT FROM WIDESPREAD USE OF CERTAIN DISPERSED SOLAR ELECTRIC TECHNOLOGIES APPEAR TO BE RELATIVELY MINOR WHEN COMPARED WITH THOSE EMANATING FROM EXISTING ELECTRICITY GENERATING FACILITIES. THOSE IMPACTS WHICH WILL OCCUR WILL PRIMARILY BE EXTREMELY LOCALIZED HEALTH CONCERNS. CONVERSELY, SIGNIFICANT SOCIOECONOMIC BARRIERS TO THE DEPLOYMENT OF SUCH ONSITE SYSTEMS MAY EXIST. THE MOST SIGNIFICANT OF THESE APPEAR TO INVOLVE THE ISSUES OF INTERFACE WITH ELECTRICAL UTILITIES, ZONING, BUILDING CODES, SAFETY, INSURANCE AND PUBLIC ACCEPTANCE.

1979-0886 SISTERSON D L, HICKS B B
APPLICATION OF POWER LAWS FOR WIND ENERGY ASSESSMENT.

PROCEEDINGS OF THE CONFERENCE AND WORKSHOP ON WIND ENERGY CHARACTERISTICS AND WIND ENERGY SITING 1979. PORTLAND, OREGON, JUNE 19-21, 1979. RICHLAND, WASHINGTON, PACIFIC NORTHWEST LABORATORY, 1979. P. 353-359.
ALSO: NTIS, 1979. 8 P.
PNL-3214, CONF-790665-2

THIS INVESTIGATION MAKES USE OF WIND DATA FROM THE ANL METEOROLOGY TOWER IN NORTHERN ILLINOIS. FOR CONVENIENCE, AND SINCE QUESTIONS OF WIND ENERGY WILL BE ADDRESSED IN WHICH THE USE OF THE POWER-LAW WIND PROFILE IS COMMON, POWER LAWS HAVE BEEN FITTED TO ACTUAL WIND PROFILES, AND THE FREQUENCY DISTRIBUTION OF THE POWER-LAW EXPONENT HAS THEN BEEN DETERMINED HOURLY, SEASONALLY, AND ANNUALLY.

1979-0887 SLOOP J L, WATT M H, GORDON J J
SOLAR ENERGY IN AFRICA: SURVEY OF NEEDS AND ACTIVITIES; POTENTIAL APPLICATIONS OF SMALL SOLAR ENERGY SYSTEMS. SUN 2. INTERNATIONAL SOLAR ENERGY SOCIETY SILVER JUBILEE CONGRESS, ATLANTA, GEORGIA, MAY 1979. PROCEEDINGS. ELMSFORD, NEW YORK, OXFORD, ENGLAND, PERGAMON PRESS, 1979. P. 1471-1474.

THIS TWO-PART STUDY CONSISTS OF A SURVEY OF SOLAR ENERGY ACTIVITIES IN EIGHT AFRICAN COUNTRIES AND AN ASSESSMENT OF SPECIFIC ENERGY NEEDS OF A TYPICAL AFRICAN VILLAGE. THE AFRICAN COUNTRIES OF KENYA, CAMEROON, NIGERIA, NIGER, IVORY COAST, SENEGAL, MAURITANIA, AND MALI, THOUGH DIFFERING IN CLIMATE AND ECONOMIC AND ENERGY RESOURCES, HAVE SIMILAR ELECTRIC ENERGY NEEDS. NOT SURPRISINGLY, THE GREATEST NEED FOR SOLAR ENERGY WAS IN RURAL APPLICATIONS. THE SURVEY SHOWED PHOTOVOLTAICS TO BE THE MOST PROMISING SOLAR ENERGY TECHNOLOGY FOR MEETING THE ELECTRIC POWER NEEDS OF REMOTE AFRICAN VILLAGES. IN THE CASE STUDY OF THE AFRICAN VILLAGE, THREE SOLAR TECHNOLOGIES--PHOTOVOLTAICS, WIND, AND SOLAR THERMAL--WERE CONSIDERED FOR MEETING THE VILLAGE'S ELECTRIC ENERGY REQUIREMENT.

1979-0888 SMALL SEWAGE LAGOON ENHANCEMENT PROJECT.
NTIS, 1979. 6 P.
DOE/R5/10125-1

THE INTENT WAS TO APPLY SIMPLE, EXISTING TECHNOLOGY TO ENHANCE THE EFFICIENCY OF A SMALL, OVERLOADED SEWAGE LAGOON SYSTEM. IF SUCCESSFUL, THE TECHNIQUE EMPLOYED COULD BE USED BY SMALL COMMUNITIES AND BY FOOD PROCESSING PLANTS IN NORTHERN STATES TO ALLEVIATE A SERIOUS ENVIRONMENTAL PROBLEM WITH A LOW EXPENDITURE OF ENERGY AND REDUCED COSTS FOR CAPITAL, MAINTENANCE, AND OPERATION. THE PROBLEM ORIGINATES FROM LOW RATES OF BACTERIAL DEGRADATION OF ORGANIC WASTES DURING WINTER MONTHS, RESULTING IN COMPLAINTS ABOUT ODOR DURING SPRING AND FALL TURNOVER TIMES. THE PROPOSED SOLUTION INVOLVES RAISING WATER TEMPERATURE IN SEWAGE LAGOONS BY INSULATING THE SURFACE AND ADDING HEAT PROVIDED BY WIND-TURBINE POWERED RESISTANCE HEATERS IMMERSED IN THE LAGOONS. THUS SMALL LAGOON SYSTEMS AT COLD WEATHER SITES COULD ACCOMMODATE INCREASED LOADS WITHOUT EXPANDING THE SIZE OF THE SYSTEM OR INVESTING IN PROHIBITIVELY COSTLY AERATION SYSTEMS. THE PROPOSAL PRESENTED ESTIMATED COSTS DEMONSTRATING THAT THE LAGOON IN ALLENDALE COULD BE TREATED BY THE NEW METHOD AT AN ANNUAL SAVINGS OF 65,000 KILOWATT HOURS AND WITH RECOVERY OF ADDED CAPITAL INVESTMENT IN TWO YEARS COMPARED WITH THE AERATION METHOD. BEYOND THAT POINT A SAVINGS IN OPERATING COSTS OF $2000 TO $3000 ANNUALLY COULD BE REALIZED (BASED ON PRESENT COSTS FOR ELECTRICITY).

1978-0285 AHMADI G
SOME PRELIMINARY RESULTS ON THE PERFORMANCE OF A SMALL VERTICAL-AXIS CYLINDRICAL WIND TURBINE.
WIND ENG. 2(2): 65-74, 1978.

THE PERFORMANCE OF A NEWLY DEVELOPED VERTICAL-AXIS ROTOR WITH FLEXIBLE BLADES IS STUDIED. THE MODEL OF THE TURBINE IS DESCRIBED AND SOME PRELIMINARY EXPERIMENTAL RESULTS ON ITS PERFORMANCE ARE PRESENTED. THE EFFECT OF WIND VELOCITY AND VARIOUS BLADE ANGLE SETTINGS ON THE POWER COEFFICIENT ARE DISCUSSED AND THE POSSIBLE USE OF THIS SIMPLE AS WELL AS ECONOMICAL WIND ENERGY CONVERTER IN THE RURAL AREAS IS POINTED OUT.

1978-0286 ALLISON H J
DECENTRALIZED POWER SYSTEMS FOR DEVELOPING COUNTRIES.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 112-116.

DECENTRALIZED POWER SYSTEMS WHICH OPERATE FROM RENEWABLE ENERGY RESOURCES CAN SUPPLY RELIABLE ENERGY TO REMOTE AREAS OF THE DEVELOPING COUNTRIES OF THE WORLD. SUCH SYSTEMS CAN DO MUCH TO IMPROVE THE QUALITY OF LIFE FOR MILLIONS OF PEOPLE THROUGHOUT THE WORLD. THIS PAPER DESCRIBES AN ENERGY SYSTEM WHICH INTEGRATES SOLAR, WIND, AND BIOMASS RESOURCES IN A MANNER WHICH PRODUCES A MORE FLEXIBLE AND RELIABLE POWER SOURCE THAN COULD BE MADE AVAILABLE FROM SEPARATE USES OF THESE RENEWABLE RESOURCES.

1978-0287 BILGEN E, PARASCHIVOIU I, KAINE M
HYBRID WIND TURBINE SUITABLE FOR DEVELOPING COUNTRIES.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 2, PAP. 4.3.3. 6 P.

IN THIS ARTICLE, A STUDY IS PRESENTED ON A HYBRID WIND TURBINE WHICH CONSISTS OF TWO VERTICAL AXIS COAXIAL TURBINES, ONE OF SAVONIUS TYPE AND THE OTHER A SCREW TYPE. THE SAVONIUS TYPE TURBINE ROTATES IN A UNIFORM VELOCITY FIELD WHILE THE SECOND, THE SCREW TYPE, CONVERTS THE KINETIC ENERGY OF THE VORTEX FLOW GENERATED IN THE CENTER OF THE FIRST TURBINE.

1978-0288 CROMACK D, EDDS M
OPERATIONAL ASPECTS OF THE UMASS WIND TURBINE.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 62-72.

THE WIND FURNACE PROJECT WAS BEGUN IN 1975 UNDER AN NSF GRANT TO INVESTIGATE THE FEASIBILITY OF USING WIND POWER FOR SPACE HEATING IN A COLDER CLIMATE. THIS WORK HAS CONTINUED UNDER ERDA AND DOE SUPPORT AS PART OF THE ROCKWELL INTERNATIONAL WIND ENERGY PROGRAM. SOLAR HABITAT I, AND ENERGY CONSERVATION HOUSE DESIGNED BY PROFESSOR CURTIS JOHNSON OF THE DEPARTMENT OF FOOD, AND AGRICULTURAL ENGINEERING, SERVES AS A DEMONSTRATION FACILITY FOR THE WIND FURNACE. CONCEPTUALLY THE WIND FURNACE IS A HEATING SYSTEM CONSISTING OF A WIND TURBINE, SOLAR FLAT PLATE COLLECTORS, A STORAGE SYSTEM AND A HEAT DELIVERY SYSTEM. WATER IN THE INSULATED THERMAL STORAGE TANK IS HEATED BY THE SOLAR COLLECTORS AND BY THE ELECTRICITY GENERATED BY THE WIND TURBINE. IN TURN, THIS WATER IS USED TO HEAT THE HOUSE BY CONVENTIONAL BASEBOARD HOT WATER CONVECTORS. A GAS FIRED HOT AIR FURNACE SERVES AS THE AUXILIARY BACK-UP HEATING SYSTEM.

1978-0289 CROMACK D E, HERONEMUS W E
WIND POWER FOR SPACE HEATING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 185-201.
CONF-770921/1

ONE OF THE MOST COST EFFECTIVE APPLICATIONS FOR WIND POWER IS THOUGHT TO BE FOR SPACE HEATING. THIS PAPER PRESENTS A BRIEF DESCRIPTION OF THE UMASS WIND FURNACE, THE DESIGN AND CONSTRUCTION ASPECTS ALONG WITH A DISCUSSION OF THE PRELIMINARY COMPONENT TESTS AND INITIAL OPERATIONAL EXPERIENCE. THE WIND FURNACE WILL BE DEMONSTRATED UNDER FULLY AUTOMATIC OPERATION DURING THE 1977-78 HEATING SEASON.

1978-0290 DARKAZALLI G, MCGOWAN J G
ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF RESIDENTIAL WIND OR WIND AND SOLAR POWERED HEATING SYSTEMS.
SOL. ENERGY 21(5): 415-421, 1978.

A PERFORMANCE AND COST MODEL FOR A VARIETY OF WIND POWERED SPACE AND WATER HEATING SYSTEMS FOR SINGLE FAMILY RESIDENCES IS PRESENTED. IN ADDITION TO WIND POWERED SYSTEMS, COMBINED WIND AND SOLAR SYSTEMS ARE MODELED AND COMPARED TO CONVENTIONAL AND SOLAR ONLY HEATING SYSTEMS. ANALYTICAL RESULTS ARE PRESENTED FOR A SITE IN AMHERST, MASSACHUSETTS. SYSTEM CAPITAL ECONOMIC DETAILS INCLUDE AN ITEMIZED COST BREAKDOWN OF THE WIND HEATING SYSTEM COMPONENTS. THE RESULTS DEMONSTRATE THAT WIND POWERED SYSTEMS ARE PRESENTLY COMPETITIVE WITH ELECTRIC BASED HEATING SYSTEMS AND WILL BE COMPETITIVE WITH OIL OR GAS SYSTEMS IN THE FUTURE.

1978-0291 KILKIS B
USE OF WIND ENERGY FOR IRRIGATION AND ENERGY SUPPLY PURPOSES IN A TURKISH VILLAGE.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 347-363.

THE DESIGN CONSIDERATIONS, PROCEDURE AND DETAILS OF A WINDMILL DESIGN AIMED TO MEET THE SPECIFIC DEMANDS OF A TURKISH VILLAGE ARE PRESENTED. THE DESIGN MAINLY CONSISTS OF A HORIONTAL AXIS, THREE BLADED, 14.7 M. DIAMETER ROTOR AND A HYDRAULIC ENERGY STORAGE SYSTEM. COMPUTED ROTOR POWER IS 7.5 KW AT 6 M/SEC CONSTANT WIND SPEED. MECHANICAL (1.34 KW) AND/OR ELECTRICAL (1 KW) ENERGY SUPPLY IS MADE AVAILABLE DEPENDING UPON THE INSTANTANEOUS MODE OF DEMAND.

1978-0292 KUMAR K L, GROVER O P, SACHDEVA R C
WIND MILLS FOR RURAL INDIA.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1838-1842.

STUDIES OF DIFFERENT TYPES OF WIND MILLS REVEAL THE POSSIBILITY OF ADAPTING SOME OF THEM FOR RURAL INDIA. A VERTICAL-AXIS VERTICAL BLADED WIND MILL IS SEEN TO BE SUITABLE FOR PROVIDING A SELF-SUFFICIENT RURAL UTILITY SYSTEM FOR INDIAN CONDITIONS. A HORIZONTAL-AXIS MULTIBLADED ROTOR IS FOUND TO BE OPERATIONAL AT LOW WIND-SPEEDS AND USEFUL FOR HIGH INITIAL-TORQUE TASKS SUCH AS SUGAR-CANE EXTRACTORS AND OIL EXTRACTORS.

1978-0293 MCGOWAN J G, CROMACK D E, EDDS M, LEWIS D C
OPERATIONAL EVALUATION OF A WIND POWERED HEATING SYSTEM.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING,

DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 746-752.

THIS PAPER PRESENTS EXPERIMENTAL RESULTS AND OPERATIONAL EXPERIENCE FOR A RESIDENTIAL WIND HEATING SYSTEM (WIND FURNACE) INSTALLED IN NEW ENGLAND BASED ON A 25 KW WIND TURBINE GENERATOR. IN ADDITION TO A DESCRIPTION OF MODIFICATIONS TO THE ORIGINAL WIND (AND SOLAR) SYSTEM, THE DATA ACQUISITION AND REDUCTION SYSTEM IS DESCRIBED. DETAILED PERFORMANCE DATA IS PRESENTED FOR THE WIND TURBINE GENERATOR ALONG WITH A SUMMARY OF THERMAL TEST RESULTS.

1978-0294 MUKHOPADHYAY V
VERTICAL AXIS TILTING BLADE WINDMILL SUITABLE FOR USE IN RURAL AREAS IN INDIA.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1863-1866.

A VERTICAL AXIS DIFFERENTIAL DRAG TYPE WINDMILL IS DEVELOPED ALONG WITH A WORKING MODEL TO DEMONSTRATE THE FEASIBILITY. THE POWER COEFFICIENT VARIATION WITH TIP SPEED RATIO IS CALCULATED BASED ON A SIMPLE ANALYTICAL MODEL AND COMPARED WITH OTHER TYPES OF WINDMILLS. THIS TYPE OF WINDMILL IS THOUGHT TO BE SUITABLE AND COST EFFECTIVE FOR USE IN SMALL IRRIGATION, LIFTING WATER FROM WELLS AND TUBEWELLS ETC. IN RURAL AREAS IN INDIA, BECAUSE OF ITS INHERENT SIMPLICITY AND ABILITY TO RESPOND TO GUSTY WINDS WITHOUT A STEERING MECHANISM. BECAUSE OF SLOW ROTATIONAL SPEED, NO EXPENSIVE GEARING MECHANISM IS NECESSARY. THUS THE PROBLEM OF PILFERAGE COULD BE MINIMIZED AND TIMELY MAINTENANCE ENSURED. THESE POINTS ARE OFTEN OVERLOOKED IN DESIGN AND INSTALLATION OF SOME EFFECIENT BUT EXPENSIVE AND SOPHISTICATED WINDMILLS FOR RURAL USE.

1978-0295 NOLL R B, DREES H M, NICHOLS L
DEVELOPMENT OF THE 1-2 KW CYCLOTURBINE.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 40-49.
CONF-780357

THE DESIGN AND DEVELOPMENT OF A SMALL WIND ENERGY SYSTEM IN THE 1 TO 2 KW RANGE IS DISCUSSED. THE CYCLOTURBINE, A VERTICAL-AXIS, STRAIGHT-BLADED, WIND-DRIVEN TURBINE WITH CYCLICALLY PITCHED BLADES IS BEING DEVELOPED FOR ROCKWELL INTERNATIONAL. THE COMPLETED TURBINE IS INTENDED FOR USE IN RURAL AND REMOTE APPLICATIONS NECESSITATING VERY HIGH RELIABILITY AND LOW COST IN BOTH THE TURBINE AND THE ELECTRICAL SYSTEM. THE CONSTRUCTION AND DESIGN CONSIDERATIONS OF THE SYSTEM CURRENTLY UNDER DEVELOPMENT ARE DISCUSSED AND PERFORMANCE CHARACTERISTICS FOR EXISTING CYCLOTURBINES ARE GIVEN.

1978-0296 PLUCHARD A
SOLAR ENERGY AND TELECOMMUNICATIONS, A FRENCH PROGRAMME OF DEVELOPMENT AND RESEARCH.
SOLTECH '78 CONFERENCE PROCEEDINGS. MIDDLE EAST SOLAR TECHNOLOGY EXHIBITION AND CONFERENCE. BAHRAIN, BAHRAIN, APRIL 24, 1978. LONDON, ENGLAND, UK-ISES, 1978. P. 19-20.

THE DEVELOPMENT IN FRANCE OF SMALL POWER SUPPLIES, CALLED AEROSOLEC, WHICH USE BOTH SOLAR CELL ARRAYS AND WIND TURBINES FOR TELECOMMUNICATIONS STATIONS IN REMOTE SITES IS DESCRIBED. THE SYSTEM DESIGN CAN BE TAILORED TO FIT THE PREVAILING CLIMACTIC ENVIRONMENT; ELECTRIC BATTERIES ARE USUALLY USED.

1978-0297 DRIGGS C L, HOESON M J
REVIEW OF ALTERNATIVE CAES CONCEPTS FOR THE FUTURE.
1978 COMPRESSED AIR ENERGY STORAGE SYMPOSIUM PROCEEDINGS. CAES TECHNOLOGY SYMPOSIUM, PACIFIC GROVE, CALIFORNIA, MAY 15, 1978. P. 967-1002.
CONF-780599-P2

THE MAJORITY OF PROPOSED CAES PLANT CONCEPTS FOR THE NEAR TERM TYPICALLY ARE LARGE SCALE UNITS (180 TO 280 MW) REQUIRING HIGH GRADE DISTILLATE FUEL, GENERALLY INTENDED FOR APPLICATION TO LARGE UTILITY SYSTEMS IN PLANT SIZES OF 500 TO 2,000 MW. A NUMBER OF ALTERNATIVE CONCEPTS INVOLVING THE USE OF COMPRESSED AIR STORAGE INCLUDING CONCEPTS FOR ELECTRIC POWER GENERATION ON A SMALL SCALE ARE REVIEWED WITH SOME PROJECTIONS OF PERFORMANCE AND COSTS.

1978-0298 REICHEL R
RURAL ELECTRIFICATION AND WINDPOWER IN TANZANIA.
NTIS, MARCH 1978. 253 P.
PB-298774

PRESENT RURAL ELECTRIFICATION IN TANZANIA MEANS SUPPLYING ELECTRICITY TO TOWNSHIPS AND TO ONLY A FEW OF THE EXISTING 8000 REGISTERED VILLAGES, WHICH ARE NOT YET ELECTRIFIED IN ANY CONSIDERABLE NUMBERS DUE TO TECHNICAL AND ECONOMICAL PROBLEMS. THE INITIAL DEMAND IS NORMALLY LOW AND THE DISTANCES ARE TOO GREAT TO JUSTIFY THE EXPENSES OF TRANSMISSION LINES. THUS INDIVIDUAL POWER STATIONS SEEM TO BE THE ONLY ALTERNATIVE. DEMAND FIGURES FOR TYPICAL VILLAGES ARE EVALUATED, AND COMPARED TO DATA FROM EUROPE. OUT OF THE ALTERNATIVE SOURCES OF ENERGY ONLY ONE, THE WIND ENERGY, IS DESCRIBED IN SOME DETAIL. SOME WINDPOWER THEORY AND BRIEF EXPLANATIONS OF WINDPOWER TERMS ARE GIVEN. THE STATUS OF CURRENT WINDPOWER RESEARCH IS DESCRIBED INCLUDING A LIST OF PAST AND PRESENT PROTOTYPES. BASED ON COMMERCIALLY MANUFACTURED WIND ENERGY SYSTEMS AND CAREFUL COST ESTIMATIONS AND CALCULATIONS, TWO WIND ENERGY SUPPLY SCHEMES ARE PROPOSED: ONE IS FOR A TELE-COMMUNICATION LINK AND THE OTHER FOR A COMPLETE VILLAGE POWER STATION OF 45 KW RATED OUTPUT. THE POWER STATION BASED ON WIND-ENERGY WAS FOUND TO DELIVER THE ELECTRICITY AT PRICES CHEAPER THAN THE DIESEL-BASED SCHEME AND, UNDER CERTAIN CONDITIONS, WORKING PROFITABLE IF CURRENT ELECTRICITY SELLING PRICES IN TANZANIA ARE CONSIDERED. OPERATING AND DESIGN CRITERIA ARE DISCUSSED.

1978-0299 SODERHOLM L H
RURAL USE OF WIND POWER TO CONSERVE ENERGY RESOURCES.
IEEE TRANS. IND. APPL. IA-14(6): 492-497, NOVEMBER - DECEMBER 1978.

ENERGY DERIVED FROM THE WIND OFFERS POSSIBILITIES FOR SUPPLEMENTING RURAL POWER SUPPLIES. BASIC CONCEPTS OF WIND-DERIVED POWER AND THE POSSIBILITIES OF CONSERVING ENERGY, REDUCING ELECTRICAL DEMAND, AND IMPROVING ELECTRICAL SYSTEM LOAD FACTORS ARE CONSIDERED.

1978-0300 SODERHOLM L H
USING WIND ENERGY FOR PEAK ELECTRICAL LOAD LEVELING.
ASAE, SUMMER MEETING, LOGAN, UTAH, JUNE 27-30, 1978. PAPER 78-3040. ST. JOSEPH, MICHIGAN, ASAE, 1978. 12 P.

THE POSSIBILITIES AND VALUE OF USING WIND ENERGY FOR LEVELING PEAK ELECTRICAL LOADS ON RURAL ELECTRIC POWER SYSTEMS ARE CONSIDERED FOR BOTH POWER SUPPLIERS AND USERS. A PRELIMINARY ANALYSIS OF EXPERIMENTAL AND

SIMULATION DATA FOR THE GRUMMAN "WINDSTREAM" WIND SYSTEM INDICATES THAT WIND ENERGY CAN MAKE A SUBSTANTIAL CONTRIBUTION TO LOAD LEVELING ON RURAL POWER SYSTEMS, PARTICULARLY FOR RURAL HEATING LOADS.

1978-0301 SRINATH L S, TEWARI S K
METHODOLOGY FOR EVALUATING THE WORTH OF A NEW ENERGY RESOURCE WITH PARTICULAR REFERENCE TO WIND ENERGY UTILISATION IN RURAL AREAS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1826-1831.

EVALUATION OF NEWER ENERGY RESOURCES HAS BEEN BESET WITH PROBLEMS LIKE UNCERTAINTY AND LACK OF DATA, ABSENCE OF WELL DEFINED CRITERIA, ETC. NEVERTHELESS, SUCH AN EVALUATION IS DESIRABLE EVEN WHILE MAKING DECISIONS TO SUPPORT AN R&D PROGRAM. IN THIS PAPER A METHODOLOGY IS PROPOSED WHICH INCLUDES EMPHASIS ON SEVERAL RELEVANT SOCIAL AND ECONOMIC FACTORS AND WHICH CONSIDERS AT THE SAME TIME SUBJECTIVE PREFERENCES OF DECISION MAKERS. A STUDY OF THE USE OF WIND ENERGY IN SEVERAL APPLICATIONS INDICATES THAT ITS CONVERSION INTO SHAFT WORK WITH THE OPTION FOR A SUBSEQUENT CONVERSION INTO ELECTRICITY HAS BEEN WELL ESTABLISHED. THEREFORE, A SEARCH FOR ALTERNATIVES TO WIND ENERGY SHOULD SCAN ALL THOSE ENERGY RESOURCES AND THEIR CONVERSIONS WHICH RESULT IN SHAFT OR MECHANICAL WORK.

1978-0302 VALDEZ M E, KITTLAUS E R
CONTROLLING A WIND GENERATOR FOR INCREASED EFFICIENCY.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 247-249.

THE POWER SYSTEMS LABORATORY IN THE CALIFORNIA STATE UNIVERSITY AT LONG BEACH IS STUDYING THE PROBLEM OF WIND POWER, CONCENTRATING ON THE CONCEPT OF SMALL AND MEDIUM-SIZE INSTALLATIONS. THIS SIZE HAS THE IMPORTANT ADVANTAGE IN THAT IT IS ALWAYS SIGNIFICANT FOR ISOLATED HOUSES, FARMS, AND COMMUNITIES. THIS CONCEPT HAS THE POTENTIAL OF BECOMING AN IMPORTANT FACTOR IN SOLVING ENERGY PROBLEMS OF THE FUTURE. THE PROJECT AT LONG BEACH IS DIRECTED AT SUPPLYING THE ENERGY NEEDS OF SUCH AN INSTALLATION AND AT THE PRODUCTION OF ELECTRICITY WITH THE HIGH RELIABILITY AND QUALITY TO WHICH WE ARE ACCUSTOMED. THIS PAPER PRESENTS THE RESULTS OF ONE OF THE PHASES OF THE PROJECT--THE INCREASE IN EFFICIENCY.

1978-0303 WENTINK T
ALASKAN WIND POWER.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 173-182.
CONF-770921/1

THE GENERAL OBJECTIVES ARE, SINCE 1973, TO EXAMINE THE POTENTIAL AND POSSIBLE APPLICATIONS OF ALASKAN WIND POWER. WHILE THESE MAY SEEM PAROCHIAL, AN IMPORTANT AUXILIARY OBJECTIVE ALWAYS IS TO CONTRIBUTE TO THE NATIONAL WIND ENERGY PROGRAM STARTED AT NSF AND CONTINUED AND EXPANDED BY ERDA. IN THIS SHORT PAPER ATTENTION IS DIRECTED TO THOSE CONFERENCE OBJECTIVES DEALING WITH PROGRESS, SIGNIFICANT RESULTS DURING THE LAST YEAR, AND APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS).

1978-0304 WIEBE B C
LICUS RELIABLE POWER AT REMOTE SITES VIA THE WIND.
INTELEC 78. INTERNATIONAL TELEPHONE ENERGY CONFERENCE, WASHINGTON, D.C., OCTOBER 25-27, 1978. NEW YORK, IEEE, 78CH1353-2, 1978. P. 79-84.

THE PAPER DEALS WITH THE DEVELOPMENT OF A RELIABLE, COST EFFECTIVE WIND POWER SYSTEM DESIGNED SPECIFICALLY FOR EXTENDED OPERATION AT UNMANNED SITES. THE SYSTEM EXAMINED IS A HYBRID VERTICAL AXIS TURBINE USED TO POWER A DIRECTLY COUPLED, LOW SPEED ALTERNATOR. A DESCRIPTION OF THIS SYSTEM IN RELATION TO BOTH A PURE DARRIEUS SYSTEM AND HORIZONTAL AXIS SYSTEMS IS PROVIDED. THE PAPER PROVIDES A DESCRIPTION OF SOME OPERATIONAL CONFIGURATIONS TO BE USED IN A USER EVALUATION PROGRAM. A DESCRIPTION OF THE METHODS REQUIRED TO PROPERLY SELECT A SITE FOR USE OF A WIND POWER SYSTEM AND THE EFFECT OF VARIOUS SITES ON THE EXPECTED CAPABILITY OF A SYSTEM IS PROVIDED. THE CAPITAL AND OPERATIONAL COST BENEFITS OF EMPLOYING A VERTICAL AXIS WIND POWER SYSTEM ARE ALSO COVERED.

1978-0305 ADLER F
GRUMMAN 8 KW WIND TURBINE GENERATOR PROJECT.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 112-118.

GRUMMAN ENERGY SYSTEMS (GESI) INVOLVEMENT IN THE 8 KW WIND TURBINE GENERATOR PROGRAM IS TO DESIGN AND BUILD A WIND TURBINE GENERATOR CAPABLE OF PRODUCING 8 KW OF ELECTRICAL POWER AT 20 MPH. THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP AND PROVIDE A PRACTICAL PROTOTYPE CAPABLE OF BEING ECONOMICALLY MANUFACTURED AND SOLD AT PRICES COMPETITIVE WITH ALTERNATIVE ENERGY SOURCES. FOR COMPETITIVE ECONOMIC COMPARISON, THE ALTERNATIVE ENERGY SOURCES TO BE CONSIDERED ARE: UTILITY GENERATED ELECTRICITY AND INDEPENDENT DIESEL OR GASOLINE GENERATING PLANTS ($.02 TO .20/KWH).

1978-0306 AGOPIAN K G, CROW S C
EFFECT OF ATMOSPHERIC DENSITY STRATIFICATION ON WIND TURBINE SITING. FINAL REPORT.
NTIS, JANUARY 1978. 103 P.
RLO-2444-78/1

THE EFFECT OF ATMOSPHERIC DENSITY STRATIFICATION ON THE FLOWFIELD OVER ISOLATED TERRAIN FEATURES IS STUDIED. COMPUTER CODES FOR DENSITY STRATIFIED AIRFLOW OVER TWO-DIMENSIONAL AND THREE-DIMENSIONAL IDEALIZED MOUNTAINS WERE DEVELOPED AND PARAMETRIC STUDIES PERFORMED TO EVALUATE THE SENSITIVITY OF THE NEAR-GROUND AIRFLOW AS A FUNCTION OF AMBIENT WIND SPEED AND DIRECTION, MOUNTAIN HEIGHT AND SHAPE, HEIGHT OF THE TROPOSPHERE, STRATIFICATION IN THE TROPOSPHERE, AND DIFFERENT INVERSION CONDITIONS. REGIONS OF PROBABLE FLOW SEPARATION ARE PREDICTED USING THE STRATFORD SEPARATION CRITERION AS APPLIED TO TURBULENT FLOWS.

1978-0307 AGOPIAN K G, CROW S C
THE EFFECT OF ATMOSPHERIC DENSITY STRATIFICATION ON WIND TURBINE SITING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS, WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 349-360.
CONF-770921/1

THE POWER AVAILABLE FROM THE WIND VARIES AS THE CUBE OF THE WIND SPEED, SO THE PERFORMANCE OF A WIND TURBINE DEPENDS CRITICALLY ON ITS LOCATION. THE PHENOMENA GOVERNING THE DISTRIBUTION OF WINDS ARE LISTED IN ORDER OF DECREASING HORIZONTAL SCALES. WIND DISTRIBUTIONS ARE GREATLY INFLUENCED BY LOCAL TOPOGRAPHY HAVING HORIZONTAL SCALES OF TENS OF KILOMETERS, SO THE FLOW FIELD IS DOMINATED BY ATMOSPHERIC DENSITY STRATIFICATION. THE

OBJECTIVE OF THIS STUDY IS TO DEVELOP A SIMPLE AND ACCURATE METHOD FOR COMPUTING THE LOCATION OF MAXIMUM WIND VELOCITY OVER A GIVEN TERRAIN BASED ON THE LINEAR THEORY OF STRATIFIED ATMOSPHERIC FLOW.

1978-0308 AHMADI G
AEROELASTIC WIND ENERGY CONVERTER.
ENERGY CONVERS. 18(2): 115-120, 1978.

THE PRINCIPLE OF AEROELASTIC WIND ENERGY CONVERSION IS INTRODUCED AND AN H SECTION MODEL WHICH WORKS ON THE BASIS OF TORSIONAL AEROELASTIC INSTABILITY IS DESCRIBED. A MATHEMATICAL FORMULATION FOR THE PREDICTION OF THE POWER COEFFICIENT OF SUCH WIND MACHINES IS PRESENTED. A SMALL MODEL IS CONSTRUCTED AND TESTED IN A WIND TUNNEL. ALTHOUGH THE EFFICIENCY OF THE MODEL WAS VERY LOW, THE SYSTEM HAS THE ADVANTAGE OF BEING CAPABLE OF CONVERSION OF ENERGY AT VERY LOW WIND SPEED. FURTHERMORE, THIS WIND ENERGY CONVERTER IS RELATIVELY SIMPLE AND ECONOMICAL.

1978-0309 WARNE D F
DESIGN AND APPLICATION OF LARGE WIND TURBINE GENERATORS.
ENERGY AND AEROSPACE, PROCEEDINGS OF THE JOINT RAES/AIAA CONFERENCE ON ENERGY AND AEROSPACE, LONDON, DECEMBER 5-7, 1978. LONDON, ROYAL AERONAUTICAL SOCIETY, 1978. 14 P.

THE ECONOMICS OF WIND POWER ARE DETERMINED BY THE MEAN WIND SPEED AT THE INTENDED POINT OF USE, THE ECONOMIES OF SCALE (WHICH FAVOR VERY LARGE MACHINES) AND THE ALTERNATIVE COST OF SUPPLYING ENERGY. THESE THREE FACTORS ARE DISCUSSED AND THE CONCLUSION DRAWN IS THAT THE APPLICATIONS MOST LIKELY TO BE ECONOMIC ARE SMALL HIGH RELIABILITY MACHINES FOR REMOTE POWER SUPPLIES, AND VERY LARGE NETWORK CONNECTED MACHINES AT CAREFULLY SELECTED HIGH WIND SPEED SITES. THE LATTER APPLICATION IS CONCENTRATED UPON IN THE PAPER.

1978-0310 LJUNGSTROM O
OFF-SHORE MULTI-MW SIZE WIND TURBINE SYSTEM DEVELOPMENT IS THE KEY TO COST-EFFECTIVE WIND ENERGY FOR SWEDEN.
ENERGY AND AEROSPACE, PROCEEDINGS OF THE JOINT RAES/AIAA CONFERENCE ON ENERGY AND AEROSPACE, LONDON, DECEMBER 5-7, 1978. LONDON, ROYAL AERONAUTICAL SOCIETY, 1978. 13 P.

THE ADVANTAGE OF OFF-SHORE WIND TURBINES OVER LAND-BASED WIND POWER SYSTEMS FOR SWEDEN IS STRESSED. IT IS SUPPOSED THAT BASED ON CURRENT SYSTEM STUDIES OF THE VERTICAL AXIS TYPE WIND TURBINE IN MULTI-MW SIZES, IT SHOULD BE POSSIBLE TO DEVELOP VERY LARGE OFF-SHORE UNITS, UP TO 15 MW AND PERHAPS EVEN 25 MW SIZE, ASSEMBLED COMPLETE AT SHIPYARDS AND TOWED TO THE SITE. THESE WILL REQUIRE MUCH LESS AREA AND MUCH SMALLER NUMBER OF UNITS FOR A GIVEN ENERGY PRODUCTION THAN CURRENT 4-5 MW UNIT SIZE LAND BASED DESIGNS.

1978-0311 ALWARD R
WIND: A BIBLIOGRAPHY.
BUTTE, MONTANA, NATIONAL CENTER FOR APPROPRIATE TECHNOLOGY, 1978. PUBL. NO. B002. 8 P.

THIS BIBLIOGRAPHY COVERS BOOKS, PAMPHLETS, PROCEEDINGS, PERIODICALS, PLANS, AND ACCESS BIBLIOGRAPHIES ON WIND POWER AND WIND TURBINE EQUIPMENT.

1978-0312 ANAPOL'SKAYA L E, GANDIN L S
WIND ENERGY RESOURCES AND METHODS FOR THEIR ESTIMATION.
SOV. METEOROL. HYDROL. NO. 7: 6-11, 1978.

A PROCEDURE IS PROPOSED FOR EVALUATION OF CLIMATIC WIND ENERGY RESOURCES, POTENTIAL AND THAT USED BY WIND ENGINES OF A GIVEN TYPE, FROM DATA ON THE STATISTICAL FREQUENCY DISTRIBUTION OF WIND VELOCITIES AND THE PARAMETERS OF THE ENGINE. IT IS SHOWN THAT THE ANNUAL VARIATION OF AIR DENSITY SHOULD BE NEGLECTED. CLIMATIC ANNUAL AVERAGE WIND ENERGY RESOURCES ARE COMPUTED FOR SEVERAL LOCALITIES WITH STRONG WINDS. IT IS SHOWN FOR REGIONS OF THE USSR WITH THE RICHEST WIND ENERGY RESOURCES THAT ENGINE-CONTROL REGIMES SHARPLY LIMIT OPPORTUNITIES FOR THEIR UTILIZATION.

1978-0313 ANDERSSON R
HORIZONTAL AXIS TURBINE, PRIMARILY FOR WIND POWER PLANTS.
SWEDISH PATENT NO. 7,609,457-2, APRIL 1978. (IN SWEDISH)

A HORIZONTALLY AXLED ROTOR PREFERABLY FOR WIND POWER PLANTS, CONTAINING A HUB AND AT LEAST TWO IN THE HUB BEARED BLADES. THE BLADES CONTAIN A MAIN STRUT IN THE LENGTH DIRECTION. THIS INVENTION IS AIMED TO ACHIEVE A ROTOR, WHERE THE MAIN STRUT IS TORSIONALLY RIGID AND STAYED IN FOUR DIRECTIONS AND WHERE THE BEARING OF THE BLADES IN THE HUB IS FLEXIBLE ACROSS THE PROFILE OF THE BLADE. THE BLADES ARE TURNABLE ROUND THE CENTER OF THE MAIN STRUT AND ARE AUTOMATICALLY TURNED AWAY WHEN THE WIND PRESSURE INCREASES. THIS CONTROL REQUIRES HOWEVER THAT THE TUM FRICTION NOT BE TOO BIG. THE BEARING IS A BALL-AND-SOCKET JOINT. THE LOAD OF THIS JOINT IS MINIMIZED BY ARRANGING THE STAYS SO THAT THE CENTRIFUGAL FORCES ELIMINATE THE FORCES IN THE STAYS. THE WHOLE TORQUE IS TRANSMITTED TO THE HUB. THE TURNING OF THE BLADES IS CONTROLLED BY MEANS OF HYDRAULIC PISTONS.

1978-0314 ANDREWS J
WINDMILL POWER FOR AUSTRALIA. I.
ELECTRON. AUST. 40(3): 10-13, JUNE 1978.

THE POTENTIAL EXISTS FOR WIND POWERED GENERATORS TO SUPPLY A SIGNIFICANT PERCENTAGE OF AUSTRALIA'S ELECTRICITY REQUIREMENTS BY THE YEAR 2000. THE AUTHOR DISCUSSES THE NUMBER OF WINDMILLS WHICH WOULD BE NEEDED, THEIR SIZE AND LOCATION.

1978-0315 ANDREWS M B
WIND TURBINE BLADES AND PROCESS FOR THEIR MANUFACTURE.
GERMAN (FRG) PATENT NO. 2,753,891/A/, JUNE 22, 1978. 15 P. (IN GERMAN)

THE INVENTION CONCERNS A PROCESS FOR MANUFACTURING WIND TURBINE BLADES BY WOUND FIBRE TECHNIQUES, WHICH ARE VERY LIGHT AND CAN STILL GUARANTEE SUFFICIENT STRENGTH AND STIFFNESS EVEN WITH GREAT LENGTH. THE SPAR IS WOUND ON A MANDREL OF CIRCULAR CROSS SECTION, WHICH IS FLATTENED AT THE OUTER END. A REAR MANDREL IS FIXED TO THE HOLLOW SPAR AFTER WITHDRAWING THE MANDREL, AND THIS COMBINATION IS AGAIN WOUND WITH FIBRES, UNTIL THE BLADE IS COMPLETE. THE SPAR IS THEN DEFORMED IN ORDER TO PRODUCE THE REQUIRED BLADE PROFILE FOR THE COMPLETE BLADE WITH THE REAR MANDREL.

1978-0316 ANGELINI A M
ELECTRICITY FROM THE PRIMARY SOURCES TO THE END USES: ENERGY ECONOMICS AND SAVINGS.
ELETTROTECNICA 65(12): 1055-1072, DECEMBER 1978. (IN ITALIAN)

THIS PAPER DISCUSSES ENERGY ECONOMY AND SAVINGS IN AN ITALIAN CONTEXT, LOOKS AT ALTERNATIVE SOURCES SUCH AS SOLAR AND WIND ENERGY, AND WARNS OF THE EFFECTS OF AN ENERGY DEFICIT ON THE NATION'S ECONOMY.

1978-0317 ANNUAL REVIEW OF SOLAR ENERGY.
NTIS, NOVEMBER 1978. 178 P.
SERI/TR-54-066

THIS ANNUAL REVIEW FROM THE PROGRAM EVALUATION BRANCH OF SERI IS INTENDED TO PROVIDE A COMPREHENSIVE OVERVIEW OF THE UNITED STATES SOLAR ENERGY EFFORT, AND TO EVALUATE ITS EFFECTIVENESS IN RESPONDING TO LONG-TERM NATIONAL GOALS AND NEEDS.

1978-0318 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. FINAL REPORT. VOLUME I. STUDY SUMMARY AND CONCEPT SCREENING. JANUARY 1978.
PHILADELPHIA, PENNSYLVANIA, GENERAL ELECTRIC SPACE DIVISION, VALLEY FORGE SPACE CENTER. JANUARY 1978. 211 P.
HCP/T-22221-01/1

THE OVERALL OBJECTIVE OF THIS STUDY WAS A BROAD ASSESSMENT OF THE ATTRACTIVENESS OF ENERGY STORAGE AND ENERGY STORAGE METHODS FOR USE WITH PHOTOVOLTAIC AND WIND ENERGY CONVERSION SYSTEMS. AREAS OF INVESTIGATION INCLUDE: ASSESSMENT OF SELECTED ENERGY STORAGE CONCEPTS; EVALUATION OF THE "WORTH" OF ENERGY STORAGE; AND INVESTIGATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE USE AND WORTH OF STORAGE.

1978-0319 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. FINAL REPORT. VOLUME II. PHOTOVOLTAIC SYSTEMS WITH ENERGY STORAGE. JANUARY 1978.
PHILADELPHIA, PENNSYLVANIA, GENERAL ELECTRIC SPACE DIVISION, VALLEY FORGE SPACE CENTER. JANUARY 1978. 328 P.
HCP/T-22221-01/2

THE PRINCIPAL OBJECTIVES OF THE STUDY WITH RESPECT TO PHOTOVOLTAIC ENERGY CONVERSION SYSTEMS AND THEIR USE OF ENERGY STORAGE ARE: THE ASSESSMENT OF SELECTED CANDIDATE STORAGE CONCEPTS; AND THE EVALUATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE ATTRACTIVENESS AND WORTH OF ENERGY STORAGE. IN ADDITION TO ESTABLISHING COST GOALS FOR STORAGE, THE IMPACTS OF CHARGING STORAGE FROM MULTIPLE SOURCES, AS WELL AS FROM PHOTOVOLTAIC SYSTEMS ALONE, ALONG WITH THE EFFECTS OF INSOLATION, FORECASTING AND TRANSIENT SMOOTHING OF THE PV SYSTEM OUTPUT ARE DISCUSSED.

1978-0320 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. FINAL REPORT. VOLUME III. WIND ENERGY SYSTEMS WITH ENERGY STORAGE. JANUARY 1978.
PHILADELPHIA, PENNSYLVANIA, GENERAL ELECTRIC SPACE DIVISION, VALLEY FORGE SPACE CENTER. JANUARY 1978. 326 P.
HCP/T-22221-01/3

PRINCIPAL OBJECTIVES OF THE STUDY WITH RESPECT TO WIND ENERGY CONVERSION SYSTEMS (WECS) AND THEIR USE OF ENERGY STORAGE ARE: THE ASSESSMENT OF SELECTED CANDIDATE STORAGE CONCEPTS; AND THE EVALUATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE ATTRACTIVENESS AND WORTH OF ENERGY STORAGE UTILIZATION. ALSO INCLUDED IN THIS STUDY IS THE IMPACT OF CHARGING STORAGE FROM MULTIPLE SOURCES AS WELL AS FROM WIND SYSTEMS ALONE, AND THE EFFECTS OF WIND FORECASTING AND TRANSIENT SMOOTHING OF THE WIND SYSTEM OUTPUT.

1978-0321 SOLAR ENERGY RESEARCH AND DEVELOPMENT PROGRAM BALANCE. A REVIEW BY THE SOLAR WORKING GROUP (FORMERLY THE GENERAL ADVISORY COMMITTEE).
NTIS, FEBRUARY 1978. 35 P.
DOE/IR-0004

THE WORKING GROUP WAS CONCERNED WITH THE BALANCE AMONG THE SEVERAL SOLAR TECHNOLOGIES AND THE RELATIVE AMOUNT OF RESOURCES AND ATTENTION EACH RECEIVED.

1978-0322 ARONSON R B
ENERGY STORAGE: HOW DO YOU PRESERVE WATTS AND BTU? (RESEARCH AND DEVELOPMENT).
MACH. DES. 50(1): 30-32, 34, 36, 38, JANUARY 12, 1978.

THE SEARCH IS ON FOR MORE EFFECTIVE WAYS TO STORE AND RECOVER HEAT AND ELECTRICITY. IF SUCCESSFUL, THE PAYOFF WILL BE LARGE-SCALE FUEL SAVINGS. THE ELECTRIC UTILITIES' NEED FOR INEFFICIENT PEAK-POWER GENERATORS COULD BE ELIMINATED; SIGNIFICANT AMOUNTS OF ENERGY FROM NEW POWER SYSTEMS, SUCH AS SOLAR CELLS AND WINDMILLS, COULD BE OBTAINED; AND THE ELECTRIC VEHICLE COULD BECOME MORE APPEALING AS AN ALTERNATIVE TO GASOLINE-POWERED TRANSPORTATION.

1978-0323 ARONSON R B
SAVING ENERGY IN THE HOME.
MACH. DES. 50(13): 20-21, 23, 24, 1978.

IN THE 13TH ANNUAL ARMCO STUDENT DESIGN PROGRAM, TEAMS OF INDUSTRIAL DESIGNERS AND ENGINEERS FROM FOUR UNIVERSITIES SHOWED HOW THEY WOULD SOLVE THE PROBLEM OF CUTTING FUEL COSTS FOR THE HOME OWNER. SOME OF THE FUEL SAVING IDEAS INCLUDED HYDROGEN FUELS, COOLING BY USE OF WINDMILLS, A HOT-AIR POWERED KITCHEN, AND THE REUSE OF WASTE HEAT.

1978-0324 ASHLEY H
SOME OBSERVATIONS ON FOUR CURRENT SUBJECTS RELATED TO AEROELASTIC STABILITY.
ISR. J. TECHNOL. 16(1-2): 3-22, FEBRUARY 1978.

AFTER INTRODUCTORY COMMENTS ON THE LITERATURE AND THE PURPOSES OF THIS PAPER, A TABLE IS PRESENTED SUMMARIZING THE AUTHOR'S VIEWS ON SOME CURRENTLY SOLVED VS. PARTIALLY UNSOLVED PROBLEMS RELATED TO AEROELASTIC STABILITY. THE TERM "SOLVED" IS USED IN THE PRACTICAL SENSE THAT ENGINEERS ARE ABLE TO COPE CONFIDENTLY WITH THAT PROBLEM DURING THE PROCESS OF STRUCTURAL DESIGN. SELECTED ENTRIES IN THE TABLE ARE REVIEWED, PARTIALLY TO MOTIVATE THE TOPICS IN THE REST OF THE PAPER. THE FIRST TOPIC INVOLVES THE PREDICTION OF LINEARIZED UNSTEADY AERODYNAMIC LOADS DUE TO ARBITRARY MOTIONS OF STREAMLINED SHAPES. SOME CONTRIBUTIONS BY J.W. EDWARDS ARE REFINED, WHICH WERE MOTIVATED BY THE REQUIREMENTS OF ACTIVE CONTROL SYSTEM DESIGN. THE SECOND SUBJECT IS NONLINEAR UNSTEADY AERODYNAMICS FOR THE TRANSONIC REGIME. AFTER DESCRIBING A FEW USEFUL DEVELOPMENTS FROM LOCALLY-LINEAR THEORY AND COMPUTATIONAL FLUID DYNAMICS, THERE IS SUGGESTED AN EMPIRICAL PROCEDURE FOR INTERIM-ANALYSIS PURPOSES. THE THIRD AND FOURTH SUBJECTS CONCERN RECENT DISCOVERIES REGARDING THE AEROELASTIC STABILITY OF LARGE-ASPECT-RATIO WINGS AND WIND TURBINES.

1978-0325 ASMUSSEN J, KRAUSS O, PARK G L, LINVILL D E
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977. EXECUTIVE SUMMARY.
NTIS, AUGUST 1978. 14 P.

SEVERAL GENERATION-EXPANSION ALTERNATIVES FOR SMALL ELECTRIC UTILITIES WHICH INCLUDE WINDPOWER WERE EVALUATED USING THE MUNICIPAL ELECTRIC SYSTEM OF HART, MICHIGAN, AS AN EXAMPLE. ASSUMED WIND TURBINE CONFIGURATIONS WITH MACHINES RATED AT 500-KW AND 1,500-KW TOGETHER WITH A 1,000-KW HYDROELECTRIC FACILITY WERE COMBINED WITH CONVENTIONAL HART DIESEL GENERATION PLUS BULK PURCHASE AND THEN EVALUATED. FOR COMPARISON, A NEW 3,600-KW OIL-FUELED DIESEL GENERATOR WAS ALSO EVALUATED.

1978-0326 ASMUSSEN J, PARK G L, KRAUSS O, CURTICE D, LINVILL D E
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 285-290.
CONF-770921/1

THIS REPORT SUMMARIZES THE RESEARCH ENTITLED "APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART,MICHIGAN, YEARS I AND II." THESE RESEARCH PROJECTS EVALUATED THE TECHNICAL AND ECONOMIC FEASIBILITY OF WIND GENERATION FOR THE HART, MICHIGAN MUNICIPAL UTILITY, WHOSE PEAK 1976 DEMAND WAS ABOUT 4 MW. THE HART SYSTEM HAS A NUMBER OF DESIRABLE FEATURES FOR WIND POWER APPLICATION: (1) IT IS LOCATED EIGHT MILES INLAND FROM THE EAST COAST OF LAKE MICHIGAN WHERE THE AVERAGE WIND VELOCITY IS ABOUT 5.5 M/S, (2) IT DEPENDS ALMOST ENTIRELY ON DIESEL GENERATION, USING GAS AND OIL, AND (3) IT HAS A SMALL HYDRO FACILITY.

1978-0327 ASMUSSEN J, PARK G L, MANNER D
AN ANALYTICAL EXPRESSION FOR THE SPECIFIC OUTPUT OF WIND TURBINE GENERATORS.
IEEE PROC. 66(10): 1295-1298, OCTOBER 1978.

USING A RAYLEIGH DISTRIBUTION FOR THE WIND SPEED FREQUENCY DISTRIBUTION, AN ANALYTICAL EXPRESSION FOR WIND TURBINE GENERATOR SPECIFIC OUTPUT IS DERIVED AND EXPRESSED IN TERMS OF MACHINE CHARACTERISTICS AND MEAN WIND SPEED. RESULTS ARE EXPRESSED AS A FAMILY OF CURVES WHICH ARE FUNCTIONS OF THE CUT-IN, RATED, AND CUT-OUT WIND SPEEDS. THE RESULTS ARE COMPARED WITH NUMERICAL CALCULATIONS USING ACTUAL WIND RECORDS AND WITH SPECIFIC OUTPUT CURVE OF HARDER.

1978-0328 AUER F
REPORT ON OUTPUT MEASUREMENTS ON A 200 WATT WIND GENERATOR.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 189-193. (IN GERMAN)

THE CONSTRUCTION AND THE VIBRATION PROBLEMATIC ON A 200 WATT WIND GENERATOR ARE DESCRIBED. FIRST OUTPUT MEASUREMENTS UNDER REALISTIC CONDITIONS ARE SUBMITTED.

1978-0329 AUER P
ADVANCES IN ENERGY SYSTEMS AND TECHNOLOGY, VOL. 1.
NEW YORK, ACADEMIC PRESS, 1978. 387 P.

THIS BOOK CONTAINS FIVE CHAPTERS WRITTEN BY DIFFERENT AUTHORS. TOPICS COVERED INCLUDE: WIND POWER; FUEL FROM BIOMASS; GEOTHERMAL ENERGY; CLEAN FUEL FROM COAL; DISTRICT HEATING WITH COMBINED HEAT AND ELECTRIC POWER GENERATION. ENVIRONMENTAL AND ECONOMIC CONSIDERATIONS ARE DISCUSSED IN SOME DETAIL AND EACH CHAPTER HAS A BIBLIOGRAPHY.

1978-0330 BAE H M, DEVINE M D
OPTIMIZATION MODELS FOR THE ECONOMIC DESIGN OF WIND POWER SYSTEMS.
SOL. ENERGY 20(6): 469-481, 1978.

TWO BASIC MODELS ARE INTRODUCED: SYSTEMS WITHOUT STORAGE--ALL POWER GENERATED IS FED DIRECTLY INTO THE EXISTING NETWORK; AND SYSTEMS WITH STORAGE--THE SYSTEMS ARE OPERATED AS PART OF BASE LOAD OR PEAK LOAD CAPACITY. THE OBJECTIVE OF THE MODELS IS TO MAXIMIZE THE TOTAL NET VALUE OF POWER GENERATED UNDER ASSUMED OPERATING RULES AND GENERAL CONDITIONS REGARDING WIND SPEED AND DEMAND VARIATIONS.

1978-0331 BAILEY D Z
ENERGY FROM SEA AND AIR BY LARGE-SPAN TENSIONED FOILS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 6, P. 2877-2907.

KINETIC ENERGY IN OCEAN AND TIDAL STREAMS, AND IN ATMOSPHERIC WINDS MAY BE EXTRACTED IN LARGE QUANTITIES BY STRETCHING HYDRO (AERO) FOILS HORIZONTALLY OVER LARGE DISTANCES ACROSS MOVING STREAMS. THESE FOILS CAN BE MADE TO SPAN VERY LARGE DISTANCES BY DESIGNING THEM TO SUSTAIN LARGE TENSILE LOADS AND ARRANGING THEM IN "CATENARY LIKE" ARCS SUCH THAT THE MAJOR FORCES ARE DEVOID OF BENDING MOMENTS.

1978-0332 BAIRD W F, GLODOWSKI C W
ESTIMATION OF WAVE ENERGY USING A WIND WAVE HINDCAST TECHNIQUE.
INTERNATIONAL SYMPOSIUM ON WAVE AND TIDAL ENERGY, CANTERBURY, ENGLAND, SEPTEMBER 27-29, 1978. CRANFIELD, BEDFORD, ENGLAND, BHRA FLUID ENGINEERING, 1978. P. F3.39--F3.54.

A PROCEDURE FOR ANALYZING HOURLY VALUES OF WAVE DATA FROM SUITABLE METEOROLOGICAL DATA IS DISCUSSED IN DETAIL. THE OUTPUT WAVE PARAMETERS ARE COMPARED WITH RECORDED WAVE DATA. EMPHASIS IN THE DEVELOPMENT OF THIS PROCEDURE HAS BEEN PLACED ON COMPUTATIONAL EFFICIENCY, IN ORDER THAT MANY YEARS OF HOURLY VALUES OF THE WAVE PARAMETERS MAY BE HINDCAST AT REASONABLE COST.

1978-0333 BAKER R W, HEWSON E W
SEASONAL WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST AS RELATED TO WIND POWER POTENTIAL.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 14, 1978. PROCEEDINGS. NTIS, 1978. P. 166-175.
CONF-780754

THE SEASONAL VARIATION IN THE STRENGTH IN THE WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST IS INVESTIGATED TO ASSESS THE WIND POWER POTENTIAL IN THE REGION. THERE ARE BASIC FLOW CHANGES FROM SEASON TO SEASON OVER THE NORTHWEST THAT GREATLY AFFECT THE WIND POWER POTENTIAL OVER MANY AREAS IN THE REGION. HOWEVER, THE DIVERSITY IN THE WIND FLOW ON A MONTHLY AND SEASONAL BASIS OVER THE FIVE-STATE AREA DIMINISHES THE CHANGE OF NO OUTPUT FROM A SIMULATED NETWORK OF WIDELY DISPERSED WIND TURBINE GENERATORS AND STABILIZES THE POTENTIAL NETWORK WIND ENERGY OUTPUT ON A MONTHLY BASIS COMPARED TO THE INDIVIDUAL SITE OUTPUT.

1978-0334 BAKER R W, HEWSON E
SEASONAL WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST AS RELATED TO WIND POWER POTENTIAL.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING. DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 707-711.

THE SEASONAL VARIATION IN THE STRENGTH IN THE WIND FLOW PATTERNS OVER THE PACIFIC NORTHWEST IS INVESTIGATED TO ASSESS THE WIND POWER POTENTIAL IN THE REGION. THERE ARE BASIC FLOW CHANGES FROM SEASON TO SEASON OVER THE NORTHWEST THAT GREATLY AFFECT THE WIND POWER POTENTIAL OVER MANY AREAS IN THE REGION. HOWEVER, THE DIVERSITY IN THE WIND FLOW ON A MONTHLY AND SEASONAL BASIS OVER THE FIVE-STATE AREA DIMINISHES THE CHANCE OF NO OUTPUT FROM A SIMULATED NETWORK OF WIDELY DISPERSED WIND TURBINE GENERATORS AND STABILIZES THE POTENTIAL NETWORK WIND ENERGY OUTPUT ON A MONTHLY BASIS COMPARED TO THE INDIVIDUAL SITE OUTPUT.

1978-0335 BAKER R W, HEWSON E W, BUTLER N G, WARCHOL E J
WIND POWER POTENTIAL IN THE PACIFIC NORTHWEST.
J. APPL. METEOROL. 17(12): 1814-1826, DECEMBER 1978.

PRESENTED IS AN ASSESSMENT OF THE POTENTIAL WIND POWER RESOURCES IN THE PACIFIC NORTHWEST, BASED ON DATA FROM WIND RECORDING STATIONS INSTALLED IN AREAS SUBJECT TO STRONG OR PERSISTENT WINDS.

1978-0336 BAKER W J
WIND ENERGY--A DESIGN IDEA FOR A SMALL VERTICAL AXIS TURBINE.
ELECTRON. POWER 24(3): 186-187, MARCH 1978.

IT IS GENERALLY ACCEPTED THAT THE FUTURE FOR VERY LARGE (MEGAWATT) CAPACITY WIND-DRIVEN GENERATORS IN BRITAIN IS SOMEWHAT BLEAK, AS CLIMATIC AND ENVIRONMENTAL CONDITIONS ARE NOT PARTICULARLY FAVORABLE. PROSPECTS ARE RATHER BRIGHTER, HOWEVER, FOR LOCALLY INSTALLED UNITS OF COMPARATIVELY LOW POWER OUTPUT, ESPECIALLY WHEN INTENDED FOR PREHEATING THE MAKE-UP WATER IN DOMESTIC HOT-WATER SYSTEMS.

1978-0337 BARCHET R J
MOD-1 WIND TURBINE GENERATOR PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 76-91.
CONF-779021/1

THE OBJECTIVE OF THE MOD-1 PROGRAM, AS A VITAL ELEMENT OF THE NATIONAL WIND ENERGY PROGRAM, IS QUITE SIMPLE -- TO DEVELOP A LARGE, UTILITY-CLASS WTG WHICH HAS THE POTENTIAL FOR GENERATING UTILITY-GRADE ELECTRICAL POWER AT COSTS COMPETITIVE WITH ALTERNATIVE ENERGY SOURCES. THIS IMPLIES A MEGAWATT-CLASS MACHINE WITH AN OUTPUT POWER QUALITY COMPATIBLE WITH TYPICAL UTILITY GRID VOLTAGE/CURRENT, RIPPLE, REACTANCE, ETC.

1978-0338 BARNETT K M
WIND ENERGY PROGRAMS SPONSORED BY THE STATE OF NEW MEXICO.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 31-33.
CONF-780357

A REVIEW IS PRESENTED OF WIND ENERGY RESEARCH PROGRAMS BEING CONDUCTED BY THE STATE OF NEW MEXICO.

1978-0339 BARTOS K P
THE GOLDSTONE ENERGY PROJECT.
NTIS, FEBRUARY 15, 1978. 50 P.
NASA-CR-156133, JPL-PUB-78-5, N78-20618

THE GOLDSTONE ENERGY PROJECT WAS ESTABLISHED IN 1974 TO INVESTIGATE WAYS IN WHICH THE GOLDSTONE DEEP SPACE COMPLEX IN CALIFORNIA COULD BE MADE PARTLY OR COMPLETELY ENERGY-SUFFICIENT, ESPECIALLY THROUGH THE USE OF SOLAR- AND WIND-DERIVED ENERGY RESOURCES. WAYS IN WHICH ENERGY COULD BE CONSERVED AT THE COMPLEX WERE ALSO STUDIED.

1978-0340 BENDICK P
ELECTRICITY FROM THE WIND: A GUIDE FOR THE GENERALIST.
NTIS, 1978. 23 P.
PB80-139751

THIS GUIDE WAS COMPILED AND WRITTEN FOR THE GENERALIST WORKING IN DEVELOPING COUNTRIES WHO ARE CONSIDERING THE OPTION OF USING WIND ENERGY TO GENERATE SMALL AMOUNTS OF ELECTRICITY. IT IS NOT INTENDED TO BE COMPREHENSIVE NOR SHOULD IT BE READ AS A TECHNICAL BULLETIN. IT PRESENTS BASIC INFORMATION TO THE READER WHO KNOWS LITTLE ABOUT THE SUBJECT AND WILL HELP HIM/HER TO DECIDE WHETHER WIND ENERGY SHOULD BE EXPLORED AS A PRACTICAL ANSWER TO A SPECIFIC ENERGY NEED. DISCUSSED IN THE PAPER ARE WIND ELECTRIC SYSTEMS, MEASURING THE WIND, DETERMINING ELECTRICAL NEEDS, SELECTING COMPONENTS, AND LISTINGS OF COMMERCIAL DEALERS, MANUFACTURERS AND DISTRIBUTORS. FINANCIAL CONSIDERATIONS ARE ALSO DISCUSSED.

1978-0341 BENESCH W, JJRKSCH G, DUENSING G, ZOELLNER R
WINDVERHAEL TNISSE IN DER BUNDESREPUBLIK DEUTSCHLAND IM HIMBLICK AUF DIE NUTZUNG DER WINDKRAFT. T. 1, 2.
BINNENLAND: KUESTENVORFELD. (WIND CONDITIONS IN THE FEDERAL REPUBLIC OF GERMANY WITH A VIEW TO WIND ENERGY UTILIZATION. PT. 1,2. INTERIOR; COASTAL REGIONS.)
OFFENBACH, GERMANY, F.R., DEUTSCHER WETTERDIENST, 1978. (IN GERMAN)

WIND CONDITIONS HAVE BEEN DETERMINED FOR SEVERAL COASTAL AND INTERIOR REGIONS WITH A VIEW TO WIND ENERGY UTILIZATION, AND THE DATA OBTAINED ARE GIVEN IN ISOLATED FORM AND IN A GRAPHICAL REPRESENTATION.

1978-0342 BEN-DOV E, NAOT Y, RUDMAN P S
HYDROGEN FUEL PRODUCTION BY WIND ENERGY CONVERSION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 8, P. 3563-3576.

THE AUTHORS BASE THEIR ANALYSIS ON RECENT NASA EXPERIENCE AND CAPITAL COST ESTIMATES BY GENERAL ELECTRIC CO. AND BY KAMAN AEROSPACE CORP. OF WIND ENERGY CONVERSION (WEC) SYSTEMS FOR FEEDING AN ELECTRIC UTILITY GRID. FIRST CONSIDERED ARE THE COST OF WEC FOR FEEDING AN ELECTRIC UTILITY GRID AS A FUNCTION OF THE MEAN WIND SPEED.

1978-0343 BEN-DOV E, NAOT Y, RUDMAN P S
WIND ENERGY CONVERSION: A FEASIBILITY STUDY FOR ISRAEL.
ELECTRICAL AND ELECTRONICS ENGINEERS IN ISRAEL, 19TH CONVENTION, TEL-AVIV, OCTOBER 10-13, 1977. NEW YORK, IEEE, 1978. P. 42-46.

THIS PAPER CONSIDERS THE COST OF WIND ENERGY CONVERSION (WECS) FOR FEEDING AN ELECTRIC UTILITY GRID THAT HAS STORAGE CAPACITY, SUCH AS A HYDROELECTRIC COMPONENT AND, THE USE OF WEC FOR FEEDING AN ELECTRIC UTILITY GRID THAT HAS NO STORAGE CAPACITY SO THAT THE WEC HAS A FUEL SAVER ROLE ONLY. ALSO THE USE OF WEC TO PRODUCE HYDROGEN BY ELECTROLYSIS OF WATER, AS A SUBSTITUTE FOR GASOLINE, IS CONSIDERED. FINALLY SOME WIND-SPEED DATA FROM NEWLY DISCOVERED HIGH WIND-SPEED SITES IN ISRAEL ARE LISTED.

1978-0344 BENESCH W, DUENSING G, JURKSCH G, ZOELLNER R
DIE WINDVERHAELTNISSE IN DER BUNDESREPUBLIK DEUTSCHLAND IM HINDBLICK AUF DIE NUTZUNG DER WINDKRAFT. (WIND FORCE ANALYSIS FOR THE FEDERAL REPUBLIC OF GERMANY TO DETERMINE THE USEFULNESS OF WIND POWER.)
NTIS, 1978. 145 P. (IN GERMAN)
N80-17635/7

THE UTILIZATION OF WIND FORCE IN INLAND AREAS IS INVESTIGATED ON THE BASIS OF DATA SETS FROM 74 STATIONS FROM THE PERIOD 1969 TO 1974. THE DEPENDENCE OF THE ANNUAL MEANS AND AVERAGE ANNUAL CUMULATIVE FREQUENCIES OF WIND VELOCITY ON ELEVATION IS EVALUATED. ANALYSES ON THE DURATION OF THRESHOLD VALUES OF WIND VELOCITY ARE ALSO MADE. A NUMBER OF SITES SUITABLE FOR WIND POWER UTILIZATION ARE IDENTIFIED.

1978-0345 BERGEY M
VERTICAL AXIS, ARTICULATED BLADE, WIND TURBINE.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 13-22.
CONF-780357

AERODYNAMICS AND DESIGN CHARACTERISTICS OF DARRIEUS ROTORS, GIROMILL TURBINES, AND VERTICAL-AXIS ARTICULATED-BLADE WIND TURBINES ARE PRESENTED. THE RESEARCH PROGRAM AT THE UNIVERSITY OF OKLAHOMA ON VERTICAL-AXIS ARTICULATED-BLADE TURBINES IS DESCRIBED.

1978-0346 BERGEY M
WIND POWER IN OKLAHOMA.
WIND POWER DIG. NO. 13: 8-10, FALL 1978.

TWO WIND TURBINES, DEVELOPED AT THE UNIVERSITY OF OKLAHOMA WIND ENERGY CENTER ARE DESCRIBED. POWERS I IS A TWO-BLADED HORIZONTAL AXIS MACHINE. POWERS II IS A VERTICAL AXIS ARTICULATED BLADE WIND TURBINE DESIGNED AND BUILT BY ENGINEERING STUDENTS DURING 1976-1977. ITS PURPOSE WAS TO INVESTIGATE AN ADVANCED WIND-ELECTRIC SYSTEM FOR PROVIDING POWER DIRECTLY TO HOMES AND SMALL INDUSTRIES OR FOR INTEGRATION INTO THE EXISTING POWER GRID.

1978-0347 BERLINER D, CHRISTMAS S, COSTELLO D, FELLHAUER C
REVIEW OF SELECTED SOLAR MARKET STUDIES AND TECHNIQUES.
NTIS, OCTOBER 1978. 58 P.
SERI/PR-52-076

THE PRELIMINARY RESULTS OF A LITERATURE REVIEW OF SOLAR ENERGY MARKET STUDIES IN THE INDUSTRIAL PROCESS HEAT, PASSIVE, SOLAR THERMAL ELECTRIC, PHOTOVOLTAIC, WIND, AND OCEAN THERMAL TECHNOLOGIES ARE PRESENTED. USEFUL ELEMENTS OF MARKET STUDIES IN OTHER SOLAR AREAS ARE DESCRIBED AS WELL. THE MARKET RESEARCH LITERATURE IS REVIEWED IN ORDER TO INVESTIGATE TECHNIQUES OR APPROACHES THAT MAY HAVE SOME APPLICABILITY IN THE CONTEXT OF SOLAR MARKETS. A PRELIMINARY PLAN IS PRESENTED FOR THE INITIATION OF SELECTED SOLAR MARKET STUDIES DURING FY79.

1978-0348 BEUSSE H
ARRANGEMENT FOR MATCHING A WIND ROTOR TO AN ELECTRICAL GENERATOR.
GERMAN (FRG) PATENT NO. 2,623,233/A/, APRIL 6, 1978. 6 P. (IN GERMAN)

THE INVENTION CONCERNS AN ARRANGEMENT FOR MATCHING A WIND POWER MACHINE TO AN ELECTRICAL GENERATOR, WHICH FEEDS A CONSUMER NETWORK. ACCORDING TO THE INVENTION FIRST GENERATOR USING THE SHAFT HORSEPOWER OF THE WIND POWER MACHINE FEEDS AN ELECTRIC WATER, WHICH IS COUPLED TO A SECOND GENERATOR, WHOSE POWER IS TAKEN TO THE CONSUMER NETWORK. THE OUTPUT SIGNAL OF A COMPUTER WHICH HAS THE ANEMOMETER FEEDING INTO IT CONTROLS THE EXCITATION OF THE MOTOR AT SUFFICIENT WIND SPEED, SO THAT THE SPEED OF ROTATION OF THE SECOND GENERATOR IS PRACTICALLY CONSTANT, AND A SPEED REGULATOR TAKES EXCESS ENERGY VIA A CONTROLLER RECTIFIER (THYRISTOR) TO A SHUNT CIRCUIT OF THE MOTOR, IF THE WIND POWER EXCEEDS THE LOAD TAKEN FROM THE OUTPUT OF THE SECOND GENERATOR. AS AN EXTENSION OF THE ARRANGEMENT ACCORDING TO THE INVENTION IT IS PROPOSED TO ARRANGE A DIESEL ENGINE IN THE SHAFT OF THE SECOND GENERATOR, WHICH CAN BE CONTROLLED AT CONSTANT SPEED BY THE CONTROL DEVICE, SO THAT IT TAKES OVER THE MISSING OUTPUT IF THE WIND POWER IS LESS THAN THE LOAD AT THE GENERATOR OUTPUT.

1978-0349 BEYER G
SOLAR-WIND-HYDROGEN COMBINATION POWER PLANT.
GERMAN (FRG) PATENT NO. 2,650,866/A/, MAY 11, 1978. 8 P. (IN GERMAN)

A COMBINED POWER PLANT GENERATING ELECTRICAL ENERGY IS DESCRIBED. THE ELECTRIC GENERATOR IS DRIVEN BY AN INTERNAL COMBUSTION ENGINE. HYDROGEN IS USED AS FUEL. THE HYDROGEN IS GENERATED BY ELECTROLYSIS, TAKING THE NECESSARY ENERGY FROM A WIND POWER PLANT OR A SOLAR ENERGY PLANT.

1978-0350 BHUMRALKAR C M, LUDWIG F L, MANCUSO R L
ESTIMATION OF WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
SYMPOSIUM ON TURBULENCE, DIFFUSION, AND AIR POLLUTION, 4TH, RENO, JANUARY 15-18, 1978. BOSTON, AMERICAN METEOROLOGICAL SOCIETY, 1978. PREPRINTS. P. 160-166.

THE PAPER DESCRIBES A PHYSICALLY BASED THREE-DIMENSIONAL MODEL THAT INCORPORATES THE EFFECT OF UNDERLYING TERRAIN AND UTILIZES AVAILABLE, CONVENTIONAL WIND INFORMATION FROM SELECTED WEATHER STATIONS IN THE VICINITY OF THE SITE. THE REQUIRED STATISTICAL WIND CHARACTERISTICS ARE ESTIMATED FROM THE HOURLY WINDS SYNTHESIZED WITH THE AID OF THE MODEL. THE METHOD CAN BE APPLIED TO VIRTUALLY ANY SITE, REGARDLESS OF TOPOGRAPHIC SETTING.

1978-0351 BHUMRALKAR C M
POSSIBLE IMPACTS OF LARGE SOLAR ENERGY SYSTEMS ON LOCAL AND MESOSCALE WEATHER.
IIASA WORKSHOP ON CLIMATE AND SOLAR ENERGY CONVERSION, LAXENBURG, AUSTRIA, DECEMBER 8-10, 1976. PROCEEDINGS.

LAXENBURG, AUSTRIA, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS, 1978. P. 123-145.

THIS PAPER REVIEWS THE VARIOUS PROPOSED SOLAR ENERGY TECHNOLOGIES INCLUDING: SOLAR THERMAL ELECTRICITY; OCEAN THERMAL ENERGY CONVERSION; WIND ENERGY CONVERSION; BIOCONVERSION, AND DISCUSSES THEIR CLIMATIC IMPACT.

1978-0352 BILTOFT C A
WIND AND WIND-POWER POTENTIAL AT DUGWAY NATIONAL TEST FACILITY PHASE I. WIND VELOCITY PROFILES.
NTIS, MARCH 1978. 24 P.
AD-A059119, DPG-TN-C625A

DATA COLLECTED AT METEOROLOGICAL TOWERS ON DUGWAY RANGES ARE USED IN A POWER LAW RELATIONSHIP FOR WIND VELOCITY WITHIN THE 8 TO 48 METER LAYER. ANALYSIS SHOWS THE POWER LAW RELATIONSHIP FUNCTIONING WELL FOR MODERATE TO HIGH WIND SPEEDS AND DURING DAYTIME. WIND SPEED HAS A MINOR INFLUENCE ON ACTUAL MAGNITUDE OF POWER LAW EXPONENTS, BUT A MAJOR INFLUENCE ON THE SCATTER OF EXPONENT VALUES, MAKING VELOCITY PROFILE RELATIONSHIPS INVALID FOR NOCTURNAL LIGHT WIND CONDITIONS. A LEAST SQUARES FIT IS USED TO COMPUTE POWER LAW EXPONENTS FOR MODERATE TO STRONG WIND SPEEDS, WHILE LOW WIND SPEED CASES ARE DESCRIBED ONLY WITH MEAN VALUES. THE BREAKDOWN OF VELOCITY PROFILE RELATIONSHIPS WITH LIGHT WIND IS NOT A SERIOUS DEFICIENCY, AS LOW WIND SPEEDS CONTRIBUTE LITTLE TO WIND POWER POTENTIAL.

1978-0353 BINDER G, FRITZSCHE A, VOLLAN A, DEKITSCH A, JOOS R
DEVELOPMENT OF A 5.5 M DIAMETER VERTICAL AXIS WIND TURBINE (PHASE II).
NTIS, JUNE 1978. 142 P.
BMFT-FB-T-79-04

IN CONTINUATION OF THE PRECEDING PROJECT, DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE (PHASE I), THE DESIGN WORK WAS PERFORMED INCLUDING THE AERODYNAMIC AND STRUCTURAL DYNAMIC INVESTIGATIONS. THE WIND ENERGY CONVERTER HAS BEEN BUILT AND TESTED IN A WIND TUNNEL. THE ROTOR DIAMETER OF 5.5 M IS NOT ONLY A SUITABLE SIZE FOR THE AERODYNAMIC TESTS, BUT GUARANTEES ALSO THAT THE RESULTS OF SUBSEQUENT FIELD TESTS WILL CONTRIBUTE TO THE EXPERIMENTAL DATA REQUIRED FOR THE DESIGN OF LARGER CONVERTERS. THE LAYOUT OF THE ROTOR, THE CONSTRUCTION METHODS AND THE CHOICE OF MATERIALS PROMISE FAVOURABLE ECONOMIC CONDITIONS FOR A SERIES PRODUCTION APPLYING ADVANCED MASS PRODUCTION TECHNOLOGY, WITHOUT EXCLUDING THE MANUFACTURE IN DEVELOPING COUNTRIES. THE WIND TUNNEL TESTS, PERFORMED WITH THE 2-, 3-, AND 4-BLADE VERSION OF THE DARRIEUS-ROTOR AND WITH SAVONIUS-ROTORS OF DIFFERENT HEIGHTS CONFIRMED EXPERIMENTALLY THE AERODYNAMIC CALCULATIONS AND PROVIDED FURTHER KNOW-HOW REFERRING TO INFLUENCES NOT ACCESSIBLE TO CALCULATION.

1978-0354 BLAKE S
WIND DRIVEN WATER PUMPS, ECONOMICS, TECHNOLOGY, CURRENT ACTIVITIES.
NTIS, DECEMBER 1978. 29 P.
PB-292816

THE ILLUSTRATED HANDBOOK DISCUSSES THE ECONOMICS AND THE CHARACTERISTICS TYPICAL OF THE AERMOTOR WINDMILL AND THE INDIGENOUS WINDMILL. SINCE THE USE OF WINDMILLS CAN HAVE WORLDWIDE IMPACT UPON THE DEVELOPMENT AND UPGRADING OF WATER SUPPLIES, AN EMPHASIS IS PLACED UPON THE IMPORTANCE OF SUPPLYING THIS TECHNICAL INFORMATION TO THE DEVELOPING COUNTRIES OF THE WORLD.

1978-0355 BOESTAD G K W
DEVICE AT A WIND POWER PLANT WITH HYDRAULICLY REGULATED TURBINE BLADES.
SWEDISH PATENT NO. 7,605,308-1, MARCH 1978. (IN SWEDISH)

THIS PATENT DESCRIBES A HYDRAULIC SERVOMOTOR CONTROL ARRANGEMENT OF WIND POWER PLANTS WITH HORIZONTAL-AXIS TURBINES, THAT REGULATES THE ANGLE BETWEEN THE TURBINE-BLADES AND THE WIND IN ORDER TO REDUCE STRESSES AND INCREASE THE USEFUL RANGE OF WIND SPEEDS. IT ALSO PERMITS ONE BLADE TO TURN IN RELATION TO THE OTHER BLADE IF THE FORCES ON THE BLADES ARE NOT OF EQUAL MAGNITUDE.

1978-0356 BONNET J A, BRACETTI F P
ALTERNATE ENERGY SOURCES FOR SMALL TROPICAL ISLANDS. THE CASE OF PUERTO RICO.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 111.

A PROJECT TO INSTALL AN EXPERIMENTAL 200 KW WIND TURBINE GENERATOR SPONSORED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) IS IN THE CONSTRUCTION PHASE. A DRAFT PROPOSAL FOR A WIND POWER ASSESSMENT OF THE WHOLE ISLAND WAS SUBMITTED TO ERDA. OTHER PROJECTS ON SOLAR ENERGY, OCEAN THERMAL ENERGY CONVERSION, AND SOLID WASTE ARE MENTIONED.

1978-0357 ZULIANI G
ALTERNATIVE ENERGY SOURCES: WIND ENERGY.
ELETTRIFICAZIONE NO. 2: 65-68, 1978. (IN ITALIAN)

AMONGST ALTERNATIVE ENERGY SOURCES TO OIL AND NUCLEAR REACTORS, WIND ENERGY IS AGAIN BECOMING OF INTEREST BUT THE PERFORMANCE WITH THE PRESENT STATE OF THE ART IS RESTRICTED IN RELATION TO THE SIZE AND COST OF THE INSTALLATION. THE BASIC TECHNICAL AND CONSTRUCTIONAL FEATURES OF PROPELLERS ARE CONSIDERED AND VARIOUS EXPRESSIONS ARE GIVEN RELATING THE MECHANICAL POWER OUTPUT TO WIND VELOCITY, PROPELLER DIMENSIONS, NUMBER OF BLADES AND BLADE ANGLE. BASED ON THE EXPERIENCE GAINED, VALUES OF RATIO OF DIAMETERS AND BLADE ANGLE ARE QUOTED FOR NUMBERS OF BLADES OF 2, 4 AND ABOVE 4.

1978-0358 BOODA L
OCEAN ENERGY CHALLENGES TECHNOLOGY; GROWS.
SEA TECHNOL. 19(8): 10-14, 16-17, AUGUST 1978.

SEVERAL POSSIBILITIES UNDER CONSIDERATION BY US DOE FOR TAPPING THE SOLAR ENERGY RESOURCES INHERENT IN THE OCEAN ARE DISCUSSED, INCLUDING OCEAN THERMAL ENERGY CONVERSION (OTEC), OCEAN BIOMASS, OCEAN WAVES, OCEAN CURRENTS, OFFSHORE WINDS, TIDAL POWER AND SALINITY GRADIENTS. THE POTENTIALS FOR THESE SYSTEMS AND THEIR POLITICAL AND ECONOMIC SUPPORT ARE ANALYZED.

1978-0359 BOOTH D
OFFSHORE WIND FARM IN THE WASH.
OFFSHORE SERV. 11(5): 19-20, MAY 1978.

CLUSTERS OF HIGH EFFICIENCY WINDMILLS OFFSHORE COULD PROVIDE BRITAIN WITH AS MUCH AS 10 PER CENT OF ITS BASE LOAD ELECTRICITY WITHIN THE NEXT 10 TO 15 YEARS. TO PROVIDE WIND GENERATION OF 1000 MW, COMPARABLE WITH THE OUTPUT OF A MODERN FOSSIL FUELLED STATION, ONE WOULD REQUIRE 400 VERTICAL AXIS OFFSHORE WINDMILLS. THE MAJOR

ATTRACTION OF THE OFFSHORE WINDMILL IS THAT 400 COULD BE CLUSTERED INTO A SITE OF ONLY 10 KM SQUARE. OFF THE WASH THERE ARE SEVERAL SHALLOW WATER SITES HAVING THE MEAN WIND SPEED NECESSARY WHERE A NUMBER OF 10 KM SQUARE CLUSTERS COULD BE GROUPED.

1978-0360 BOUWMEESTER R J B, MERONEY R N, SANDBORN V A
SITES FOR WIND-POWER INSTALLATIONS: WIND CHARACTERISTICS OVER RIDGES. PART II. FINAL REPORT.
NTIS, JUNE 1978. 122 P.
RLO-2438-78/2

THE PURPOSE OF THIS RESEARCH WAS TO INCREASE KNOWLEDGE OF THE PHYSICAL PROCESSES THAT GOVERN WIND CHARACTERISTICS OVER RIDGES AND, SUBSEQUENTLY, TO IMPROVE EMPIRICAL AND NUMERICAL FOR ESTIMATING WIND VELOCITIES OVER RIDGES. THESE OBJECTIVES WERE ACHIEVED BY CONDUCTING A WIND-TUNNEL STUDY OF THE FLOW FIELD OVER TRIANGULAR-SHAPED AND SINUSOIDAL-SHAPED RIDGE MODELS WITH VARYING UPWIND AND DOWNWIND SLOPES UNDER VARIOUS THERMAL STRATIFICATION CONDITIONS. A SIMPLE TECHNIQUE WAS DEVELOPED TO PREDICT THE VELOCITY-AMPLIFICATION PROFILE ABOVE A RIDGE CREST FOR AN ARBITRARY RIDGE SLOPE. LARGEST SPEEDUPS WERE MEASURED FOR THE STEEPEST SYMMETRICAL RIDGE WHICH DID NOT CAUSE FLOW SEPARATION. CRITERIA FOR FLOW SEPARATION OVER RIDGES ARE PROVIDED IN THIS REPORT. APPLICABILITY OF THE RESULTS FOR RIDGES WITH FINITE WIDTH IS DISCUSSED.

1978-0361 BOUWMEESTER R J B, MERONEY R N, SANDBORN V A, RIDER M A
THE INFLUENCE OF HILL SHAPE ON WIND CHARACTERISTICS OVER TWO DIMENSIONAL HILLS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 646-653.
CONF-770921/2

SINCE JUNE 1975 THE FLUID MECHANICS AND WIND ENGINEERING PROGRAM AT COLORADO STATE UNIVERSITY HAS BEEN ENGAGED IN A THREE-YEAR RESEARCH PROJECT TO DETERMINE WHICH LOCATIONS ARE MOST FAVORABLE FOR WIND-POWER INSTALLATIONS. WIND-TUNNEL MODELING TECHNIQUES ARE USED TO ANALYZE SYSTEMATICALLY THE EFFECT OF CHARACTERISTIC TOPOGRAPHICAL FEATURES ON DIFFERENT FLOW REGIMES. THE RESEARCH WHICH IS PRIMARILY EXPERIMENTAL INCLUDES EVALUATION OF WIND CHARACTERISTICS OVER SIMPLE TWO-DIMENSIONAL AND THREE-DIMENSIONAL SHAPED HILLS WITH DIFFERENT UPSTREAM FLOW CONDITIONS.

1978-0362 BRAASCH R H
VERTICAL AXIS WIND TURBINE PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 745-758.
CONF-770921/2

THIS REPORT PRESENTS THE MAJOR ACTIVITIES ASSOCIATED WITH THE VERTICAL AXIS WIND TURBINE PROGRAM, TO INCLUDE: THE 17 METER RESEARCH TURBINE, PERFORMANCE DATA ON STRUCTURAL DATA, AS WELL AS LOW COST PRODUCTION AND COST STUDY.

1978-0363 BRAASCH R H
DESIGN, CONSTRUCTION, TESTING AND MANUFACTURING OF VERTICAL AXIS WIND TURBINES.
NTIS, 1978. 37 P.
CONF-781014-1, SAND-78-1253C

A SUBSTANTIAL DESIGN AND DEVELOPMENT PROGRAM HAS BEEN UNDERWAY IN THE UNITED STATES OF AMERICA ON THE DARRIEUS VERTICAL AXIS WIND TURBINE (VAWT). THE PURPOSE OF THIS REPORT IS TO PRESENT CURRENTLY AVAILABLE INFORMATION ON: DESIGN, CONSTRUCTION, AND TESTING OF A 17 METER RESEARCH TURBINE; VAWT PERFORMANCE-COST OPTIMIZATION STUDY; AND VAWT MANUFACTURING STUDIES.

1978-0364 BRANDVOLD G E
VERTICAL AXIS WIND TURBINE STATUS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON PRESS, 1978. VOL. III, P. 1843-1847.

ABOUT 50 YEARS AGO, A FRENCH INVENTOR, D.J.M. DARRIEUS, DESIGNED AN UNUSUAL VERTICAL AXIS WIND TURBINE, WHICH, FOR NEARLY 45 YEARS, DREW LITTLE ATTENTION UNTIL THE NATIONAL RESEARCH COUNCIL OF CANADA RENEWED INTEREST BY STARTING NEW DEVELOPMENT EFFORTS. TODAY IT IS ONE OF THE MORE PROMISING CANDIDATES FOR A PRACTICAL WIND POWER SYSTEM. USING FUNDING PROVIDED BY THE UNITED STATES DEPARTMENT OF ENERGY, DIVISION OF SOLAR ENERGY, SANDIA LABORATORIES IS EXPLORING THE CAPABILITIES OF THE VERTICAL AXIS WIND TURBINE (VAWT) AS AN ALTERNATIVE ENERGY SOURCE. INVESTIGATION OF THIS WIND SYSTEM TAKES SEVERAL PATHS. DETAILED COMPUTER MODELING AND ANALYSIS, CONDUCTED ALONG WITH ACTUAL DESIGN AND OPERATION OF PROTOTYPE TURBINES, WILL SEEK TO ESTABLISH THE MECHANICAL PRACTICALITY.

1978-0365 BRAY R E
SOLAR-CLIMATIC STATISTICAL STUDY.
SOLAR HEATING AND COOLING R AND D BRANCH CONTRACTORS MEETING, 3RD ANNUAL, WASHINGTON, D.C., SEPTEMBER 24, 1978.
NTIS, MARCH 1978. P. 445-446.
CONF-780983

THE OBJECTIVE OF THIS STUDY IS TO DERIVE, FROM HISTORICAL DATA AVAILABLE AT 26 SOLMET STATIONS RECORDING ON AN HOURLY BASIS, FREQUENCIES AND PROBABILITIES OF SPECIFIC LEVELS OF SOLAR INSOLATION AND WIND POWER OCCURRING AND PERSISTING FOR UP TO ONE WEEK. THESE EMPIRICAL PROBABILITIES WILL BE DETERMINED FOR AVERAGE DAILY INSOLATION AND AVERAGE DAILY WIND POWER, ON A MONTHLY BASIS, CONSIDERED INDEPENDENTLY OR IN COMBINATION.

1978-0366 BROWN F
POWER COULD COME OUT IN THE WASH.
ELECTR. REV. 202(7): 16-17, FEBRUARY 17, 1978.

WINDPOWER COULD PROVIDE UP TO 20 PER CENT OF THE COUNTRY'S ENERGY REQUIREMENTS IF RESEARCH WAS GIVEN THE PROPER FUNDING. THIS PAPER REVIEWS THE CURRENT STATE OF WIND RESEARCH AND THE DIRECTION IN WHICH IT COULD PROGRESS.

1978-0367 BROWN R H
DESIGN AND UTILIZATION OF LOW-COST SOLAR COLLECTORS FOR AGRICULTURE.
ASAE, SUMMER MEETING, LOGAN, UTAH, JUNE 27-30, 1978. PAPER 78-3045. ST. JOSEPH, MICHIGAN, ASAE, 1978. 16 P.

THIS ENERGY SOURCE OFFERS A VERY REAL OPPORTUNITY FOR PRACTICAL APPLICATIONS IN AGRICULTURAL SITUATIONS SUCH AS CROP DRYING, SPACE HEATING, WATER HEATING AND PERHAPS SPACE AND PRODUCT COOLING AND SHAFT HORSEPOWER. THE ENERGY MAY BE COLLECTED WITH LOW-COST SOLAR COLLECTORS, EXPENSIVE COLLECTORS, BIOMASS PRODUCTION FROM PLANTS

AND WIND ENERGY SYSTEMS FOR WATER PUMPING OR GENERATION OF ELECTRICITY. THE PAPER REPORTS ON THE USE OF LOW-COST SOLAR COLLECTORS FOR HEATING OF AIR AND WATER. DESIGN DATA AND SYSTEM CONCEPTS INCLUDING WIND ENERGY AND BIOMASS BURNING ARE PRESENTED.

1978-0368 BRULLE R V
GIROMILL WIND TUNNEL TEST AND ANALYSIS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 775-783.
CONF-770921/2

THE FEASIBILITY OF THE GIROMILL AS A VIABLE WIND ENERGY CONVERSION SYSTEM WAS VERIFIED BY THE INITIAL ONE YEAR FEASIBILITY STUDY COMPLETED IN MAY 1976. THIS PAPER REPORTS ON THE DESIGN, FABRICATION, AND TESTING OF A GIROMILL MODEL IN A WIND TUNNEL. THE PRIMARY OBJECTIVE OF THE TEST WAS TO VERIFY THAT THE LARSEN CYCLOGIRO THEORETICALLY COMPUTED PERFORMANCE WAS OBTAINABLE. A SECONDARY OBJECTIVE WAS TO OBTAIN A COMPARISON OF GIROMILL PERFORMANCE WITH THAT OF OTHER TYPES OF VERTICAL AXIS MACHINES.

1978-0369 ZULIANI G
ALTERNATIVE POWER SOURCES-WIND ENERGY.
ELETTRIFICAZIONE NO. 3: 117-120, MARCH 1978. (IN ITALIAN)

THIS ARTICLE DESCRIBES RECENT DEVELOPMENTS IN WIND POWERED GENERATORS OF HORIZONTAL AND VERTICAL CONSTRUCTION IN THE USA AND ELSEWHERE. AN ACCOUNT IS GIVEN OF GERMAN WORK TO COMBINE WIND AND SOLAR ENERGY FOR POWER GENERATION. THE POSSIBILITIES OF PHOTO-ELECTRIC SOLAR POWER AND COMBINED SCHEMES TO SERVE WATER HEATING OR DISTILLATION PURPOSES ARE BRIEFLY CONSIDERED.

1978-0370 BUILTJES P J H, SMITH J
CALCULATION OF WAKE EFFECTS IN WIND TURBINE PARKS.
WIND ENG. 2(3): 135-145, 1978.

CONSIDERING THE PROBLEM OF THE MUTUAL SPACING AND PATTERN IN WHICH WIND TURBINES HAVE TO BE PLACED IN ORDER TO GET AN OPTIMAL (FROM AN AERODYNAMIC AND ECONOMICAL POINT OF VIEW) ENERGY OUTPUT ON A RESTRICTED AREA, WAKE MEASUREMENTS HAVE BEEN CARRIED OUT IN A WIND TUNNEL OF A TURNING MODEL OF A DARRIEUS ROTOR. USING THESE WAKE RESULTS CALCULATIONS CONSIDERING INTERACTING WAKES OF DIFFERENT TURBINES HAVE BEEN PERFORMED USING THE COMPUTER CODE "WINDS". FOR SMALL PARKS WITH UP TO 20 TURBINES AN OPTIMUM ENERGY OUTPUT SEEMS TO BE GAINED AT A MUTUAL DISTANCE OF ABOUT 5 WIND DIAMETERS; FOR LARGER PARKS ABOVE 60 TURBINES THIS VALUE IS ABOUT 9 DIAMETERS. IN THE CASE OF LARGER PARKS A ROW PATTERN IS PREFERABLE TO A REGULAR PATTERN.

1978-0371 BUSCHULTE W
SEMINAR AND STATUS REPORT ON WIND ENERGY.
NTIS, 1978. 23 P. (IN GERMAN)
SEMINAR AND STATUS REPORT ON WIND ENERGY, JULICH, F.R.G., OCTOBER 23, 1978.
CONF-7810148-1, INKA-CONF-78-012-001, JUL-CONF-27

THE METEOROLOGICAL REQUIREMENTS FOR THE OPERATION OF WIND ENERGY SYSTEMS ARE DESCRIBED, AND DESCRIPTIONS OF SMALL AND LARGER PLANTS, PART OF THEM IN THE PLANNING STAGE AND PART OF THEM ALREADY IN OPERATION, ARE PRESENTED.

1978-0372 BUTLER D A
AMBIENT ENERGY: ECONOMIC APPRAISAL.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 29-38.

SUN, SEA, AND WIND ARE DISCUSSED AS RENEWABLE ENERGY SOURCES. PROBLEMS AND COST FACTORS ARE INTRODUCED. THE FOLLOWING ECONOMIC APPRAISAL TECHNIQUES ARE EXPLORED: COST BENEFIT ANALYSIS, DISCOUNTING, AND PROBABILITY ANALYSIS.

1978-0373 CAHILL T P
TECHNOLOGY DEVELOPMENT OVERVIEW.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 491-501.
CONF-770921/2

A DESCRIPTION IS PRESENTED OF A NUMBER OF TECHNOLOGY DEVELOPMENT PROJECTS THAT ERDA IS FUNDING. SOME OF THE SIGNIFICANT RESULTS TO DATE ARE INDICATED, AND IF THE PROJECT IS A CONTINUING EFFORT, FUTURE PLANS ARE PRESENTED. THE REPORT IS AN OVERVIEW OF THE PROJECT STRUCTURE, TASKS AND OBJECTIVES WHICH WILL BE PURSUED DURING FISCAL YEAR 1978, DEPENDING ON AVAILABLE FUNDING AND ERDA FINAL APPROVAL. THE STUDIES AND PROJECTS DISCUSSED ARE THOSE THAT HAVE BEEN IDENTIFIED AS A RESULT OF THE EXPERIENCE GAINED TO DATE. AS MORE DATA AND EXPERIENCE ARE GAINED, THE SR&T PLAN WILL BE MODIFIED IF REQUIRED TO PROVIDE NEW OR CHANGING EMPHASIS IN SUPPORT OF THE EVOLVING EXPERIENCE OF OVERALL WIND TURBINE DEVELOPMENT.

1978-0374 CALIFORNIA UTILITIES ALLOW WIND SYSTEM HOOK UP.
WIND POWER DIG. NO. 13: 12, FALL 1978.

1978-0375 CALIFORNIA WIND.
WIND POWER DIG. NO. 13: 37-38, FALL 1978.

1978-0376 CAMPBELL J S
THE CAMPBELL CHINESE TYPE WINDMILL.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON PRESS, 1978. VOL. III, P. 1790-1795.

A VERTICAL-AXIS WINDMILL WHICH USES AN OLD BASIC OPERATING PRINCIPLE, THAT OF THE CHINESE WINDMILLS, HAS BEEN DEVELOPED. IT HAS BEEN ENGINEERED AIMING PRINCIPALLY AT LOW COSTS AND ABILITY TO UTILIZE A WIDE RANGE OF WIND VELOCITIES INCLUDING LOWER VELOCITY WINDS. A DEVICE FOR STOPPING THE WINDMILL OPERATION, OR ROTATION, WHILE THE WIND IS BLOWING IS INCLUDED. THIS WINDMILL HAS IMPORTANT DISTINCTIVE ADVANTAGES AS FOLLOWS: LOW TOTAL WEIGHT; NO UNUSUAL SIZE LIMITATION; NO STRENGTHENING LIMITATION; HIGH STARTING TORQUE; SATISFACTORY EFFICIENCY; ABILITY TO UTILIZE LOWER VELOCITY WINDS; RELATIVELY LOW SAIL VELOCITIES; AND LOW PRODUCTION COST PER RATED KILOWATT. SIMILAR TYPE EQUIPMENT CAN BE USED IN FLOWING WATER SUCH AS TIDES AND RIVERS.

1978-0377 CAMPBELL J S

CAMPBELL CHINESE TYPE WINDMILL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1755-1778.

A NEW VERTICAL-AXIS WINDMILL WHICH USES AN OLD OPERATING PRINCIPLE, THAT OF THE CHINESE WINDMILLS, HAS BEEN DEVELOPED. IT HAS BEEN ENGINEERED AIMING PRINCIPALLY AT LOW COSTS AND THE ABILITY TO UTILIZE A WIDE RANGE OF WIND VELOCITIES INCLUDING LOWER VELOCITY WINDS. A DEVICE FOR STOPPING THE WINDMILL OPERATION, OR ROTATION, WHILE THE WIND IS BLOWING IS INCLUDED. THIS DEVICE MAY BE USED FOR PROTECTION OF THE WINDMILL. IN ADDITION TO THE ADVANTAGES COMMONLY FOUND WITH ALL VERTICAL-AXIS WIND MACHINES, THIS NEW WINDMILL HAS IMPORTANT DISTINCTIVE ADVANTAGES AS FOLLOWS: LOW TOTAL WEIGHT, NO UNUSUAL SIZE LIMITATIONS, NO STRENGTHENING LIMITATIONS, HIGH STARTING TORQUE, SATISFACTORY EFFICIENCY, ABILITY TO UTILIZE LOWER VELOCITY WINDS, INTERCEPTED WIND AREA IS RECTANGULAR, RELATIVELY LOW SAIL VELOCITIES, SIMILAR TYPE EQUIPMENT CAN BE USED IN FLOWING WATER SUCH AS TIDES AND RIVERS, AND LOW PRODUCTION COST PER RATED KILOWATT.

1978-0378 CANEGHEM A E VON
WIND ENERGY SYSTEM.
GERMAN (FRG) PATENT NO. 2,645,443/A/, APRIL 13, 1978. 8 P. (IN GERMAN)

A WIND POWER PLANT WITH ROTOR, POLE AND GENERATOR IS DESCRIBED WHICH INCLUDES AT LEAST TWO ROTORS ROTATING IN THE SAME DIRECTION FIRMLY MOUNTED ON THE EXTREME ENDS OF A COMMON SHAFT TWO TO THREE METERS APART. THE SHAFT IS SUPPORTED IN THE MIDDLE BY THE POLE, WHICH IS TELESCOPICALLY DISPLACEABLE IN VERTICAL DIRECTION, AND HAS A TRANSMISSION BAND DRIVING BY MEANS OF A DRIVING BELT OR THE LIKE A DRIVE GEAR OF A DRIVING SHAFT OF THE GENERATOR MOUNTED AT GROUND LEVEL.

1978-0379 CARLISLE J W, MARRS R W
AIRFLOW OVER PART OF THE SOUTHERN HIGH PLAINS INTERPRETED FROM LANDSAT IMAGERY. SPECIAL REPORT.
NTIS, JULY 1978. 64 P.
RLO/2343-78/4

AN INTERPRETATION OF EOLIAN FEATURES USING REMOTE SENSING TECHNIQUES FOR PART OF THE SOUTHERN HIGH PLAINS DEMONSTRATES THE USE OF REMOTE SENSING AS AN INEXPENSIVE AND EASILY APPLICABLE TOOL TO ASSESS WIND-ENERGY POTENTIAL. THE MOST USEFUL EOLIAN FEATURES IN SUCH AN INTERPRETATION ARE SAND DUNES, BLOWOUTS, DUST PLUMES, CLAY DUNES, PLAYA PLUMES, AND PLAYA ORIENTATION. ALTHOUGH THE RELIEF IS LOW TO MODERATE IN THIS AREA, TOPOGRAPHIC CHANNELING IS THE MOST IMPORTANT FACTOR IN DETERMINING HIGH WIND-ENERGY AREAS.

1978-0380 CARROLL T O
ENERGY: OPTIONS FOR THE FUTURE. CURRICULUM DEVELOPMENT PROJECT FOR HIGH SCHOOL TEACHERS. FINAL REPORT.
NTIS, APRIL 1978. 385 P.
COO-4278-1

RECENT STATE AND REGIONAL ENERGY CRISES DEMONSTRATE THE DELICATE BALANCE BETWEEN ENERGY SYSTEMS, THE ENVIRONMENT, AND THE ECONOMY. INDEED, THE INTERACTION BETWEEN THESE THREE ELEMENTS OF SOCIETY IS VERY COMPLEX. THIS PROJECT DEVELOPS CURRICULUM MATERIALS THAT WOULD BETTER PROVIDE STUDENTS WITH AN UNDERSTANDING AND AWARENESS OF FUNDAMENTAL PRINCIPLES OF ENERGY SUPPLY, CONVERSION PROCESSES, AND UTILIZATION NOW AND IN THE FUTURE. THE PROJECT HAD TWO SPECIFIC OBJECTIVES: TO TRANSFER KNOWLEDGE OF ENERGY SYSTEMS, ANALYSIS TECHNIQUES, AND ADVANCED TECHNOLOGIES FROM THE ENERGY ANALYST COMMUNITY TO THE TEACHER PARTICIPANTS; AND TO INVOLVE TEACHERS IN THE PREPARATION OF MODULAR CASE STUDIES ON ENERGY ISSUES FOR USE WITHIN THE CLASSROOM. THESE CURRICULUM MODULES ARE INTENDED TO ENHANCE THE TEACHER'S ABILITY TO PROVIDE ENERGY-RELATED EDUCATION TO STUDENTS WITHIN HIS OR HER OWN ACADEMIC SETTING.

1978-0381 CARTER J
WIND POWER SYSTEMS' STORM MASTER.
WIND POWER DIG. NO. 13: 34-35, FALL 1978.

1978-0382 CARTER J
WIND TAX INCENTIVES.
WIND POWER DIG. NO. 13: 36, FALL 1978.

1978-0383 CARTER J
THE "WINDFLOWER".
WIND POWER DIG. NO. 13: 30-32, FALL 1978.

1978-0384 CATANIA P J, DE HOLANDA P R H, HUNT D J
DEVELOPMENT OF WOODEN AIRFOILS FOR A DARRIEUS WIND GENERATOR.
UNION PANAMERICANA DE ASOCIACIONES DE INGENIEROS, CONVENTION, 15TH, SANTIAGO, CHILE, OCTOBER 1-7, 1978.
SANTIAGO, UPADI, 1978. VOL. 4, P. 263-276.

THE PAPER DESCRIBES AN EXPERIMENTAL RESEARCH PROGRAM CARRIED OUT AT THE LABORATORY OF WIND ENERGY AT THE FEDERAL UNIVERSITY OF PARAIBA, BRAZIL. THE THEORETICAL BACKGROUND LEADING TO THE SPECIFICATIONS FOR A 6 M THREE-BLADE DARRIEUS WIND GENERATOR AND A DETAILED DESCRIPTION OF THE PROCEDURE USED TO CONSTRUCT LOW COST, WOODEN, LAMINATED AIRFOILS IS INCLUDED. THE DARRIEUS WIND GENERATOR HAS THE CAPACITY OF PRODUCING 5 KW AT AN AVERAGE WIND VELOCITY EQUAL TO 9 M/S. THE AERODYNAMIC SHAPE OF THE AIRFOIL WAS NASA 0015.

1978-0385 CENTER FOR THE INTEGRAL DEVELOPMENT OF "LAS GAVIOTAS".
NTIS, 1978. 21 P.
ERDA-TR-288

THE FOLLOWING RESEARCH PROJECTS IN COLOMBIA ARE DESCRIBED BRIEFLY: DEVELOPMENT AND USE OF 0.5 TO 1.0 KW HYDRAULIC TURBINES FOR RURAL HYDROELECTRIC POWER GENERATION; WATER PIPELINE CONSTRUCTION; CONSTRUCTION OF SMALL DAMS; WATER PUMP DESIGN; WIND MILL DESIGN; DEVELOPMENT OF SOLAR WATER HEATERS; TESTING OF HYDRAULIC RAMS; AN EARTH-CEMENT SOLAR REFLECTOR; AND DESIGN OF A CASSAVA SHREDDER.

1978-0386 CHAMIS C C, SINCLAIR J H
ANALYSIS/DESIGN OF STRIP REINFORCED RANDOM COMPOSITES (STRIP HYBRIDS).
COMPOSITE MATERIALS IN THE AUTOMOBILE INDUSTRY, SYMPOSIUM PRESENTED AT ASME WINTER ANNUAL MEETING, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 67-84.

RESULTS ARE DESCRIBED WHICH WERE OBTAINED BY APPLYING ADVANCED ANALYSIS METHODS AND COMPOSITE MECHANICS TO A STRIP-REINFORCED RANDOM COMPOSITE SQUARE PANEL WITH FIXED ENDS. THIS WAS DONE IN ORDER TO ILLUSTRATE THE USE

OF THESE METHODS FOR THE APRIORI ASSESSMENT OF THE COMPOSITE PANEL WHEN SUBJECTED TO COMPLEX LOADING CONDITIONS. THE PANEL WAS ASSUMED TO BE OF E-GLASS/RANDOM COMPOSITE. THE STRIPS WERE ASSUMED TO BE OF THREE ADVANCED UNIDIRECTIONAL COMPOSITES TO COVER A RANGE OF LOW, INTERMEDIATE, AND HIGH MODULUS STIFFNESS. THE PANELS WERE ASSUMED TO BE SUBJECTED TO COMPLEX LOADINGS TO ASSESS THEIR ADEQUACY AS LOAD-CARRYING MEMBERS IN AUTO BODY, AIRCRAFT ENGINE NACELLE, AND WINDMILL BLADE APPLICATIONS. THE RESULTS SHOW THAT STRIP HYBRID PANELS CAN BE SEVERAL TIMES MORE STRUCTURALLY EFFICIENT THAN THE RANDOM COMPOSITE BASE MATERIALS. SOME OF THE RESULTS ARE PRESENTED IN GRAPHICAL FORM AND PROCEDURES ARE DESCRIBED FOR USE OF THESE GRAPHS AS GUIDES FOR PRELIMINARY DESIGN OF STRIP HYBRIDS.

1978-0387 CHANG G C, HIRSCHFELD F
FOR THE LATEST IN ENERGY STORAGE, TRY THE FLYWHEEL.
MECH. ENG. 100(2): 38-45, FEBRUARY 1978.

FROM REGENERATIVE BRAKING IN AUTOMOBILES TO PEAKING POWER FOR UTILITY OPERATIONS, FLYWHEELS HAVE BECOME A KEY ELEMENT IN DEVELOPING PRIMARY AND HYBRID SYSTEMS FOR ENERGY STORAGE. USING NEW COMPOSITE MATERIALS, TOGETHER WITH OTHER SOPHISTICATED ENGINEERING COMPONENTS, THE FLYWHEEL HAS BEEN REDESIGNED TO MEET THE NEEDS OF AN OIL-SHORTAGE ECONOMY. THE MOST IMMEDIATE APPLICATIONS ARE IN TRANSPORT VEHICLES, BUT THERE ARE OTHER PROMISING USES AHEAD IN UTILITIES, SOLAR POWER, AND WIND TURBINE FACILITIES. THE DIRECTION OF RESEARCH ON THE FLYWHEEL ITSELF, ITS CAPABILITY FOR REDUCING FUEL CONSUMPTION IN GASOLINE VEHICLES, THE LOAD ON THE BATTERY IN ELECTRIC VEHICLES, AND THE POSSIBILITY OF AN ALL-FLYWHEEL-POWERED ELECTRIC VEHICLE ARE DISCUSSED.

1978-0388 CHANGERY M J
NATIONAL WIND DATA INDEX: FINAL REPORT.
NTIS, DECEMBER 1978. 280 P.
HCO/T1041-01

THIS INDEX IS A CONCISE LISTING OF THE PERIODS OF RECORD OF ALL AVAILABLE WIND OBSERVATIONS IN THE NATIONAL CLIMATIC CENTER'S METEOROLOGICAL (DATA) ARCHIVES FOR LOCATIONS IN THE UNITED STATES. INCLUDED ARE THE PERIODS WITH VARIOUS TYPES OF MANUSCRIPT RECORDS AND AUTOGRAPHIC CHARTS CONTAINING WIND DATA, THE APPROXIMATE NUMBER OF OBSERVATIONS PER DAY, AND PERIODS FOR WHICH WIND DATA ARE ON MAGNETIC TAPE. A BRIEF HISTORY OF STANDARD U.S. INSTRUMENTATION AND AVAILABLE METEOROLOGICAL RECORD FORMS IS INCLUDED. FOR MOST LOCATIONS, THE ANEMOMETER HEIGHTS ARE INCLUDED TOGETHER WITH DATES OF HEIGHT CHANGES AND THE INSTRUMENT EXPOSURE.

1978-0389 CHASE V D
COMING: SUPER WINDMILLS FOR SUPER POWER.
POP. MECH. 149(5): 116-119, 286-287, MAY 1978.

THE DESIGN CHARACTERISTICS OF WIND TURBINE SYSTEMS ARE DESCRIBED. THE PLANNED DOE WIND TURBINES AND THE FEASIBILITY OF LARGE WIND POWER PLANTS ARE DISCUSSED.

1978-0390 CHATTOPADHYAY S N
INSTRUMENTS FOR SOLAR RADIATION AND WIND POWER MEASUREMENT.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978.
OXFORD, ENGLAND, PERGAMON, 1978. VOL. I; P. 454.

A SUMMARY ONLY IS GIVEN, SUBSTANTIALLY AS FOLLOWS: A PROGRAM FOR THE DESIGN, DEVELOPMENT, AND MANUFACTURE OF INSTRUMENTS HAS BEEN TAKEN UP IN ORDER TO MEET LARGE SCALE RESEARCH PROGRAM NEEDS AND INCREASED OPERATIONAL REQUIREMENTS. THE FIRST PHASE COMPRISES THE DEVELOPMENT OF INSTRUMENTS REQUIRED IN LARGE NUMBERS FOR THE MEASUREMENT OF DURATION OF SUNSHINE AND OF SOLAR RADIATION, COMPLETE WITH AUTOMATIC ELECTRONIC INTEGRATING AND RECORDING DEVICES. THE PAPER DISCUSSES THE DESIGN AND PRODUCT ENGINEERING ASPECTS OF THESE INSTRUMENTS, THEIR ACCURACY AND RELIABILITY, AND THE EXTENSIVE LABORATORY AND FIELD TESTS CARRIED OUT TO DETERMINE THEIR ERRORS. THE CHARACTERISTICS AND PRINCIPLES OF OPERATION OF COMMONLY USED INSTRUMENTS, TYPES OF DATA OBTAINED, OPERATIONAL ADVANTAGES AND DISADVANTAGES, AND THE APPROXIMATE COST OF EACH TYPE OF INSTRUMENT ARE ALSO REVIEWED AND THE INSTRUMENTS EVALUATED.

1978-0391 CHENG E D H
TRADEOFF CONSIDERATIONS BETWEEN WIND POWER POTENTIAL AND SITE SELECTION.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978.
GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-16-1. (ABSTRACT ONLY)

1978-0392 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE.
SOL. ENERGY 20(3): 233-240, 1978.

THE COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT HAS CHARACTERISTICS IDEALLY SUITED FOR WIND TURBINE APPLICATIONS. IT ELIMINATES BLADE BEARINGS AND HINGES THROUGH UTILIZATION OF THE STRUCTURAL CHARACTERISTICS OF UNIAXIAL COMPOSITE MATERIALS. DEVELOPED FEATURES ALLOW SELF-STARTING FOR WIND INITIATING FROM ANY DIRECTION AND AUTOMATIC PITCH AND YAW VARIATIONS TO OPTIMIZE PERFORMANCE UNDER ALL NORMAL WIND CONDITIONS. THE WORK DESCRIBED IN THIS REPORT CONSISTS OF THE DESIGN AND FABRICATION OF A 4.5 FT DYNAMICALLY SCALED WIND TURBINE MODEL AND THE SUCCESSFUL TESTING OF THIS MODEL IN THE UNITED TECHNOLOGIES RESEARCH CENTER LOW SPEED WIND TUNNEL.

1978-0393 CHEREMISINOFF P N, REGINO T C
PRINCIPLES AND APPLICATIONS OF SOLAR ENERGY.
ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBLISHERS, 1978. 255 P.

THE FOLLOWING CHAPTERS ARE INCLUDED: SOLAR ENERGY--HISTORICAL; SOLAR ENERGY AVAILABILITY; THERMAL COLLECTION DEVICES; THERMAL SOLAR ENERGY APPLICATIONS; PHOTOVOLTAIC GENERATION OF ELECTRICITY; ENERGY FROM THE WIND; OCEAN THERMAL GRADIENT POWER; CHEMICAL CONVERSION OF SOLAR ENERGY; AND BIOLOGICAL CONVERSION OF SOLAR ENERGY. INSOLATION DATA TABLES AND MAPS ARE INCLUDED IN THE APPENDIX.

1978-0394 CHIU A N L
WIND ENGINEERING RESEARCH DIGEST. VOLUME 3. 1978.
NTIS, NOVEMBER 1978. 174 P.
PB-290694

RESEARCH ACTIVITY IN WIND ENGINEERING (OR ENVIRONMENTAL AERODYNAMICS) HAS EXPANDED RAPIDLY THROUGHOUT THE UNITED STATES. THE WIND ENGINEERING RESEARCH DIGEST KEEPS TRACK OF THIS FAR FLUNG RESEARCH EFFORT, AND PUBLISHES A SUMMARY OF ON-GOING RESEARCH PROJECTS AT ANNUAL INTERVALS. TOPIC AREAS DISCUSSED INCLUDE THE FOLLOWING: STRUCTURE OF WIND; WIND-WAVE EFFECTS; EFFECTS ON URBAN AREAS; WIND LOADING ON STRUCTURES; SEVERE

STORMS; DESIGN FOR HURRICANES AND TORNADOES; FULL-SCALE TESTING; MODEL TESTING; ENVIRONMENTAL FACTORS; PSYCHO-PHYSICAL FACTORS; LEGAL FACTORS; SPECIAL PROBLEMS; WIND CONSIDERATIONS IN URBAN PLANNING; BUILDING CODES AND REGULATIONS; SOCIO-ECONOMIC EFFECTS; INTERNATIONAL COOPERATION; AND WIND ENERGY.

1978-0395 CHOPRA I, DUGUNDJI J
NONLINEAR DYNAMIC RESPONSE OF A WIND TURBINE ROTOR UNDER GRAVITATIONAL LOADING.
AIAA J. 16(8): 773-774, AUGUST 1978.

THE NONLINEAR EQUATIONS OF MOTION FOR AN ISOLATED 3-DEG FLAPPING-LAGGING-FEATHERING ROTOR BLADE ARE DERIVED USING LAGRANGE'S EQUATIONS FOR ARBITRARY LARGE ANGULAR DEFLECTIONS. THE AERODYNAMIC FORCES AND THE TOWER INTERACTION ARE NOT CONSIDERED HERE. A CONSISTENT SET OF NONLINEAR EQUATIONS IS OBTAINED BY USING NONLINEAR TERMS UP TO THIRD ORDER. THE LIMIT CYCLE ANALYSIS FOR FORCED OSCILLATIONS AND THE PRINCIPAL PARAMETRIC RESONANCE OF THE FLAP-LAG BLADE UNDER A PERIODIC GRAVITY FIELD ARE STUDIED USING THE HARMONIC BALANCE METHOD. FOR A RELATIVELY SMALL INITIAL CONING ANGLE (ABOUT 9 DEG), THE NONLINEARITY BECOMES OF THE SOFTENING SPRING TYPE, AND LARGE COUPLED RESPONSES ARE POSSIBLE FOR ROTATIONAL FREQUENCIES SIGNIFICANTLY LOWER THAN THE LAGGING FREQUENCY.

1978-0396 CHOPRA I
WIND ENERGY CONVERSION. VOLUME 6. NONLINEAR RESPONSE OF WIND TURBINE ROTOR. ASRL-TR-184-12.
NTIS, SEPTEMBER 1978. 231 P.
COO-4131-T1(VOL.6)

THE NONLINEAR EQUATIONS OF MOTION FOR A RIGID ROTOR RESTRAINED BY THREE FLEXIBLE SPRINGS REPRESENTING, RESPECTIVELY, THE FLAPPING, LAGGING, AND FEATHERING MOTIONS ARE DERIVED USING LAGRANGE'S EQUATIONS, FOR ARBITRARY ANGULAR ROTATIONS. THESE ARE REDUCED TO A CONSISTENT SET OF NONLINEAR EQUATIONS USING NONLINEAR TERMS UP TO THIRD ORDER. THE COMPLETE ANALYSIS IS DIVIDED INTO THREE PARTS, A, B, AND C. PART A CONSISTS OF FORCED RESPONSE OF TWO-DEGREE FLAPPING-LAGGING ROTOR UNDER THE EXCITATION OF PURE GRAVITATIONAL FIELD (I.E., NO AERODYNAMIC FORCES). IN PART B, THE EFFECT OF AERODYNAMIC FORCES ON THE DYNAMIC RESPONSE OF TWO-DEGREE FLAPPING-LAGGING ROTOR IS INVESTIGATED. IN PART C, THE EFFECT OF THIRD DEGREE OF MOTION, FEATHERING, IS CONSIDERED.

1978-0397 CHUNG S Y
WIND ENERGY CONVERSION. VOLUME 9. AERODYNAMICS OF WIND TURBINE WITH TOWER DISTURBANCES. ASRL-TR-184-15.
NTIS, SEPTEMBER 1978. 103 P.
COO-4131-T1(VOL. 9)

LIFTING LINE THEORY WHICH IS THE COUNTERPART OF PRANDTL'S LIFTING LINE THEORY FOR ROTATING WING IS EMPLOYED FOR THE OVERALL PERFORMANCE ANALYSIS OF A HORIZONTAL AXIS WIND TURBINE ROTOR OPERATING IN A UNIFORM FLOW. THE WAKE SYSTEM IS MODELED BY A NON-RIGID WAKE WHICH INCLUDES THE RADIAL EXPANSION AND THE AXIAL RETARDATION OF TRAILING VORTICES. FOR THE NON-UNIFORM FLOW WHICH ARE CAUSED BY THE GROUND, THE TOWER REFLECTION, OR THE TOWER SHADOW, THE UNSTEADY AIRLOADS ACTING ON THE TURBINE BLADE ARE COMPUTED, USING LIFTING LINE THEORY AND A NON-RIGID WAKE MODEL. AN EQUATION WHICH GIVES THE WIND PROFILE IN THE TOWER SHADOW REGION IS DEVELOPED. ALSO, THE EQUATIONS TO DETERMINE PITCH ANGLE CONTROL ARE DERIVED TO MINIMIZE THE FLAPPING MOMENT VARIATIONS OR THE THRUST VARIATIONS DUE TO THE NON-UNIFORM FLOW OVER A ROTATION.

1978-0398 CLARK R N
USDA WIND ENERGY PROGRAM.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 92-96.

STUDIES PERFORMED BY THE U.S. DEPARTMENT OF AGRICULTURE ON THE USE OF WIND ENERGY IN FARMING PROCEDURES ARE REVIEWED.

1978-0399 CLARK R N, SCHNEIDER A D
IRRIGATION PUMPING WITH WIND ENERGY.
ASAE PAPER 78-2549, FOR WINTER MEETING, CHICAGO, DECEMBER 18-20, 1978. ST. JOSEPH, MICHIGAN, ASAE, 1978. 16 P.

A 40-KW VERTICAL AXIS WIND TURBINE WAS ERECTED AT THE USDA SOUTHWESTERN GREAT PLAINS RESEARCH CENTER, BUSHLAND, TEXAS. OBJECTIVES OF THIS PROJECT WERE TO ASSEMBLE A COMPLETE WIND-POWER PUMPING SYSTEM, ADAPT OR MODIFY EXISTING PUMPING EQUIPMENT SO THAT IT COULD BE EFFECTIVELY POWERED BY A WIND TURBINE AND MAKE ECONOMIC ANALYSIS OF WIND PUMPING SYSTEMS. THE PUMPING SYSTEM USED BOTH A WIND TURBINE AND AN ELECTRICAL MOTOR TO POWER AN EXISTING DEEP WELL IRRIGATION PUMP IN A WIND-ASSIST CONCEPT. THE SYSTEM DELIVERED 104 M**3/H AGAINST A HEAD OF 105 M. ALL COMPONENTS OF THE WIND-ASSISTED PUMPING SYSTEM WORKED SATISFACTORILY.

1978-0400 CLEARLY L D
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1977 SURVEY.
NTIS, FEBRUARY 1978. 133 P.
EPRI-ER-649-SR

THE RESULTS OF A SURVEY TO DETERMINE THE SCOPE OF SOLAR ENERGY PROJECTS SPONSORED BY ELECTRIC UTILITIES IN THE UNITED STATES ARE PRESENTED. BRIEF DESCRIPTIONS ARE GIVEN OF 458 PROJECTS BEING CONDUCTED BY 150 UTILITY COMPANIES. ALSO INCLUDED IS A LIST OF PARTICIPATING UTILITIES WITH INFORMATION CONTACTS AND ADDRESSES, A LIST OF UTILITIES WITH PROJECTS DESIGNATED BY CATEGORY, AND A LIST OF UTILITIES ORGANIZED BY STATE.

1978-0401 CLEGG R J, JOHNS M D, PATTEMORE S W
WIND POWER SITE EVALUATION. I. WIND ENERGY POTENTIAL.
N. Z. J. SCI. 21(2): 185-193, JUNE 1978.

A FIELD STATION ON THE WHANGAPARAOA PENINSULA HAS PROVIDED DATA ON WIND SPEED AND DIRECTION FOR A 12 MONTH PERIOD. IN ADDITION TO EVALUATING THE INSTRUMENTATION SYSTEM, THE DATA SAMPLING PROCEDURE HAS BEEN STUDIED USING A FAST RESPONSE ANEMOMETER. DATA COVERING A 6 MO. PERIOD HAVE BEEN USED TO DETERMINE THE WIND POWER POTENTIAL OF THE SITE. ANALYSIS REVEALS THAT THE WHANGAPARAOA SITE HAD A MEAN WIND ENERGY FLUX OF 464 W/M**2 AT A HEIGHT OF 10 M FOR THE 6 MONTHS SEPTEMBER 1975 TO FEBRUARY 1976; THE ESTIMATE FOR THE FULL YEAR IS 371 W/M**2.

1978-0402 CLEGG R J, JOHNS M D, PATTEMORE S W
WIND POWER SITE EVALUATION. II. DATA ACQUISITION AND PROCESSING.
N. Z. J. SCI. 21(2): 195-204, JUNE 1978.

SOME ASPECTS OF THE ACQUISITION AND PROCESSING OF DATA RELATING TO WIND POWER SITE EVALUATION ARE DISCUSSED IN DETAIL. THE INSTRUMENTS USED IN ACQUIRING AND LOGGING THE DATA ARE LISTED AND CRITICIZED. THE EFFECT OF WIND SPEED SAMPLING INTERVALS ON THE ACCURACY OF WIND POWER ESTIMATES HAS BEEN MEASURED, AND SOME ALTERNATIVE METHODS OF CALCULATING WIND POWER FROM THE WIND SPEED DATA HAVE BEEN EXPLORED. AN EXPERIMENTAL ASSESSMENT OF THE SIGNIFICANCE OF FLUCTUATIONS IN AIR DENSITY ON THE ESTIMATED WIND POWER IS PRESENTED.

1978-0403 CLIFF W C
FLOW FIELD ANALYSIS.
NTIS, JANUARY 16, 1978. 9 P.
CONF-780153-1, PNL-SA-6739

THE AVERAGE MEAN WIND SPEED INTEGRATED OVER A DISK IS SHOWN TO BE EXTREMELY CLOSE TO THE MEAN VALUE OF WIND SPEED WHICH WOULD BE MEASURED AT THE CENTER OF A DISK FOR MOST GEOMETRIES IN WHICH A WECS (WIND ENERGY CONVERSION SYSTEM) WOULD OPERATE. FIELD TEST RESULTS ARE PRESENTED WHICH COMPARE INSTANTANEOUS RECORDS OF WIND SPEED INTEGRATED OVER A DISK WITH THE WIND SPEED MEASURED AT THE CENTER OF THE DISK.

1978-0404 CLIFF W C
U.S. WIND ENERGY -- 1978.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. TUTORIALS VOL., P. 23-32.

THIS PAPER PRESENTS AN OVERALL VIEW OF THE STATE-OF-THE-ART IN WIND ENERGY IN THE UNITED STATES FOR 1978. THE NATIONAL ASSESSMENT OF WIND ENERGY IS PRESENTED INCLUDING A DISCUSSION OF CURRENT WIND TURBINES READY TO EXTRACT THE WIND ENERGY FOR THE GENERATION OF ELECTRICITY.

1978-0405 COMPREHENSIVE TESTS WITH WIND AS ENERGY SOURCE.
ELEKTRON. INT. NO. 3: 97-98, 1978. (IN GERMAN)

THIS ARTICLE PRESENTS A BRIEF SURVEY OF THE PRESENT STATE OF THE ART. WINDMILL TYPES ARE DIVIDED INTO 2 GROUPS, THOSE ROTATING ROUND A HORIZONTAL-, AND THOSE ROTATING ROUND A VERTICAL-AXIS, AS ILLUSTRATED BY SIMPLE DIAGRAMS. THE DEVELOPMENTS OF THE JOINT DESIGN TEAM OF NTT AND THE UNIVERSITY OF TOKAI ARE SINGLED OUT FOR A MORE DETAILED DESCRIPTION; THEIR GENERATORS SUPPLY 2 KW AT A WINDSTRENGTH OF 7 M/SEC AND ARE CAPABLE OF WITHSTANDING HURRICANES OF 60 M/SEC.

1978-0406 COROTIS R B
STOCHASTIC CONSIDERATIONS IN SITE SURVEY DESIGN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 361-380.
CONF-770921/1

A PROGRAM TO COMPUTE BASIC WIND STATISTICS HAS BEEN DEVELOPED. THE FIRST VERSION OF THIS PROGRAM IS CALLED WINDATA, AND THE SECOND VERSION, WINDATB. THE PRIMARY PURPOSE OF THIS PROGRAM IS TO PROVIDE SUMMARY INFORMATION CHARACTERIZING THE WIND VELOCITY AND WIND POWER AT A PARTICULAR SITE DESIGNED TO PROVIDE THE INFORMATION NECESSARY TO DEVELOP SITE SURVEY DURATION REQUIREMENTS.

1978-0407 COROTIS R B, SIGL A B, KLEIN J
PROBABILITY MODELS OF WIND VELOCITY MAGNITUDE AND PERSISTENCE.
SOL. ENERGY 20(6): 483-493, 1978.

HOURLY WIND DATA FROM THE NATIONAL CLIMATIC CENTER ARE USED TO STUDY PROBABILITY DENSITY FUNCTIONS OF WIND VELOCITY AND WIND POWER AND RUN DURATION PERSISTENCE. OBSERVED HISTOGRAMS OF VELOCITY ARE COMPARED WITH THE CHI-2 AND WEIBULL DISTRIBUTIONS USING GOODNESS-OF-FIT STATISTICS, AND WIND POWER HISTOGRAMS ARE COMPARED WITH DISTRIBUTIONS DERIVED FROM THESE. FROM AN ENGINEERING STANDPOINT, THE OBSERVED HISTOGRAMS COMPARE WELL WITH THE MODELS, ALTHOUGH DISCREPANCIES EXIST. OVER THE POWER RANGES OF INTEREST FOR WIND CONVERSION, THE MODELS APPEAR PROMISING.

1978-0408 COROTIS R B
A PROBABILISTIC BASIS FOR WIND POWER SITING.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978. GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. 11-18-1. (ABSTRACT ONLY)

1978-0409 COTY U, DUBEY M
THE HIGH POTENTIAL OF THE WIND AS AN ECONOMIC ENERGY SOURCE FOR ELECTRIC POWER GENERATION.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1809.

WIND ENERGY CAN BE ECONOMICALLY CONVERTED TO ELECTRIC ENERGY USING LARGE WIND TURBINE GENERATORS WITH ROTOR DIAMETERS OF ABOUT 100 METERS. THESE WINDMILLS CAN BE RATED AT 2000 TO 5000 KILOWATTS OF POWER FOR AVERAGE ANNUAL WIND SPEEDS OF 5 TO 12 METERS/SECOND. WIND TURBINE GENERATORS CAN BE CONNECTED DIRECTLY TO POWER TRANSMISSION AND DISTRIBUTION WORKS. THEY CAN PROVIDE FROM M 5 TO 15 PERCENT OF THE NETWORK POWER WITHOUT INDUCING INSTABILITIES, DEPENDING ON THE NATURE OF OTHER GENERATING EQUIPMENT FEEDING THE NETWORK.

1978-0410 COUCH J P
MOD-2 WIND GENERATOR PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 92-106.
CONF-770921/1

THE MOD-2 PROJECT WILL LEAD TO THE DEVELOPMENT OF A MACHINE WITH A MINIMUM 300 FOOT DIAMETER ROTOR WHICH IS DESIGNED FOR A SITE HAVING A YEARLY MEAN WIND SPEED OF 14 MPH AND IS WIDELY USEFUL THROUGHOUT THE UNITED STATES. THE PROGRAMMATIC GOAL OF THE MOD-2 PROJECT IS TO PRODUCE AN ELECTRICAL GENERATING SYSTEM THAT WILL BE COST COMPETITIVE WITH CONVENTIONAL FUELED POWERPLANTS. THE COST OF ELECTRICITY TARGET FOR THE ONE-HUNDREDTH MOD-2 WIND TURBINE IS IN THE RANGE OF 2 TO 4 CENT/KW-HR.

1978-0411 COXON L K
ALTERNATE ENERGY INSTALLATIONS ON THE JORDAN COLLEGE CAMPUS.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 2, PAP. 3.1.11. 8 P.

SINCE PLANNING ITS FIRST SOLAR INSTALLATION IN 1974, JORDAN COLLEGE HAS CONSTRUCTED FIVE ALTERNATE ENERGY DEMONSTRATION UNITS WHICH CONTRIBUTE GREATLY TO REDUCING ENERGY EXPENSES. THE TWO LARGEST SOLAR HEATING UNITS RANGE IN COLLECTOR SIZE FROM 1,000 TO 2,080 SQUARE FEET WHILE A RETROFITTED STUDENT RESIDENCE HAS APPROXIMATELY 340 SQUARE FEET OF COLLECTOR. SOLAR HEATED AIR FOR THE HEATING OF SPACE AND SOLAR HEATED WATER FOR BOTH SPACE AND DOMESTIC HOT WATER APPLICATIONS ARE UTILIZED ON THE CAMPUS, BOTH SEPARATELY AND JOINTLY.

1978-0412 CURTIS G B
A WIND POWERED HEAT PUMP IN A DAIRY FARM APPLICATION. FINAL REPORT.
NTIS, 1978. 174 P.
DOE/TIC-10227

A 30-FOOT HIGH, 20-FOOT DIAMETER DARRIEUS WIND TURBINE WAS INSTALLED ON A 120-COW DAIRY FARM. THE WIND TURBINE GENERATED 3-PHASE ELECTRICAL POWER WHICH WAS USED, IN PARALLEL WITH UTILITY POWER, TO OPERATE THE REFRIGERATION EQUIPMENT FOR MILK COOLING AT THE DAIRY FARM. A MILK PRE-COOLER AND HEAT RECOVERY FROM THE REFRIGERATION CONDENSER WERE ALSO INSTALLED TO SUPPLY THE WARM WATER REQUIREMENTS OF THE DAIRY. THE SYSTEM WAS OPERATED FOR 183 DAYS AND ITS PERFORMANCE, ALONG WITH WIND MEASUREMENTS FOR THE SAME PERIOD, WAS ANALYZED TO YIELD PREDICTIONS FOR THE SIZE OF WIND TURBINE REQUIRED TO SUPPLY NEEDED ENERGY AND THE SIZE OF ICE STORAGE UNIT NEEDED TO STORE REFRIGERATION CAPACITY OVER PERIODS OF LOW WIND. THIS "FINAL REPORT" ACTUALLY COMBINES A 15 P. EXECUTIVE SUMMARY AND A 157 P. FINAL REPORT IN ONE VOLUME.

1978-0413 DANIELS P A, SCHROEDER T A
AIR FLOW IN THE CENTRAL VALLEY OF MAUI, HAWAII.
J. APPL. METEOROL. 17(6): 812-818, JUNE 1978.

LOW-LEVEL WINDS IN THE CENTRAL VALLEY OF THE ISLAND OF MAUI WERE INVESTIGATED IN A FIELD PROGRAM DURING AUGUST 1976. FORTY-ONE SITES WERE OCCUPIED USING THREE MOBILE STATIONS DURING A PERIOD OF PERSISTENT TRADE WINDS. CONTEMPORANEOUS DATA FROM THE KAHULUI WEATHER SERVICE OFFICE AS WELL AS OTHER HAWAIIAN STATIONS WERE COLLECTED TO RELATE FIELD OBSERVATIONS TO LARGE-SCALE EVENTS.

1978-0414 DAUVILLIER A
L'ENERGIE THERMIQUE MARINE ET LA COMBINAISON DES ENERGIES SOLAIRE, RADIATIVE ET EOLIENNE. (MARINE THERMAL ENERGY AND THE COMBINATION OF SOLAR, RADIATIVE AND WIND ENERGIES.)
REV. ENERG. 29(302): 142-145, MARCH 1978. (IN FRENCH)

A THERMODYNAMIC PROCESS FOR THE GENERATION OF ENERGY IS PRESENTED WHICH USES METEOROLOGICAL ELEMENTS THROUGH THE CREATION OF A HEAT SOURCE DUE TO DAY-TIME RAYS AND A COLD SOURCE DUE TO NIGHT-TIME RAYS PLUS A MINOR ADDITION OF WIND ENERGY, OBTAINED BY A HEAT PUMP. MARINE THERMAL ENERGY, THE RADIATION PROCESS, WIND ENERGY AND THE PROBLEM OF SITES AND CONSTRUCTION ARE ALL SUCCESSIVELY STUDIED IN THIS ARTICLE.

1978-0415 DAUVILLIER A
MARINE THERMIC ENERGY AND THE COMBINATION OF SOLAR, RADIATIVE AND AEOLIAN ENERGIES.
REV. ENERG. 29(309): 593-597, NOVEMBER 1978. (IN FRENCH)

A THERMODYNAMIC PROCESS FOR THE GENERATION OF ENERGY IS PRESENTED WHICH USES METEOROLOGICAL ELEMENTS THROUGH THE CREATION OF A HEAT SOURCE DUE TO DAY-TIME RAYS AND A COLD SOURCE DUE TO NIGHT-TIME RAYS PLUS A MINOR ADDITION OF WIND ENERGY OBTAINED BY A HEAT PUMP. MARINE THERMAL ENERGY, THE RADIATION PROCESS, WIND ENERGY AND THE PROBLEM OF SITES AND CONSTRUCTION ARE ALL SUCCESSIVELY STUDIED IN THIS ARTICLE.

1978-0416 DAVIS J C, WALKER C
WAGE THE ENERGY WAR AT HOME.
BUCHANAN, NEW YORK, EMERSON BOOKS, INC., 1978. 255 P.

THIS BOOK COVERS THE BASIC TECHNIQUES OF INSTALLING AND SELECTING INSULATION AND STORM WINDOWS, REDUCING HEAT LOSS AND POWER CONSUMPTION AS WELL AS MORE COMPLEX SOLAR AND WIND SYSTEMS. IT COVERS THE GAMUT OF ENERGY-SAVING IDEAS THAT CAN SAVE MONEY WITHOUT COSTING COMFORT. INFORMATIVE AND DETAILED CHAPTERS COVER WINDOWS, DOORS, AND WALLS; INSULATION, CLIMATE CONTROL EQUIPMENT, FIREPLACES AND STOVES; HOUSEHOLD APPLIANCES AND FIXTURES; AND HOUSE DESIGN, CONSTRUCTION, ORIENTATION, AND LANDSCAPING. HOUSEHOLD HINTS AND ENERGY-SAVING ROUTINES OFFER NOVEL IDEAS ON HOW TO STRETCH ENERGY DOLLARS. A CHAPTER ON HOW CONSUMERS CAN INFLUENCE UTILITY RATES IS ALSO INCLUDED.

1978-0417 DAVITIAN H
WIND POWER AND ELECTRIC UTILITIES: A REVIEW OF THE PROBLEMS AND PROSPECTS.
WIND ENG. 2(4): 234-255, 1978.

THE USE OF WINDPOWER POSES A VARIETY OF PROBLEMS FOR UTILITIES PRIMARILY DUE TO THE UNCONTROLLABILITY OF THE POWER SOURCE AND THE HIGH DEGREE OF VARIABILITY OF THE WIND. DIFFERENCES IN THE DYNAMIC BEHAVIOR OF THE WIND AND OF UTILITY LOAD PATTERNS -- AND THE PROBLEMS THAT ARISE FROM THESE DIFFERENCES ARE DESCRIBED IN THIS PAPER. UTILITY CAPACITY EXPANSION METHODS AND MODIFICATIONS TO THEM TO INCORPORATE THE CHARACTERISTICS OF WIND MACHINES INTO THE ANALYTIC PROCEDURE ARE OUTLINED AND RESULTS FROM INITIAL STUDIES EMPLOYING THESE MODIFICATIONS ARE REVIEWED.

1978-0418 DAY J T, LE K D
RELIABILITY ISSUES INCORPORATING NEW GENERATION TECHNOLOGIES WITH PRIORITIES.
POWER SYSTEM RELIABILITY: RESEARCH NEEDS AND PRIORITIES. WORKSHOP ON POWER SYSTEM RELIABILITY-RESEARCH NEEDS AND PRIORITIES, PACIFIC GROVE, CALIFORNIA, MARCH 5, 1978. NTIS, OCTOBER 1978. P. 5.40-5.46.
EPRI-WS-77-60

NEW DIMENSIONS TO THE GENERATION RELIABILITY PROBLEM HAVE BEEN INTRODUCED WITH THE NEW GENERATING TECHNOLOGIES NOW UNDER INVESTIGATION. FOR EXAMPLE, WIND POWER, PHOTOVOLTAICS, AND SOLAR THERMAL CONVERSION PLANTS ARE ALL SUBJECT TO UNCERTAINTY REGARDING AVAILABILITY OF ENERGY AT ANY SPECIFIC TIME. BECAUSE OF THIS VARIABILITY IN AVAILABLE ENERGY, A CONCOMITANT INTEREST HAS BEEN RENEWED IN VARIOUS FORMS OF ENERGY STORAGE. SOME OF THESE STORAGE FORMS ARE DEDICATED IN THAT THEY CAN ONLY BE CHARGED BY THE SINGLE GENERATING PLANT WITH WHICH THEY ARE ASSOCIATED, WHEREAS OTHERS MAY BE CHARGED BY ANY PLANT CONNECTED TO THE SYSTEM.

1978-0419 DE CAMARA TORRES C, GOLDFARB J
ELECTROLYTIC PRODUCTION OF HYDROGEN WITH SOLAR AND WIND ENERGY.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 291-299. (IN FRENCH)

THE PRODUCTION OF ELECTROLYTIC HYDROGEN IS PROPOSED THROUGH A WIND-SOLAR POWER STATION, CONSISTING OF 5

DARRIEUS WIND GENERATORS OF 20 KW, A SOLAR TOWER OF 100 KWTH, WITH HYDROELECTRIC PHASE. STUDIES MADE TO ESTABLISH THE CONDITIONS FOR ECONOMIC VIABILITY OF THE PROCESS ARRIVED AT A PERIOD OF 11 YEARS FOR RECOVERY OF THE INVESTED CAPITAL.

1978-0420 ZATARAIN A M, JANNA W S
ECONOMICS OF WIND GENERATED POWER.
ASME PAPER 78-PET-80, 1978. 8 P.

THE METHOD EXPLAINED IN THE PAPER CONSIDERS THE VARIOUS ECONOMIC AND ENGINEERING VARIABLES THAT ARE NECESSARY TO PLAN PROPERLY A NATURAL ENERGY SYSTEM. THE GOAL OF THE METHOD IS TO PRODUCE AN OPTIMUM SIZE RANGE FOR THE SYSTEM AND TO PROVIDE A MAXIMUM ALLOWABLE COST BASED ON AREA OF THE COLLECTOR THAT CAN BE SPENT WHILE STILL RETAINING AN ECONOMIC ADVANTAGE.

1978-0421 DEMEO E
THE WECS/UTILITY INTERFACE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U. S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 908-911.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0422 DEVINE M, KUMIN H, ALY A
OPERATIONS RESEARCH PROBLEMS IN THE ECONOMIC DESIGN AND OPERATION OF SOLAR ENERGY SYSTEMS.
SYMPOSIUM PAPERS: ENERGY MODELING AND NET ENERGY ANALYSIS. CONFERENCE ON NET ENERGY ANALYSIS AND ENERGY MODELING, COLORADO SPRINGS, COLORADO, AUGUST 21, 1978. CHICAGO INSTITUTE OF GAS TECHNOLOGY, 1978. P. 619-638.

THE ECONOMICS OF ANY SOLAR ENERGY SYSTEM DEPENDS VERY MUCH ON THE PARTICULAR CONDITIONS AT THE SITE AND THE SPECIFIC CHARACTERISTICS OF THE APPLICATION. DESIGNING THE ECONOMICALLY MOST ATTRACTIVE SYSTEM FOR A PARTICULAR APPLICATION PRESENTS A VERY CHALLENGING OPERATIONS RESEARCH OR SYSTEMS ANALYSIS PROBLEM. THIS PAPER PRESENTS A GENERAL SYSTEMS VIEW THAT APPLIES TO A WIDE RANGE OF SOLAR ENERGY OPTIONS AND DISCUSSES HOW OPERATIONS RESEARCH TECHNIQUES CAN BE APPLIED TO THE ECONOMIC DESIGN OF SOLAR-ENERGY SYSTEMS. AFTER A BRIEF REVIEW OF PREVIOUS WORK IN THIS AREA, THREE SPECIFIC CASES ARE DISCUSSED. ONE IS AN OPTIMIZATION MODEL FOR LARGE-SCALE WIND POWER SYSTEMS. THE SECOND IS A STOCHASTIC PROCESS ANALYSIS OF SOLAR ENERGY STORAGE SYSTEMS. THE THIRD EXAMPLE CONCERNS A SET OF COMPUTER SIMULATION AND ECONOMIC ANALYSIS MODELS DEVELOPED BY THE OFFICE OF TECHNOLOGY ASSESSMENT OF THE US CONGRESS THAT CAN BE USED TO ASSESS A WIDE VARIETY OF ON-SITE SOLAR ENERGY SYSTEMS.

1978-0423 DEWINKEL C C
ASSESSMENT OF WIND CHARACTERISTICS AND WIND ENERGY SYSTEMS APPLICATIONS TO ELECTRIC UTILITIES IN WISCONSIN AND SECTIONS OF MINNESOTA, IOWA AND ILLINOIS.
UNIVERSITY OF WISCONSIN, MADISON, WISCONSIN. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 79-02,397, 1978. 313 P.

INTEREST AGAIN TURNS TOWARD APPLICATIONS OF WIND ENERGY IN LIGHT OF PROBLEMS RELATING TO THE USE OF FOSSIL AND NUCLEAR FUELS. THE APPLICATION OF WIND ENERGY CONVERSION SYSTEMS (WECS) REQUIRES AN ACCURATE ASSESSMENT OF WIND CHARACTERISTICS, WHICH IS NOT READILY AVAILABLE. WECS APPLICATIONS TO AN ELECTRIC UTILITY DEMAND A DETAILED ANALYSIS, SINCE THE VARIABILITY IN LOAD AND WIND POWER IS SIGNIFICANTLY DIFFERENT FOR EACH UTILITY AND REGION. THE COMBINATION OF WECS AND THERMAL STORAGE SYSTEMS ACTIVELY CONTROLLED BY A UTILITY MAY OVERCOME SOME OF THE PROBLEMS PERTAINING TO THE VARIABILITY IN WIND POWER.

1978-0424 DHOTARAD M S, GANESAN N, RAO B V A
TRANSMISSION LINE VIBRATIONS.
J. SOUND VIB. 60(2): 217-237, SEPTEMBER 22, 1978.

VARIOUS FORMS OF DAMPERS ARE USED TO SUPPRESS VIBRATIONS IN TRANSMISSION LINES. IN THE PRESENT PAPER A STUDY HAS BEEN MADE ON VIBRATIONS OF TRANSMISSION LINES HAVING ONE OR MORE DAMPERS (STOCKBRIDGE TYPE) NEAR EACH END OF THE SPAN FOR DIFFERENT CABLE LENGTHS. AN ATTEMPT IS MADE HERE TO STUDY THE EFFECT OF THE LOCATION OF DAMPERS ON MAXIMUM STRAINS PRODUCED IN THE LINE.

1978-0425 DINELEY J L, LAKOUTSIS D
THE WHOLE ENERGY PROBLEM ON A FARM.
IEE COLLOQUIUM ON MICROPROCESSORS IN AGRICULTURE, LONDON, DECEMBER 6, 1978. LONDON, IEE, 1978. P. 4-1 TO 4-5.

ONE OF THE MEASURES TO BE TAKEN TO STRETCH THE DURATION OF THE FOSSIL-FUEL RESERVES OF THE WORLD IS TO USE ALL THE RENEWABLE ENERGY RESOURCES THAT ARE AVAILABLE-WIND POWER, SMALL-SCALE HYDRO POWER, SOLAR HEATING ETC., AND THE RURAL ENVIRONMENT, ESPECIALLY THE FARM HEAVILY COMMITTED TO THE USE OF ELECTRICAL ENERGY, OFFERS A VERY GOOD OPPORTUNITY TO STUDY SUCH WHOLE-ENERGY SCHEMES. THIS PAPER BRIEFLY DESCRIBES SUCH A STUDY.

1978-0426 DIVONE L V
WIND POWER TESTS WILL ESTABLISH ROLE ON UTILITY SYSTEMS.
PUBLIC POWER 36(2): 34-37, MARCH 1978.

THE WIND TURBINE DEVELOPMENT PROGRAM UNDER THE DEPARTMENT OF ENERGY AND MANAGED BY THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION IS DESCRIBED. ECONOMIC ASPECTS OF USING WIND POWER PLANTS IN THE U.S. ARE ANALYZED.

1978-0427 YOUSEF H L
ELECTRICAL GENERATOR EMPLOYING NATURAL ENERGY TO POWER SAME.
U.S. PATENT NO. 4,114,046, SEPTEMBER 12, 1978. 16 P.

THIS INVENTION CONCERNS AN IMPROVED TURBO-ELECTRICAL GENERATOR POWERED BY THE CONVERSION OF NATURAL ENERGY INTO MECHANICAL ENERGY IN ORDER TO PROPEL FERROMAGNETIC BLOCKS ABOUT AN IRREGULARLY, NON-CIRCULAR SHAPED CLOSED LOOP TRACK, ALTERNATELY ENTERING AND PASSING THROUGH A PLURALITY OF ELECTROMAGNETS POSITIONED ABOUT THE TRACK. AS THESE BLOCKS ENTER AND PASS THROUGH THESE ELECTROMAGNETS, THEIR MAGNETIC FLUX IS MAXIMIZED AND THEN MINIMIZED AND THIS CHANGE IS CONVERTED INTO USABLE AC VOLTAGE. MEANS ARE TAUGHT FOR THE CONVERSION OF SOLAR ENERGY, WIND ENERGY AND WAVE ENERGY INTO THE NECESSARY MECHANICAL ENERGY TO PROPEL THESE BLOCKS ABOUT THE CLOSED LOOP. AN ALTERNATIVE EMBODIMENT EMPLOYS A ROTATABLE, FERROMAGNETIC CROSS SHAPED DEVICE WHICH IS ROTATED ABOUT A CENTER AXIS BY THE PASSAGE OF THE BLOCKS ABOUT THE TRACK. AS THE DEVICE IS ROTATED, ITS EXTREMITIES ENTER AND PASS THROUGH THE ELECTROMAGNETS POSITIONED ABOUT THE TRACK.

1978-0428 DIVONE L

OVERVIEW OF THE WECS PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 11-31.
CONF-770921/1

THE OBJECTIVE OF THIS PROGRAM IS TO EXPEDITE THE DEVELOPMENT OF RELIABLE AND COST COMPETITIVE WIND ENERGY CONVERSION SYSTEMS, WHICH ARE CAPABLE OF RAPID COMMERCIAL EXPANSION TO PRODUCE SIGNIFICANT QUANTITIES OF ELECTRICAL ENERGY.

1978-0429 DIVONE L
FUTURE FEDERAL PLANS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 921-925.
CONF-770921/2

THIS A REVIEW OF FUTURE PLANS OF THE FEDERAL WIND ENERGY PROGRAM.

1978-0430 DIXIT D K
HARNESSING WIND POWER FOR RURAL DEVELOPMENT.
INDIAN EAST. ENG. 120(3): 65-69, FEBRUARY 1978.

THE ARTICLE MAKES OUT A CASE FOR TAPPING THE WINDS BY USING TECHNICALLY FEASIBLE WINDMILL FOR PUMPING WATER AND GENERATING ELECTRICITY IN INDIA'S RURAL AREAS. A SURVEY OF THE RESEARCHES AND DEVELOPMENTS IN THIS FIELD IS PRESENTED AND ANALYSES GIVEN OF THE IMPACT OF A LOW-COST WINDMILL FOR AGRICULTURAL APPLICATIONS. AN OPTIMUM WIND-WATER POWER-MIX HAD BEEN SUGGESTED TO ACCOMMODATE SEASONAL VARIABILITY AND INCONSISTENCY OF WIND ENERGY. SUITABLE AREAS WITH HIGH WINDSPEEDS THAT HOLD MORE PROMISE HAVE BEEN IDENTIFIED AND DIFFERENT SCHEMES COMPARATIVELY EVALUATED.

1978-0431 DODD C W, EVERS J L
ELECTRICAL ENERGY CONVERSION TECHNIQUES FOR THE VERTICAL AXIS WIND TURBINE.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MO-ROLLA. EXTENSION DIVISION, 1978. P. 65-70.

THE CHARACTERISTICS OF THE VERTICAL AXIS WIND TURBINE MAKE IT POSSIBLE TO USE GENERATING TECHNIQUES NOT SUITABLE FOR HORIZONTAL AXIS WIND TURBINES. METHODS FOR CONVERTING MECHANICAL ENERGY INTO ELECTRICAL ENERGY ARE PRESENTED AND DISCUSSED FOR VERTICAL TURBINES OF THE 250 KW TO 2500 KW SIZE. THIS PAPER WILL ALSO LOOK AT THE PRESENT STATUS OF VERTICAL AXIS WIND TURBINE RESEARCH IN THE UNITED STATES.

1978-0432 DOMAN G S
INVESTIGATION OF DYNAMIC AND STRUCTURAL CHARACTERISTICS OF ROTORS FOR WIND ENERGY CONVERSION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS, WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 603-611.
CONF-770921/2

1978-0433 DRAKE R L
SITE SELECTION TECHNIQUES AND METHODOLOGIES FOR WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 635-645.
CONF-770921/2

THIS PAPER DEALS WITH THE TECHNICAL ASPECTS OF SITING. IF WE CAN IMPROVE THE SITING OF WECS FROM THE METEOROLOGICAL AND THE TOPOGRAPHICAL POINTS OF VIEW, THEN THE OVERALL SITING POLICY CAN BE IMPROVED. THE ECONOMIC BENEFITS OF THESE IMPROVEMENTS WILL BE, AT LEAST, FOURFOLD.

1978-0434 YEOMAN J C
WIND TURBINES.
NTIS, DECEMBER 1978. 61 P.
ANL/CES/TE-78-9

THIS EVALUATION OF WIND TURBINES IS PART OF A SERIES OF TECHNOLOGY EVALUATIONS OF POSSIBLE COMPONENTS AND SUBSYSTEMS OF COMMUNITY ENERGY SYSTEMS. WIND TURBINES, RANGING IN SIZE FROM 200 W TO 10 MW, ARE DISCUSSED AS CANDIDATES FOR PRIME MOVERS IN COMMUNITY SYSTEMS. ESTIMATES OF PERFORMANCE CHARACTERISTICS AND COST AS A FUNCTION OF RATED CAPACITY AND RATED WIND SPEED ARE PRESENTED. DATA CONCERNING MATERIAL REQUIREMENTS, ENVIRONMENTAL EFFECTS, AND OPERATING PROCEDURES ALSO ARE GIVEN AND ARE REPRESENTED EMPIRICALLY TO AID COMPUTER SIMULATION.

1978-0435 DREES H M
THE AMERICAN WIND ENERGY ASSOCIATION AND THE WIND ENERGY INDUSTRY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 183-184.
CONF-770921/1

IN MID 1974, THE AMERICAN WIND ENERGY ASSOCIATION (AWEA) ROSE TO RESPOND TO A NEED OF THE GROWING WIND ENERGY COMMUNITY, BOTH TO THE INDUSTRY AND TO THE CONSUMERS. AWEA EXISTS TO PROMOTE WIND AS A POLLUTIONLESS, RENEWABLE ENERGY SOURCE, AND TO ACT AS A CLEARING HOUSE FOR TECHNICAL, INSTITUTIONAL, AND SOCIAL ISSUES CONCERNING WIND ENERGY UTILIZATION. THE ASSOCIATION IS MODELED AFTER THE MORE TRADITIONAL PROFESSIONAL ORGANIZATIONS SUCH AS THE AIAA AND THE AHS. HOWEVER, THE ASSOCIATION EXISTS AS AN ORGANIZATION TO PROVIDE NEEDED SERVICES NOT ONLY TO THE INDUSTRY, BUT TO THE CONSUMERS AS WELL.

1978-0436 DUBEY M B
CONVERSION AND STORAGE OF WIND ENERGY AS NITROGENOUS FERTILIZER.
NTIS, NOVEMBER 1978. 264 P.
LR-28338, PB-290760

WIND ENERGY, AIR AND WATER CAN BE COMBINED TO MAKE ANHYDROUS AMMONIA AND AMMONIUM NITRATE, TWO IMPORTANT NITROGENEOUS FERTILIZERS THAT ARE USUALLY SYNTHESIZED USING NATURAL GAS AS THE PRIMARY FEEDSTOCK. IN THE STUDY CONCEPT, WIND ENERGY IS CAPTURED BY A WIND TURBINE AND CONVERTED TO ELECTRICITY. THE ELECTRICITY GENERATES HYDROGEN AND OXYGEN BY WATER ELECTROLYSIS. THE HYDROGEN IS STORED IN SUFFICIENT QUANTITY TO SERVE AS CHEMICAL FEEDSTOCK AND ENERGY TO MANUFACTURE ANHYDROUS AMMONIA OR AMMONIUM NITRATE SOLUTION.

1978-0437 DUBEY M
TECHNICAL AND ECONOMIC FEASIBILITY OF MAKING FERTILIZER FROM WIND ENERGY, WATER, AND AIR.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1812-1821.

WIND ENERGY, AIR AND WATER CAN BE COMBINED TO MAKE ANHYDROUS AMMONIA AND AMMONIUM NITRATE, TWO IMPORTANT NITROGENOUS FERTILIZERS THAT ARE USUALLY SYNTHESIZED USING NATURAL GAS AS THE PRIMARY FEEDSTOCK. A PROCESS USING ABUNDANT, REPLENISHABLE SOURCES OF ENERGY AND FEEDSTOCK CHEMICALS IN LIEU OF NATURAL GAS IS ATTRACTIVE AS A CONSERVATION MEASURE.

1978-0438 DUGUNDJI J, LARRABEE E E, BAUER P H
WIND ENERGY CONVERSION. VOLUME 5. EXPERIMENTAL INVESTIGATION OF A HORIZONTAL AXIS WIND TURBINE.
ASRL-TR-184-11.
NTIS, SEPTEMBER 1978. 66 P.
COO-4131-T1(VOL.5)

THE RESULTS ARE PRESENTED OF SOME BRIEF EXPERIMENTS CONDUCTED ON A WIND TURBINE MODEL OF A ROTOR SYSTEM TO VERIFY THE AERODYNAMIC THEORIES DEVELOPED AND TO INVESTIGATE THE DYNAMIC EXCITATION CHARACTERISTICS OF WIND TURBINES.

1978-0439 DUSKIN A
FEDERAL WIND ENERGY COMMERCIALIZATION ACT.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 169-174.
CONF-780357

THE WIND ENERGY COMMERCIALIZATION AND JOB-DEVELOPMENT ACT OF 1978 IS PRESENTED.

1978-0440 EDSINGER R W, WARREN A W, GORDON L H, CHANG G C
SIMWEST--A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2108-2114.

THIS PAPER DESCRIBES A COMPREHENSIVE AND EFFICIENT COMPUTER PROGRAM FOR THE MODELING OF WIND ENERGY SYSTEMS WITH STORAGE. THE LEVEL OF DETAIL OF SIMWEST IS CONSISTENT WITH EVALUATING THE ECONOMIC FEASIBILITY AS WELL AS THE GENERAL PERFORMANCE OF WIND ENERGY SYSTEMS WITH ENERGY STORAGE OPTIONS. THE SOFTWARE PACKAGE CONSISTS OF TWO BASIC PROGRAMS AND A LIBRARY OF SYSTEM, ENVIRONMENTAL, AND CONTROL COMPONENTS.

1978-0441 EGGLESTON D M
CONSUMER OWNED WIND TURBINE SYSTEMS.
INTERNATIONAL SOLAR ENERGY CONFERENCE AND FAIR, EL PASO, TEXAS, APRIL 13, 1978. EL PASO, TEXAS, 1978. P. 19. (ABSTRACT)

1978-0442 ELECTRICITY FROM THE WIND--THOUGHTS ON THE PROBLEM OF UTILISATION OF WIND POWER.
ELEKTR. MASCH. 57(1): 11-13, JANUARY 1978. (IN GERMAN)

ATTEMPTS AT UTILISING WIND POWER FOR ELECTRICITY GENERATION HAVE TENDED TO CONCENTRATE ON SOLVING THE PROBLEMS OF CONSTANT FREQUENCY AND CONSTANT VOLTAGE GENERATION OVER A WIDE RANGE OF WIND SPEED WITH CONSEQUENT COMPLEXITY AND HIGH COST. IT IS CONSIDERED THAT VARIABLE VOLTAGE/FREQUENCY APPLICATIONS FOR WATER HEATING USING SMALL, MASS-PRODUCED UNITS HAVE A BETTER CHANCE OF SUCCESS.

1978-0443 ENERGY: A GUIDE TO ORGANIZATIONS AND INFORMATION RESOURCES IN THE UNITED STATES. SECOND EDITION.
CLAREMONT, CALIFORNIA, PUBLIC AFFAIRS CLEARINGHOUSE, 1978. 221 P.

THIS BOOK PROVIDES IN CONVENIENT REFERENCE FORM A CENTRAL SOURCE OF INFORMATION ON KEY ORGANIZATIONS CONCERNED WITH ENERGY IN THE UNITED STATES AND UPDATES AN EARLIER ISSUE (SAME TITLE) (EAPA 1:808).

1978-0444 ENERGY FOR RURAL REQUIREMENTS.
INTERNATIONAL FORUM ON APPROPRIATE INDUSTRIAL TECHNOLOGY. NITS, OCTOBER 17, 1978. 23 P.
INTERNATIONAL FORUM ON APROPRIATE INDUSTRIAL TECHNOLOGY, NEW DELHI, ANAND, INDIA, NOVEMBER 20-30, 1978.
PB80-159296

THIS REPORT DESCRIBES RURAL ENERGY NEEDS AND THE ENERGY SOURCES AND TECHNOLOGICAL OPTIONS INCLUDING BIO-GAS, WATER-MECHANICAL POWER, WIND FOR OPERATION OF HEAT ENERGY, AND STORAGE. PROBLEMS AND CONSTRAINTS ARE DISCUSSED ALONG WITH POLICY IMPLICATIONS, CHOICES AND PRIORITIES, AND A PLAN OF ACTION FOR THE FUTURE.

1978-0445 ENGELKE C E
SELF-CONTAINED COMMUNITY ENERGY SYSTEM.
BULL. AT. SCI. 34(9): 51-53, NOVEMBER 1978.

A COMMUNITY THERMAL ENERGY STORAGE SYSTEM, WHERE HOT WATER COULD BE STORED IN LARGE RESERVOIRS, COULD BE THE IDEAL WAY TO CIRCUMVENT THE SUPPLY AND DEMAND MISMATCH OF SOLAR AND WIND ENERGY OR CO-GENERATION. A COMMUNITY SYSTEM WOULD NEED LESS SOLAR COLLECTOR AREA AND NO BACK-UP EQUIPMENT FOR HEATING AND COOLING. THE STORAGE AREAS, BESIDES PROVIDING HEATING AND COOLING ENERGY, COULD BE USED WITH AMMONIA CYCLE HEAT ENGINES TO GENERATE ELECTRIC POWER FROM WIND AND SOLAR ENERGY AND FROM TEMPERATURE CHANGES. THE SYSTEM WOULD SAVE ON ELECTRICITY COSTS BY DRAWING FREE ENERGY FROM THE STORAGE SYSTEM AND BY USING SMALLER GENERATORS.

1978-0446 ENGSTROM S, GUSTAVSSON B, SMEDMAN-HOEGSTROM A S
EXPERIENCE FROM A YEAR'S RESEARCH INTO WIND POWER.
ERA 51(8): 26-29, 1978. (IN SWEDISH)

IN NOVEMBER 1975 SAAB-SCANIA, AEROPLANE DIVISION, BEGAN WORK ON THE CONSTRUCTION AND OPERATION OF A RESEARCH UNIT FOR WIND POWER, COMMISSIONED BY THE SWEDISH BOARD FOR ENERGY RESEARCH. THE AIM OF THE PROJECT WAS TO GIVE: (1) GENERAL EXPERIENCE OF WIND POWER, (2) PARALLEL STUDY OF REALISTIC WIND POWER GENERATORS ON A COMMERCIAL SCALE, (3) THE OPPORTUNITY OF LOAD MEASUREMENT AND OBSERVATIONS, (4) A PLATFORM FOR THE TESTING OF COMPONENTS. AFTER ONE AND ONE-HALF YEARS WORK THE UNIT WAS MOUNTED ON A TOWER. THE SET WAS CONNECTED IN AND DELIVERED POWER TO THE NETWORK FOR THE FIRST TIME IN APRIL 1977. IT WAS THEN USED FOR MEASUREMENT AND EXPERIMENTS, IN THE FIRST PLACE AS A "LABORATORY". DURING THE MEASUREMENT PERIOD IT WAS RUN ON UNATTENDED AUTOMATIC OPERATION. EVALUATION OF THE FIRST YEAR'S OPERATION WILL BE AVAILABLE IN OCTOBER 1978.

1978-0447 ERIKSSON B, HELGESEN H
CYCLIC VARIATIONS OF THE LOAD ANGLE OF WIND TURBINES WITH TORSION AXIS.
NTIS, AUGUST 1978. 33 P. (IN SWEDISH)
LUTMDN/TMVK-3070/1-31/(1978)

THE CYCLIC VARIATIONS OF THE LOAD ANGLE OF A WIND TURBINE CONNECTED TO A STRONG FIELD HAVE BEEN INVESTIGATED. THE ASSEMBLY IS LOOKED UPON AS TWO MASSES CONNECTED WITH A NON-RIGID SHAFT. A STEP MOMENT IS APPLIED TO THE MASS EQUAL TO THE MASS OF THE WIND ROTOR AND LOAD ANGLE IS STUDIED. THE DIFFERENTIAL EQUATION OF THE SYSTEM IS SOLVED BY APPLYING THE EULER'S MODIFIED METHOD. IN THIS WAY THE EFFECT OF THE SIZES OF THE MASSES AND THE SOFTNESS OF THE SHAFT ON THE CYCLIC VARIATION AT DISTURBANCES COULD BE STUDIED. THE RESULTS ARE PRESENTED IN GRAPHS.

1978-0448 ERIKSSON B, HELGESEN H
DISCUSSION OF DIFFERENT PROBLEMS IN CONNECTION WITH THE CHOICE OF MOMENTUM EXCHANGE DEVICE AT WIND POWER PLANTS.
NTIS, AUGUST 1978. 11 P. (IN SWEDISH)
LUTMDN/TMVK-3069/1-9(1978)

THE AIM OF THE INVESTIGATION IS TO DISCUSS DIFFERENT PROBLEMS WHICH OCCUR IN CONNECTION WITH THE CHOICE OF CHANGE-OVER DEVICE BETWEEN THE ROTOR AND THE GENERATOR AT A WIND POWER PLANT.

1978-0449 ESBENSEN T V, STRABO F
DESIGN OF A LOW-ENERGY HOUSE IN DENMARK HEATED BY A COMBINATION OF SOLAR AND WIND ENERGY.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1454-1458.

THIS PAPER DESCRIBES THE PROJECT FOR A LOW-ENERGY HOUSE CONSTRUCTED IN SKIVE, JUTLAND, IN DENMARK, WITH ENERGY CONSERVATION ARRANGEMENTS SUCH AS HIGH-INSULATED CONSTRUCTIONS, MOBILE INSULATION OF THE WINDOWS AND HEAT RECOVERY IN THE VENTILATING SYSTEM. THE HEAT REQUIREMENT FOR SPACE HEATING IS CALCULATED TO 6000 KWH PER YEAR. THE ENERGY SYSTEM CONSISTS OF A 13 SQ. M. FLAT-PLATE SOLAR COLLECTOR INTEGRATED INTO THE ROOF CONSTRUCTION, A WIND ROTOR WITH A COATED AREA OF 25 SQ. M. AND A WATER STORAGE TANK WITH A CAPACITY OF 4 CUB. M. THE STORAGE TANK IS PROVIDED WITH A WATER BRAKE DRIVEN BY THE WIND ROTOR. THIS ENERGY SYSTEM SUPPLIES THE HOUSE WITH 7200 KWH, WHICH IS 67% OF THE TOTAL HEAT REQUIREMENT FOR SPACE HEATING AND HOT WATER SUPPLY.

1978-0450 ESKINAZI S, BRENNAN P J
SITING AND CONCEPT DESIGN CONSIDERATIONS FOR HYDRO PUMP BACK WIND ENERGY CONVERSION SYSTEM (HPB-WECS).
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978.
GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-20-1. (ABSTRACT ONLY)

1978-0451 ETZLER C, FRITZSCHE A
THE 230 KW WIND ENERGY CONVERTER WITH VERTICAL ROTATION AXIS AT THE MAGDALEN ISLANDS (CANADA).
BRENNST.-WAERME-KRAFT 30(5): 220-221, MAY 1978. (IN GERMAN)

1978-0452 EVANS M
INTERVIEW WITH RICK KATZENBERG.
WIND POWER DIG. NO. 13: 4-7, FALL 1978.

1978-0453 YEN J T
SOME RECENT DEVELOPMENTS IN WIND AND OCEAN POWER SYSTEMS.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 18-20, 1978. NEW YORK, IEEE, 1978. P. 373-377.

DEVELOPMENTS ARE REVIEWED WITH EMPHASIS ON THE TORNADO-TYPE WIND ENERGY SYSTEM AND THE DYNAMIC DAM SYSTEM. BASIC REQUIREMENTS FOR AN ECONOMICALLY VIABLE WIND AND OCEAN POWER SYSTEM ARE OUTLINED.

1978-0454 YEN J T
SUMMARY OF RECENT PROGRESS ON TORNADO-TYPE WIND ENERGY SYSTEM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 808-818.
CONF-770921/2

THE TORNADO-TYPE WIND ENERGY SYSTEM IS ONE OF SEVERAL ADVANCED AND INNOVATIVE CONCEPTS BEING INVESTIGATED UNDER ERDA'S WIND ENERGY PROGRAM AS POTENTIAL WAYS TO REDUCE THE COST AND BROADEN THE USABILITY OF WIND ENERGY. THIS SYSTEM USES A LARGE HOLLOW TOWER TO FORM AN INTERNAL VORTEX, AND THE LOW PRESSURE AT THE CORE OF THE TOWER PROVIDES AN EFFECTIVE AND LOW-PRESSURE EXHAUST RESERVOIR FOR THE TURBINE, WHICH ACCEPTS A SEPARATE RAM AIR INLET SUPPLY. ANALYTICAL INVESTIGATIONS OF SEVERAL VERY CHALLENGING FLUID MECHANICAL PROBLEMS ARE BEING CARRIED OUT, BUT IT WILL BE SOME TIME BEFORE ALL OF THE FLOW PROCESSES INVOLVED WILL BE WELL KNOWN ENOUGH TO YIELD A HIGHLY ACCURATE ANALYTICAL PREDICTION OF PERFORMANCE AND TO GREATLY IMPROVE EXISTING SCALING LAWS. A VARIETY OF WIND TUNNEL MODELS HAVE BEEN DESIGNED AND BUILT AND SOME TESTING AT SMALL SCALE HAS BEEN CONDUCTED USING SCREENS TO SIMULATE THE TURBINES.

1978-0455 FAXEN T, SMEDMAN-HOEGSTROM A S, HOEGSTROM U
METEOROLOGICAL FIELD PROJECT AT THE WIND ENERGY TEST SITE KALKUGNEN, SWEDEN.
NTIS, 1978. 27 P.
UUIM-51

A METEOROLOGICAL FIELD STATION IS DESCRIBED THAT HAS BEEN SET INTO OPERATION AT A 63 KW WIND ENERGY TEST STATION CALLED KALKUGNEN IN THE MIDDLE OF SWEDEN. THE TEST SITE IS SITUATED NEAR THE COASTLINE OF GAVLEBUKTEN (BALTIC SEA) AT ABOUT 60 DEG. N. THE TEST STATION HAS A HUB HEIGHT OF 24 M. AND A TURBINE DIAMETER OF 18 M. THE METEOROLOGICAL FIELD STATION CONSISTS OF TWO 42 M. MASTS, BOTH EQUIPPED WITH CUP ANEMOMETERS AT 6 LEVELS AND WIND DIRECTION AT TWO LEVELS. TEMPERATURE IS MEASURED AT 6 LEVELS IN ONE OF THE MASTS AND IN ADDITION RADIATION, HUMIDITY AND AIR PRESSURE AT ONE LEVEL. DATA FROM THIS INSTRUMENTATION IS RECORDED CONTINUOUSLY SINCE SEPTEMBER 1977. IN 1978 TURBULENCE MEASUREMENTS AT SEVERAL LEVELS WILL ALSO BE CONDUCTED IN SELECTED SITUATIONS. A PRELIMINARY ANALYSIS OF WIND DATA FROM THE PERIOD OCTOBER--DECEMBER 1977 IS PRESENTED.

1978-0456 THE FEDERAL WIND PROGRAM.
WIND POWER DIG. NO. 13: 40-43, FALL 1978.

EXCERPTS ARE PRESENTED OF A FEDERAL WIND DRAFT PLAN WRITTEN BY L. DIVONE OF THE DOE.

1978-0457 FEJER A A
WIND ENERGY CONVERSION.
ENERGY FROM THE SUN. SYMPOSIUM ON ENERGY FROM THE SUN, CHICAGO, APRIL 3, 1978. CHICAGO, INSTITUTE OF GAS TECHNOLOGY, 1978. P. 399-422.

EFFECTIVE UTILIZATION OF WIND ENERGY REQUIRES SYSTEMATIC STUDIES OF THE SITES AVAILABLE FOR THE LOCATION OF WIND ENERGY CONVERSION SYSTEMS AND CAREFUL EVALUATION OF THE TYPE AND SIZE OF MACHINES TO BE USED. THE PRESENT PAPER DESCRIBES AN APPROACH CURRENTLY IN USE FOR THE SITING OF WIND GENERATORS. IT DESCRIBES ALSO THE AERODYNAMIC FEATURES OF VARIOUS TYPES OF WIND MACHINES AND INDICATES THE PRESENT STATUS OF DEVELOPMENT AND PROSPECTS OF HORIZONTAL AXIS PROPELLER TYPE AND VERTICAL AXIS DARRIEUS TURBINES.

1978-0458 FERBER R
PUBLIC REACTIONS TO WIND ENERGY AND WINDMILL DESIGNS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978, VOL. 1, P. 413-422.
CONF-770921/1

THIS STUDY WAS UNDERTAKEN TO EXPLORE REACTIONS OF THE GENERAL PUBLIC TOWARD DIFFERENT TYPES OF WIND ENERGY DEVICES FOR GENERATING ELECTRIC ENERGY. MORE SPECIFICALLY, THE OBJECTIVES OF THE STUDY WERE TWO-FOLD; TO PROVIDE SUBSTANTIVE INFORMATION ON PUBLIC ACCEPTANCE OF DIFFERENT TYPES OF WIND ENERGY DEVICES IN DIFFERENT SETTINGS; TO FURNISH A METHODOLOGICAL BASE FOR MORE INTENSIVE STUDIES OF PUBLIC ACCEPTANCE OF SUCH DEVICES.

1978-0459 FEUSTEL J
UTILIZABLE ENERGY FROM WIND AND SUN.
M.A.N. FORSCH. PLANEN BAUEN NO. 9: 32-37, 1978. (IN GERMAN)

AFTER A GENERAL SURVEY OF THE EARTH'S POWER ECONOMY AND POSSIBLE WAYS TO UTILIZE REGENERATIVE ENERGY SOURCES, THE PAPER DISCUSSES THE PRESENT TECHNOLOGICAL POTENTIAL IN THESE FIELDS. DISCUSSED ARE: SOLAR PLANTS AND WIND ENERGY CONVERSION PLANTS, WITH SPECIAL REGARD TO PROJECTS OF THE MAN COMPANY.

1978-0460 FEUSTEL J
TAPPING THE ENERGY OF THE WIND AND SUN.
M.A.N. RES. ENG. MANUF. NO. 9: 32-36, APRIL 1978.

VARIOUS SYSTEMS FOR THE UTILIZATION OF SOLAR AND WIND ENERGY ARE DISCUSSED. SUNSHINE HOURS AND WIND SPEEDS FOR GERMANY ARE PRESENTED.

1978-0461 FIRST SEMIANNUAL REPORT, ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. VOLUME I. DESCRIPTION OF THE NATIONAL SMALL WIND SYSTEMS TEST CENTER.
NTIS, SEPTEMBER 28, 1978. 109 P.
RFP-2920/3533/78/6-1

INFORMATION IS PRESENTED CONCERNING THE ROCKY FLATS WIND TURBINE TEST SITE; THE PHILOSOPHY OF TESTING AT ROCKY FLATS; TEST PROCEDURE DEVELOPMENT; ATMOSPHERIC SWECS TESTING; SWECS COMPONENT TESTING; DATA COLLECTION, HANDLING, AND ANALYSIS; REPORTING PROCEDURES; AND FUTURE PLANS.

1978-0462 FIRST SEMIANNUAL REPORT, ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER ACTIVITIES. VOLUME 2. EXPERIMENTAL DATA COLLECTED FROM SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, SEPTEMBER 28, 1978. 107 P.
RFP-2920/3533/78/6-2

VOLUME II OF THE FIRST SEMIANNUAL REPORT OF THE ROCKY FLATS SMALL WIND SYSTEMS TEST CENTER (WSTC) DESCRIBES THE NINE (9) SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) TESTED AS OF JUNE 30, 1978 AND PROVIDES THE SIGNIFICANT QUANTITATIVE AND QUALITATIVE DATA COLLECTED TO THAT DATE. METEOROLOGICAL DATA COLLECTED AT ROCKY FLATS ARE ALSO PROVIDED AND DESCRIBED.

1978-0463 FLAIM S J, BUCHANAN D L, CHRISTMAS S
ECONOMIC FEASIBILITY AND MARKET READINESS OF SOLAR TECHNOLOGIES. DRAFT FINAL REPORT. VOLUME I-II.
NTIS, SEPTEMBER 1978. 336 P. (VOL.I), 171 P. (VOL.II).
SERI/TR-52-055D(V.1-2)

SYSTEMS DESCRIPTIONS, COSTS, TECHNICAL AND MARKET READINESS ASSESSMENTS ARE REPORTED FOR TEN SOLAR TECHNOLOGIES: SOLAR HEATING AND COOLING OF BUILDINGS (SHACOB), PASSIVE, AGRICULTURAL AND INDUSTRIAL PROCESS HEAT (A/IPH), BIOMASS, OCEAN THERMAL (OTEC), WIND (WECS), SOLAR THERMAL ELECTRIC, PHOTOVOLTAICS, SATELLITE POWER STATION (SPS), AND SOLAR TOTAL ENERGY SYSTEMS (STES). STUDY OBJECTIVES, SCOPE, AND METHODS ARE PRESENTED. THE COST AND MARKET ANALYSIS WILL BE USED TO MAKE COMMERCIALIZATION ASSESSMENTS IN THE CONCLUSIONS OF THE FINAL REPORT. VOL. II INCLUDES APPENDICES: AGRICULTURAL AND INDUSTRIAL PROCESS HEAT SYSTEMS, BIOMASS, OCEAN THERMAL ENERGY CONVERSION SYSTEMS, WIND ENERGY CONVERSION SYSTEMS, AND SOLAR THERMAL ELECTRIC POWER SYSTEMS.

1978-0464 FOREMAN K M, GILBERT B L
DIFFUSER DESIGNS FOR IMPROVED WIND ENERGY CONVERSION.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 73-91.

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING DEVELOPED TO IMPROVE THE ATTRACTIVENESS OF WIND ENERGY AS AN ENERGY RESOURCE ALTERNATIVE. THIS WORK IS DEDICATED TO INCREASE THE CONCENTRATION OF NATURALLY DIFFUSE WIND ENERGY AND REDUCE THE SPECIFIC COST OF AVAILABLE POWER BY MINIMIZING THE CAPITAL COST OF ENERGY CONVERSION MACHINERY. DIFFUSERS CAN INCREASE TURBINE POWER OUTPUT PRIMARILY BY INCREASING MASS FLOW RATE THROUGH THE BLADES AND SECONDARILY BY REDUCING BLADE TIP LOSSES. A MULTIPHASED INVESTIGATION IS DESCRIBED INVOLVING THREE TEST FACILITIES, OF SEVERAL COMPACT DIFFUSER APPROACHES. SCREENS, TO SIMULATE A WIND TURBINE, AND A THREE-BLADED, FIXED-PITCH TURBINE HAVE BEEN USED WITH THE DIFFUSER MODELS. A CANDIDATE BASELINE DESIGN IS DESCRIBED AND SOME OF THE KEY ISSUES ARE DISCUSSED THAT CAN LEAD TO FUTURE FULL SCALE IMPLEMENTATION.

1978-0465 FOREMAN K M, GILBERT B, OMAN R A
DIFFUSER AUGMENTATION OF WIND TURBINES.
SOL. ENERGY 20(4): 305-311, 1978.

ONE OF THE MORE PROMISING ADVANCED CONCEPTS FOR OVERCOMING THE ECONOMIC DETERRENTS TO WIDESPREAD USE OF

WINDPOWER IS THE DIFFUSER-AUGMENTED WIND TURBINE (DAWT) WITH THE OUTPUT POWER MUCH LARGER THAN THAT OF AN UNSHROUDED TURBINE. WIND TUNNEL INVESTIGATION OF MODELS OF TWO DIFFUSER DESIGN CONCEPTS IS DESCRIBED WHICH HAS BEEN DIRECTED TOWARD UNCONVENTIONAL, VERY SHORT, COST-EFFECTIVE CONFIGURATIONS. ONE APPROACH USES THE ENERGETIC EXTERNAL WIND TO PREVENT SEPARATION OF THE DIFFUSER'S INTERNAL BOUNDARY LAYER. ANOTHER METHOD USES HIGH LIFT AIRFOIL CONTOURS FOR THE DIFFUSER WALL SHAPE. DIFFUSER MODEL TESTS HAVE INDICATED ALMOST A DOUBLING OF WIND POWER EXTRACTION CAPABILITY FOR DAWTS COMPARED TO CONVENTIONAL TURBINES. THE SPECIFIC POWER COSTS ($/KW) FOR A REALISTIC DAWT CONFIGURATION ARE FOUND TO BE LOWER THAN CONVENTIONAL WIND TURBINES FOR VERY LARGE SIZE ROTORS, ABOVE 50 M DIAMETER, AND FOR ROTOR DIAMETERS LESS THAN ABOUT 20 M.

1978-0466 YEN J T
SOME RECENT DEVELOPMENTS IN WIND AND OCEAN POWER SYSTEMS.
SAE PREPR. NO. 780690, 1978. 9 P.

SOME RECENT DEVELOPMENTS IN WIND AND OCEAN POWER SYSTEMS ARE REVIEWED WITH EMPHASIS ON THE TORNADO-TYPE WIND ENERGY SYSTEM AND THE DYNAMIC DAM SYSTEM. BASIC REQUIREMENTS FOR AN ECONOMICALLY VIABLE WIND AND OCEAN POWER SYSTEM ARE OUTLINED. HOW THE SYSTEMS TO BE DISCUSSED WILL BE ABLE TO MEET THESE REQUIREMENTS IS DESCRIBED IN SOME DETAIL. THE TORNADO-TYPE WIND ENERGY SYSTEM IS ALSO SHOWN WITH MEANS FOR STORING SOLAR ENERGY AND FIRING COAL, OIL SHALE, OR GARBAGE TO AUGMENT ITS ENERGY. THE DYNAMIC DAM CONCEPT IS SHOWN IN CONFIGURATIONS SUITABLE FOR UTILIZING RIVER OR OCEAN CURRENTS AND/OR TIDES.

1978-0467 FRANK MEDINA'S WINDMILL.
WIND POWER DIG. NO. 13: 38, FALL 1978.

1978-0468 FRANKLIN R
WIND-DRIVEN REFRIGERATION SYSTEM. PROGRESS REPORT.
LE MARS, IOWA, WESTMAR COLLEGE, NOVEMBER 9, 1978. 4 P.

SPECIFICATIONS ARE PRESENTED FOR A WIND TURBINE POWERED REFRIGERATION SYSTEM. THE SYSTEM WAS A MECHANICAL LINKAGE FOR INTERFACING THE TURBINE WITH THE 3-CYLINDER REFRIGERATION COMPRESSOR.

1978-0469 FRIEDMANN P P
AEROELASTIC RESPONSE AND STABILITY OF HORIZONTAL AXIS WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 517-527.
CONF-770921/2

THE PURPOSE OF THIS PAPER IS TO REVIEW SOME CURRENT RESEARCH BEING DONE AT UCLA ON AEROELASTIC EFFECTS IN LARGE WIND TURBINES.

1978-0470 FROST W, NOWAK D
TECHNOLOGY DEVELOPMENT FOR ASSESSMENT OF SMALL-SCALE TERRAIN EFFECTS ON AVAILABLE WIND ENERGY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2 P. 654-663.
CONF-770921/2

THE PURPOSE OF THE RESEARCH BEING CONDUCTED IS TO ESTABLISH GUIDELINES AND GATHER INFORMATION PERTAINING TO THE SITING OF WIND TURBINE GENERATORS RELATIVE TO SMALL-SCALE TERRAIN FEATURES. THE INFORMATION COLLECTED IS INTERPRETED IN AN ENGINEERING MANUAL. THE MANUAL HAS THE TITLE "TECHNOLOGY DEVELOPMENT FOR ASSESSMENT OF SMALL-SCALE TERRAIN EFFECTS ON AVAILABLE WIND ENERGY." A THREE-YEAR PROGRAM IS BEING CARRIED OUT. THE FIRST YEAR EFFORT WILL INCLUDE THE EFFECT OF TWO-DIMENSIONAL TERRAIN FEATURES ON WIND TURBINE SITING.

1978-0471 FROST W
ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 563-573.
CONF-770921/2

AN ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT IS BEING WRITTEN. THE PURPOSE OF THE HANDBOOK IS TO PROVIDE IN AN ENGINEERING FORMAT THE ATMOSPHERIC DESIGN INPUTS FOR WIND ENERGY CONVERSION MACHINES. THE HANDBOOK DOES NOT ADDRESS THE PROBLEM OF SITING WIND TURBINE GENERATORS BUT PROVIDES INPUTS FOR STRUCTURAL AND DYNAMIC ANALYSES SUCH AS DATA ON WIND LOADING, TURBULENCE LEVEL, SNOW AND ICE LOADINGS, ETC.

1978-0472 FROST W, LONG B H, TURNER R E
ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT.
NTIS, DECEMBER 1978. 372 P.
NASA-TP-1359

THE ENVIRONMENTAL DESIGN CRITERIA NECESSARY TO DEVELOP A WIND TURBINE GENERATOR (WTG) ARE PROVIDED. ALL CRITERIA ARE PROVIDED IN A WORKING ENGINEERING FORMAT. MORE SPECIFICALLY, THE REPORT PROVIDES INPUTS FOR STRUCTURAL AND DYNAMIC ANALYSIS, SUCH AS DATA ON WIND LOADING, TURBULENCE LEVEL, SNOW AND ICE LOADING, ETC., BUT IT DOES NOT DIRECTLY ADDRESS THE GENERAL PROBLEM OF SITING WIND TURBINE GENERATORS.

1978-0473 FROST W
ANALYSIS OF THE EFFECT OF TURBULENCE ON WIND TURBINE GENERATOR ROTATIONAL FLUCTUATIONS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SCURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1703-1734.

THREE METHODS OF INTRODUCING TURBULENCE INTO ANALYSES OF ROTOR RESPONSE TO FLUCTUATIONS IN THE WIND ARE CONSIDERED. THE SPECTRAL APPROACH, THE DISCRETE GUST APPROACH, AND THE TURBULENCE SIMULATION TECHNIQUE ARE APPLIED TO A SIMPLE UNLOADED, RIGID, ROTOR HAVING A CONSTANT LIFT-TO-DRAG RATIO. THE ROTATIONAL FLUCTUATIONS ABOUT THE MEAN DUE TO TURBULENCE OF ROTORS OF THE SAME DIMENSIONS BUT OF DIFFERENT MATERIALS IS INVESTIGATED. THE THREE METHODS OF ANALYZING TURBULENT EFFECTS ON ROTOR PERFORMANCE ARE SUMMARIZED AND COMPARED. THE EFFECT OF THESE FLUCTUATIONS ON POWER GENERATION AND ON SYNCHRONIZATION OF THE GENERATORS IS DISCUSSED.

1978-0474 FURLONG D B
FEASIBILITY OF PRE-STRESSED CONCRETE ROTOR BLADES FOR WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 552-562.

CONF-770921/2

THE FEASIBILITY OF PRE-STRESSED CONCRETE AS A MATERIAL FOR WIND TURBINE BLADES IS BEING STUDIED. A CONCRETE BLADE FOR A 125-FOOT DIAMETER ROTOR HAS BEEN DESIGNED AND COMPARED WITH THE ALUMINUM ALLOY BLADES NOW IN OPERATION AT PLUMBROOK. THE CONCRETE BLADES ARE ABOUT TWICE THE WEIGHT OF ALUMINUM BLADES, BUT ARE STIFFER TO PROVIDE THE SAME BENDING VIBRATION FREQUENCIES. THE CENTRIFUGAL FORCES ON CONCRETE BLADES ARE TWICE AS MUCH, BUT THE CONING ANGLE CAN BE REDUCED SO THAT BENDING MOMENTS FROM CENTRIFUGAL FORCES NEUTRALIZE THOSE FROM NORMAL AIRLOADS. THE CYCLICAL CHORDWISE GRAVITY LOADS ARE PROPORTIONAL TO BLADE WEIGHTS, BUT THE BLADES ARE MUCH STRONGER IN THE CHORDWISE BENDING DIRECTION, SO THAT AIRLOAD BENDING IN THE BEAM DIRECTION PRODUCES HIGHER STRESSES. FABRICATION TECHNIQUE FOLLOWS CONVENTIONAL PRE-STRESSED CONCRETE PRACTICE. THE GOAL OF THE PROJECT WAS TO DEVELOP A BLADE WITH A RECURRING COST OF UNDER $15,000. THE PROJECTED COSTS OF THE CONCRETE BLADE ACHIEVE THIS GOAL. TOOLING COSTS ARE ALSO VERY LOW IN COMPARISON TO AIRCRAFT PRACTICE. DETAILED COST ESTIMATES HAVE BEEN MADE FOR ALL BLADE PARTS. STUDIES OF TOWER MODIFICATIONS REQUIRED FOR THE HEAVIER BLADES ARE IN PROGRESS.

1978-0475 GAIA M, GIGLIOLI G
WINDPOWERED THERMOCOMPRESSION DESALINATION.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 365-375.

WIND POWER DESALINATION BY THERMOCOMPRESSION IS DISCUSSED, WITH REFERENCE TO THE POSSIBILITY OF USING A HYDRAULIC TRANSMISSION TO PROVIDE THE OPTIMUM ANGULAR VELOCITY TO BOTH THE WIND TURBINES AND THE COMPRESSOR AT VARYING WIND VELOCITIES.

1978-0476 GAIA M, MACCHI E
A COMPARISON BETWEEN SUN AND WIND AS ENERGY SOURCES IN IRRIGATION PLANTS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 265-272.

IN ORDER TO INVESTIGATE THE CONSTRUCTION COSTS, THE ENGINE PERFORMANCE AT VARIOUS LOADS AND THE RELIABILITY, TWO PROTOTYPES OF RANKINE CYCLE ENGINES USING TETRACHLOROETHYLENE AS THE WORKING FLUID WERE BUILT, HAVING A POWER OUTPUT OF ABOUT 4 KW. ENGINE DATA AND MEASURED PERFORMANCE ARE REPORTED. OPTIMUM COLLECTING TEMPERATURES FOR COMMERCIAL CYLINDRO-PARABOLIC AND FLAT-PLATE COLLECTORS ASSOCIATED WITH ORGANIC FLUID ENGINES ARE DISCUSSED. ENGINE COSTS FOR 10 KW AND 100 KW UNITS ARE EXTRAPOLATED. A 4 M DIAMETER DARRIEUS WIND TURBINE WAS ALSO BUILT AND THE COST FOR SMALL SERIES PRODUCTION WAS COMPUTED AS A FUNCTION OF TURBINE DIAMETER. A COMPARISON OF THE USEFUL ENERGY COST FOR THE SOLAR ENGINE AND THE WIND TURBINE IS REPORTED AND THE PROBLEM OF PUMP/ENGINE MATCHING ARE DISCUSSED FOR DEEP AND SHALLOW WELLS.

1978-0477 GARATE J A
WIND ENERGY MISSION ANALYSIS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 209-221.
CONF-770921/1

THE PRINCIPAL OBJECTIVES OF THIS STUDY WERE TO ASSESS THE POTENTIAL FOR WIND ENERGY CONVERSION SYSTEMS ON A NATIONAL SCALE AND TO IDENTIFY HIGH POTENTIAL APPLICATIONS FOR WECS. THE STUDY CONCENTRATED ON BROAD APPLICATIONS OF WECS OVER LARGE GEOGRAPHIC AREAS WITHIN THE CONTINENTAL UNITED STATES. EMPHASIS WAS PLACED ON IDENTIFYING AND EXPLORING HIGH AGGREGATE ENERGY USERS WHO HAVE SIGNIFICANT POTENTIAL TO UTILIZE WIND ENERGY IN PLACE OF OTHER ALTERNATIVES. ATTRACTIVE APPLICATIONS WERE FOUND TO BE ELECTRIC UTILITIES, RESIDENCES, THE PAPER INDUSTRY, AGRICULTURE, AND REMOTE COMMUNITIES. KEY CHARACTERISTICS OF THESE APPLICATIONS ARE SHOWN. FOR PURPOSES OF BREVITY, THIS DISCUSSION IS LIMITED TO THE ELECTRIC UTILITY CASE, BY FAR THE LARGEST APPLICATION.

1978-0478 WYLDE A F
WIND MACHINES FOR LARGE-SCALE ELECTRICITY PRODUCTION.
N.Z. ENG. 33(10): 218-223, OCTOBER 15, 1978.

THE VARIABILITY OF THE WIND AND ITS LOW-ENERGY DENSITY ARE IMPORTANT FACTORS IN THE DESIGN AND OPTIMIZATION OF WIND ENERGY CONVERSION SYSTEMS FOR ELECTRICITY PRODUCTION. ON A WORLD SCALE TWO TYPES ARE CURRENTLY RECEIVING MOST ATTENTION. A SOPHISTICATED EXPERIMENTAL MODEL OF THE HORIZONTAL SHAFT PROPELLER TYPE STARTED OPERATION IN LATE 1975. THE DARRIEUS VERTICAL AXIS MACHINE, UNLIKE THE PROPELLER TYPE, HAS NOT BEEN INVESTIGATED TO ANY EXTENT PREVIOUSLY IN OPERATION, BOTH TYPES EXPERIENCE CYCLICALLY VARYING STRUCTURAL LOADS. CONSIDERABLE FURTHER DEVELOPMENT IS REQUIRED BEFORE EITHER CAN BE MARKETED COMMERCIALLY.

1978-0479 GARSTANG M
COASTAL ZONE WIND ENERGY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 381-392.
CONF-770921/1

AN IMPORTANT PART OF THE COASTAL ZONE WIND ENERGY STUDY BEING CARRIED OUT AT THE UNIVERSITY OF VIRGINIA IS TO DETERMINE THE VELOCITY FIELD IN THE LOWEST 100 METERS OF THE ATMOSPHERE ALONG A LINE WHICH IS NORMAL TO THE COAST EXTENDING LANDWARD AND SEAWARD. THE COASTLINE FROM MAINE TO TEXAS IS BEING CONSIDERED IN THE U. VA. STUDY. DETERMINATION OF THE LOW LEVEL VELOCITY FIELD AS A FUNCTION OF HEIGHT AND DISTANCE NORMAL TO THE SHORE AT EVERY POINT ALONG THIS COASTLINE WOULD NOT BE PRACTICAL. TO DEAL WITH THIS DIFFICULTY TIMES AND REGIONS ALONG THE COAST WITH COMMON WIND REGIMES ARE DETERMINED. A SIMPLIFIED 2-DIMENTIONAL MODEL IS USED IN EACH REGION. THIS WILL BE FOLLOWED WITH A MORE DETAILED STUDY USING A 3-DIMENSIONAL MODEL TO INCLUDE COASTLINE CONFIGURATION. IN THIS PAPER RESULTS OBTAINED USING THE 2-DIMENSIONAL MODEL FOR ONE OF THE FIVE REGIONS OF THE EAST AND GULF COAST ARE REPORTED.

1978-0480 GEWEHR H W
THE 150-FOOT WIND TURBINE BLADE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 528-539.
CONF-770921/2

THE OBJECTIVE OF THE 150 FT WIND TURBINE BLADE PROGRAM IS TO DEMONSTRATE THAT CURRENT DESIGN AND FABRICATION METHODS ARE CAPABLE OF PRODUCING A BLADE OF THIS SIZE, AND HAVE THE POTENTIAL FOR LOW COST MANUFACTURE OF SUCH BLADES IN PRODUCTION QUANTITIES. THE PROGRAM INCLUDES DESIGN, FABRICATION, TEST AND EVALUATION OF ONE 150 FT LONG PROTOTYPE TEST BLADE. THIS PAPER DESCRIBES THE BLADE DESIGN AND ITS FABRICATION, AND INCLUDES A BRIEF SUMMARY OF LOADS, STRESSES AND NATURAL FREQUENCIES OBTAINED DURING THE PRELIMINARY DESIGN ANALYSIS.

1978-0481 GILBERT B L, FOREMAN K M
EXPERIMENTAL DEMONSTRATION OF THE DIFFUSER AUGMENTED WIND TURBINE CONCEPT.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2082-2089.

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). VERY COMPACT DIFFUSERS USING BOUNDARY LAYER CONTROL HAVE BEEN EXAMINED EXPERIMENTALLY. SMALL SCALE MODEL TESTING WITH SCREENS AND CENTERBODIES TO SIMULATE A REAL TURBINE WAS USED TO CHOOSE A BASELINE DIFFUSER CONFIGURATION. THIS DESIGN IS A CONICAL, 60 DEGREES INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS. THE CONFIGURATION ALSO HAS BEEN TESTED AT TEN TIMES GREATER PHYSICAL SIZE AND UP TO 3.5 TIMES GREATER WIND SPEED USING SCREENS AND A REAL TURBINE. THIS FIRST GENERATION, NONOPTIMIZED DAWT CONFIGURATION SHOULD PROVIDE ABOUT FOUR TIMES THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE EFFICIENCY, DIAMETER, AND WIND AT OPTIMUM TURBINE DISK LOADING.

1978-0482 GILBERT B L, OMAN R A, FOREMAN K M
FLUID DYNAMICS OF DIFFUSER-AUGMENTED WIND TURBINES.
J. ENERGY 2(6): 368-374, NOVEMBER-DECEMBER 1978.

THE DIFFUSER-AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). APPLICATION OF MODERN BOUNDARY-LAYER CONTROL TECHNIQUES HAS REDUCED THE SURFACE AREA REQUIREMENTS OF AN EFFICIENT DIFFUSER BY AN ORDER OF MAGNITUDE. MANY PARAMETERS THAT AFFECT THE PERFORMANCE OF THE DIFFUSER SYSTEM HAVE BEEN EXAMINED IN SMALL-SCALE WIND TUNNEL TESTS WITH A FAMILY OF COMPACT DIFFUSERS, USING SCREENS AND CENTERBODIES TO SIMULATE THE PRESENCE OF A TURBINE. FLOWFIELD SURVEYS, OVERALL PERFORMANCE, THE EFFECT OF GROUND PROXIMITY, AND THE PROSPECTS FOR FURTHER IMPROVEMENT ARE DESCRIBED. THE BASELINE CONFIGURATION IS A CONICAL, 60 DEGREES INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS. THIS FIRST-GENERATION DAWT CAN PROVIDE ABOUT TWICE THE POWER OF A CONVENTIONAL WECS WITH THE SAME TURBINE DIAMETER AND WIND. ECONOMIC ESTIMATES SHOW THAT THIS DAWT CAN BE AS MUCH AS 50% CHEAPER THAN CONVENTIONAL WECS FOR THE SAME RATED POWER.

1978-0483 GILMORE E
EVOLUTION OF THE WEST TEXAS STATE UNIVERSITY: AMARILLO COLLEGE WIND ENERGY PROGRAM.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 8-12.
CONF-780357

FEASIBILITY STUDIES AND RESEARCH PROGRAMS STRUCTURED FOR WIND POWER DEVELOPMENT IN TEXAS ARE REVIEWED. ECONOMIC ASPECTS OF LARGE WIND POWER PLANTS FOR ELECTRIC POWER GENERATION ARE DISCUSSED.

1978-0484 GINOSAR M
LARGE SCALE WIND ENERGY PROGRAM FOR THE STATE OF CALIFORNIA. PH.D. THESIS.
UNIVERSITY OF CALIFORNIA, LOS ANGELES. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 79-15,662, 1978.
164 P.

WIND-ELECTRIC ENERGY IS A SLEEPING GIANT. ITS LARGE ENERGY CAPABILITIES, COMPETITIVE ECONOMICS AND ITS SOCIAL AND ENVIRONMENTAL ADVANTAGES ARE NOT GENERALLY KNOWN. WIND-ELECTRIC ENERGY, HOWEVER, CAN AND SHOULD BE ONE OF THE MAJOR RENEWABLE ENERGY SUPPLIES IN CALIFORNIA. THIS DOCUMENT PROPOSES AND PROVIDES THE RATIONALE FOR A LARGE-SCALE WIND-ELECTRIC ENERGY PROGRAM FOR CALIFORNIA. IT IS WRITTEN FOR DECISION MAKERS; THEREFORE, SIMPLIFIED CALCULATIONS AND EXPLANATIONS ARE USED THROUGHOUT. IT IS NOT INTENDED TO BE A TECHNICAL DOCUMENT, ALTHOUGH MANY TECHNICAL ITEMS ARE PRESENTED IN SUPPORT OF THE PROGRAM. THIS PLAN IS BASED ON THE IDEA THAT TIME IS ONE OF THE MOST CRITICAL ELEMENTS IN DEVELOPING RENEWABLE ENERGY SUPPLIES.

1978-0485 GLASGOW J C, BIRCHENOUGH A G
DESIGN AND OPERATING EXPERIENCE ON THE U.S. DEPARTMENT OF ENERGY EXPERIMENTAL MOD-0 100 KW WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2052-2059.

THE TURBINE WAS DESIGNED AND FABRICATED BY NASA, AS PART OF THE FEDERAL WIND ENERGY PROGRAM, TO ASSESS TECHNOLOGY REQUIREMENTS AND ENGINEERING PROBLEMS OF LARGE WIND TURBINES. THE MACHINE BECAME OPERATIONAL IN OCTOBER 1975 AND HAS DEMONSTRATED SUCCESSFUL OPERATION IN ALL OF ITS DESIGN MODES. DURING THE COURSE OF ITS OPERATIONS THE MACHINE HAS GENERATED A WEALTH OF EXPERIMENTAL DATA AND HAS SERVED AS A PROTOTYPE DEVELOPMENTAL TEST BED FOR THE MOD-0A OPERATIONAL WIND TURBINES WHICH ARE CURRENTLY USED ON UTILITY NETWORKS. THIS PAPER DESCRIBES THE MECHANICAL AND CONTROL SYSTEMS AS THEY EVOLVED IN OPERATIONAL TESTS AND DESCRIBES SOME OF THE EXPERIENCE WITH VARIOUS SYSTEMS IN THE DOWNWIND ROTOR CONFIGURATION.

1978-0486 GLASGOW J C, BIRCHENOUGH A G
MECHANICAL AND CONTROL SYSTEM DESIGN OF THE US DEPARTMENT OF ENERGY EXPERIMENTAL MOD-0 100 KW WIND TURBINE.
CECON '78 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 25TH, CLEVELAND, MAY 9-11, 1978. NEW YORK, IEEE, 78CH1300-3 REG 2, 1978. P. 106-111.

THE MACHINE BECAME OPERATIONAL IN OCTOBER 1975 AND HAS DEMONSTRATED SUCCESSFUL OPERATION IN ALL OF ITS DESIGN MODES. DURING THE COURSE OF ITS OPERATIONS THE MACHINE HAS GENERATED A WEALTH OF EXPERIMENTAL DATA AND HAS SERVED AS A PROTOTYPE DEVELOPMENTAL TEST BED FOR THE MOD-0A OPERATIONAL WIND TURBINES WHICH ARE USED CURRENTLY ON UTILITY NETWORKS. THIS PAPER DESCRIBES THE MECHANICAL AND CONTROL SYSTEMS AS THEY EVOLVED IN OPERATIONAL TESTS AND SOME OF THE TEST RESULTS WITH THE POWER CONTROLLER.

1978-0487 GLASSEY C R, MOYER G F
METHODS OF ESTIMATING THE RELIABILITY OF WIND ENERGY SYSTEMS WITH STORAGE.
NTIS, 1978. 61 P.
UCRL-15005

SOME PRELIMINARY RESULTS OBTAINED IN ANALYZING THE RELIABILITY OF WIND GENERATOR-STORAGE SYSTEMS ARE PRESENTED. THE INVESTIGATION TAKES TWO SEPARATE APPROACHES--SIMULATION AND PROBABILISTIC MODELLING--TO REVEAL THE TRADE-OFFS WHICH CAN BE MADE BETWEEN GENERATING CAPACITY AND STORAGE CAPACITY TO ATTAIN A DESIRED LEVEL OF RELIABILITY. THE PERFORMANCE CRITERION USED THROUGHOUT THIS WORK IS THE FREQUENCY OF OCCURRENCE OF EMPTY STORAGE. THIS CRITERION IS ESSENTIALLY THE SAME AS THE FREQUENCY OF LOSS OF LOAD.

1978-0488 GLOWER D D, COON H L
WORKSHOP ON ENERGY RESOURCES AND ELECTRIC POWER GENERATION FOR HIGH SCHOOL SCIENCE TEACHERS. FINAL REPORT.
NTIS, SEPTEMBER 1978. 345 P.

WORKSHOP PARTICIPANTS SPENT 15 DAYS STUDYING VARIOUS ASPECTS OF THE NATIONAL ENERGY PROBLEM AND PREPARING INSTRUCTIONAL MATERIALS FOR USE IN THEIR CLASSROOMS. ATTENTION WAS GIVEN TO SHORT- AND LONG-TERM RESOURCES AVAILABLE; TO CONVERSION SYSTEMS; TO ECONOMIC, SOCIAL AND PHILOSOPHICAL PROBLEMS ASSOCIATED WITH ENERGY PRODUCTION AND USE; AND THE IMPORTANCE OF CONSERVATION.

1978-0489 GNECCO A J, WHITEHEAD G T
MICROPROCESSOR CONTROL OF A WIND TURBINE GENERATOR.
CECON '78 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 25TH, CLEVELAND, MAY 9-11, 1978. NEW YORK, IEEE, 78CH1300-3 REG 2, 1978. P. 4-10.

THIS PAPER DESCRIBES A SYSTEM USED TO CONTROL THE UNATTENDED OPERATION OF A WIND TURBINE GENERATOR. THE TURBINE AND ITS MICROCOMPUTER SYSTEM ARE DESCRIBED FULLY WITH SPECIAL EMPHASIS ON THE WIDE VARIETY OF TASKS PERFORMED BY THE MICROPROCESSOR FOR THE SAFE AND EFFICIENT OPERATION OF THE TURBINE. THE FLEXIBILITY, COST AND RELIABILITY OF THE MICROPROCESSOR WERE MAJOR FACTORS IN ITS SELECTION.

1978-0490 GOHARD J C
WIND ENERGY CONVERSION. VOLUME 8. FREE WAKE ANALYSIS OF WIND TURBINE AERODYNAMICS. ASRL-TR-184-14.
NTIS, SEPTEMBER 1978. 294 P.
COO-4131-T1(VOL.8)

THE UNDERLYING THEORY IS PRESENTED FOR DETERMINING BLADE AND ROTOR/TOWER VIBRATION AND DYNAMIC STABILITY CHARACTERISTICS AS WELL AS THE BASIC DYNAMIC (AS OPPOSED TO AERODYNAMIC) OPERATING LOADS. STARTING WITH A SIMPLE CONCEPT OF EQUIVALENT HINGED ROTORS, THE EQUATIONS OF MOTION FOR THE BLADE INCLUDING PITCH, FLAP AND LAG MOTIONS ARE DEVELOPED. THE NONLINEAR EQUATIONS ARE DERIVED FIRST AND LINEARIZED ABOUT A FINITE DISPLACEMENT OF THE BLADE OUT OF THE PLANE OF ROTATION. THIS IS IMPORTANT SINCE WIND TURBINES TEND TO OPERATE AT RELATIVELY HIGH CONING ANGLES. THE EFFECT OF DISTRIBUTED FLEXIBILITY, AS OPPOSED TO THE EQUIVALENT HINGE CONCEPT, IS THEN DISCUSSED.

1978-0491 GOKHMAN A, OZBOYA N
MULTISTAGE TURBINE-PUMP WITH CONTROLLED FLOW RATE.
NTIS, 1978. P. 316-327.
CONF-781046

ANALYSIS OF THE TURBINE PUMP SHOWS THAT THIS NEW MACHINE HAS THE UNIQUE FEATURE TO REGULATE THE FLOW RATE EVEN IN THE PUMP MODE. THIS UNIQUE FEATURE MAKES THE NEW TURBINE-PUMP ESPECIALLY ATTRACTIVE FOR THE PUMPED-STORAGE PLANT APPLICATIONS TO STORE THE ENERGY PRODUCED BY THE PLANTS UTILIZING NON-CONTROLLABLE NATURAL ENERGY SOURCES SUCH AS SOLAR ENERGY, WIND ENERGY, ETC. A DESCRIPTION OF THE DESIGN AND A HYDRAULIC ANALYSIS ARE GIVEN.

1978-0492 GOSLICH H D
FURTHER DEVELOPMENT OF A HIGH-SPEED CONVERTER WITH A SPECIAL BALL-AND SOCKET TYPE JOINT.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 141-155. (IN GERMAN)

THE DEVELOPMENT AND CONSTRUCTION OF THE BLADES OF THE 70 KW TWIN ROTOR WIND POWER PLANT ON SYLT AND THE TWO BLADE HIGH SPEED ROTOR PLANT PRESENTED TO THE SOLAR FORUM 1977 ARE DESCRIBED. THREE BLADE ROTOR CONFIGURATIONS ARE DISCUSSED WITH DIFFERENT BLADE STARTING POSITION DUE TO DIFFERENT SPRING PRELOADING CHARACTERISTICS AND OVER-ALL RUNNING BEHAVIOR OF THE ENTIRE ROTOR SYSTEM. THE ADVANTAGE OF APPLICATIONS OF THE WIND POWER PLANT SYSTEM GOSLICH IN THIRD WORLD COUNTRIES IS SHOWN.

1978-0493 GOVINDA RAJU S P, NARASIMHA R
WINDMILLS FOR RURAL USE.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1796-1802.

THIS PAPER DISCUSSES THE INDIAN DEVELOPMENT OF WINDMILLS USING THE "SOFT" DESIGN APPROACH. THE DESIGN AND PERFORMANCE OF TWO PROTOTYPE WINDMILLS BASED ON THE SAIL-TYPE SAVONIUS ROTOR ARE DESCRIBED.

1978-0494 GRIFFITHS R T, WOOLLARD M G
PERFORMANCE OF THE OPTIMAL WIND TURBINE.
APPL. ENERGY 4(4): 261-272, OCTOBER 1978.

THE PERFORMANCE OF A TYPICAL WIND TURBINE, DESIGNED TO GIVE MAXIMUM POWER COEFFICIENT AT A TIP SPEED RATIO OF 5, HAS BEEN ESTIMATED OVER A RANGE OF SPEED RATIOS AND PITCH ANGLES USING BLADE ELEMENT THEORY. INFORMATION IS GIVEN ON THE POWER, TORQUE, AND THRUST DEVELOPED AND ON THE NATURE OF THE FLOW OVER THE BLADES.

1978-0495 GRUENBAUM R
ALTERNATIVE ENERGY IN THE USSR.
ENVIRONMENT 20(7): 25-30, SEPTEMBER 1978.

ALTHOUGH RENEWABLE ENERGY SOURCES HAVE A RELATIVELY LOW PRIORITY IN THE RESOURCE-RICH SOVIET UNION, RESEARCH AND DEVELOPMENT IN NEW ENERGY-CONVERSION SYSTEMS WILL BE EXPANDED TO EXPLOIT WIND AND SOLAR ENERGY. WIND RESEARCH PROJECTS WILL INCLUDE DESALINATION AND PUMPING WATER, CATHODIC PROTECTION OF PIPELINES, AND LARGE-SCALE POWER GENERATION. SOLAR PROJECTS WILL INCLUDE DESERT IRRIGATION, SOLAR-POWERED HOUSES AND APPLIANCES, AND PULSED SOLAR IRRADIATION. IN ADDITION, TIDAL POWER PLANTS ARE BEING INSTALLED ALONG THE COASTS AND GEOTHERMAL PLANTS FOR BOTH POWER GENERATION AND LOCAL HEATING WILL OPERATE AT SEVERAL SITES.

1978-0496 WURTZ F R, HAWKINS T J
WIND GENERATOR SYSTEM.
U.S. PATENT NO. 4,113,408, SEPTEMBER 12, 1978. 8 P.

A WIND OPERATED GENERATOR IS DESCRIBED WHICH HAS A STATIONARY FRAME OR BASE ROTATABLY SUPPORTING AT LEAST FOUR SETS OF PIVOTAL BLADES INTENDED TO BE DRIVEN BY IMPINGING WIND CURRENTS. EACH SET OF BLADES OPERATE IN UNISON FOR OPENING AND CLOSING AIR PASSAGEWAYS BETWEEN ADJACENT ONES OF THE BLADES AS THE SETS OF BLADES ROTATE ABOUT A COMMON VERTICAL AXIS. A WIND DIRECTION SENSOR IS PROVIDED WHICH MOVES INTO THE DIRECTION OF THE WIND AND ELECTRIC-MECHANICAL OR ELECTRICAL INTERFACE NETWORKS OPERABLY COUPLE THE WIND DIRECTION SENSOR TO THE RESPECTIVE SETS OF BLADES WHEREBY THE BLADES ARE RESPONSIVE TO WIND DIRECTION SO AS TO BE PROPERLY FEATHERED TO PROPEL THE SETS OF BLADES. BY EMPLOYMENT OF THE INTERFACE NETWORK, THOSE BLADES THAT ARE IN POSITION TO ACTUATE OR ROTATE THE WINDMILL WILL RECEIVE THE FULL FORCE OF THE WIND WHILE OTHER BLADES WHICH ARE NOT IN A

POSITION TO ACCOMPLISH THE PROPER OPERATION WILL BE TURNED TO PERMIT PASSAGE OF THE WIND.

1978-0497 GUPTA R P, CHANDRA S K
DEVELOPMENT OF A 1 KW VERTICAL AXIS WIND GENERATOR.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1803-1808.

THE DESIGN AND DEVELOPMENT ACTIVITIES ON A 1 KW VERTICAL AXIS WIND GENERATOR ARE GIVEN. IT IS A TWO-BLADED DARRIEUS TYPE DESIGN WITH A COMBINATION OF VERTICAL AND INCLINED BLADES. BLADES OF FIBREGLASS REINFORCED WITH A MILD STEEL STRIP HAVE BEEN USED AND THEY ARE ANALYSED THEORETICALLY FOR MECHANICAL STRENGTH AND TESTED EXPERIMENTALLY IN ACTUAL RUNNING CONDITION FOR STRESS LEVELS USING A PHOTOELASTIC COATING AND REFLECTION POLARISCOPE. THE CENTRAL ROTATING SHAFT HAS BEEN DESIGNED TO CARRY THE BUCKLING LOAD AND THE BLADE SHAFT COMBINATION IS ANALYSED FOR BOTH TORSIONAL AND BENDING MODES OF VIBRATION.

1978-0498 WORTMANN F X
WIND ENERGY PLANT WITH AERODYNAMIC INHERENT CONTROL.
GERMAN (FRG) PATENT NO. 2,715,584/A/, OCTOBER 19, 1978. 17 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND POWER MACHINE IN WHICH THE ROTOR BLADES ARE CONNECTED ELASTICALLY OR VIA JOINTS WITH THE ROTOR HUB, INDEPENDENTLY OF EACH OTHER. ACCORDING TO THE INVENTION A SMALL IMPACT MOVEMENT, I.E. A CHANGE OF THE CONE ANGLE BETWEEN THE PLANE OF ROTATION AND THE CONE PRODUCED BY ROTATION OF THE BLADES LEADS VIA A VERY HIGH TRANSMISSION (RATIO) TO A GREAT CHANGE IN ANGLE OF INCIDENCE. THIS SUPPRESSES THE CORIOLIS FORCE, AND THE AMOUNT OF AIR POWER REMAINS CONSTANT FOR EACH BLADE INDIVIDUALLY AND INDEPENDENTLY OF WIND STRENGTH AND DIRECTION.

1978-0499 GUSTAVSSON B
WIND ENERGY TEST PLANT OPERATION: RESULTS AND FINDINGS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 480-488.
CONF-770921/1

THE 75 KW TEST PLANT IS PART OF THE NATIONAL SWEDISH WIND ENERGY PROGRAM. IT WAS DESIGNED TO SUPPORT THEORETICAL WECS-STUDIES IN THE FOLLOWING AREAS; LOADS AND OTHER ENGINEERING DATA, AND CORRESPONDENCE BETWEEN WIND DATA AND ENERGY PRODUCTION.

1978-0500 GUSTAVSSON B
THE WIND POWER STATION AT KALKUGNEN (SWEDEN).
SVEN. KRAFTVERKSFOEREN. PUBL. NO. 571: 40-51, 1978. (IN SWEDISH)

AN EXPERIMENTAL WIND POWER STATION IS DESCRIBED.

1978-0501 GUSTAVSON M R
WIND ENERGY RESOURCE PARAMETERS.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 148-152.
CONF-780357

THE GLOBAL WIND ENERGY RESOURCES ARE ANALYZED.

1978-0502 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, SEPTEMBER 1978. 228 P.
NTIS/PS-78/0998/1ST

1978-0503 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE).
NTIS, SEPTEMBER 1978. 263 P.
NTIS/PS-78/0997/3ST

1978-0504 HALL D C, CARLSON A, FULLER D, REYER R, MALLNER C
USAF TERRESTRIAL ENERGY STUDY. VOLUME III. PART I. SUMMARY DATA DISPLAY. FINAL REPORT, APRIL 1, 1976-FEBRUARY 1, 1978.
NTIS, MAY 1978. 393 P.
AD-A061071

THIS REPORT WAS PREPARED TO SERVE AS A GUIDE FOR THE U.S. AIR FORCE IN SELECTING TYPES OF ENERGY CONVERSION SYSTEMS TO MEET THEIR FUTURE GROUND POWER REQUIREMENTS. THE ELECTRIC POWER REQUIREMENTS INCLUDED IN THIS REPORT RANGE FROM 10 KILOWATTS TO 50 MEGAWATTS. TWENTY-ONE TYPES OF SYSTEMS, CONVENTIONAL AS WELL AS ADVANCED, ARE CONSIDERED. EACH SYSTEM IS CHARACTERIZED IN TERMS OF A SET OF ECONOMIC, PHYSICAL AND PERFORMANCE PARAMETERS INCLUDING ACQUISITION COSTS, LIFE CYCLE COSTS, SIZE, EFFICIENCY AND ENVIRONMENTAL CONSTRAINTS.

1978-0505 HALL F F
FREE-WHEELING HYDRAULIC POWER MILLS.
NTIS, OCTOBER 1978. 10 P.
CONF-781214-3, SLAC-PUB-2204

FREE-WHEELING POWER PLANTS USING FREE REPLENISHABLE HYDRAULIC FORCES OF WINDS AND WATER CURRENTS WOULD CONSIST OF MOST OR ALL OF THE FOLLOWING: FORE AND AFTER CONES TO INCREASE THROUGHPUT; DUPLEX IMPELLERS; ROTORS WITH DC/AC EXCITATION, AC/DC INVERTERS AND DC FIELD COILS; STATORS WITH AC OUTPUT OF VARYING FREQUENCY, VOLTAGE AND POWER; SOLID-STATE AC/DC INVERTERS, DC ELECTROLYTIC CELL BANKS FOR GH2 AND GO2 PRODUCTION; AND NEON REFRIGERATORS FOR REDUCING THESE TO LOX AND CHILLED GH2 FOR EASE IN SHIPMENT OR STORAGE.

1978-0506 HAMMOND G
CASH BOOST FOR ALTERNATIVE ENERGY.
PHYS. TECHNOL. 9(4): 139-140, JULY 1978.

FOLLOWING THE INCREASE IN GOVERNMENT SPENDING ON ALTERNATIVE ENERGY SOURCES, THE LEVEL OF FUNDING FOR WAVE POWER, GEOTHERMAL SOURCES, WIND POWER, TIDAL (SEVERN ESTUARY), AND SOLAR ENERGY ARE DISCUSSED.

1978-0507 WORKSHOP ON SOLAR ENERGY FOR THE VILLAGES OF TANZANIA, HELD AT DAR ES SALAAM, TANZANIA ON AUGUST 11-19, 1977.

NTIS, 1978. 177 P.
WORKSHOP ON SOLAR ENERGY FOR THE VILLAGES OF TANZANIA, DAR ES SALAAM, TANZANIA, AUGUST 11-19, 1977.
PB-282941

THE SEMINAR/WORKSHOP'S PURPOSES WERE: (1) TO REVIEW THE STATE-OF-THE-ART OF SMALL-SCALE SOLAR ENERGY DEVICES, INCLUDING BOTH THE TECHNICAL AND ECONOMIC ASPECTS OF THEIR UTILIZATION; AND (2) TO SUGGEST SHORT- AND LONG-RANGE PROJECTS USING SOLAR DEVICES IN THE VILLAGES, WITH PARTICULAR EMPHASIS ON RECOMMENDATIONS FOR IMPLEMENTATION.

1978-0508 HARDY D
WIND ENERGY ACTIVITIES AT THE SOLAR ENERGY RESEARCH INSTITUTE.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. SYMPOSIUM VOL., P. 99-104.

WIND ENERGY PROJECT ACTIVITIES AT THE SOLAR ENERGY RESEARCH INSTITUTE ARE COLLECTIVELY REVIEWED. OVERALL OBJECTIVES OF EACH MAJOR ACTIVITY AREA ARE DISCUSSED IN RELATION TO THE BROADER OBJECTIVES OF THE INSTITUTE IN FURTHERING WIND ENERGY UTILIZATION. ALSO DISCUSSED IS SERI'S ROLE IN SUPPORTING THE PRIVATE SECTOR IN WIND ENERGY DEVELOPMENT, AND EFFORTS TO PROMOTE INFORMATION TRANSFER THROUGHOUT THE WIND ENERGY COMMUNITY.

1978-0509 HARDY D M
NUMERICAL AND MEASUREMENT METHODS OF WIND ENERGY ASSESSMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 664-676.
CONF-770921/2

A SITE SELECTION METHODOLOGY DEVELOPED BY THE LAWRENCE LIVERMORE LABORATORY AS PART OF THE FEDERAL WIND ENERGY PROGRAM IS DESCRIBED. IT HAS FOUR KEY ELEMENTS: (1) COLLECTION OF METEOROLOGICAL OBSERVATIONS; (2) STATISTICAL ANALYSIS OF VECTOR WIND MEASUREMENTS; (3) USE OF A NUMERICAL OBJECTIVE-ANALYSIS MODEL; AND (4) COORDINATED APPLICATION OF THE NUMERICAL ANALYSIS AND FIELD MEASUREMENT EFFORTS.

1978-0510 HARDY D M
WIND RESOURCE ANALYSIS. ANNUAL REPORT.
NTIS, DECEMBER 1978. 20 P.
SERI/TR-36-088

THIS REPORT DESCRIBES FY78 RESULTS OF THE WIND RESOURCE ANALYSES TASK OF THE ERAB (ENERGY RESOURCE ASSESSMENT BRANCH OF THE SOLAR ENERGY RESEARCH INSTITUTE). INITIAL STEPS WERE TAKEN TO ACQUIRE MODERN ATMOSPHERE MODELS OF NEAR-SURFACE WIND FLOW AND PRIMARY DATA SETS USED IN PREVIOUS STUDIES OF NATIONAL AND REGIONAL WIND RESOURCES. BECAUSE NUMEROUS ASSUMPTIONS ARE NECESSARY TO INTERPRET AVAILABLE DATA IN TERMS OF WIND ENERGY POTENTIAL, CONCLUSIONS OF PREVIOUS STUDIES DIFFER CONSIDERABLY. THESE DATA ANALYSES MAY BE IMPROVED BY FUTURE SERI RESEARCH. STATE-OF-THE-ART ATMOSPHERE MODELS ARE A NECESSARY COMPONENT OF THE SERI WIND RESOURCE ANALYSES CAPACITY. HOWEVER, THESE METHODS ALSO NEED TO BE TESTED AND VERIFIED IN DIVERSE APPLICATIONS. THE PRIMARY DATA SETS AND PRINCIPAL FEATURES OF THE MODELS ARE DISCUSSED IN THE REPORT.

1978-0511 HARDY W E, HASSAN U
LARGE WIND TURBINES GAIN FAVOUR IN THE UK.
INT. POWER GENERATION 1(7): 25-31, OCTOBER/NOVEMBER 1978.

A BRITISH DESIGNED WIND TURBINE GENERATOR IS DESCRIBED IN DETAIL. IT IS A 3.7 MW HORIZONTAL AXIS DEVICE, WITH A TWO BLADED ROTOR 60 M IN DIAMETER MOUNTED ON A 45 M HIGH CONCRETE OR STEEL LATTICE TOWER. REVOLVING AT 34.1 RPM, CUT-IN SPEED WILL BE 7 M/S WITH A MAXIMUM SPEED OF 27 M/S. IT IS INTENDED FOR USE ON THE SUMMITS OF HILLS, PARTICULARLY IN NORTH WESTERN SCOTLAND, AND A MAP OF THE ANNUAL MEAN WIND SPEED CONTOURS FOR THE UPLAND AREAS OF THE UK IS GIVEN TO ILLUSTRATE SITE SELECTION CRITERIA.

1978-0512 HASSEL W F
INDIRECT FOREIGN OIL REQUIREMENTS FOR ALTERNATE ENERGY SOURCES.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 4: GREATER LOS ANGELES AREA SYMPOSIUM, CALIFORNIA, MAY 23, 1978. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1978. P. 84-95.

AN ANALYSIS IS CONDUCTED ON THE EXTERNAL ENERGY REQUIREMENTS OF VARIOUS BASELOAD ELECTRIC POWER SYSTEMS, INCLUDING CONVENTIONAL, NUCLEAR AND SYNTHETIC FUEL PLANTS, SOLAR AND WINDPOWER, AND FUSION POWER. THESE ENERGY REQUIREMENTS ARE TRANSFORMED INTO ADDITIONAL NEEDS FOR IMPORTED OIL DURING THE CONSTRUCTION AND EARLY OPERATIONAL PERIODS OF THE POWER SYSTEMS.

1978-0513 HAUSMANN H, HAUSMANN K H
ENERGY SAVING IN THE TEXTILE INDUSTRY.
INT. TEXT. BULL. DYEING PRINT. FINISH. NO. 2: 11 PAGES BETWEEN P. 109 AND 139, 1978.

THE AUTHORS SHOW HOW THE COST OF PRODUCING WARM PROCESS WATER IN THE TEXTILE INDUSTRY CAN BE REDUCED BY USING SOLAR HEAT COLLECTORS, WIND ENERGY, HEAT PUMPS AND HEAT RECOVERY INSTALLATIONS. REGENERATIVE AND RECUPERATIVE HEAT RECOVERY SYSTEMS ARE SUITABLE. THE ADVANTAGES AND DISADVANTAGES OF BOTH ARE DISCUSSED. SEVERAL DIFFERENT EXAMPLES OF HEAT RECOVERY PLANTS IN THE TEXTILE INDUSTRY ARE DESCRIBED.

1978-0514 HEALY J V
INFLUENCE OF BLADE THICKNESS ON THE OUTPUT OF VERTICAL AXIS WIND TURBINES.
WIND ENG. 2(1): 1-9, 1978.

THE AMOUNT OF DATA REQUIRED TO COMPUTE THE OUTPUT OF STRAIGHT-BLADE TURBINES IS ONLY A FRACTION OF WHAT IS NEEDED FOR CURVED-BLADE ONES. USING THE DATA IN NACA TR 586, THE POWER COEFFICIENTS FOR NACA PROFILES 0009, 0012, 0015, AND 0018 HAVE BEEN COMPUTED FOR A WIDE RANGE OF TURBINE REYNOLDS NUMBERS AND TIP SPEED RATIOS FROM 2.25 UPWARDS. LIFT AND DRAG MATRICES ARE SET UP FROM THE DATA AND A STANDARD SUBROUTINE USED TO INTERPOLATE FOR THE LIFT AND DRAG COEFFICIENTS FOR GIVEN VALUES OF ANGLE OF ATTACK AND BLADE REYNOLDS NUMBER. THE COMPUTER PROGRAM IS BASED ON THE MULTIPLE-STREAMTUBE MODEL AND TAKES INFLOW INTO ACCOUNT.

1978-0515 HEALY J V
INFLUENCE OF BLADE CAMBER ON THE OUTPUT OF VERTICAL-AXIS WIND TURBINES.
WIND ENG. 2(3): 146-155, 1978.

THIS STUDY REPRESENTS AN EXTENSION TO CAMBERED AIRFOILS OF A PREVIOUS WORK ON SYMMETRIC ONES. THE MODEL USED IS

THE MULTIPLE-STREAMTUBE ONE AND THE AIRFOILS HAVE GOTTINGEN PROFILES--THE ONLY ONES FOR WHICH SUFFICIENT DATA IS AVAILABLE. IT IS FOUND THAT AIRFOILS WITH HIGH LIFT CAN ABSTRACT MORE THAN THE OPTIMUM AMOUNT OF ENERGY FROM EACH STREAMTUBE. THIS HIGH LIFT CAN BE GENERATED BY USING CAMBER OR BY PRESETTING SYMMETRIC PROFILES AT SOME INITIAL ANGLE OF INCIDENCE. IN GENERAL, THE CLOSER THE AIRFOIL IS TO SYMMETRIC, THE MORE SATISFACTORY ITS POWER OUTPUT. CAMBERING OR PRESETTING THE ANGLE OF INCIDENCE SEEMS A LIKELY WAY TO AVOID EXCESSIVE TURBINE SPEEDS.

1978-0516 HEALY J V
AN INVERSE PROBLEM FOR VERTICAL-AXIS WIND TURBINES.
J. ENERGY 2(6): 382-384, NOVEMBER-DECEMBER 1978.

VERTICAL AXIS TURBINES DRAG AND LIFT COEFFICIENTS WERE STUDIED AND IT WAS DETERMINED THAT VERTICAL-AXIS TURBINES CANNOT EQUAL HORIZONTAL-AXIS MACHINES IN EFFICIENCY BECAUSE THE ANGLE OF ATTACK OF THE HORIZONTAL-AXIS TURBINE CAN BE VARIED TO SUIT CONDITIONS. THE BEST HOPE FOR VERTICAL-AXIS WIND TURBINES LIES IN CONCENTRATING ON THE REGIONS WHERE COMPLETE EXTRACTION IS THEORETICALLY POSSIBLE AND LOOKING FOR A BLADE PROFILE THAT WILL MOST NEARLY MATCH THE LIFT AND DRAG CURVES.

1978-0517 HEALY T J
DEVELOPMENT AND TEST OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS).
INTERNATIONAL SOLAR ENERGY CONFERENCE AND FAIR, EL PASO, TEXAS, APRIL 13, 1978. EL PASO, TEXAS, 1978. P. 20. (ABSTRACT)

1978-0518 HENNESSEY J P
COMPARISON OF THE WEIBULL AND RAYLEIGH DISTRIBUTIONS FOR ESTIMATING WIND POWER POTENTIAL.
WIND ENG. 2(3): 156-164, 1978.

FOR POTENTIAL WIND POWER SITES WHERE THE WEIBULL MODEL OF THE WIND SPEED DISTRIBUTION IS APPLICABLE, SOME GENERAL GUIDANCE IS PROVIDED WHICH WILL HELP INVESTIGATORS DECIDE: WHETHER OR NOT THE RAYLEIGH DISTRIBUTION WILL BE A SATISFACTORY APPROXIMATION TO THE WEIBULL; WHICH SITES ARE THE MOST PRODUCTIVE AND RELIABLE FOR AN AEROGENERATOR OF A SPECIFIC SIZE; AND WHICH SIZE OF AEROGENERATOR SHOULD BE USED GIVEN THE WIND SPEED CHARACTERISTICS OF A CERTAIN SITE.

1978-0519 HENRY G E
CLEAN ENERGY: SOME BITS AND PIECES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1947-1961.

ONE SEEKS TO IDENTIFY POSSIBLE NOVEL APPLICATIONS OF EXISTING TECHNOLOGY, TO ACHIEVE, ON A LIMITED SCALE, ECONOMICALLY REWARDING SUBSTITUTIONS OF CLEAN ENERGY FOR THE USUAL CHEMICAL-TO-THERMAL CONVERSIONS. MAIN EMPHASIS IS ON WIND POWER. TWO POSSIBILITIES ARE TREATED IN SOME DETAIL: DESALTING SEAWATER (WINDMILL DIRECT COUPLED TO DRIVE A VAPOR COMPRESSION DISTILLATION SYSTEM) AND, SPACE HEATING (HEAT PUMP OPERATED BY WIND POWER). PRELIMINARY EVALUATION OF ECONOMIC FEASIBILITY IS MILDLY ENCOURAGING. FINALLY, THERE IS AN EXAMINATION OF THE MERITS AND THE DRAWBACKS INHERENT IN THE "BITS AND PIECES" APPROACH TO THE ENERGY PROBLEM.

1978-0520 HENSING P C
FLUTTER ANALYSIS OF SMALL WINDTURBINE. DESIGNED FOR MANUFACTURE AND USE IN DEVELOPING COUNTRIES.
NTIS, AUGUST 1978. 29 P.
UTH-LR-272, N80-18415/3

THE FLUTTER BEHAVIOR OF A WIND TURBOROTOR DESIGNED FOR MANUFACTURE AND USE IN DEVELOPING COUNTRIES WAS INVESTIGATED. POSSIBLE IMPROVEMENTS ARE DISCUSSED. THE EFFECT OF SCALING IS CONSIDERED. RESULTS SHOW THAT THE ADDITION OF SMALL TIP-MASSES HAS A CURATIVE INFLUENCE ON FLUTTER SENSITIVE ROTOR DESIGNS.

1978-0521 HERTER E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,721,450/A/, NOVEMBER 16, 1978. 49 P. (IN GERMAN)

THE PATENT CONCERNS A WIND TURBINE WITH VERTICAL ROTOR SHAFT. THE ROTOR HAS SEVERAL BLADES WHICH IN THEIR SIMPLEST FORM ARE SECTORS OF A HOLLOW SPHERE, SO THAT THE GAIN OF THE ANGLES SUBTENDED AT THE CENTRE OF THE INDIVIDUAL SECTORS IS 360 DEGREES. THE PART OF EACH SECTOR AT THE FRONT IN THE DIRECTION OF ROTATION HAS AN AXIS OF ROTATION FIXED BY TWO ARMS ON THE ROTOR AXIS, ROUND WHICH THE BLADE CAN BE ADJUSTED IN ANGULAR POSITION AND MOVED OUTWARDS, IN ORDER TO SET THE OPTIMUM ROTOR EFFICIENCY AT EACH WIND SPEED. A ROTOR WITH THIS FORM OF BLADES WAS TRIED IN A SMALL EXPERIMENTAL MODEL WITH 3 BLADES IN A WIND TUNNEL AND FOUND VERY USEFUL. APART FROM THIS TYPE OF BLADE, A LARGE NUMBER OF OTHER SHAPES OF BLADES IS PROPOSED.

1978-0522 HEWSON E W, BARBER D A, CHILOCOTE W W
PANEL II: BIOLOGICAL WIND PROSPECTING.
ECOLOGISTS/METEOROLOGISTS WORKSHOP, 1976, DOUGLAS LAKE, MICHIGAN, AUGUST 16, 1976. NTIS, FEBRUARY 1978. P. 43-89.
CONF-7608116

THE USE OF WIND AS AN ALTERNATE SOURCE OF ENERGY GENERATION IS DISCUSSED AND METEOROLOGICAL AND BIOLOGICAL ASPECTS OF WIND ARE CONSIDERED. EFFECTS OF WIND ON PLANTS ARE DISCUSSED WITH REGARD TO WATER BALANCE, PHOTOSYNTHESIS, HORMONE DISTRIBUTION, DESTRUCTION OF BUDS, AND DISTRIBUTION OF SHED PARTS. RECOMMENDATIONS FOR RESEARCH PROJECTS ON BIOLOGICAL WIND PROSPECTING ARE DESCRIBED.

1978-0523 HEWSON E W, WADE J E, BAKER R W, HEALD R C
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. WIND POWER POTENTIAL IN THE PACIFIC NORTHWEST COASTAL REGION. FINAL REPORT, FEBRUARY 15, 1978-JUNE 14, 1978.
NTIS, JUNE 1978. 92 P.
RLO/2227-T24-78-2

METHODOLOGIES FOR EVALUATING WIND POWER POTENTIAL OVER A REGIONAL AREA ARE DESCRIBED AS ARE THE ANALYSES PERFORMED UPON THE DATA FOR THE REGION DEFINED AS THE PACIFIC NORTHWEST COASTAL REGION (PNWCR). THIS REGION IS COMPOSED OF THE AREA WEST OF THE CASCADE MOUNTAINS IN WASHINGTON AND OREGON. THE ANALYSES UTILIZE EXISTING SUMMARIZED DATA, VEGETATIVE INDICATORS OF WIND VELOCITY, AND INFERRED WINDFLOW PATTERNS OVER CHARACTERISTIC COASTAL REGION TERRAIN FORMS.

1978-0524 HEWSON E W, WADE J H

BIOLOGICAL WIND PROSPECTING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 335-348.
CONF-770921/1

THE OBJECTIVE OF BIOLOGICAL WIND PROSPECTING IS TO DEVELOP METHODS OF USING WIND DEFORMED VEGETATION FOR SELECTING OPTIUM SITES FOR UTILIZATION OF WIND ENERGY. FIVE DIFFERENT INDICES OF WIND EFFECTS ON TREES HAVE BEEN DEVELOPED AND ARE BEING CALIBRATED IN TERMS OF VARIOUS WIND CHARACTERISTICS.

1978-0525 HIGHTOWER S J, WATTS A W
A PROPOSED CONCEPTUAL PLAN FOR INTEGRATION OF WIND TURBINE GENERATORS WITH A HYDROELECTRIC SYSTEM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 107-121.
CONF-770921/1

A COMPREHENSIVE STUDY OF THE PERFORMANCE, COST, AND MARKETING ASPECTS OF A LARGE WINDPOWER SYSTEM INTEGRATED WITH AN EXISTING HYDROELECTRIC NETWORK HAS BEEN ACCOMPLISHED BY THE BUREAU OF RECLAMATION FOR A HIGH WIND REGION IN SOUTHERN WYOMING. THE BUREAU OPERATES AN EXTENSIVE TRANSMISSION SYSTEM, WITH NUMEROUS INTERCONNECTIONS WITH OTHER UTILITIES AND DELIVERY POINTS THROUGHOUT THE WESTERN UNITED STATES. THE ADVANTAGE OF THIS CAPABILITY IS THAT WIND TURBINES CAN BE INSTALLED AT OPTIMUM SITES OF KNOWN HIGH AVERAGE ANNUAL WINDPOWER AND STILL USE THE ENERGY STORAGE CAPABILITIES OF HYDROELECTRIC FACILITIES WHICH MAY BE KILOMETERS AWAY.

1978-0526 HIGHTOWER S J, WATTS A W
PROPOSED CONCEPTUAL PLAN FOR INTEGRATION OF WIND TURBINE GENERATORS WITH A HYDROELECTRIC SYSTEM.
INST. ENVIRON. SCI. PROC., 1978, P. 307-309D.

A COMPREHENSIVE STUDY OF THE PERFORMANCE, COST, AND MARKETING ASPECTS OF A LARGE WINDPOWER SYSTEM INTEGRATED WITH AN EXISTING HYDROELECTRIC NETWORK HAS BEEN ACCOMPLISHED BY THE BUREAU OF RECLAMATION FOR A HIGH WIND REGION IN SOUTHERN WYOMING. APPROXIMATELY 49 WIND TURBINES WOULD BE INSTALLED IN AN ARRAY AT A SITE NEAR MEDICINE BOW, WYOMING, ONE OF THE WINDIEST AREAS IN THE UNITED STATES. POWER OUTPUT FROM THE WIND TURBINES WOULD BE INTEGRATED WITH THE EXISTING HYDROELECTRIC SYSTEM WITHIN THE COLORADO RIVER STORAGE PROJECT, WHICH SERVES AS THE ENERGY STORAGE SYSTEM, AND HAS FACILITIES TO REGENERATE THE CAPACITY AND ENERGY IN A PRESCRIBED PATTERN AS DETERMINED BY THE MARKETING PLAN. TO STORE THE ENERGY FROM THE WIND TURBINES, GENERATION AT THE HYDRO POWER PLANTS WOULD BE REDUCED AN AMOUNT EQUAL TO THE WIND-TURBINE GENERATION. THUS, THE WATER THAT WOULD HAVE BEEN USED BY THE HYDRO POWER PLANTS REMAINS IN THE RESERVOIRS AND IS STORED FOR LATER USE. THE LOADS THAT WOULD HAVE BEEN SERVED BY THE HYDROGENERATORS WILL BE SERVED BY THE CAPACITY AND ENERGY PROVIDED BY THE WIND TURBINES.

1978-0527 HINSLEY A J A, SMITH D A D
APPLICATION OF SMALL WIND POWERED GENERATORS IN TELECOMMUNICATIONS AND OTHER HIGH RELIABILITY SYSTEMS.
WIND ENG. 2(2): 115-126, 1978.

A GREAT DEAL OF RESEARCH HAS BEEN AND IS STILL BEING CARRIED OUT TO DEVISE PROGRESSIVELY MORE EFFICIENT MEANS OF USING WIND ENERGY. IN THIS PAPER THE AUTHORS DISCUSS THE PRACTICAL AND ECONOMIC CONSIDERATIONS OF USING EXISTING 2 KW WIND POWERED GENERATORS, OF WELL PROVEN DESIGN, TO PROVIDE A HIGHLY RELIABLE SOURCE OF POWER FOR RADIO COMMUNICATION AND OTHER SYSTEMS OF A CRITICAL NATURE.

1978-0528 SFORZA P M
FLUID FLOW ENERGY CONVERSION SYSTEMS.
U.S. PATENT NO. 4,111,594, SEPTEMBER 5, 1978. 20 P.

FLUID FLOW ENERGY CONVERSION SYSTEMS EMPLOYING AERODYNAMIC FLOW-SEPARATION VORTEX GENERATION FOR FOCUSING THE KINETIC ENERGY OF FLOW IN THE WORKING AREA OF THE TURBINE ARE DISCLOSED IN THE CONTEXT OF WIND POWER PLANTS. AS A CONSEQUENCE OF THIS AUGMENTATION, FLUID VELOCITY ACTING ON THE ROTOR IS INCREASED BY A SUBSTANTIAL AMOUNT OVER THE FREE STREAM VELOCITY, RESULTING IN SUBSTANTIAL INCREASES IN POWER OUTPUT FOR A GIVEN TURBINE CONFIGURATION. PROVISIONS FOR VARYING THE ANGLE OF ATTACK OF THE AUGMENTOR SURFACE FOR CONTROL PURPOSES ARE ALSO DESCRIBED AS ARE CONFIGURATIONS EMPLOYING MULTIPLE AUGMENTOR SURFACES AND BOTH SLENDER BODY AND BLUFF BODY AUGMENTORS. ALSO DISCLOSED ARE VORTEX MIXING TECHNIQUES FOR CONTROLLING THE WIND GRADIENT TO ACHIEVE A MORE OPTIMUM WIND VELOCITY DISTRIBUTION AND MAGNITUDE RELATIVE TO THE WIND CONVERTER.

1978-0529 HOLDREN J P, MORRIS G, TANENBAUM G
ENVIRONMENTAL ASPECTS OF ALTERNATIVE ENERGY TECHNOLOGIES FOR CALIFORNIA.
NTIS, NOVEMBER 1978. 167 P.
UCRL-15002

THE FOLLOWING TOPICS ARE DISCUSSED: COST-BENEFIT ANALYSIS OF ENERGY IMPACTS ON BIOLOGICAL, GEOPHYSICAL, AND SOCIAL ENVIRONMENTS; IMPACTS OF SOFT AND TRANSITION TECHNOLOGIES SUCH AS SOLAR HEAT, ON-SITE/CENTRAL WIND SYSTEMS, WASTE/FARM BIOMASS SYSTEMS, GEOTHERMAL HEAT/ELECTRICITY, HYDROELECTRIC DAMS, AND FLUIDIZED-BED COAL BURNERS; OBSERVATIONS ON INCREASED EFFICIENCY; AND NEEDS FOR FURTHER WORK. AN APPENDIX ON BIOMASS INCLUDES DISCUSSIONS OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE CONVERSION OF BIOMASS TO SECONDARY ENERGY FORMS, ENVIRONMENTAL IMPACTS ASSOCIATED WITH USE OF FUELS, AND SYSTEMS IMPLICATIONS OF BIOMASS ENERGY USE. ENVIRONMENTAL EFFECTS OF HYDROPOWER ARE DISCUSSED IN A SECOND APPENDIX.

1978-0530 HOLLAND M B
POWER FROM THE WIND
CHART. MECH. ENG. 25(5): 39-45, MAY 1978.

THE ADVENT OF MECHANICAL POWER WHICH COULD BE GENERATED AT WILL BY THE COMBUSTION OF CHEAP FOSSIL FUELS MADE THE WINDMILL UNECONOMIC AND FEW NOW REMAIN IN THE UNITED KINGDOM. NOWADAYS, FOSSIL FUEL IS NO LONGER CHEAP AND THE ECONOMICS OF WIND POWER ARE ONCE AGAIN BEGINNING TO LOOK ATTRACTIVE.

1978-0531 WORKSHOP ON MECHANICAL STORAGE OF WIND ENERGY. PROCEEDINGS.
NTIS, DECEMBER 14, 1978. 150 P.
WORKSHOP ON MECHANICAL STORAGE OF WIND ENERGY.
SAND-79-0001

A SUMMARY OF THE PAPERS PRESENTED AT THE MEETING INCLUDES INFORMATION ON FLYWHEEL INTERFACE AND STORAGE TECHNOLOGY FOR PHOTOVOLTAIC APPLICATIONS; A SIMULATION MODEL FOR WIND ENERGY SYSTEMS, STORAGE FACTORS; PLANNED FY 79 SERI TASKS IN STORAGE AND WIND; ENERGY STORAGE TECHNOLOGY DEVELOPMENT TO SUPPORT THE DOE WIND ENERGY

PROGRAM; ROCKY FLATS PRESENT AND PLANNED POWER MANAGEMENT SYSTEM; WIND ENERGY CONVERSION SYSTEM STORAGE NEEDS; ENERGY CONSERVATION AND STORAGE; AND SLA SYSTEMS ANALYSIS RESULTS.

1978-0532 HOWELL W E
ENVIRONMENTAL IMPACT OF LARGE WINDPOWER FARMS.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978. GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-21-1. (ABSTRACT ONLY)

1978-0533 HSU C T, MELLOR G L, YEN J T
SOME FLOW ANALYSES FOR TORNADO-TYPE WIND TURBINES.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 59-72.

THE POWER COEFFICIENT OF A TORNADO-TYPE WIND TURBINE IS ANALYZED FOR AN INCOMPRESSIBLE AND INVISCID FLUID WITH THE ASSUMPTION OF RADIALLY EQUILIBRIUM FLOW. A POWER COEFFICIENT BASED ON THE TOWER BASE AREA WAS CHOSEN FIRST. IT IS FOUND THAT THIS COEFFICIENT MAINLY DEPENDS ON THE AXIAL VELOCITY ALLOWED TO BE PRODUCED AT THE TURBINE OUTLET. A POWER COEFFICIENT BASED ON THE TOWER FRONTAL AREA IS ALSO COMPUTED.

1978-0534 HUGHES W L
SOME PRACTICAL TECHNICAL AND ECONOMIC ASPECTS OF SMALL WIND POWER SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 202-208.
CONF-770921/1

BECAUSE THE COST OF CONVENTIONALLY GENERATED ELECTRICITY IS INCREASING SIGNIFICANTLY DUE TO THE CAPITAL AND FUEL COST INCREASE, THERE HAS BEEN AN INTENSE CONSUMER INTEREST IN WIND ENERGY FOR THE INDIVIDUAL HOME. THIS INTEREST IN COMMERCIAL WIND AND SOLAR ENERGY CREATES EXPECTATIONS THAT CANNOT BE REASONABLY FULFILLED. THE BACKLASH OF THAT CAN DESTROY THE GREAT POTENTIAL THAT WIND AND SOLAR ENERGY HAVE FOR MAKING SIGNIFICANT CONTRIBUTIONS TO ALLEVIATING THE LONG-TERM ENERGY CRISIS.

1978-0535 WOOD A
WINDMILLS SHOW MECHANICAL PROBLEMS BUT DEPT. OF ENERGY ISN'T DISCOURAGED.
ENERGY RES. REP. 4(18): 3-5, OCTOBER 2, 1978.

AN ECONOMICALLY VIABLE WIND TURBINE SYSTEM PRODUCING ELECTRICITY AT TWO CENTS PER KILOWATT HOUR IS STILL PROJECTED FOR 1985 IN SPITE OF RECENT MECHANICAL PROBLEMS IN EXISTING MACHINES. A 100-HR INSPECTION OF A WINDMILL AT CLAYTON, N. MEX. DISCLOSED, E.G., LOOSE AND MISSING RIVETS AND PROPELLOR-BLADE CRACKS DUE TO DEFICIENCIES IN THE DESIGN AND CONSTRUCTION OF THE YAW MECHANISM. THE DOE WIND-SYSTEMS DIVISION HAS REPAIRED THE DAMAGE AND PLANS THREE NEW MACHINES FOR TESTING AT HAWAII, PUERTO RICO, AND BLOCK ISLAND, R.I.

1978-0536 HUGOSSON S
THE SWEDISH WIND ENERGY PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 474-479.
CONF-770921/1

THIS REPORT SUMMARIZES THE RESULTS FROM THE NATIONAL SWEDISH WIND ENERGY PROGRAM. IT OUTLINES THE FAVOURABLE CONDITIONS, LOCATIONS, TIME PERIODS, AND AVAILABILITY OF WIND ENERGY. SYSTEM ANALYSIS OF LARGE WIND POWER UNITS IS DISCUSSED AS WELL AS THE SITING POSSIBILITIES FOR WIND POWER UNITS AND THE IMPACT ON SOCIETY AND ENVIRONMENT.

1978-0537 HUNNICUTT C L, LINSCOTT B, WOLF R A
AN OPERATING 200-KW HORIZONTAL AXIS WIND TURBINE.
NATIONAL SAMPE SYMPOSIUM AND EXHIBITION, ANAHEIM, CALIFORNIA, MAY 2-4, 1978. NTIS, MAY 1978. 26 P.
DOE/NASA/1004-78/14, NASA-TM-79034

THE MOD-0A WIND TURBINE BLADES, MANUFACTURED BY LOCKHEED AIRCRAFT SERVICE COMPANY (LAS), ONTARIO, CALIFORNIA, ARE NOW OPERATING IN CLAYTON, NEW MEXICO. THESE BLADES, ROTATED FOR THE FIRST TIME ON NOVEMBER 30, 1977, ESTABLISH THE MOD-0A AS THE FIRST WIND-DRIVEN GENERATOR IN 35 YEARS TO BE CONTINUALLY TIED INTO AN ELECTRICAL POWER SYSTEM WHICH SERVICES A COMMUNITY.

1978-0538 HUSAIN S A
WIND POWER FOR BIRD SCARER TO BE USED IN ORCHARDS AND GRAIN-FIELDS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1858-1862.

IN TROPICAL COUNTRIES IT HAS BEEN OBSERVED THAT BIRDS SPOIL THE MAJOR PORTION OF GRAINS AND FRUITS. PARROTS EAT LESS BUT BITE MORE. SIMILARLY SPARROWS DESTROY THE CROPS LIKE LOCUSTS. EVEN CROWS, PEACOCKS, DUCKS AND GEESE CAUSE HEAVY DESTRUCTION TO CROPS. IN ORDER TO GET RID OF SUCH ENEMIES THE PEASANTS SHOUT THROUGHOUT THE DAY IN THEIR FIELDS AND ORCHARDS. THE NUMBER OF SUCH LABORERS INCREASES ACCORDING TO THE AREA TO BE CONTROLLED. THE CHEAPEST ENERGY AVAILABLE TO BE USED FOR THIS PURPOSE IS UNDOUBTEDLY WIND POWER.

1978-0539 HUTTER U
WIND ENERGY.
SCHWEIZ. TECH. Z. NO. 37-38: 1137-1140, SEPTEMBER 21, 1978. (IN GERMAN)

THE EXTENSIVE DATA ON THE TIME AND SPACE DISTRIBUTION OF WIND VELOCITY THROUGHOUT EUROPE AVAILABLE TO EUROPEAN METEOROLOGICAL OFFICES SHOWS THAT IN SWITZERLAND TOO THERE IS CONSIDERABLE WIND ENERGY POTENTIAL. THE ADVANTAGES OF LARGER WIND POWER ELECTRICITY GENERATING UNITS ARE DISCUSSED WITH THE AID OF TYPICAL DIMENSIONS, SOME OF THE MECHANICAL PROBLEMS WHICH NEED CONSIDERATION ARE DETAILED AND REFERENCE IS MADE TO THREE EXISTING INSTALLATIONS, WHICH INCLUDE A GERMAN 100 KW UNIT UNDER EVALUATION FOR 10 YEARS, AND TO SOME PROJECTS BEING CONSIDERED.

1978-0540 HUTTER U
WIND ENERGY CONVERTER.
GERMAN (FRG) PATENT NO. 2,655,026/B/, MAY 18, 1978. 11 P. (IN GERMAN)

THE PROBLEM WITH WIND WHEELS IS THE OCCURRENCE OF INSTABILITIES OF MOTION BY DIFFERENT FLOW VELOCITIES IN THE WING BLADE REGION. ACCORDING TO THE INVENTION DESCRIBED HERE, BETTER STABILITY OF MOTION THAN IN THE CURRENT DESIGNS IS ACHIEVED BY MEANS OF PROPER ROTOR BEARING.

1978-0541 HWANG H H, GILBERT L J
SYNCHRONIZATION OF WIND TURBINE GENERATORS AGAINST AN INFINITE BUS UNDER GUSTING WIND CONDITIONS.
IEEE TRANS. POWER APPAR. SYST. PAS-97(2): 536-544, MARCH-APRIL 1978.

STUDIES OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS ARE PERFORMED ON A DIGITAL COMPUTER. IN THE DIGITAL SIMULATION, WIND GUSTS OF DIFFERENT MAGNITUDES AND DURATIONS ARE HYPOTHESIZED. PRIOR TO THE SYNCHRONIZATION, DIFFERENCES OF THE FREQUENCY AND PHASE POSITION BETWEEN VOLTAGES OF THE ALTERNATOR AND THE BUS ARE ALSO INCLUDED IN THE SIMULATION. SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE SIMULATED AND PRESENTED GRAPHICALLY. THE ERDA-NASA 100-KW WIND TURBINE IS USED AS A CASE STUDY.

1978-0542 HWANG H H, GUO T, MOZEICO H V
TECHNIQUES FOR STABILIZING WIND TURBINE GENERATORS CONNECTED TO POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, JANUARY 29-FEBRUARY 3, 1978. NEW YORK, IEEE, 1978. P. 280-290.

PRESENTED IS AN ANALYTICAL REPRESENTATION OF A WIND TURBINE GENERATOR WHICH EMPLOYS BLADE PITCH ANGLE FEEDBACK CONTROL. A MATHEMATICAL MODEL IS FORMULATED. WITH THE FUNCTIONING MOD-0 WIND TURBINE SERVING AS A PRACTICAL CASE STUDY, RESULTS OF A COMPUTER SIMULATION OF THE MODEL AS APPLIED TO THE PROBLEM OF DYNAMIC STABILITY AT RATED LOAD IS PRESENTED.

1978-0543 WOLFF B
STANDARDS AND TESTING OF WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 898-902.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0544 INGLIS D R
WIND POWER AND OTHER ENERGY OPTIONS.
ANN ARBOR, MICHIGAN, UNIVERSITY OF MICHIGAN PRESS, 1978. 308 P.

THIS BOOK PRESENTS A BROAD LOOK AT WIND POWER AND AT THE ALTERNATIVE ENERGY SOURCES WITH WHICH ITS PROSPECTS ARE COMPARED: SOLAR, GEOPHYSICAL AND NUCLEAR. LARGE-SCALE WIND POWER IS SHOWN TO BE THE ONE OF THE SOLAR-RELATED SOURCES THAT IS TECHNICALLY AND ECONOMICALLY MOST READY TO GO NOW IN A BIG ENOUGH WAY TO CONTRIBUTE SUBSTANTIALLY TO NATIONAL ENERGY NEEDS SOON, LACKING MAINLY POLITICAL PRIORITY DECISIONS TO INITIATE THE NEEDED ENGINEERING EFFORT AND FINANCIAL BACKING. COST ESTIMATES OF LARGE WIND FARMS WITH STORAGE, BASED ON VARIED EXPERIENCE, COMPARE FAVORABLE WITH FUTURE NUCLEAR COSTS. THE BOOK IS LARGELY DESCRIPTION, HISTORY, ECONOMICS AND POLITICS BUT ALSO EXPLAINS THE SIMPLE PHYSICS OF HOW THINGS WORK.

1978-0545 INGLIS D R
POWER FROM THE OCEAN WINDS.
ENVIRONMENT 20(8): 17-20, OCTOBER 1978.

NO ONE HAS BEEN WILLING TO TRY TO MOOR TENS OF THOUSANDS OF FLOATING, MEGAWATT-SCALE WINDMILLS ABOVE THE MODERATE DEPTHS OF THE CONTINENTAL SHELF OFF THE US ATLANTIC SEABOARD. THE WIND AVERAGES FROM 400 TO 700 WATTS PER SQUARE METER WHERE ON LAND IN NEW ENGLAND THE WIND AVERAGES ONLY ABOUT 150 WATTS PER SQUARE METER. WILLIAM E. HERONEMUS PROPOSED SUCH A DESIGN IN 1972. HE ALSO PROPOSED THAT POWER FROM THOUSANDS OF THESE UNITS COULD BE CONVERTED TO HYDROGEN AT SEA AND PART OF THE HYDROGEN COULD BE PUT ASIDE FOR WINDLESS PERIODS IN EXPANDABLE STORAGE TANKS UNDER THE PRESSURE OF THE DEEP SEA AND IT WOULD ALL BE CONDUCTED ASHORE BY PIPELINE, EITHER TO BE USED DIRECTLY OR TO BE CONVERTED INTO ELECTRIC POWER STORED IN FUEL CELLS.

1978-0546 INHABER H
IS SOLAR POWER RISKIER THAN NUCLEAR?
AM. NUCL. SOC. TRANS. 30: 11-12, 1978.

1978-0547 INHABER H
IS SOLAR POWER MORE DANGEROUS THAN NUCLEAR?
NEW SCI. 78(1103): 444-446, MAY 18, 1978.

THE AUTHOR COMPARES THE DANGERS TO HUMAN HEALTH AND SAFETY INHERENT IN THE PRODUCTION OF ENERGY FROM UNCONVENTIONAL SYSTEMS SUCH AS WIND, METHANOL, SOLAR AND OCEAN THERMAL SYSTEMS, WITH CONVENTIONAL SYSTEMS SUCH AS COAL, OIL, NUCLEAR AND NATURAL GAS SYSTEMS.

1978-0548 INHABER H
RISK OF ENERGY PRODUCTION. SECOND EDITION.
NTIS, MAY 1978. 169 P.
AECB-1119(REV.1)

EVERY FORM OF HUMAN ACTIVITY INVOLVES RISK OF ACCIDENT OR DISEASE, RESULTING IN INJURY OR DEATH. GENERATION OF ENERGY IS NO EXCEPTION. ALTHOUGH SUCH RISK HAS PREVIOUSLY BEEN CONSIDERED FOR CONVENTIONAL SYSTEMS (COAL, OIL AND NUCLEAR), A SIMILAR ANALYSIS FOR THE SO-CALLED ALTERNATIVE OR NON-CONVENTIONAL SYSTEMS (SOLAR, WIND, OCEAN THERMAL AND METHANOL) HAS BEEN LACKING. THIS PAPER PRESENTS AN EVALUATION OF THE RISK, BOTH OCCUPATIONAL AND TO THE PUBLIC, OF THESE NON-CONVENTIONAL ENERGY SYSTEMS.

1978-0549 ISAACS N
NEW ZEALAND DIRECTORY OF ENERGY RESEARCHERS.
NTIS, 1978. 16 P.
NP-23453

1978-0550 JACOB A, VEILLETTE D, RAJAGOPALAN V
CONTROL STRATEGY FOR A VARIABLE-SPEED WIND ENERGY CONVERSION SYSTEM.
NEW YORK INST. ELECTR. ENG. PROC.: 528-531, 1978. (IN FRENCH) TRANSL.: NTIS, NOVEMBER 1979. 10 P.
NASA-TM-75512, N80-18558/0

A CONTROL CONCEPT FOR A VARIABLE-SPEED WIND ENERGY CONVERSION SYSTEM IS PROPOSED, FOR WHICH A SELF-EXCITED ASYNCHRONOUS CAGE GENERATOR IS USED ALONG WITH A SYSTEM OF THYRISTOR CONVERTERS. THE CONTROL LOOPS ARE THE FOLLOWING: (1) REGULATION OF THE ENTRAINMENT SPEED AS FUNCTION OF AVAILABLE MECHANICAL ENERGY BY ACTING ON THE

RESISTANCE COUPLE OF THE ASYNCHRONOUS GENERATOR; (2) CONTROL OF ELECTRIC POWER DELIVERED TO THE ASYNCHRONOUS MACHINE, FUNCTIONING AS A MOTOR, FOR START-UP OF THE VERTICAL AXIS WIND CONVERTER; AND (3) LIMITATION OF THE SLIP VALUE, AND BY CONSEQUENCE, OF THE INDUCTION CURRENTS IN THE PRESENCE OF SUDDEN VARIATIONS OF INPUT PARAMETERS.

1978-0551 JACOB A, VEILLETTE D, RAJAGOPALAN V
A COMMAND STRATEGY FOR AN ENERGY CONVERSION SYSTEM USING VARIABLE SPEED WIND POWER.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 18-20, 1978. NEW YORK, IEEE, 1978. P. 528-531.

THE PAPER DESCRIBES A CONTROL SYSTEM WHICH USES AN ASYNCHRONOUS CAGE TYPE GENERATOR, SELF EXCITED, WITH AN ASSEMBLY OF THYRISTOR CONVERTORS. THE OVERALL AIMS ARE CONTROL OF POWER (BY CLUTCHING), CONTROL OF DRIVE SPEED, AND LIMITING SLIP. A DESCRIPTION IS GIVEN OF THE SCHEME FOR POWER CONTROL. THE ASYNCHRONOUS MACHINE AND ITS TRANSFER FUNCTION. FURTHER INFORMATION FOLLOWS ON THE THYRISTOR CONVERTORS, WITH SOME OF THE MATHEMATICS. THE DESIGN OF A DIGITAL OPTIMAL CONTROLLER IS CONSIDERED.

1978-0552 JARASS L
INTEGRATION OF WIND ENERGY IN NATIONAL ENERGY SUPPLY SYSTEMS--COMPARISON OF CONVENTIONAL AND WIND POWER PLANTS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 444-455.
CONF-770921/1

THIS STUDY PROPOSES A METHOD TO EVALUATE THE PERFORMANCE OF ALTERNATIVE POWER GENERATING TECHNOLOGIES AND ASSUMES FOR SIMPLICITY THAT THE POWER DEMAND EXCEEDS THE ENTIRE PRODUCTION OF THE CONSIDERED INDIVIDUAL POWER PLANT AT ALL TIMES.

1978-0553 JARASS L
ELECTRICITY GENERATION BY WIND POWER: AN OLD DREAM CAN BECOME REALITY.
ENERGIEWIRTSCH. TAGESFRAGEN 28(6): 357-366, JUNE 1978. (IN GERMAN)

THIS ARTICLE SUMMARISES BRIEFLY THE MAIN EQUATIONS RELATING TO WIND POWER, REVIEWS THE PROGRESS MADE IN WIND POWER GENERATION, DETAILS THE PRINCIPAL TECHNICAL CHARACTERISTICS OF INSTALLATIONS BUILT, UNDER CONSTRUCTION AND UNDER CONSIDERATION AND SUMMARISES THE EXPERIENCE GAINED, PROBLEMS ENCOUNTERED AND FINANCIAL INVESTMENT. THE STUDY, PART OF A FEDERAL GERMAN GOVERNMENT CONTRACT, CONCLUDES THAT WIND POWER GENERATION HAS AN IMPORTANT AND COMPETITIVE ROLE TO PLAY, DETAILS SOME PROBLEM AREAS AND RECOMMENDS GREATER R AND D EFFORT IN WEST GERMANY WHICH COULD LEAD TO SEVERAL PROTOTYPE INSTALLATIONS BY 1980 INSTEAD OF THE SINGLE PROTOTYPE PLANNED AT PRESENT.

1978-0554 JARASS L
POWER GENERATION FROM WIND ENERGY: AN ANCIENT DREAM CAN COME TRUE.
ENERGIEWIRTSCH. TAGESFRAGEN 28(6): 357-367, JUNE 1978. (IN GERMAN)

IN THE FIRST PART OF THE ARTICLE, THE PHYSICAL FUNDAMENTALS OF WIND ENERGY UTILIZATION ARE EXPLAINED. AFTER THIS, A SURVEY IS GIVEN ON WIND ENERGY UTILIZATION IN THE PAST AND ON MODERN WIND ENERGY PROJECTS. THE FOLLOWING COUNTRIES ARE CONSIDERED: DENMARK, FRANCE, SOVIET UNION, GREAT BRITAIN, NETHERLANDS, SWEDEN, WEST GERMANY. THE MAIN PLANTS ARE LISTED IN A DETAILED TABLE.

1978-0555 JARASS L
DETERMINATION OF WIND ENERGY PRODUCTION BY GUARANTEED PERFORMANCE (CAPACITY EFFECT) AND TOTAL PERFORMANCE.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 389-402. (IN GERMAN)

FOR THE DETERMINATION OF WIND ENERGY PRODUCTION TWO MEASURES ARE CRUCIAL: GUARANTEED PERFORMANCE AS A MEASURE OF CAPACITY CREDIT AND TOTAL PERFORMANCE AS A MEASURE OF TOTAL ENERGY PRODUCTION. BOTH MEASURES ARE DEFINED SUCH THAT THEY CAN BE USED FOR COMPARISON OF CONVENTIONAL AND ALTERNATIVE POWER PLANTS. EXPLANATION OF RELATIONS BETWEEN GUARANTEED PERFORMANCE, TOTAL PERFORMANCE, INSTALLED CAPACITY, MAINTENANCE AND LOSS OF LOAD OF CONVENTIONAL AND ALTERNATIVE POWER PLANTS, STORAGE SIZE, MEAN WIND SPEED, NOMINAL FREQUENCY AND ITS VARIATION, ARE DISCUSSED.

1978-0556 JARASS A, JARASS L
STORMY DEVELOPMENT OF WIND ENERGY.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 3(6): 14-17, NOVEMBER-DECEMBER 1978. (IN GERMAN)

THE ARTICLE GIVES A SURVEY OF THE DEVELOPMENT OF SOLAR POWER PLANTS IN RECENT YEARS. AFTER A SURVEY OF GENERAL POWER SUPPLY SYSTEMS THE METEOROLOGICAL AND TOPOGRAPHICAL CONDITIONS FOR THE USE OF WIND ENERGY ARE EXPLAINED. THE TECHNOLOGY AND POSSIBILITIES OF PRODUCING OR SAVING ENERGY BY USING WIND POWER PLANTS ARE EXPLAINED WITH EXAMPLES.

1978-0557 JAYADEV T S, PERKINS F, PERCIVAL D
OVERVIEW ASSESSMENT OF POTENTIAL SMALL ELECTRIC UTILITY APPLICATIONS OF WIND ENERGY SYSTEMS.
NTIS, NOVEMBER 1978. 63 P.
SERI/TR-35-086

A SURVEY OF SMALL MUNICIPAL AND RURAL ELECTRIC COOPERATIVE (REC) UTILITIES WAS ACCOMPLISHED. THE RELATIONSHIP BETWEEN THESE SMALL UTILITIES AND THE MEAN WIND POWER AT THEIR LOCATIONS WAS FOUND BY LOCATING THEM ON APPROPRIATE MAPS OF MEAN WIND POWER DENSITY. SOME OF THE SAFETY, SYSTEMS AND ECONOMIC IMPLICATIONS OF WECS DEPLOYMENT BY THESE UTILITIES WERE DISCUSSED. IT IS CONCLUDED THAT CERTAIN FINANCING ADVANTAGES AND GEOGRAPHICAL CONSIDERATIONS MAKE THE GREAT PLAINS REGION A STRONG CANDIDATE FOR THE EARLY COMMERCIALIZATION OF WECS.

1978-0558 WIND POWERED COMPOST.
WIND POWER DIG. NO. 13: 12-13, FALL 1978.

1978-0559 JESCH L F, WALTON D
DESIGN ANALYSIS OF A VERTICAL AXIS WIND TURBINE.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 2(5): 157-168, 1978. ALSO: INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 157-168.

AERODYNAMIC AND STRUCTURAL DESIGN ANALYSIS OF A DARRIEUS ROTOR IS PRESENTED. THE COMPUTER MODEL USES PUBLISHED EXPERIMENTAL DATA FOR THE NACA 0012 AEROFOIL. THE ANALYSIS OF THE RELATIVE CONTRIBUTIONS OF THE

TROPOSKIEN BLADE ELEMENTS LEADS TO A SUGGESTED CUTTING OFF OF BLADE PARTS WHICH WIDENS THE USEFUL VELOCITY RANGE. THE EFFECTS OF BLADE NUMBERS ON PERFORMANCE AND STRESSES ARE ANALYZED.

1978-0560 JIRLOW K
ENERGY ANALYSIS OF WIND POWER.
NTIS, MARCH 6, 1978. 24 P. (IN SWEDISH)
STUDSVIK-78/2

THE ENERGY INVESTMENTS IN WIND TURBINES HAVE BEEN ANALYZED FOR SOME SPECIFIC SWEDISH DESIGNS WITH ROTOR DIAMETERS OF 50, 100 AND 112 M. TYPICAL ENERGY PAYBACK TIMES FOR UNITS OF 1-4 MW NOMINAL POWER ARE 1 TO 2 YEARS AT A MEDIAN WIND SPEED OF 7.5 M/SEC. (100 M ABOVE GROUND) AND 0.75 TO 1.5 YEARS AT 8.5 M/SEC. FOR COMPARISON THE PAYBACK TIME FOR A NUCLEAR POWER STATION CALCULATED WITH THE SAME METHOD IS A FACTOR OF 5 LOWER.

1978-0561 WIND ENERGY SYSTEMS. PROGRAM SUMMARY.
NTIS, DECEMBER 1978. 135 P.
DOE/ET-0093

THIS SUMMARY REPORT OUTLINES THE PROJECTS FUNDED BY THE FEDERAL WIND ENERGY PROGRAM DURING FY 1978, AS WELL AS THE PROGRAM'S GENERAL ORGANIZATION AND SPECIFIC PROGRAM ELEMENTS.

1978-0562 JOHANSON E E
SUMMARY OF CURRENT COST ESTIMATES OF LARGE WIND ENERGY SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 273-285.
CONF-770921/1

THE FEDERAL WIND ENERGY PROGRAM HAS FUNDED A NUMBER OF STUDIES TO EXAMINE WECS ECONOMICS AND POTENTIAL UTILIZATION ON A NATIONAL AND REGIONAL BASIS. THESE STUDIES INCLUDE TWO MACHINE DESIGN EFFORTS, TWO MISSION ANALYSES, AND FOUR REGIONAL ANALYSES. IN ADDITION, THE COSTS FOR THE SECOND GE MOD 1 MACHINE, FROM THE ORIGINAL CONTRACT, ARE PRESENTED. THIS PAPER IS A SUMMARY OF THE STUDY CONDUCTED BY JBF SCIENTIFIC CORPORATION TO PULL TOGETHER THE RESULTS OF THESE EIGHT STUDIES IN THE AREA OF LARGE WIND ENERGY SYSTEM ECONOMICS AND PUT THEM ON A COMMON ECONOMIC BASIS FOR COMPARISON PURPOSES.

1978-0563 JOHANSON E E
INSTITUTIONAL BARRIERS TO WECS GROWTH.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 893-897.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0564 JOHANSON E E, GOLDENBLATT M K
ASSESSMENT OF THE POTENTIAL FOR USING LARGE WIND TURBINES IN NEW ENGLAND.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 222-236.
CONF-770921/1

PRESENTED IN THIS PAPER IS A DESCRIPTION OF A GENERIC PLANNING PROCESS FOR EVALUATING THE FEASIBILITY OF WECS AS PART OF THE FUTURE POWER GENERATING MIX OF A UTILITY. THE DESCRIPTION IS SUFFICIENTLY GENERIC SO THAT IT CAN BE USED EITHER BY ELECTRIC UTILITIES THAT ARE PARTICIPANTS IN A POOLING ARRANGEMENT OR UTILITIES THAT HAVE STAND ALONE OPERATIONS.

1978-0565 JOHANSON E E, GOLDENBLATT M K
ECONOMIC MODEL TO ESTABLISH THE VALUE OF WECS TO A UTILITY SYSTEM.
SOLAR DIVERSIFICATION. AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, MEETING, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 580-587.

AN ECONOMIC MODEL IS DESCRIBED WHICH WAS DEVELOPED TO ALLOW DETERMINATION OF THE LIFE CYCLE VALUE OF A WECS INSTALLATION TO A UTILITY. THE MODEL WAS DESIGNED SO THAT IT IS COMPATIBLE WITH EXISTING UTILITY PRODUCTION COST MODELS AND PLANNING TECHNIQUES. IT ALLOWS THE UTILITY TO EVALUATE THE ECONOMIC EFFECT A STOCHASTIC SOURCE, SUCH AS A WECS, WOULD HAVE IF USED AS A FUEL SAVER. MORE IMPORTANT, HOWEVER, THE MODEL ALSO PROVIDES THE UTILITY WITH THE CAPABILITY OF REOPTIMIZING ITS CONVENTIONAL SOURCE MIX SO THAT THE MAXIMUM TOTAL COST SAVINGS AND CAPACITY CREDIT CAN BE OBTAINED.

1978-0566 JOHANSSON M
THE DANISH WIND ENERGY PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 432-437.
CONF-770921/1

A NUMBER OF ASSESSMENTS AND STUDIES, MOSTLY CONCERNING THE ECONOMICAL POSSIBILITIES, AND SOME PRACTICAL EXPERIMENTS HAVE BEEN CARRIED OUT. A TWO YEARS DEVELOPMENT PROGRAM FOR LARGER WIND TURBINE GENERATORS (WTGS) WAS INITIATED BY THE GOVERNMENT IN DECEMBER 1976. THIS PROGRAM IS THE FIRST STAGE OF A LARGE PROGRAM, WHICH SHOULD CLARIFY THE QUESTION OF A POSSIBLE EXPLOITATION OF WIND POWER IN THE DANISH ELECTRICITY SUPPLY SYSTEM. THE TWO YEARS PROGRAM IS SPONSORED WITH 14,260,000 KR. ($2,400,000) BY THE MINISTRY OF COMMERCE AND WITH 3,000,000 KR ($500,000) BY THE ELECTRIC UTILITIES, WHO ARE ALSO MANAGING THE PROGRAM.

1978-0567 JOHANSSON T B, STEEN P
SOLAR SWEDEN.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 3, P. 1453-1468.

THE AUTHORS OUTLINE A CONCEIVABLE RENEWABLE ENERGY SYSTEM FOR THE YEAR 2015 USING BIOMASS, SOLAR HEATING, HYDRO-ELECTRIC POWER, WIND POWER AND SOLAR CELLS.

1978-0568 JOHANSSON T B, STEEN P
SOLAR SWEDEN: AN OUTLINE TO A RENEWABLE ENERGY SYSTEM.
NTIS, 1978. 134 P.
NP-23513

A SWEDISH ENERGY SUPPLY BASED COMPLETELY ON SOLAR ENERGY (INCLUDING BIOMASS AND WIND POWER) FOR THE YEAR 2015 IS STUDIED. THE TECHNICAL, ECONOMIC, AND ORGANIZATIONAL CHARACTERISTICS OF SUCH A SYSTEM ARE DISCUSSED.

1978-0569 JOHN V I, SONES J
A VARIABLE SPEED CONSTANT FREQUENCY (VSCF) WIND GENERATOR FOR LOW POWER APPLICATIONS.
CANADIAN COMMUNICATIONS AND POWER CONFERENCE, MONTREAL, OCTOBER 18-20, 1978. NEW YORK, IEEE, 1978. P. 382-385.

A POLYPHASE COMMUTATOR MOTOR OF THE SCHRAGE TYPE IS USED. AN AUTOMATIC CONTROL SYSTEM WHICH MAINTAINS CONTINUOUS GENERATOR OPERATION FOR A WIDE RANGE OF SPEEDS IS DESCRIBED. TEST-RESULTS AND COMPUTED RESULTS (BASED ON AN EQUIVALENT CIRCUIT) ARE OBTAINED FOR EFFICIENCY, POWER OUTPUT, POWER FACTOR AND MECHANICAL TORQUE FOR DIFFERENT OPERATING SPEEDS.

1978-0570 JOHNSON G L
ECONOMIC DESIGN OF WIND ELECTRIC SYSTEMS.
IEEE TRANS. POWER APPAR. SYST. PAS-97(2): 554-562, MARCH - APRIL 1978.

LONG TERM WIND RECORDS ARE USED TO SELECT THE RATED WIND SPEED FOR WIND ELECTRIC GENERATORS. THE WIND IS CHARACTERIZED BY A WEIBULL DENSITY FUNCTION. DETAILED RESULTS ARE PRESENTED FOR WESTERN KANSAS. GRAPHS ARE PRESENTED WHICH CAN BE USED TO DESIGN A WIND SYSTEM FOR MAXIMUM SPECIFIC OUTPUT FOR A SPECIFIED LOAD FACTOR AT A GIVEN SITE. IT IS SHOWN THAT A WIND TURBINE RATED AT A WIND SPEED OF 9 M/S HAS A SPECIFIC OUTPUT WITHIN 80 PERCENT OF THE MAXIMUM FOR A WIDE RANGE OF WIND CONDITIONS.

1978-0571 JORDAN G A, MARSH W D, OPLINGER J L
APPLICATION OF WIND AND PHOTOVOLTAIC POWER PLANTS IN ELECTRIC UTILITY SYSTEMS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 345-350.

THIS PAPER GIVES A BRIEF REPORT OF THE PROCEDURES AND RESULTS OF TWO STUDIES PERFORMED BY THE ELECTRIC UTILITY SYSTEMS ENGINEERING DEPARTMENT OF THE GENERAL ELECTRIC COMPANY FOR THE ELECTRIC POWER RESEARCH INSTITUTE. ONE OF THE STUDIES CONCERNED WIND POWER PLANTS AND THE OTHER PHOTOVOLTAIC POWER PLANTS. THE MAJOR OBJECTIVE OF EACH WAS TO DEVELOP A METHODOLOGY FOR STUDYING THE PERFORMANCE AND ECONOMIC REQUIREMENTS OF THE PLANT WHEN APPLIED TO ELECTRIC UTILITY POWER SYSTEMS.

1978-0572 JORDAN P F
SELF-ADJUSTING WIND TURBINE ROTORS: A CONCEPT.
ENERGY 3(4): 25-26, FALL 1978.

IT IS POINTED OUT THAT THE LARGER THE ROTOR, THE LESS UNIFORM WILL BE THE DISTRIBUTION OF THE WIND SPEED OVER THE ROTOR PLANE. IDEALLY, THEREFORE, ONE WOULD LIKE TO HAVE ROTOR BLADES WHICH ADJUST THEMSELVES AUTOMATICALLY AND LOCALLY TO THE INSTANTANEOUS WIND SPEED DISTRIBUTIONS ALONG EACH BLADE. SUCH BLADES WOULD ELIMINATE NOT ONLY THE NEED FOR PITCH DRIVES BUT ALSO WOULD ELIMINATE THE STRUCTURALLY CUMBERSOME REQUIREMENT TO FASTEN THE BLADES TO THE TURBINE HUB IN SUCH A MANNER THAT THE BLADE CAN BE ROTATED IN PITCH. A BRIEF DESCRIPTION IS GIVEN OF A CONCEPTUAL DESIGN OF SUCH A SELF-ADJUSTING ROTOR BLADE, THE MAIN RESULTS OF AN INVESTIGATION SUPPORTED BY ERDA FROM MAY 1975 THROUGH APRIL 1976. THE BASIC CONCEPT WAS THAT THE ROTOR BLADE SHOULD REACT TO CHANGING WIND SPEEDS AEROELASTICALLY, WITH SUITABLE CHANGES OF ITS LOCAL PITCH ANGLES, SUCH THAT THE LOCAL CONTRIBUTIONS OF THE BLADE'S AERODYNAMIC LIFT TO THE TOTAL ROTOR TORQUE WOULD REMAIN INVARIANT, HAVING ALWAYS THEIR IDEAL VALUES AS CALCULATED FOR THE DESIGN SPEEDS. OF THE DESIGN APPROACHES THAT WERE CONSIDERED, A SEGMENTED BLADE DESIGN APPEARED THE MOST PROMISING AND WAS INVESTIGATED IN CONSIDERABLE DETAIL.

1978-0573 JUSTUS C G
WINDS AND WIND SYSTEM PERFORMANCE.
PHILADELPHIA, FRANKLIN INSTITUTE PRESS, 1978. 120 P.

1978-0574 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE WECS ARRAYS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 297-306.
CONF-770921/1

WIND POWER PERFORMANCE OF LARGE ARRAYS OF WIND ENERGY CONVERSION SYSTEMS (WECS) IN FOUR REGIONS OF THE COUNTRY HAVE BEEN STUDIED (NEW ENGLAND, GREAT LAKES, CENTRAL U.S., AND PACIFIC COAST REGIONS). THE LARGE ARRAYS OF WECS PERFORM DIFFERENTLY THAN A SINGLE WECS AT AN INDIVIDUAL SITE WOULD, ESPECIALLY WITH REGARD TO DISTRIBUTIONS OF POWER OUTPUT AND PROBABILITIES OF POWER CHANGES. A SIMPLE MODEL HAS BEEN DEVELOPED, BASED ON THE NUMBER OF WECS SITES IN THE ARRAY AND AVERAGE SPATIAL CORRELATION ACROSS THE ARRAY, WHICH REPRODUCES WELL CERTAIN OF THE OBSERVED ARRAY PERFORMANCE CHARACTERISTICS.

1978-0575 JUSTUS C G, MANI K, MIKHAIL A
INTERANNUAL AND MONTH-TO-MONTH VARIATIONS OF WIND SPEED. TECHNICAL REPORT.
NTIS, APRIL 1978. 100 P.
RLO-2439-78/2

SPATIAL CROSS-CORRELATIONS AND INTERANNUAL AND MONTH-TO-MONTH VARIATION OF MONTHLY AND ANNUAL MEAN WIND SPEED WERE STUDIED AT 40 SITES THROUGHOUT THE U.S. RESULTS INDICATE THAT FOR CANDIDATE SITE EVALUATION, ONSITE DATA MUST BE RELIED UPON MORE THAN ORIGINALLY CONSIDERED, AND CLIMATOLOGICAL DATA RELIED UPON LESS. OTHER ASPECTS ADDRESSED CONCERN THE DEGREE OF VARIABILITY TO BE EXPECTED IN CANDIDATE SITE DATA AND THE PROBABILITIES OF OBSERVING CONSECUTIVE HIGH PERIODS OR CONSECUTIVE LOW PERIODS OF ONSITE WIND SPEEDS. THESE FACTORS ALLOW MORE THOROUGH EVALUATION OF CANDIDATE SITE WIND POTENTIAL FROM LIMITED ONSITE DATA (E.G., ON YEAR).

1978-0576 JUSTUS C G, MIKHAIL A S
ENERGY STATISTICS FOR LARGE WIND TURBINE ARRAYS.
WIND ENG. 2(4): 184-202, 1978.

RESULTS OF STUDIES OF LARGE ARRAYS OF WIND ENERGY CONVERSION SYSTEMS ARE SUMMARIZED AND SYNTHESIZED INTO A METHODOLOGY WHEREBY ARRAY WIND SPEED DISTRIBUTIONS AND ARRAY POWER OUTPUT DISTRIBUTIONS CAN BE CALCULATED FOR ARRAY OF ANY NUMBER OF SITES AND ANY SPATIAL SIZE. REQUIRED INPUT FOR THE METHOD CONSISTS OF: ARRAY MEAN WIND SPEED; MAXIMUM DISTANCE BETWEEN SITES WITHIN AN ARRAY; NUMBER OF SITES IN THE ARRAY; AND STANDARD DEVIATION (OR WEIBULL SCALE FACTOR), EITHER MEASURED OR INFERRED FROM REFERENCE STATISTICAL DATA.

1978-0577 JUSTUS C G, SALES A T
SOLAR ENERGY METEOROLOGICAL RESEARCH AND TRAINING AT GEORGIA TECH.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 509-512.

THE GEORGIA INSTITUTE OF TECHNOLOGY HAS BEEN SELECTED BY THE DEPARTMENT OF ENERGY AS THE SOUTHEASTERN (REGION 3) SOLAR ENERGY METEOROLOGICAL RESEARCH AND TRAINING SITE. A COMPREHENSIVE MONITORING PROGRAM FOR SOLAR RADIATION AND METEOROLOGICAL PARAMETERS WILL BE DEVELOPED FOR TWO SITES: (1) AN ON CAMPUS SITE ADJACENT TO THE DEPARTMENT OF ENERGY 400 KWTH ADVANCED COMPONENTS TEST FACILITY AND WIND TURBINE TEST SITE, (2) AN OFF-CAMPUS SITE ADJACENT TO THE SHENANDOAH SOLAR TOTAL ENERGY SITE.

1978-0578 JUSTUS C G, MIKHAIL A S
ENERGY STATISTICS FOR LARGE WIND TURBINE ARRAYS. ANNUAL PROGRESS REPORT, MAY 1, 1977-APRIL 30, 1978.
NTIS, MAY 1978. 127 P.
RLO-2439-78/3

WIND ENERGY STATISTICS OF LARGE ARRAYS OF WIND ENERGY CONVERSION SYSTEMS (WECS) HAVE BEEN STUDIED IN FOUR REGIONS OF THE COUNTRY: THE NEW ENGLAND AND CENTRAL UNITED STATES REGIONS (JUSTUS, 1976) AND THE GREAT LAKES AND PACIFIC COAST REGIONS (JUSTUS AND HARGRAVES, 1977). RESULTS OBTAINED FROM MULTIREGIONAL ARRAYS OF SELECTED SITES FROM THESE FOUR PREVIOUSLY STUDIED REGIONS ARE PRESENTED.

1978-0579 JUUL N H
OPTIMUM DESIGN POINT GEOMETRY AND PERFORMANCE OF PROPELLER TYPE WIND TURBINES.
WIND ENG. 2(2): 86-102, 1978.

THE SIMPLE STRIP THEORY IS USED TO DEVELOP THE EQUATIONS WHICH ARE REQUIRED TO DETERMINE THE OPTIMUM DESIGN POINT GEOMETRY AND PERFORMANCE PARAMETERS OF PROPELLER TYPE WIND TURBINES. THE OPTIMUM DESIGN POINT IS DEFINED BY THE CONDITIONS WHICH MAXIMIZE THE POWER ABSORBED BY EACH BLADE ELEMENT ALONG THE BLADE. A COMPUTER PROGRAM IS DEVELOPED TO CALCULATE, FOR A GIVEN AIRFOIL, THE DIMENSIONLESS OPTIMUM DESIGN POINT PERFORMANCE.

1978-0580 KADLEC E G
CHARACTERISTICS OF FUTURE VERTICAL-AXIS WIND TURBINES.
NTIS, JULY 1978. 22 P.
SAND-79-1068

AS A DOE FACILITY, SANDIA LABORATORIES IS DEVELOPING DARRIEUS VERTICAL-AXIS WIND TURBINE (VAWT) TECHNOLOGY. THE OBJECTIVE OF THIS TECHNOLOGY IS TO ASSESS THE PRACTICALITY OF WIND-ENERGY SYSTEMS FOR LOW-COST PRODUCTION AND COMMERCIAL MARKETING BY PRIVATE INDUSTRY. THIS REPORT DESCRIBES THE CHARACTERISTICS OF CURRENT TECHNOLOGY DESIGNS AND ASSESSES THEIR COST-EFFECTIVENESS. BETTER AERODYNAMICS AND FUTURE STRUCTURAL REQUIREMENTS COMBINE FOR POTENTIAL ENERGY COST REDUCTIONS OF 35 TO 40%.

1978-0581 KALSER H W
WIND POWERED TURBINE AND AIRFOIL CONSTRUCTION.
U.S. PATENT NO. 4,130,380, DECEMBER 19, 1978.

THIS PATENT COVERS A WIND POWERED TURBINE COMPRISING IN COMBINATION A TOWER, AND A ROTOR STRUCTURE SUPPORTED BY SAID TOWER INCLUDING OUTWARDLY EXTENDING ARMS, AN AIRFOIL BLADE SUPPORTED IN AN UPRIGHT MANNER AT THE OUTER END OF EACH OF SAID ARMS, EACH BLADE BEING OF CURVILINEAR SHAPE WITH BLADE END SEGMENTS DIRECTED OUTWARDLY AWAY FROM THE AXIS OF ROTOR ROTATION, EACH BLADE BEING OF AN AERODYNAMIC SHAPE AND HAVING A LEADING EDGE, TENSIONED ELONGATE MEANS EXTENDING INTERMEDIATE EACH BLADE END SEGMENT AND ITS SUPPORTING ARM TO RECEIVE BLADE IMPARTED LOADS TO INHIBIT BLADE DISTORTION UNDER DYNAMIC LOADS.

1978-0582 KEAST D N
NOISE-CONTROL NEEDS IN THE DEVELOPING ENERGY TECHNOLOGIES.
NTIS, MARCH 1978. 250 P.
COO-4389-1

THE NOISE CHARACTERISTICS OF EXISTING ENERGY CONVERSION TECHNOLOGIES, E.G., FROM OBTAINING AND PROCESSING FOSSIL FUELS TO POWER PLANT OPERATIONS, AND OF DEVELOPING ENERGY TECHNOLOGIES (WIND, GEOTHERMAL SOURCES, SOLAR ENERGY OR FUSION SYSTEMS) ARE DISCUSSED IN TERMS OF THE EFFECTS OF NOISE ON HUMANS, ANIMALS, STRUCTURES, AND EQUIPMENT AND METHODS FOR NOISE CONTROL.

1978-0583 KELLY D A
COMBINED HIGH DENSITY SOLAR PANELS AND VERTICAL WIND TURBINES.
U.S. PATENT NO. 4,119,863, OCTOBER 10, 1978. 10 P.

THE COMBINED HIGH DENSITY SOLAR PANELS AND VERTICAL WIND TURBINES CONSIST OF MULTIPLE SOLAR PANELS WITH CLOSELY SPACED SOLAR CELLS ON BOTH SIDES WHICH ARE SUPPORTED BY AN OPEN FRAMEWORK AND VERTICAL POSTS. THE ADOPTION OF AN ELEVATED, ROOFTOP SOLAR PANEL ARRAY, SUPPORTED BY VERTICAL POSTS MAKES THE BASIC STRUCTURE ATTRACTIVE FOR THE INCLUSION OF MULTIPLE VERTICAL WIND TURBINES, AS A SUPPLEMENTARY POWER SOURCE. THIS COMBINED NATURAL POWER CONVERSION ARRANGEMENT IS INTENDED FOR MOUNTING ON THE FLAT ROOFS OF CITY BUILDINGS AND OTHER SIMILAR FLAT, LIMITED AREA SITES.

1978-0584 KENTFIELD J A C
PREDICTION OF THE OPTIMUM PERFORMANCE OF VENTURI-TYPE WIND-ENERGY CONCENTRATORS.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MO-ROLLA, EXTENSION DIVISION, 1978. P. 57-64.

A SIMPLE THEORETICAL ANALYSIS IS PRESENTED WHICH ALLOWS THE OPTIMUM PERFORMANCE TO BE PREDICTED FOR VENTURI-TYPE WIND-ENERGY CONCENTRATORS. THE RESULTS OF THE ANALYSIS ARE PRESENTED IN CONVENIENT PARAMETRIC FORM IN SUCH A MANNER THAT, FOR EXAMPLE, THE INFLUENCE ON OPTIMUM PERFORMANCE OF REDUCING THE OUTLET AREA OF THE EXIT DIFFUSER, AN OBVIOUS MEANS OF REDUCING THE BULK AND COST OF A VENTURI-TYPE CONCENTRATOR, CAN BE ESTABLISHED DIRECTLY FROM THE CURVES.

1978-0585 KERRIGAN T C
SPECTRAL ESTIMATES OF A WIND FLUCTUATION STATISTIC PERTAINING TO WIND ENERGY GENERATORS.
NTIS, SEPTEMBER 1978. 40 P.
PNL-2511

AN ESTIMATE IS DEVELOPED FOR THE FREQUENCY WITH WHICH A VOLUME AVERAGE OF THE LONGITUDINAL COMPONENT OF WIND VELOCITY CHANGES BY A GIVEN AMOUNT IN A GIVEN TIME.

1978-0586 KERRIGAN T C
VERIFICATION STATISTIC FOR NUMERICAL WIND MODELS.
NTIS, SEPTEMBER 1978. 81 P.
PNL-2510

A GENERALIZED WIND ESTIMATE BASED ON A LIMITED NUMBER OF UNCERTAIN FIELD MEASUREMENTS IS COMPUTED AT EACH POINT IN A GIVEN GEOGRAPHICAL REGION. A POINT-BY-POINT COMPARISON WITH A NUMERICAL MODEL PREDICTION OF THE WIND FIELD IS THEN DESCRIBED. THIS COMPARISON RESULTS IN NUMERICAL ASSESSMENTS OF THE PROBABILITY THAT THE MODEL SUCCEEDED IN PREDICTING THE ACTUAL WIND FIELD AND THAT THE FIELD MEASUREMENTS CONTAIN SUFFICIENT INFORMATION ON WHICH TO BASE SUCH A COMPARISON.

1978-0587 KHAN M H
MODEL AND PROTOTYPE PERFORMANCE CHARACTERISTICS OF SAVONIUS ROTOR WINDMILL.
WIND ENG. 2(2): 75-85, 1978.

MODEL TESTS WERE CONDUCTED IN A WIND TUNNEL TO ARRIVE AT AN OPTIMUM CONFIGURATION OF SAVONIUS ROTOR WINDMILL. EFFECTS OF THREE DESIGN PARAMETERS, NAMELY ROTOR SHAPE, OVERLAP BETWEEN ROTOR BLADES, AND SEPARATION GAP BETWEEN ROTOR BLADES, ON THE OPERATING CHARACTERISTICS WERE STUDIED. ROTOR MODELS WITH DIFFERENT COMBINATIONS OF THE VARIABLE PARAMETERS WERE TESTED UNDER THREE WIND VELOCITIES TO DETERMINE THE CONFIGURATION WHICH WOULD PROVIDE THE BEST RELATIVE PERFORMANCE.

1978-0588 KILAR L A
OFFSHORE WIND ENERGY CONVERSION SYSTEMS -- PREVIEW OF A FEASIBILITY STUDY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 712-722.
CONF-770921/2

IN AUGUST 1976, THE ADVANCED SYSTEMS TECHNOLOGY DIVISION OF WESTINGHOUSE POWER SYSTEMS COMPANY INITIATED WORK ON AN ERDA-SPONSORED STUDY TO ASSESS THE TECHNICAL FEASIBILITY AND COSTS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS SITED IN THE U.S. OFFSHORE. SUBCONTRACTORS FOR THE 14-MONTH INVESTIGATION ARE GLOBAL MARINE DEVELOPMENT INCORPORATED, OCEANOGRAPHIC SERVICES INCORPORATED, KAMAN AEROSPACE CORPORATION AND WESTINGHOUSE RESEARCH LABS. PUBLIC SERVICE ELECTRIC & GAS OF NEW JERSEY AND THE INSTITUTE OF GAS TECHNOLOGY ARE CONTRIBUTING AS CONSULTANTS.

1978-0589 KING R J
STATE OF TEXAS SUPPORT FOR WIND ENERGY.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 4-7.
CONF-780357

A BRIEF SUMMARY IS PRESENTED OF THE TEXAS STATE GOVERNMENT COMMITMENTS TO THE DEVELOPMENT OF WIND ENERGY PROGRAMS.

1978-0590 KING S M, DUFFY M
ANALYSIS AND TESTING OF A TOWER STRUCTURE FOR APPLICATION TO WIND TURBINE SYSTEMS.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 97-106.

A TOWER IS AN ESSENTIAL PART OF ALL WIND TURBINE SYSTEMS. ALTHOUGH LARGE TURBINES CAN AFFORD TO INCORPORATE CUSTOM DESIGNED TOWERS, SMALL TURBINES CANNOT. MARKET ECONOMICS FORCE SUPPLIERS OR USERS OF SMALL TURBINES TO ADOPT EXISTING TOWERS DESIGNED FOR OTHER APPLICATIONS. THERE APPEARS TO BE A NEED FOR A RELATIVELY SMALL TOWER FOR WIND TURBINES TYPICALLY USED IN CONNECTION WITH INDIVIDUAL RESIDENCES AND SMALL FARMS. A NEW TOWER DESIGN, THE OCTAHEDRON TOWER, HAS BEEN CARRIED TO A STAGE WHICH IS CLOSE TO BEING ENTIRELY CERTIFIABLE TO EIA (ELECTRONICS INDUSTRY ASSOCIATION) STANDARDS. A SIGNIFICANT PART OF THIS EFFORT INVOLVED COMPUTER ANALYSIS AND THE PHYSICAL TESTING OF AN ACTUAL TOWER. RESULTS OF MANUAL CALCULATION, COMPUTER ANALYSIS AND LOAD TESTING SHOWED GOOD AGREEMENT.

1978-0591 KIRCHHOFF R H, MODARRESI K, MURPHY P
THE INTERACTION OF THE WIND FIELD WITH A HORIZONTAL AXIS WIND TURBINE.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 45-57.

A STEADY STATE, AXISYMMETRIC, POTENTIAL FLOW MODEL OF THE WIND FIELD UPSTREAM OF A HORIZONTAL AXIS WIND TURBINE IS PRESENTED. THE BLADE DISC IS MODELED BY A DISTRIBUTION OF SOURCES IN ITS PLANE OF ROTATION. AN ANALYTICAL EXPRESSION FOR THE POTENTIAL FUNCTION IS DEVELOPED. SAMPLE FLOW FIELD CALCULATIONS FOR THE UMASS SOLAR HABITAT I 25 KW WIND TURBINE ARE PRESENTED. THE DYNAMIC INTERACTION BETWEEN THE HORIZONTAL GUSTINESS OF THE WIND FIELD AND THE INSTANTANEOUS POWER GENERATED BY THIS 25 KW WIND TURBINE IS INVESTIGATED BY MEASURING THE TRANSFER FUNCTION BETWEEN WIND SPEED AND THE GENERATOR VOLTAGE.

1978-0592 KLEIN H, WAGNER H F, FREIDRICH F J, HEINZELMANN P J
FEDERAL REPUBLIC OF GERMANY PROGRAMME TECHNOLOGIES FOR THE UTILIZATION OF SOLAR ENERGY.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 45-50.

THE PROGRAMME WAS LAUNCHED AT THE BEGINNING OF 1974 AS PART OF THE NON-NUCLEAR R AND D PROGRAMME. A NEW PROGRAMME BASED UPON EXPERIENCE GAINED DURING THE LAST 3 YEARS WAS LAUNCHED IN SEPTEMBER 1977. THE MAJOR OBJECTIVES ARE THERMAL UTILIZATION, ELECTRICAL UTILIZATION (THERMAL ENGINES AND PHOTOCELLS, WIND ENERGY, WATER POWER AND WAVE ENERGY), BIOLOGICAL AND CHEMICAL UTILIZATION, GENERAL MEASURES (DATA COMPILATION AND EVALUATION, STANDARDIZATION OF COMPONENTS AND SYSTEMS, AND SYSTEMS ANALYSIS) AND INTERNATIONAL COOPERATION.

1978-0593 KOHLOSS F H
HAWAIIAN ENERGY HOUSE.
MIL. ENG. 70(455): 170-172, 1978.

A DESCRIPTION IS GIVEN OF THE HAWAIIAN ENERGY HOUSE, WHICH WAS DESIGNED TO ACHIEVE COMFORTABLE HOUSING USING LOW-COST MATERIALS AND CONSTRUCTION METHODS CONSISTENT WITH CURRENT IDEALS OF LOW ENERGY CONSUMPTION, USE OF

ALTERNATE ENERGY SOURCES, AND CONSERVATION AND RECYCLING OF WATER. TOPICS DISCUSSED INCLUDE THE VENTILATION SYSTEM, THE SOLAR HOT WATER SYSTEM, SEASONAL SUN POSITION AND SHADING DESIGN, THE WIND POWER GENERATION SYSTEM, AND HOUSEHOLD APPLIANCES.

1978-0594 KOIDE G T, TAKAHASHI P K
SOLAR AND WIND ENERGY APPLICATIONS IN HAWAII.
SOL. ENERGY 21(4): 297-305, 1978.

THE OBJECTIVE OF THE STUDY DESCRIBED WAS TO STIMULATE THE DEVELOPMENT OF SOLAR ENERGY BY ASSISTING IN THE FIRST CRUCIAL STEPS OF THE PLANNING PROCESS. THIS INVESTIGATION SELECTED PROJECTS WHICH HAD POTENTIAL FOR IMMEDIATE IMPLEMENTATION IN THE STATE OF HAWAII. VARIETY IN FORM OF APPLICATION, TYPE OF ENGINEERING ANALYSIS AND LOCATION WITHIN THE STATE WAS SOUGHT. TO A LARGE EXTENT THESE BASIC PREMISES WERE WELL MET, AS APPLICATIONS RANGE FROM AGRICULTURE TO AQUACULTURE TO TOURISM TO EDUCATION ON THREE ISLANDS.

1978-0595 KORNREICH T R, TOMPKINS D M
AN ANALYSIS OF THE ECONOMICS OF CURRENT SMALL WIND ENERGY SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 156-172.
CONF-770921/2

THIS REPORT PRESENTS A REVIEW OF THE PERFORMANCE AND ECONOMICS OF CURRENTLY AVAILABLE SMALL WECS AND PROVIDES AN INDICATION OF HOW WELL THESE SYSTEMS COMPETE WITH ALTERNATIVE ENERGY SOURCES IN CERTAIN APPLICATIONS AT TODAY'S TECHNOLOGY AND COMMERCIAL STATUS. IT SHOULD BE POINTED OUT THAT WECS COSTS DO NOT INCLUDE THE EFFECTS OF R&D WHICH MIGHT LEAD TO BETTER MACHINES AS MEASURED BY PERFORMANCE AND COST.

1978-0596 KORNREICH T R
THIRD WIND ENERGY WORKSHOP. PROCEEDINGS OF THE THIRD BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. 2 VOLS. 1009 P.
CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, WASHINGTON, D.C., SEPTEMBER 19-21, 1977.
CONF-770921/1, CONF-770921/2

SEPARATE ABSTRACTS ARE INCLUDED FOR 34 PAPERS PRESENTED CONCERNING TECHNOLOGY DEVELOPMENT, METEOROLOGICAL SITING CONSIDERATION, MULTI-UNIT APPLICATIONS, AND INNOVATIVE AND ADVANCED SYSTEMS CONCEPTS.

1978-0597 KOS J M
ON-LINE CONTROL OF A LARGE HORIZONTAL AXIS WIND ENERGY CONVERSION SYSTEM AND ITS PERFORMANCE IN A TURBULENT WIND ENVIRONMENT.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2064-2073.

THIS PAPER DESCRIBES A CLOSED LOOP, SHAFT TORQUE CONTROL FOR CONTROLLING THE POWER OF A LARGE (2 MEGAWATT), VARIABLE PITCH, HORIZONTAL AXIS WIND TURBINE, DRIVING A SYNCHRONOUS GENERATOR CONNECTED TO A LARGE POWER SYSTEM (ON-LINE OPERATION) A CONTROL MODE IS PRESENTED WHICH PROVIDES A STABLE, RESPONSIVE CONTROL SYSTEM BY SENSING SHAFT TORQUE AND ROTOR ROTATIONAL SPEED. DYNAMIC PERFORMANCE RESULTS FROM A DIGITAL SIMULATION OF THE SYSTEM OPERATING ON-LINE IN A TURBULENT WIND ENVIRONMENT ARE PRESENTED.

1978-0598 KOTTAPALLI S B R, FRIEDMANN P P, ROSEN A
AEROELASTIC STABILITY AND RESPONSE OF HORIZONTAL AXIS WIND TURBINE BLADES.
LOS ANGELES, UNIVERSITY OF CALIFORNIA, SCHOOL OF ENGINEERING AND APPLIED SCIENCE, MECHANICS AND STRUCTURES DEPARTMENT, 1978. 154 P.
UCLA-ENG-7880

THE COUPLED FLAP-LAG-TORSION EQUATIONS OF MOTION OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE BLADE ARE FORMULATED. QUASI-STEADY BLADE-ELEMENT STRIP THEORY IS APPLIED TO DERIVE THE AERODYNAMIC OPERATOR WHICH ACCOUNTS FOR BOUNDARY-LAYER TYPE GRADIENT WINDS. THE FINAL EQUATIONS HAVE PERIODIC COEFFICIENTS. A NEW METHOD OF GENERATING AN APPROPRIATE TIME-DEPENDENT EQUILIBRIUM POSITION (REQUIRED FOR THE SUBSEQUENT STABILITY ANALYSIS) IS IMPLEMENTED. DIFFERENCES IN STABILITY AND RESPONSE FOR TWO MODES OF OPERATION OF THE BLADE ARE INVESTIGATED.

1978-0599 WILSON R E
VORTEX SHEET ANALYSIS OF THE GIROMILL.
ASME TRANS. J. FLUIDS ENG. 100(3): 340-342, SEPTEMBER 1978.

A TWO-DIMENSIONAL ANALYSIS OF THE PERFORMANCE AND FLOWFIELD OF THE GIROMILL IS PRESENTED. THE GIROMILL IS A VERTICAL-AXIS WIND TURBINE WITH STRAIGHT BLADES THAT ARE ARTICULATED TO PRODUCE MAXIMUM ENERGY EXTRACTION FROM THE WIND. IT IS FOUND THAT THE POWER COEFFICIENT AND WINDWISE FORCE COEFFICIENT FOR THE GIROMILL HAVE THE SAME LIMIT AS OBTAINED FOR THE HORIZONTAL-AXIS WIND TURBINE. A CROSS-WIND FORCE IS ALSO OBTAINED WITH THIS TYPE OF WIND TURBINE. THE CROSS-WIND FORCE IS OF SECOND ORDER AND DECREASES WITH TIP SPEED. STREAMLINES AND VELOCITY PROFILES ARE ILLUSTRATED FOR SEVERAL LOADING CONDITIONS.

1978-0600 KRAUSS O, PARK G L, LINVILL D E, CURTICE D H, MANNER D, MATSON R, LAWLER J, ASMUSSEN J
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977. EXECUTIVE SUMMARY.
NTIS, AUGUST 1978. 11 P.
COO-2992-78/1-T1

SEVERAL GENERATION-EXPANSION ALTERNATIVES FOR SMALL ELECTRIC UTILITIES WHICH INCLUDE WINDPOWER WERE EVALUATED USING THE MUNICIPAL ELECTRIC SYSTEM OF HART, MICHIGAN, AS AN EXAMPLE. ASSUMED WIND TURBINE CONFIGURATIONS WITH MACHINES RATED AT 500-KW AND 1,500-KW TOGETHER WITH A 1,000-KW HYDROELECTRIC FACILITY WERE COMBINED WITH CONVENTIONAL HART DIESEL GENERATION PLUS BULK PURCHASE AND THEN EVALUATED. FOR COMPARISON, A NEW 3,600-KW OIL-FUELED DIESEL GENERATOR WAS ALSO EVALUATED.

1978-0601 LARGE WIND ENERGY FOCUS GROUP RESULTS.
NTIS, AUGUST 1978. 35 P.
DOE/TIC-10038

A REPORT IS PRESENTED OF THE FOCUS GROUP RESEARCH ON LARGE WIND ENERGY SYSTEMS PREPARED FOR THE DEPARTMENT OF ENERGY AS PART OF THE COMMERCIALIZATION PROGRAM. THE PURPOSE OF THIS RESEARCH IS TO EVALUATE THE POTENTIAL FOR COMMERCIALIZATION OF WIND ENERGY, TO DETERMINE THE BARRIERS TO DEVELOPMENT OF THIS RESOURCE, AND TO JUDGE WHAT

ACTIONS ARE REQUIRED BY THE FEDERAL GOVERNMENT TO PROMOTE COMMERCIALIZATON. THE RESEARCH DISCUSSES THE ISSUES OF COMMERCIALIZATION AS EXAMINED BY A FOCUS GROUP CONSISTING OF KEY INDIVIDUALS FROM VARIOUS ORGANIZATIONS INVOLVED IN LARGE WIND ENERGY SYSTEMS DEVELOPMENT.

1978-0602 LARSSON L
LARGE-SCALE INTRODUCTION OF WIND POWER STATIONS IN THE SWEDISH GRID: A SIMULATION STUDY.
WIND ENG. 2(4): 221-233, 1978.

A SIMULATION STUDY ON THE FACTORS TO BE CONSIDERED IF WIND POWER WERE TO BE INTRODUCED TO THE SOUTH SWEDISH POWER GRID ON A LARGE SCALE IS DESCRIBED. THE HEURISTIC TECHNIQUE REFLECTS THE ACTUAL RUNNING STRATEGIES OF A BIG POWER COMPANY WITH SUITABLE ACCURACY. ALL SIMULATIONS REFER TO CERTAIN TYPICAL DAYS IN 1976 TO WHICH ALL WIND DATA AND SYSTEM CHARACTERISTICS ARE RELATED.

1978-0603 LAWRENCE K A
REVIEW OF THE ENVIRONMENTAL EFFECTS OF THREE SOLAR ENERGY TECHNOLOGIES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, INC. PROCEEDINGS OF THE 1978 ANNUAL MEETING, DENVER, AUGUST 28-31, 1978. NEWARK, DELAWARE, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1978. VOL. 2.2, P. 592-595.

THIS PAPER REVIEWS AND SUMMARIZES DATA ON THE ENVIRONMENTAL EFFECTS OF THREE SOLAR TECHNOLOGIES: PHOTOVOLTAIC CELLS, WIND ENERGY CONVERSION (WEC), AND THE SOLAR THERMAL CENTRAL RECEIVER. POTENTIAL EFFECTS ARE IDENTIFIED FOR EACH OF THE LIFE CYCLE PHASES: RESOURCE EXTRACTION AND COMPONENT MANUFACTURE, PLANT CONSTRUCTION, OPERATION AND DECOMMISSION. THE SOLAR ENERGY TECHNOLOGIES ARE ASSUMED TO BE DEPLOYED AS A CENTRALIZED ENERGY PRODUCTION FACILITY.

1978-0604 LAWS K L
ENERGY IN THE ATMOSPHERE.
PHYS. TEACH. 16(2): 101-103, FEBRUARY 1978.

AN EXERCISE FOR STUDENTS TO CALCULATE CRUDE ORDERS OF MAGNITUDE OF THE QUANTITY OF ENERGY EXISTING IN VARIOUS FORMS IN THE ATMOSPHERE IN ADDITION TO DIRECT INSOLATION IS PRESENTED. FIVE DIFFERENT FORMS OF ENERGY ARE CONSIDERED: DIRECT SOLAR, WIND, ELECTRICITY FROM THE ATMOSPHERE, USE OF THE HEAT CAPACITY OF AIR, AND LATENT HEAT OF VAPORISATION OF WATER VAPOUR IN THE AIR.

1978-0605 LAWSON M O
A LOW COST AERODYNAMIC HEATER REPRESENTING A FULLY MATCHED LOAD FOR WIND ENERGY SYSTEMS.
NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE, NAECON '78, DAYTON, OHIO, MAY 16-18, 1978. NEW YORK, IEEE, 78CH1336-7, 1978. P. 874-880.

THIS PAPER PRESENTS A LOW COST ALTERNATIVE FOR REPLACEMENT OF THE ALTERNATOR. IT IS CALLED THE AERODYNAMIC HEATER AS IT OPERATES ON FLUID DYNAMIC PRINCIPLES AS DOES THE WIND TURBINE. ALTHOUGH AN AIR CHURN COULD BE APPLIED, IT WOULD BE VERY LARGE DUE TO THE LOW DENSITY OF AIR, WHILE A CONVERTER BASED ON FLUID DYNAMIC PRINCIPLES IS REASONABLE IN SIZE AND HAS A MAJOR ADVANTAGE OVER A CHURN. IT OPERATES ON THE SAME PRINCIPLES AS A WIND TURBINE. THIS CAN MAKE POSSIBLE THE OPERATION OF THE WIND TURBINE AT ITS OPTIMUM TIPSPEED TO WIND VELOCITY RATIO UP TO THE WIND TURBINES RATED VALUE.

1978-0606 LEICESTER R J, NEWMAN V G, WRIGHT J K
RENEWABLE ENERGY SOURCES AND STORAGE.
NATURE 272(5653): 518-521, APRIL 6, 1978.

A FEATURE OF WIND, WAVE AND SOLAR ENERGY SOURCES IS THE UNPREDICTABLE VARIABILITY OF THE STRENGTH OF THE SOURCE DUE TO THE VAGARIES OF THE CLIMATE. THERE ARE TWO MAIN WAYS OF EXPLOITING THESE SOURCES. IN THE FIRST A BACK-UP SUPPLY IS PROVIDED. THUS, WITH SOLAR WATER HEATING, IT IS CUSTOMARY TO RELY ON ELECTRICAL IMMERSION HEATERS OR BOILERS BURNING GAS, OIL OR SOLID FUEL TO SUPPLEMENT THE SOLAR ENERGY INPUT DURING THE WINTER MONTHS AND AT OTHER TIMES WHEN THE INSOLATION LEVEL IS LOW. IT IS GENERALLY ACCEPTED THAT LARGE WIND GENERATORS WOULD FEED THEIR ELECTRICAL OUTPUT INTO THE NATIONAL GRID. THE SECOND WAY OF EXPLOITING RENEWABLE ENERGY SOURCES IS TO COUPLE THEM WITH SOME FORM OF STORAGE. IF THE STORAGE CAPACITY IS SUFFICIENT THERE IS A GUARANTEED OUTPUT FROM THE RENEWABLE ENERGY SOURCE PLUS STORAGE SYSTEM AT THE TIMES WHEN IT IS REQUIRED. RYLE (SEE NATURE VOL. 267, P. 111, 1977) HAS SUGGESTED THAT A FORM OF STORAGE IS AVAILABLE IN CONNECTION WITH WIND POWER. THE VALIDITY OF THIS CLAIM IS ANALYZED.

1978-0607 LEMASOV B I, SAVCHENKO I G, SMIRNOVA A N, TARNIZHEVSKII B V
EXPERIMENTAL INVESTIGATION OF THE JOINT OPERATION OF WIND AND SOLAR PLANTS.
GELIOTEKHNIKA 14(2): 46-49, 1978. TRANSL.: APPL. SOL. ENERGY 14(2): 33-35, 1978.

RESULTS ARE REPORTED FOR AN ANNUAL CYCLE OF TESTS OF A WIND-POWERED ELECTRIC PLANT AND SOLAR PHOTOELECTRIC PLANT OPERATING INTO A COMMON LOAD. THE RATED CAPACITIES OF THESE INVESTIGATIONS WAS TO DETERMINE STORAGE-DEVICE CAPACITIES FOR SEPARATE AND JOINT UTILIZATION OF THESE UNITS.

1978-0608 LERNER J
WIND PROGRAM PRIORITIES
WIND POWER DIG. NO. 13: 16-18, FALL 1978.

1978-0609 LERNER J
WIND - ELECTRIC POWER: A RENEWABLE ENERGY RESOURCE FOR CALIFORNIA.
SACRAMENTO, CALIFORNIA, CALIFORNIA ENERGY COMMISSION, 1978. 21 P.

INFORMATION ON THE USE OF WIND ENERGY IN CALIFORNIA IS PRESENTED CONCERNING WIND TURBINE TECHNOLOGY; AVAILABILITY; MARKET POTENTIAL; SYSTEM INTEGRATION; LIMITS TO WIND SYSTEMS DEVELOPMENT; AND GOVERNMENT PROGRAMS IN WIND ENERGY.

1978-0610 LEWIS J O
SOLAR ENERGY DEVELOPMENTS IN IRELAND.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. I, P. 118-122.

THE WORK BEING DONE IN IRELAND TO REALIZE THE POTENTIAL OF AMBIENT SOURCES OF ENERGY BY A VARIETY OF AGENCIES IN BOTH THE PUBLIC AND PRIVATE SECTORS IS DESCRIBED. THERE IS PARTICULAR INTEREST IN AGRICULTURAL APPLICATIONS, AND WIND POWER, PHOTOVOLTAICS AND SOLAR THERMAL APPLICATIONS ARE OTHER AREAS BEING ADVANCED. GIVEN THAT THE FINANCIAL RESOURCES AVAILABLE ARE SMALL, A PROMISING AMOUNT OF ACTIVITY IS UNDERWAY.

1978-0611 LIEBLEIN S, ROSS R S, FERTIS D G
EVALUATION OF URETHANE FOR FEASIBILITY OF USE IN WIND TURBINE BLADE DESIGN.
NTIS, APRIL 1978. 158 P.
DOE/NASA/7653.79/1, NASA-CR-159530

A PRELIMINARY EVALUATION WAS CONDUCTED OF THE USE OF CAST URETHANE AS A POSSIBLE MATERIAL FOR LOW-COST BLADES FOR WIND TURBINES. SPECIMEN TEST DATA ARE PRESENTED FOR ULTIMATE TENSILE STRENGTH, ELASTIC MODULUS, FLEXURAL STRAIN, CREEP, AND FATIGUE PROPERTIES OF A NUMBER OF URETHANE FORMULATIONS.

1978-0612 LILJEDAHL L A
WIND POWER USES IN AGRICULTURE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 141-155.
CONF-770921/1

AGRICULTURE PRESENTS A NUMBER OF INTERESTING, AND POTENTIALLY VALUABLE, OPPORTUNITIES FOR THE USE OF WIND POWER. THE OPPORTUNITY FOR WIND POWER USE COMES FROM THE FACT THAT SEVERAL OPERATIONS IN AGRICULTURE WHICH USE APPRECIABLE AMOUNTS OF ENERGY ARE INTERRUPTIBLE FOR SHORT PERIODS OF TIME AND A NUMBER OF OTHERS ARE CAPABLE OF STORING ENERGY IN INEXPENSIVE FORMS, OR CAN STORE WORK DONE FOR FUTURE USE. PLANNING WIND ENERGY RESEARCH IN AGRICULTURE THEN, HAS BEEN TO REVIEW AGRICULTURAL OPERATIONS BY BROAD CATEGORIES, AND ESTIMATE THE EXTENT TO WHICH IT MEETS THE CRITERIA OF CHARACTERISTICS.

1978-0613 LILLEY G M
AERODYNAMIC EFFICIENCY OF WINDMILLS.
AERONAUT. Q. 29(1): 1-17, FEBRUARY 1978.

THE PAPER REPRODUCES THE RESULTS OF AN EARLIER REPORT ON THE VORTEX THEORY OF WINDMILLS AND FOLLOWS THAT THEORY THROUGH TO ESTABLISH THE AERODYNAMIC DESIGN PROCEDURE FOR A HORIZONTAL AXIS WINDMILL. THE RESULTS ARE SHOWN TO DIFFER CONSIDERABLY FROM THOSE GIVEN IN A RECENT PAPER BY GRIFFITH AND THE DIFFERENCES ARE EXPLAINED.

1978-0614 LINDGREN M
SINGLE PERSON INSTALLATION OF SMALL WINDPLANTS.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 14, 1978. PROCEEDINGS. NTIS, 1978. P. 149-155.
CONF-780754

THE PROCEEDINGS FOR REMOVING OR INSTALLING A 600 POUND WIND GENERATOR ATOP A 65 FOOT TOWER ARE PRESENTED.

1978-0615 LINDLEY C A
WIND MACHINES FOR THE CALIFORNIA AQUEDUCT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 262-272.
CONF-770921/1

THE CALIFORNIA AQUEDUCT IS A 648 MILE LONG WATER SYSTEM THAT CAPTURES AND STORES SURPLUS WATER FROM THE STATE'S NORTHERN MOUNTAIN REGIONS AND DELIVERS IT TO THE CENTRAL AND SOUTHERN ARID REGIONS FOR AGRICULTURE, INDUSTRY, AND URBAN USES. MOST OF ITS TRIP IS UPHILL, AND REQUIRES LARGE AMOUNTS OF ELECTRICAL PUMPING POWER. THE RISING COST OF ENERGY AND POTENTIAL FUEL SHORTAGES HAVE LED TO A SERIOUS CONCERN OVER HOW TO INSURE THE AVAILABILITY OF ADEQUATE ENERGY AT REASONABLE PRICES. THIS STUDY WAS INITIATED IN THE HOPE THAT A MAJOR WATER PUMPING JOB WOULD PROVE A NATURAL MATCH FOR THE INTERMITTENT SUPPLY OF ENERGY AVAILABLE FROM THE WIND. THERE WAS SOME CONCERN WHETHER AN ADEQUATE WIND RESOURCE COULD BE FOUND IN THE AREA.

1978-0616 LINDLEY C A, MELTON W C
WIND ENERGY SYSTEMS APPLICATIONS IN HAWAII.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 237-250.
CONF-770921/1

THIS STUDY IS INTENDED TO ASSESS THE POTENTIAL FOR APPLICATION OF WIND ENERGY CONVERSION SYSTEMS (WECS) ON OAHU, AND TO GENERALIZE TO GENERICALLY SIMILAR SITUATIONS ELSEWHERE, AS A GUIDE TO ERDA'S FUTURE DESIGN AND APPLICATION PLANNING. AT THIS REPORTING, THE STUDY IS NOT COMPLETE.

1978-0617 LINDLEY D, CHIN S W
WIND ENERGY POTENTIAL IN NEW ZEALAND-ASPECTS OF THE RESOURCE ASSESSMENT AND ITS UTILIZATION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 456-466.
CONF-770921/1

A WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND IS BRIEFLY DESCRIBED WHILST COMPUTATIONS OF CAPACITY FACTOR FOR SEVERAL WIND TURBINE DESIGNS DEMONSTRATE A SIMPLE WAY OF ASSESSING SPECIFIC OUTPUT GIVEN ONLY THE ANNUAL MEAN WIND SPEED FOR THE SITE. COMPARISONS ARE MADE OF POWER DEMAND VERSUS WIND ENERGY AVAILABILITY ON A DIURNAL AND SEASONAL BASIS FOR NEW ZEALAND'S FOUR LARGEST POPULATION CENTRES AND SOME PRELIMINARY WORK ON THE MEASUREMENT OF WIND STRUCTURE AND TOPOGRAPHICAL EFFECTS AS THEY AFFECT TURBINE DESIGN AND PERFORMANCE IS DESCRIBED.

1978-0618 LINDQUIST O H, MALVER F S
MINNESOTA UTILITY APPLICATION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 251-261.
CONF-770921/1

THE OVERALL OBJECTIVE OF THIS STUDY WAS TO ASSESS CURRENT WECS VIABILITY FOR A UTILITY APPLICATION AND TO DEFINE THE ATTRIBUTES AND PERFORMANCE REQUIREMENTS OF A SYSTEM CAPABLE OF YIELDING A SATISFACTORY RETURN ON INVESTMENT TO A UTILITY COMPANY.

1978-0619 LINKE S, TESHOME A, YEHSAKUL P D
A STUDY OF TRANSMISSION AND PROTECTION ELEMENTS FOR WIND ENERGY GENERATING SYSTEMS. VOLUME 1.
NTIS, APRIL 1978. 36 P.
BNL-50851

RESULTS ARE REPORTED OF A STUDY AT CORNELL UNIVERSITY ON TRANSMISSION, DISTRIBUTION, AND PROTECTION SYSTEMS FOR

LARGE WIND-ENERGY GENERATORS (WEG) CONNECTED TO AN ELECTRIC UTILITY GRID. CONFIGURATIONS FOR WIND FARMS ON FLAT TERRAIN, MOUNTAIN-PEAK CLUSTERS, AND INSTALLATIONS ALONG A RIDGE WERE EXAMINED. COMPUTER STUDIES OF LOAD-FLOW AND SHORT-CIRCUIT BEHAVIOR CONFIRMED THE TECHNICAL FEASIBILITY OF THE PROPOSED SYSTEMS. REALISTIC UNIT COSTS FOR THE PROJECTED TRANSMISSION AND PROTECTION SCHEMES RANGE FROM $109 TO $317 PER KW, DEPENDING UPON CHOICE OF CONFIGURATION AND DISTANCE FROM THE GRID. COST OF PROTECTIVE EQUIPMENT IS FOUND TO BE A MAJOR FACTOR IN MOST CASES, TENDING TO BE EQUAL TO OR GREATER THAN TRANSMISSION LINE COSTS WHEN THE WEG UNITS ARE LOCATED FIVE MILES OR LESS FROM THE GRID. SEVERAL ALTERNATIVES ARE SUGGESTED FOR FUTURE STUDY. AN ALTERNATE, LESS EXPENSIVE, PROTECTION DESIGN INVOLVING THE USE OF HIGH-CAPACITY FUSES INSTEAD OF OIL CIRCUIT BREAKERS, COUPLED WITH A DISREGARD FOR THE DISCONNECTION OF ONE OR MORE WEG UNITS FOR CONSIDERABLE PERIODS OF TIME, IS DISCUSSED.

1978-0620 LISSAMAN P B S, WALKER S N
DEVELOPMENT OF DYNAMIC INDUCER ROTOR SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 595-603.
CONF-770921/2

THE TIPVANE CONCEPT IS AT AN EXPLORATORY STATE. THE CURRENT RESEARCH IS FUNDED UNDER ERDA AND INVOLVES THEORETICAL STUDIES DESIGNED TO ESTIMATE THE PERFORMANCE AND OPTIMAL GEOMETRY OF TIPVANES, PRELIMINARY ENGINEERING ESTIMATES OF SYSTEM COST BENEFITS, AND FIELD TESTING OF A NUMBER OF DIFFERENT TIPVANES ON AN INSTRUMENTED TWO METER PROPELLER TYPE WIND TURBINE MOUNTED ON A MOVING PLATFORM.

1978-0621 LISSAMAN P B S
TECHNICAL IMPROVEMENTS IN SMALL SYSTEM DESIGN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 878-880.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0622 LISSAMAN P B S, WALKER S N
DYNAMIC INDUCER RESEARCH PROGRAM. FINAL REPORT.
NTIS, JUNE 1978. 170 P.
RLO/1021-77/1

THE DYNAMIC INDUCER ROTOR (DIR) IS A NOVEL TYPE OF WIND TURBINE ROTOR WHICH HAS THE THEORETICAL POTENTIAL OF PRODUCING AS MUCH AS 160% OF THE POWER OUTPUT OF A CONVENTIONAL PROPELLER-TYPE HORIZONTAL AXIS ROTOR (HAR) OF THE SAME DIAMETER. THE RESEARCH DESCRIBED HERE CONSTITUTES THREE SECTIONS: AN ANALYTICAL DEVELOPMENT OF DIR DESIGN PROCEDURE AND PERFORMANCE PREDICTION TECHNIQUES; INSTRUMENTED FIELD TESTS OF A 3.7-METER DIAMETER DIR SYSTEM; AND A COST-EFFECTIVENESS ANALYSIS OF THE DIR COMPARED TO THE HAR.

1978-0623 LITTLER J G F, THOMAS R B
WIND GENERATION OF ELECTRICITY FOR A NOVEL DWELLING INDEPENDENT OF SERVICING NETWORKS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1822-1825.

THE PROTOTYPE DWELLING DESIGNED WITHIN THE AUTARKIC HOUSING PROJECT IS DISCONNECTED FROM ALL MAIN SERVICES. ELECTRICITY IS SUPPLIED BY A VERTICAL AXIS WIND TURBINE, GENERATOR, BATTERIES AND INVERTER. THE CONSIDERATIONS WHICH DETERMINED THE SYSTEM DESIGN ARE SUMMARIZED. EXPERIMENTAL OPERATION INDICATES THAT A 24 SQUARE METER VERTICAL AXIS WIND TURBINE CAN PROVIDE THE ELECTRICAL NEEDS (APART FROM HEATING AND COOKING) OF A FOUR PERSON HOUSE IN A SEMI-URBAN SITUATION IN EAST ANGLIA, PROVIDED A LARGE BATTERY STORE IS AVAILABLE. THERE IS ALSO A SUBSTANTIAL CONTRIBUTION TO THE SPACE HEATING LOAD IN MANY YEARS.

1978-0624 WILSON R E
VORTEX SHEET ANALYSIS OF THE GIROMILL.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 33-43.

A TWO-DIMENSIONAL ANALYSIS OF THE PERFORMANCE AND FLOWFIELD OF THE GIROMILL IS PRESENTED. THE GIROMILL IS A VERTICAL-AXIS WIND TURBINE WITH STRAIGHT BLADES THAT ARE ARTICULATED TO PRODUCE MAXIMUM ENERGY EXTRACTION FROM THE WIND. IT IS FOUND THAT THE POWER COEFFICIENT AND WINDWISE FORCE COEFFICIENT FOR THE GIROMILL HAVE THE SAME LIMIT AS OBTAINED FOR THE HORIZONTAL-AXIS WIND TURBINE. A CROSS-WIND FORCE IS ALSO OBTAINED WITH THIS TYPE OF WIND TURBINE. THE CROSS-WIND FORCE IS OF SECOND ORDER AND DECREASES WITH TIP SPEED. STREAMLINES AND VELOCITY PROFILES ARE ILLUSTRATED FOR SEVERAL LOADING CONDITIONS.

1978-0625 LODGE M
PRINCE EDWARD ISLAND WIND ENERGY PROGRAM.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 1, PAP. 4.3.5. 13 P.

THIS PAPER DESCRIBES THE WIND ENERGY PROGRAM OF THE INSTITUTE OF MAN AND RESOURCES. WORK ON THIS PROGRAM COMMENCED IN JUNE OF 1977. THE WIND ENERGY PROGRAM IS COMPOSED OF FOUR SUB-PROGRAMS. THE FIRST SUB-PROGRAM IS AN ANALYSIS OF SIX YEARS OF HISTORICAL WIND DATA AVAILABLE FROM EIGHT MONITORING SITES OPERATED FOR THE ATMOSPHERIC ENVIRONMENT SERVICE (A.E.S.) OF CANADA BY THE P.E.I. DEPARTMENT OF AGRICULTURE. SUBSEQUENTLY, SPATIAL CORRELATION OF DATA FROM PAIRS OF THESE SITES IS PERFORMED. A PRELIMINARY DESCRIPTION OF THE APPLICATION OF A DARRIEUS VAWT FOR DIRECT HEAT GENERATION FOR SPACE HEATING OF A GREENHOUSE AND RESIDENCE IS GIVEN. PRELIMINARY OBJECTIVES AND DESCRIPTION OF THE ATLANTIC WIND TEST SITE ARE OUTLINED.

1978-0626 LOEB A
WIND DRIVEN ENERGY SYSTEM.
U.S. PATENT NO. 4,124,182, NOVEMBER 7, 1978. 20 P.

A METHOD AND APPARATUS USING PARAKITES, OR MODIFIED PARACHUTES, FOR CAPTURING WIND ENERGY AND FOR CONVERTING THE CONSEQUENT WIND-INDUCED LINEAR MOTION TO SHAFT ROTATION ARE DESCRIBED. THE PARAKITE APPARATUS INCLUDES A PLURALITY OF TRAINS OF PARAKITES, WITH EACH TRAIN COMPRISING A POWER LINE HAVING A PLURALITY OF SERIALLY COUPLED PARAKITES SECURED THERETO. THE POWER LINES ARE OF SUFFICIENT LENGTH TO ALLOW THE PARAKITES TO REACH AN ALTITUDE ABOVE THE EARTH AT WHICH PREVAILING WINDS ARE STRONGER AND MORE UNIFORM THAN AT THE EARTH'S SURFACE. EACH TRAIN IS SECURED AT ITS EARTHBOUND END TO A DRUM OR WINDLASS SELECTIVELY ROTATABLE IN BOTH CLOCKWISE AND COUNTER-CLOCKWISE DIRECTIONS TO EITHER REEL IN THE POWER LINES ATTACHED THERETO, OR TO ENABLE THE POWER LINES TO BE PULLED UPWARDLY AND OUTWARDLY BY THE ACTION OF THE WINDS ON THE PARAKITES.

1978-0627 LORMAN W R
DIGEST OF EQUIPMENT FOR CONVERTING SOLAR, WIND, AND GEOTHERMAL ENERGY INTO ELECTRIC POWER FOR USN APPLICATION ASHORE. FINAL REPORT, MAY 1977-MARCH 1978.
NTIS, NOVEMBER 1978. 103 P.
AD-A066221

THIS DOCUMENT ENUMERATES PRINCIPAL REQUIREMENTS OF SELF-SUFFICIENT ELECTRIC POWER CONVERSIONAL EQUIPMENT UNDER ACTIVE CONSIDERATION BY CEL. DATA PERTAIN TO FINANCIAL REQUIREMENTS, PHYSICAL CHARACTERISTICS, AND POTENTIAL OUTPUTS OF SOLAR, WIND, AND GEOTHERMAL ENERGY CONVERSION SYSTEMS; THESE SYSTEMS ARE PART OF USN SHORE ENERGY RESEARCH AND DEVELOPMENT PROGRAM. DATA ARE INTENDED FOR USE BY CEL SYSTEMS ANALYSTS AS INPUT TO MATHEMATICAL MODEL FOR PLANNING AND OPTIMIZING POWER SYSTEMS THROUGHOUT THE NAVAL SHORE ESTABLISHMENT.

1978-0628 LOTH J L
BETZ TYPE LIMITS FOR VORTEX WIND MACHINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 794-802.
CONF-770921/2

IN A SHROUDED WIND TURBINE THE LOCAL HIGH INVISCID WIND VELOCITY INCREASES THE MAXIMUM OBTAINABLE POWER. THE INCREASE IN POWER OUTPUT IS DUE TO THE INCREASE IN VELOCITY. SUCH A DEVICE IS CALLED A WIND ENERGY CONCENTRATOR. THE USE OF A VORTEX HAS BEEN CONSIDERED BY SEVERAL INVESTIGATORS. IN THIS STUDY THE THEORETICAL MAXIMUM POWER COEFFICIENT OF TWO VORTEX INGESTING WIND TURBINE CONFIGURATIONS HAVE BEEN COMPUTED, AND TWO CONFIGURATIONS, WHICH USE LOW PRESSURE IN THE VORTEX CORE TO EXHAUST INTO, HAVE ALSO BEEN ANALYZED.

1978-0629 LOTKER M
ECONOMIC CHALLENGES OF WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 881-892.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0630 LOTKER M, SHAW R W, ADOLFSON W F, BERNARDI R P, DAVIDOFF P H, ECKHART M T, GUNWALDSEN D S, METTAM P J, NARAYANAN P, SILLIN J O
ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION. FINAL REPORT.
NTIS, AUGUST 1978. 36 P.
DOE/ET/4053-78/1, EG-77-C-01-4053

THIS ASSESSMENT OF ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION IS AN ANALYSIS OF THE QUANTITATIVE AND QUALITATIVE IMPACTS OF A VARIETY OF GOVERNMENT FUNDED ECONOMIC INCENTIVES ON WIND ENERGY CONVERSION SYSTEMS (WECS). THE PURPOSE OF THIS STUDY IS TO ACHIEVE BETTER UNDERSTANDING OF THE RELATIONSHIP BETWEEN IMPLEMENTATION OF SPECIFIC ECONOMIC INCENTIVES FOR WECS, AND THE FACTORS SURROUNDING WECS COMMERCIAL INTRODUCTION.

1978-0631 LOTKER M, SHAW R W, ADOLFSON W F, DAVIDOFF P H, BERNARDI R P, ECKHART M T, GUNWALDSEN D S, METTAM P J, NARAYANAN P, SILLIN J O
ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION. EXECUTIVE SUMMARY.
NTIS, AUGUST 1978. 34 P.
DOE/ET/4053-78/1(EXEC. SUMM.)

THIS ASSESSMENT OF "ECONOMIC INCENTIVES TO WIND SYSTEMS COMMERCIALIZATION" IS AN ANALYSIS OF THE QUANTITATIVE AND QUALITATIVE IMPACTS OF A VARIETY OF GOVERNMENT FUNDED ECONOMIC INCENTIVES ON WIND ENERGY CONVERSION SYSTEMS (WECS). THE PURPOSE OF THIS STUDY IS TO ACHIEVE BETTER UNDERSTANDING OF THE RELATIONSHIP BETWEEN IMPLEMENTATION OF SPECIFIC ECONOMIC INCENTIVES FOR WECS, AND THE FACTORS SURROUNDING WECS COMMERCIAL INTRODUCTION.

1978-0632 WENDELL L L, ELDERKIN C E
PROGRAM OVERVIEW FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE UNITED STATES FEDERAL WIND ENERGY PROGRAM.
AMERICAN METEOROLOGICAL SOCIETY. SYMPOSIUM ON TURBULENCE, DIFFUSION, AND AIR POLLUTION, 4TH, RENO, JANUARY 15-18, 1979. BOSTON, AMERICAN METEOROLOGICAL SOCIETY, 1978. PREPRINT. P. 160-166.

THE OVERALL OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM OF THE UNITED STATES IS "TO ACCELERATE THE DEVELOPMENT, COMMERCIALIZATION AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS." TO ACHIEVE THIS OBJECTIVE, THE PROGRAM IS ORGANIZED INTO DISCRETE, YET INTERRELATED PROGRAM ELEMENTS.

1978-0633 LOWY S H
WIND POWER AS A VIABLE ENERGY SOURCE.
SOLAR ARCHITECTURE. WORKSHOP ON SOLAR ENERGY APPLICATIONS, ASPEN, COLORADO, MAY 27, 1977. ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBLISHERS, INC., 1978. P. 227-240.

THE DEVELOPMENT OF WIND TURBINES IS REVIEWED AND THE PLANNED EXPANSION OF WIND POWER PLANTS IN THE US IS DETAILED. TECHNICAL AND ECONOMIC CONSIDERATIONS FOR WIND POWER PLANTS ARE DISCUSSED.

1978-0634 WILSON D E
AEROELASTIC PUMP.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1925-1946.

THE IDEA OF USING THE GALLOPING OR FLUTTER MODE OF A SUSPENDED CABLE AS A SIMPLE INEXPENSIVE WIND ENERGY SOURCE HAS PREVIOUSLY MET WITH FAILURE DUE TO THE DIFFICULTY INHERENT IN EXTRACTING ENERGY FROM THE CABLE. HOWEVER, THIS STUDY HAS DEMONSTRATED AT LEAST IN THEORY THAT WHEN THE CABLE IS OF A HOLLOW CONFIGURATION AND FILLED WITH A FLUID, IT CAN BE EMPLOYED AS A PERISTALTIC PUMP.

1978-0635 LYSEN L H
MEGAWATTS AND MEMOWATTS.
INGENIEUR 90(32-33): 602-605, AUGUST 10, 1978. (IN DUTCH)

THIS ARTICLE DESCRIBES WORK ON THE DEVELOPMENT OF 10-100 KW WINDMILLS OF WHICH 10,000 WOULD PROVIDE 1% OF THE ANNUAL POWER CONSUMPTION IN THE NETHERLANDS. BRIEF DESCRIPTIONS ARE GIVEN OF 18, 22, 30, 45, AND 132 KW MODELS

MADE IN DENMARK, 1.5 AND 4 KW MODELS MADE IN THE UK, 0.25 TO 15 KW MODELS MADE IN GERMANY, 0.1 TO 6 KW MODELS MADE IN FRANCE, AND A 1.6 KW MODEL MADE IN BELGIUM. FINANCIAL CALCULATIONS SHOW THAT WIND POWER IS NOT CHEAP.

1978-0636 MCCORMICK M E
WIND-WAVE POWER AVAILABLE TO A WAVE ENERGY CONVERTOR ARRAY.
OCEAN ENG. 5(2): 67-74, APRIL 1978.

A THEORETICAL EXPRESSION OF THE WAVE POWER STRIKING A RECTILINEAR ARRAY OF WAVE ENERGY CONVERSION DEVICES IN A RANDOM SEA IS DERIVED. THE THEORY IS THEN APPLIED TO A LINEAR ARRAY WHICH IS 1 KM IN LENGTH. FOR PURPOSES OF ILLUSTRATION, THE PIERSON-HEUMANN-JAMES DIRECTIONAL SPECTRUM IS USED TO REPRESENT THE RANDOM SEA. COMPARISON OF THE RESULTS OBTAINED BY USING THE PRESENT THEORY WITH THOSE OBTAINED FROM THE PREVIOUSLY ACCEPTED THEORY SHOWS SIGNIFICANT DIFFERENCES.

1978-0637 MACCREADY P B
ASSESSING THE LOCAL WIND FIELD FOR SITING.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 689-696.
CONF-770921/2

THIS REPORT DESCRIBES A PROGRAM TO DETERMINE IF DOPPLER ACOUSTIC WIND MEASUREMENTS PROVIDE ADEQUATE DATA AND ARE OPERATIONALLY SATISFACTORY FOR WIND GENERATOR SITING. THE PROGRAM INCLUDED ACTUAL FIELD EXPERIENCE IN ACQUIRING ACOUSTIC WIND DATA IN COMPLEX TERRAIN.

1978-0638 MCGOWAN J G, SARKISIAN P H
ADVANCED WIND FURNACE SYSTEMS FOR RESIDENTIAL AND AGRICULTURAL HEATING AND ELECTRICAL SUPPLY APPLICATONS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2074-2081.

THIS PAPER SUMMARIZES THE RESULTS OF AN ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF THREE ADVANCED WIND FURNACE HEATING SYSTEMS. THE WORK REPRESENTS AN EXTENSION OF PREVIOUS WORK ON WIND POWERED HEATING SYSTEMS AND EXTENDS THIS WIND ENERGY APPLICATION TO THE SUPPLY OF ELECTRICITY AS WELL AS SPACE AND HOT WATER ENERGY LOADS FOR RURAL RESIDENCES AND FARMS. DETAILS OF THE PROPOSED SYSTEMS AND THE ANALYTICAL MODELING OF THE OVERALL SYSTEM AND SUBCOMPONENTS ARE PRESENTED, AS WELL AS TYPICAL SYSTEM ENERGY AND ECONOMIC PERFORMANCE.

1978-0639 MCGREW P O
PALEONTOLOGICAL POTENTIAL OF FIVE WIND ENERGY SITES IN ALBANY AND CARBON COUNTIES, WYOMING.
NTIS, APRIL 14, 1978. 10 P.
PB80-125586

PALEONTOLOGICAL INVESTIGATION WAS CARRIED OUT AT FIVE PROPOSED SITES. NO PALEONTOLOGICAL RESOURCES WERE FOUND. NO ADVERSE EFFECTS WILL OCCUR.

1978-0640 MCKEE J S C
ELECTRICAL POWER FROM SUN AND WIND IN MANITOBA.
J. ENVIRON. SCI. HEALTH A13(8): 585-594, 1978.

THE POTENTIAL USEFULNESS OF SOLAR AND WIND ENERGY AS SOURCES OF ELECTRICAL POWER IS EXAMINED IN THE CONTEXT OF THE PROJECTED NEEDS OF THE PROVINCE OF MANITOBA. IT IS SUGGESTED THAT AS THE CAPITAL COSTS OF SOLAR, WIND AND NUCLEAR POWER PLANT CONSTRUCTION ARE LIKELY TO BECOME COMPARABLE WITHIN THE NEXT TWENTY YEARS, A REAL CHOICE EXISTS FOR THE CONSUMER, BECAUSE OF PURELY REGIONAL FACTORS.

1978-0641 MCVEIGH J C, PONTIN G W W
WIND/SOLAR PROJECT IN LOCAL AUTHORITY HOUSING.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 91-101.

THE INTEGRATION OF SOLAR HEATING AND A BANK OF FIXED DUCTED WINDMILLS TO PROVIDE PART OF THE ELECTRICITY DEMAND FOR A LOCAL HOUSING AUTHORITY SCHEME IS CONSIDERED. BASIC DESIGN PARAMETERS AND SPECIFICATIONS FOR THE SYSTEM ARE REVIEWED.

1978-0642 MACKLIS S L
SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION. APPENDICES. FINAL REPORT.
NTIS, FEBRUARY 1978. 284 P.
DSE-2332-T3

FLUCTUATION IN WIND SPEED CAUSES A VARIABILITY IN WIND POWER OUTPUT WHICH IS UNIQUE AMONG UTILITY LEVEL POWER SOURCES. IT IS IMPORTANT THAT THE FEASIBILITY AND THE CONSTRAINTS OF INSTALLING A SIGNIFICANT NUMBER OF WIND TURBINE GENERATORS INTO THE NATIONAL POWER SYSTEM BE INVESTIGATED. THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE EFFECT OF WIND VARIABILITY AND WIND MACHINES ON THE STABILITY OF THE ELECTRICAL POWER SYSTEM AND TO PROVIDE DESIGN INFORMATION FOR THE MACHINE DESIGNER AND THE UTILITY USER.

1978-0643 MACKLIS S L
SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 697-711.
CONF-770921/2

THE PURPOSE OF THE STUDY IS TO PROVIDE DESIGN INFORMATION FOR THE WECS MACHINE AND FOR THE ELECTRICAL UTILITY POWER SYSTEM INTERFACE WHICH WOULD ALLOW A SIGNIFICANT NUMBER OF WECS TO BE INCORPORATED INTO THE POWER SYSTEM. THE BASIC INGREDIENTS OF THE STUDY ARE WIND CHARACTERISTICS, WTG MACHINE CHARACTERISTICS, PROTECTION AND CONTROL FOR BOTH THE WECS AND THE UTILITY AND REPRESENTATIVE POWER SYSTEM CHARACTERISTICS.

1978-0644 MAGDALEN TURBINE FAILS.
WIND POWER DIG. NO. 13: 14, FALL 1978.

THE LARGEST WIND TURBINE ERECTED IN CANADA TO DATE, A 230 KW DAF DARRIEUS TURBINE, BROKE FREE OF ITS SUPPORTING GUY WIRES ON JULY 6, 1978, AND TWISTED INTO THE GROUND AT ITS TEST SITE ON MAGDALEN ISLAND, QUEBEC. THE TURBINE HAD BEEN OPERATING SINCE MAY 1977, PROVIDING AN AVERAGE 100 KW OF PEAK POWER FOR THE MAGDALEN ISLAND COMMUNITY IN THE GULF OF ST. LAWRENCE. THE ACCIDENT OCCURRED AS THE RESULT OF REPAIR WORK ON THE TURBINE'S BEARINGS THE DAY BEFORE. DURING THE REPAIR THE DISC BRAKES WERE REMOVED, AND REMAINED DISASSEMBLED OVERNIGHT SO

THAT REPAIRS COULD CONTINUE THE NEXT DAY. UNDER UNUSUAL CONDITIONS, A 25 MPH WIND CAUSED THE TURBINE TO SELF-START, PRECIPITATING THE ACCIDENT.

1978-0645 MALET L M
ON THE CONSIDERATION OF WIND ENERGY IN BELGIUM.
INST. R. METEOROL. BELG. PUBL. SER. G. NO. 95: 3-25, 1978. (IN FRENCH)

AFTER SOME GENERALITIES RELATIVE TO THE BEHAVIOUR OF THE WIND WITHIN THE PLANETARY BOUNDARY LAYER, A CHAPTER IS DEVOTED TO THE ANNUAL VARIATION OF THE MONTHLY MEAN WIND SPEED COMPUTED FROM THE OBSERVATIONS MADE AT BELGIAN CLIMATOLOGICAL AND SYNOPTIC STATIONS AS WELL AS ON TALL METEOROLOGICAL MASTS. THE FOLLOWING CHAPTER DEALS WITH THE DISTRIBUTIONS OF THE MEAN WIND SPEEDS AND GIVES THE PROPORTION OF WEAK AND STRONG WINDS. THE LAST CHAPTER TREATS THE PROBLEM OF THE AVAILABLE POWER FROM THE WIND AND OF ITS GEOGRAPHICAL VARIATION. THE POWERS HAVE BEEN COMPUTED FROM THE ANNUAL MEAN WIND SPEEDS AND DO NOT TAKE THE TURBULENT ENERGY INTO ACCOUNT; THE INFLUENCE OF THIS LATTER IS HOWEVER ROUGHLY ESTIMATED.

1978-0646 MARKS A M
CHARGED AEROSOL WIND/ELECTRIC POWER GENERATOR.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 854-864.
CONF-770921/2

THE WIND/ELECTRIC POWER GENERATOR IS A CHARGED AEROSOL ELECTROGASDYNAMIC GENERATOR AT ATMOSPHERIC PRESSURE WHICH IS POWERED DIRECTLY BY THE WIND. IT COMPRISES A LARGE AREA ELECTRODE SCREEN OF SPECIAL CONSTRUCTION MOUNTED IN A VERTICAL PLANE TO INTERCEPT THE WIND, WHICH EMITS CHARGED WATER DROPLETS INTO THE WIND STREAM AS A WIND/ELECTRIC POWER TRANSDUCER. WIND/ELECTRIC POWER GENERATORS WILL BE INSTALLED AT SUITABLE GEOGRAPHICAL LOCATIONS (UPDRAFTS AT MOUNTAIN RANGES, ALONG SEASHORE FRONTS, ETC.) WHERE THERE IS A STEADY FLOW OF AIR IN ONE DIRECTION IN THE 5 TO 20 M/SEC VELOCITY RANGE. A CHARGED AEROSOL WIND/ELECTRIC POWER RESEARCH AND DEVELOPMENT PROGRAM RELATES TC THE DIRECT CONVERSION OF WIND POWER TO ELECTRIC POWER THROUGH THE MEDIUM OF CHARGED WATER DROPLETS. THEORETICAL AND EXPERIMENTAL WORK WAS DONE TO DETERMINE AN EFFICIENT CHARGING METHOD.

1978-0647 MARRS R W
EOLIAN FEATURES AS INDICATORS OF HIGH-WIND AREAS IN THE PACIFIC NORTHWEST. PROGRESS REPORT.
NTIS, MAY 1978. 8 P.
RLO/2343-78/5

COLOR COMPOSITE LANDSAT IMAGES OF THE FIVE-STATE PACIFIC NORTHWEST AREA (WASHINGTON, OREGON, IDAHO, MONTANA, AND WYOMING) WERE INTERPRETED TO IDENTIFY EOLIAN LANDFORMS THAT MIGHT SERVE AS INDICATORS OF AREAS OF HIGH WIND ENERGY WITHIN THAT REGION. EOLIAN LANDFORMS IDENTIFIED INCLUDED SAND DUNES, PLAYAS, AND SCOUR FEATURES. THESE FEATURES WERE IDENTIFIED AND THEIR LOCATIONS WERE THEN PLOTTED. SEVERAL SMOKE PLUMES WERE ALSO IDENTIFIED ON THE LANDSAT IMAGES. THESE ARE INDICATED AS AEROSOLS. THE FEATURES HAVE NOT YET BEEN MAPPED IN DETAIL OR FIELD CHECKED; THEREFORE, THE MAP PRESENTS NO QUANTITATIVE ESTIMATES OF WIND ENERGY AND MUST BE CONSIDERED A PRELIMINARY MAP. THE MAP SERVES AS AN INVENTORY OF PROMINENT EOLIAN FEATURES, MOST OF WHICH OCCUR IN THE ARID BASIN AREAS. THE BROAD DISTRIBUTION OF THESE FEATURES GIVES AN INDICATION OF THE USEFULNESS OF EOLIAN LANDFORMS AS INDICATORS OF WIND CHARACTERISTICS IN THE PACIFIC NORTHWEST.

1978-0648 MARRS R W, MARWITZ J
LOCATING AREAS OF HIGH WIND ENERGY POTENTIAL BY REMOTE OBSERVATION OF EOLIAN GEOMORPHOLOGY AND TOPOGRAPHY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 307-320.
CONF-770921/1

EOLIAN LANDFORMS ARE PRESENT OVER MUCH OF THE WORLD. THEY FORM ON ANY LAND SURFACE WHERE THE CLIMATE IS WINDY AND RECORD THE EFFECT OF WIND ACTION. THEY ALSO RECORD FLUCTUATIONS IN CLIMATE AND THE INFLUENCE OF MAN ON THE LAND SURFACE. THE PURPOSE OF THIS RESEARCH IS TO DEVELOP AN EFFICIENT PROCEDURE FOR INFERRING WIND CHARACTERISTICS THROUGH INTERPRETATION OF EOLIAN LANDFORMS.

1978-0649 MARSH W D
TECHNICAL AND ECONOMIC ASPECTS OF WIND GENERATION IN ELECTRIC UTILITY SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 723-727.
CONF-770921/2

THE OVERALL OBJECTIVES OF THIS STUDY WERE TO PERFORM TECHNICAL AND ECONOMIC ANALYSES OF A WIDE RANGE OF WIND ENERGY SYSTEMS (WES) AS THEY WOULD BE EXPECTED TO PERFORM IF INSTALLED IN A SPECIFIC ELECTRIC UTILITY SYSTEM IN THE YEAR 1990. TO THAT END, SEVERAL SPECIFIC OBJECTIVES WERE DEFINED: (1) DEVELOP A METHODOLOGY FOR EVALUATING WES GENERATION CAPABILITY AS AN INTEGRAL PART OF AN ELECTRIC UTILITY SYSTEM; (2) EXERCISE THE METHODOLOGY IN A REAL ELECTRIC UTILITY SYSTEM TO EVALUATE A NUMBER OF ALTERNATIVE WES DESIGNS; (3) ESTIMATE THE VALUE OF WES CAPABILITY IN A REAL ELECTRIC UTILITY SYSTEM; (4) RECOMMEND R AND D ACTIVITIES TO ACHIEVE VIABILITY OF WES GENERATION ON ELECTRIC UTILITY SYSTEMS; AND (5) ESTIMATE PENETRATIONS AND ASSOCIATED IMPACTS IF VIABILITY IS ACHIEVED.

1978-0650 MARSH W D
UTILITY APPLICATIONS OF WIND POWER PLANTS.
ENERGY TECHNOLOGY CONFERENCE, 5TH, WASHINGTON, D.C., FEBRUARY 27-MARCH 1, 1978. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., APRIL 1978. P. 83-96.

THE PROCEDURES AND PRELIMINARY RESULTS ARE REPORTED OF A STUDY BEING PERFORMED BY THE ELECTRIC UTILITY SYSTEMS ENGINEERING DEPARTMENT OF THE GENERAL ELECTRIC COMPANY FOR THE ELECTRIC POWER RESEARCH INSTITUTE, ENTITLED "REQUIREMENTS ASSESSMENT OF WIND ENERGY SYSTEMS." THE OBJECTIVES OF THIS STUDY WERE AS FOLLOWS: (1) TO DEVELOP A METHODOLOGY FOR THE EVALUATION OF WIND ENERGY SYSTEMS (WES) OPERATING AS PARTS OF ELECTRIC UTILITY SYSTEMS; (2) TO UTILIZE THIS METHODOLOGY IN EVALUATING WIND POWER PLANTS IN ACTUAL UTILITY SYSTEMS; (3) TO RECOMMEND SUITABLE DIRECTIONS FOR RESEARCH AND DEVELOPMENT WORK TO ATTAIN ECONOMIC AND OPERATIONAL VIABILITY OF WIND POWER PLANTS IN UTILITY SYSTEMS; AND (4) TO MAKE PRELIMINARY PENETRATION AND IMPACT ANALYSES OF WIND ENERGY. THREE AREAS OF THE COUNTRY HAVE BEEN SELECTED FOR THIS STUDY: WESTERN KANSAS, NORTHERN NEW YORK, AND WESTERN OREGON. THE WORK ON THE WESTERN KANSAS AREA HAS BEEN COMPLETED AND WORK IS CONTINUING ON THE OTHER TWO AREAS.

1978-0651 MARSTON C H
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS.
NEW YORK, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 1978.

FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. 246 P.

THE FOLLOWING TOPICS WERE DEALT WITH: WIND TURBINES; MAGNETOHYDRODYNAMIC CONVERTORS; COMPRESSED AIR ENERGY STORAGE; AND OCEAN THERMAL ENERGY CONVERSION.

1978-0652 MARTINEZ-SANCHEZ M, LABUSZEWSKI T
WIND ENERGY CONVERSION. VOLUME 4. DRIVE SYSTEM DYNAMICS. ASRL-TR-184-10.
NTIS, SEPTEMBER 1978. 197 P.
COO-4131-T1(VOL.4)

THE DYNAMICS OF THE DRIVE SYSTEM AND VARIOUS APPROACHES TO POWER TRANSMISSION ARE DESCRIBED. THE EFFECTS ON PERFORMANCE OF USING A CONSTANT ROTOR SPEED AS OPPOSED TO A ROTOR SPEED VARYING WITH THE WIND SPEED ARE DISCUSSED FOR VARIOUS ROTOR OPERATING SCHEDULES AND TYPICAL WIND DISTRIBUTIONS. THE DYNAMICS OF THE COMBINED ROTOR, ALTERNATOR, AND DRIVE SYSTEM ARE ANALYZED. CONDITIONS WHICH COULD LEAD TO ELECTRO-DYNAMIC INSTABILITIES AND DESYNCHRONIZATION ARE DISCUSSED AS WELL AS MEANS FOR STABILIZING THE SYSTEM. THE DYNAMICS OF THE DRIVE SYSTEM AND IMPORTANT DESIGN CONDITIONS FOR VARIOUS DRIVE SYSTEMS ARE DISCUSSED, SUCH AS LOCATION OF THE ALTERNATORS, USE OF HYDRAULIC DRIVE SYSTEMS AND SMOOTHING TECHNIQUES.

1978-0653 WILSON R E
DARRIEUS ROTOR AERODYNAMICS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 584-594.
CONF-770921/2

OREGON STATE UNIVERSITY IN PARTNERSHIP WITH AEROVIRONMENT HAS BEEN ENGAGED IN THE DEVELOPMENT OF PERFORMANCE ANALYSIS OF WIND POWERED MACHINES SINCE 1973. UNIQUE PERFORMANCE MODELS HAVE BEEN DEVELOPED FOR VARIOUS TURBINES. THIS REPORT IS DEVOTED TO THE DARRIEUS ROTOR AERODYNAMICS.

1978-0654 MATZEN R, MOELLER F
HOT-WATER GENERATORS, WATER BRAKES, FOR WIND POWER PLANTS.
NTIS, FEBRUARY 1978. 61 P. (IN DANISH)
NP-23622

HOT WATER GENERATORS FOR CONVERTING MECHANICAL POWER FROM A WIND-POWER PLANT TO HOT WATER MAY BE OF VERY SIMPLE DESIGN. THE CHARACTERISTIC FOR THE POWER COMSUMPTION FOLLOWS THE 3RD POWER OF THE ROTOR SPEED, AND THE ROTOR DIAMETER IS THE MAIN FACTOR IN SETTING THE CONSUMPTION LEVEL. BASICALLY WATER IS USED AS THE BRAKE FLUID. IF HIGHER TEMPERATURES ARE DESIRED, OIL MAY BE USED. EXPERIMENTS ON SIMPLE NONADJUSTABLE GENERATORS BUILT IN A 135 LITRE TANK ARE DESCRIBED. IT IS SHOWN THAT FOR THIS SIZE THE TANK MAY BE OPEN IN THE TOP WITHOUT ANY SPECIAL AXLE-TIGHTENING AND EXPANSION SYSTEMS FOR POWER CONSUMPTIONS UP TO 25 KW. AN OPEN UNIT FOR USE IN A HEAT-BUFFERTANK OR A HIGHLY INSULATED HOT-WATER ACCUMULATOR TANK IS ALSO DESCRIBED.

1978-0655 MAYER D
NORTH WIND'S KW HIGH RELIABILITY WTG PROGRAM.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 50-52.

SPECIFICATIONS ARE PRESENTED FOR A 1-2 KW HIGH RELIABILITY HORIZONTAL-AXIS PROPELLER-TYPE WIND TURBINE.

1978-0656 MAYER-SCHWINNING W
GROSS WIND POWER OF CENTRAL EUROPE AND ITS MAXIMUM UTILIZATION THROUGH OPTIMUM DEVELOPMENT OF WIND POWER PLANTS.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 169-185. (IN GERMAN)

WHEN THE INCREASING STRAIN ON THE ENVIRONMENT AND THE DECREASING STORED ENERGY DEPOSITS ARE TAKEN INTO CONSIDERATION THE WIND ENERGY THROUGHOUT CENTRAL-EUROPE WILL BE REESTIMATED AND THE MOST EFFICIENT TECHNICAL POSSIBILITIES WILL BE SHOWN FOR ITS MAXIMUM UTILIZATION AS WELL AS THE ENERGY POTENTIAL OF AREAS WITH HIGH WINDS.

1978-0657 MAYO L H
SOME LEGAL-INSTITUTIONAL IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS).
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 393-401.
CONF-770921/1

WHILE THERE ARE A GREAT NUMBER OF LEGAL CONCERNS RELEVANT TO THE IMPLEMENTATION OF LAND-BASED WECS, RELATIVELY FEW OF THESE ARE SERIOUS OVERALL IMPEDIMENTS. SUCH SERIOUS CONSTRAINTS AS DO EXIST ARE OFTEN CLOSELY RELATED TO SOCIAL, ECONOMIC AND TECHNICAL PROBLEMS INVOLVED WITH WECS, AND USUALLY ONLY WORK TO INHIBIT CERTAIN PARTICULAR WECS APPLICATIONS. THIS REPORT OUTLINES THE MORE SUBSTANTIAL IMPEDIMENTS, AND JUSTIFIES VARIOUS CONCLUSIONS.

1978-0658 MELISS M
REGENERATIVE SOURCES OF ENERGY.
BRENNST.-WAERME-KRAFT 30(4): 151-156, APRIL 1978. (IN GERMAN)

THE MAIN INTERESTS IN SHORT- OR MEDIUM-TERM DEVELOPMENT ARE HEAT PUMPS, LOW TEMPERATURE COLLECTOR PLANTS, AND THE CONVERSION OF WIND ENERGY. BEYOND THESE, AND TO BE TREATED AS LONG-TERM PROJECTS, ARE HOT-DRY-ROCK, PHOTOLYSIS, SOLAR ENERGY, BIOGAS AND HIGH-TEMPERATURE COLLECTOR PLANTS. A COMPREHENSIVE ANALYSIS IS GIVEN OF THE VARIOUS POSSIBILITIES, PROBABLE DEVELOPMENT TIME, AND COSTS AS APPLYING TO THE GERMAN DEMOCRATIC REPUBLIC.

1978-0659 MELTON W C
LOSS OF LOAD PROBABILITY AND CAPACITY CREDIT CALCULATIONS FOR WECS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 728-744.
CONF-770921/2

THE NET CONCLUSION IN DISCUSSIONS OF WECS IMPLEMENTATIONS HAS OFTEN BEEN THAT THE INSTALLATION OF A WECS WILL NOT DISPLACE THE INSTALLATION OF ANY AMOUNT OF CONVENTIONAL CAPACITY. HOWEVER, USING THE SAME GENERATING SYSTEM RELIABILITY INDICES THAT UTILITY PLANNERS RELY ON, IT CAN BE SHOWN THAT TYPICAL WECS INSTALLATIONS WILL INDEED INCREASE THE OVERALL SYSTEM RELIABILITY AND, THEREFORE, THAT THERE IS SOME CONVENTIONAL CAPACITY

DISPLACEMENT DUE TO WECS. TO DO THIS CREDIBLY REQUIRES THAT THE INDEX BE AN HOURLY INDEX AND THAT THE WECS FORCED OUTAGE RATE DEPEND ON BOTH TIME OF DAY AND TIME OF YEAR. IN THIS PAPER, A METHOD OF CALCULATING THE CAPACITY EQUIVALENCY OF A WECS USING LOSS OF LOAD PROBABILITY (LOLP) AS THE INDEX IS EXPLAINED AND AN EXAMPLE IN THE CONTEXT OF THE OAHU SYSTEM OF THE HAWAIIAN ELECTRIC COMPANY IS PRESENTED.

1978-0660 MERCADIER Y
CALCULATION OF THE GEOMETRY AND PERFORMANCE OF A HIGH-SPEED WIND ROTOR.
WIND ENG. 2(1): 25-36, 1978.

WIND ROTOR DESIGN HAS HITHERTO BEEN BASED, PARTICULARLY FOR LOWER POWERS, UPON A COMPROMISE BETWEEN HIGH EFFICIENCY AND SIMPLICITY OF CONSTRUCTION. MODERN MATERIALS AND FABRICATION TECHNIQUES, HOWEVER, PERMIT THE ELIMINATION OF THIS COMPROMISE AND THE CONSTRUCTION OF ROTORS OF MAXIMUM EFFICIENCY. THE PRIMARY CONSIDERATION IN A WIND POWER INSTALLATION BEING THE PROPORTION OF ENERGY EXTRACTED FROM THE WIND RATHER THAN THE ACTUAL POWER OUTPUT, IT BECOMES NECESSARY TO ASSESS THE PERFORMANCE OF THE TURBINE OVER ITS WHOLE RANGE OF OPERATING CONDITIONS. IT IS THEN POSSIBLE TO DESIGN A TRANSMISSION SYSTEM APPROPRIATE TO THE FUNCTION OF THE INSTALLATION AND TO SPECIFY OPERATING LIMITS. THIS SEQUENCE DEPENDS UPON THE ACCURATE INITIAL CALCULATION OF ROTOR GEOMETRY AND PERFORMANCE.

1978-0661 MERONEY R N, BOWEN A J, LINDLEY D, PEARSE J R
WIND CHARACTERISTICS OVER COMPLEX TERRAIN: LABORATORY SIMULATION AND FIELD MEASUREMENTS AT RAKAIA GORGE, NEW ZEALAND.
AUCKLAND, NEW ZEALAND, NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, OCTOBER 1978. 237 P.
NZERDC--P5

BOTH TERRACED AND CONTOURED MODELS OF THE RAKAIA RIVER GORGE REGION IN NEW ZEALAND WERE PREPARED TO AN UNDISTORTED GEOMETRIC SCALE OF 1:5000. THE CONTOURED MODEL WAS EXAMINED FOR THREE SEPARATE SURFACE ROUGHNESS CONDITIONS--A SURFACE TEXTURED TO REPRESENT TYPICAL PADDOCK GRASS ROUGHNESS ONLY, THE SAME SURFACE WITH ZERO-POROSITY SHELTERBELTS ADDED, AND THE SAME SURFACE WITH POROUS SHELTERBELTS ADDED.

1978-0662 MERONEY R N, BOWEN A J, LINDLEY D, PEARSE J R
WIND CHARACTERISTICS OVER COMPLEX TERRAIN: LABORATORY SIMULATION AND FIELD MEASUREMENTS AT RAKAIA GORGE, NEW ZEALAND. PART II. FINAL REPORT.
NTIS, MAY 1978. 243 P. ALSO: FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, CER77-78RNM29, MAY 1978. 239 P.
RLO/2438-77/2

A SURVEY PROGRAM IS DESCRIBED WHICH UTILIZES LABORATORY SIMULATION OF THE RELEVANT WIND CHARACTERISTICS IN A METEOROLOGICAL WIND TUNNEL. TO EVALUATE THE VALIDITY OF LABORATORY SIMULATION METHODS AND PROVIDE A CONFIDENCE MEASUREMENT BOUND FOR LABORATORY DATA, A LIMITED FIELD MEASUREMENT PROGRAM WAS SIMULTANEOUSLY CONDUCTED. IN THIS STUDY BOTH TERRACED AND CONTOURED MODELS OF THE RAKAIA RIVER GORGE REGION WERE PREPARED TO AN UNDISTORTED GEOMETRIC SCALE OF 1:5000. THE CONTOURED MODEL WAS EXAMINED FOR THREE SEPARATE SURFACE ROUGHNESS CONDITIONS: A SURFACE TEXTURED TO REPRESENT TYPICAL PADDOCK GRASS ROUGHNESS ONLY, THE SAME SURFACE WITH ZERO-POROSITY SHELTERBELTS ADDED, AND THE SAME SURFACE WITH POROUS SHELTERBELTS ADDED.

1978-0663 MERONEY R N, SANDBORN V A, BOUWMEESTER R J B, CHIEN H C, RIDER M
SITES FOR WIND-POWER INSTALLATIONS: PHYSICAL MODELING OF THE INFLUENCE OF HILLS, RIDGES AND COMPLEX TERRAIN ON WIND SPEED AND TURBULENCE. PART 1. EXECUTIVE SUMMARY.
NTIS, JUNE 1978. 102 P.
RLO/2438-78/1

WIND-TUNNEL MODEL MEASUREMENTS HAVE BEEN PERFORMED TO STUDY THE INFLUENCE OF TOPOGRAPHY PROFILE, SURFACE ROUGHNESS AND STRATIFICATION ON THE SUITABILITY OF VARIOUS COMBINATIONS OF THESE VARIABLES FOR WIND-POWER SITES. FOR THE RANGE OF EXAMINED CASES (LARGE TURBULENCE INTEGRAL SCALES WITH RESPECT TO SURFACE FEATURE SCALES) THE FLOW IS DOMINATED BY INVISCID DYNAMICS. DETAILED TABLES OF VELOCITY, TURBULENCE INTENSITY, PRESSURE, SPECTRA, ETC., HAVE BEEN PREPARED TO GUIDE NUMERICAL MODEL DESIGN AND EXPERIMENTAL RULE OF THUMB CONSTRUCTIONS. CASES INCLUDE HILL ASPECT RATIOS RANGING FROM 1/2 TO 1/20, NEUTRAL AND STRATIFIED FLOWS, TWO- AND THREE-DIMENSIONAL SYMMETRIC RIDGES, SIX ALTERNATE HILL AND ESCARPMENT SHAPES, AND A VARIETY OF WINDWARD VERSUS LEEWARD SLOPE COMBINATIONS TO EVALUATE RIDGE SEPARATION CHARACTERISTICS.

1978-0664 MERONEY R N, SANDBORN V A
SITES FOR WIND POWER INSTALLATIONS: PHYSICAL MODELING OF THE INFLUENCE OF HILLS, RIDGES AND COMPLEX TERRAIN ON WIND SPEED AND TURBULENCE.
NTIS, JUNE 1978. 211 P.
RLO/2438-78/3

A SYSTEMATIC WIND-TUNNEL STUDY OF FLOW OVER TWO-DIMENSIONAL HILLS WAS MADE. THE FLOW OVER SIX DIFFERENT TWO-DIMENSIONAL HILLS WAS EVALUATED FOR IDENTICAL APPROACH CONDITIONS. THE RESULTS INDICATED THAT THE TRIANGULAR AND SINUSOIDAL HILLS PRODUCED THE GREATEST SPEEDUP OF THE AIRSTREAM IN THE REGION NEAR THE SURFACE. THE MORE ABRUPT MODELS PRODUCED LESS OF AN INCREASE IN LOCAL VELOCITY.

1978-0665 MERRIAM M F
WIND ENERGY IN DENMARK.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 53-61.

WIND ENERGY DEVELOPMENT PROGRAMS IN DENMARK ARE REVIEWED.

1978-0666 MERRIAM M F
WIND, WAVES, AND TIDES.
ANNU. REV. ENERGY 3: 29-56, 1978.

THIS PAPER REVIEWS THE PRESENT STATE OF KNOWLEDGE AND EXPERIENCE WITH WIND, WAVE, AND TIDAL ENERGY, AND ESTIMATES THE MAGNITUDE, IN ENERGY TERMS, OF POSSIBLE FUTURE USE. THE THREE SOURCES ARE COMPARED QUALITATIVELY. IN THE MEDIUM TERM THE SOURCE WITH THE BEST PROSPECT FOR A SUBSTANTIAL CONTRIBUTION IS WIND.

1978-0667 MILBORROW D J
PERFORMANCE PREDICTION METHODS FOR HORIZONTAL AXIS WIND TURBINES.
WIND ENG. 2(3): 165-175, 1978.

A METHOD OF ASSESSING THE PERFORMANCE CHARACTERISTICS OF HORIZONTAL AXIS WIND TURBINES HAS BEEN DEVELOPED,

USING THE AEROFOIL THEORY WHICH IS APPLIED TO AXIAL FLOW FANS. THE CAPABILITIES OF THE METHOD ARE COMPARED WITH THOSE OF THE PROPELLER THEORY NORMALLY USED FOR WINDMILL PERFORMANCE ASSESSMENT. WEAKNESSES IN THE PROPELLER THEORY ARE IDENTIFIED AND IT IS CONCLUDED THAT THE FAN ANALYSIS TECHNIQUE HAS CERTAIN ADVANTAGES AND LENDS ITSELF TO FURTHER REFINEMENT. BOTH THEORIES HAVE BEEN APPLIED TO A PARTICULAR WINDMILL DESIGN FOR WHICH FIELD MEASUREMENTS ARE AVAILABLE (THE LT CO. AEROGENERATOR AT ALDBOROUGH). FAN THEORY PREDICTS RATHER HIGHER PEAK PERFORMANCE IN AGREEMENT WITH LT CO. OBSERVATIONS THAT DESIGN PERFORMANCE HAS BEEN EXCEEDED.

1978-0668 MILLER C A
LATEST AND BIGGEST IN WINDCHARGERS.
MECH. ILLUS. 74(601): 106-107, JUNE 1978.

INFORMATION ON THE 200 KW WIND TURBINE SPONSORED BY DOE AND NASA AND LOCATED NEAR CLAYTON, NEW MEXICO, IS PRESENTED.

1978-0669 MILLER D W
WIND DRIVEN POWER MECHANISM.
U.S. PATENT NO. 4,093,398. JUNE 6, 1978. 4 P.

A BASE MEMBER IS DISPOSED LONGITUDINALLY IN THE DIRECTION OF WIND MOVEMENT AND HAS A PAIR OF PARALLEL ENDLESS CARRIERS ON OPPOSITE SIDES THEREOF. THESE CARRIERS ARE ARRANGED TO MOVE OVER AN UPPER ARCUATE RUN AND ALONG A LOWER STRAIGHT RETURN RUN. THE UPPER ENDS OF A NUMBER OF SAIL-TYPE VANES ARE CONNECTED BETWEEN THE TWO ENDLESS CARRIERS, AND THE LOWER ENDS OF THE VANES ARE LIFTED AT THE ARCUATE PORTION OF THE CARRIERS TO FORM SAILS AND ARE COLLAPSED IN THE RETURN RUN, THE UPPER ENDS OF THE VANES MOVING AROUND THE LOWER ENDS THEREOF WITH THE LATTER ENDS ROTATING WITH THE IDLERS.

1978-0670 MILLER R H, DUGUNDJI J, MARTINEZ-SANCHEZ M
DESIGN TRADE-OFFS AS INFLUENCED BY ROTOR, TOWER, AND DRIVE DYNAMICS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 574-583.
CONF-770921/2

THIS RESEARCH REPORT BUILDS ON THE ANALYTICAL BASIS AND IS PRIMARILY CONCERNED WITH REDUCING THE COMPLEX ANALYSES TO A FORM IN WHICH THEY CAN BE READILY USED FOR TRADE-OFF ANALYSES, IN RELATION TO THE DEVELOPMENT OF A METHOD FOR ANALYZING WIND TURBINE AERODYNAMICS IN THE PRESENCE OF WIND SHEAR; THE DEVELOPMENT OF A THEORY FOR THE DYNAMICS OF A COUPLED WIND TURBINE/SYNCHRONOUS ALTERNATOR; AND A METHOD FOR ANALYZING THE AEROELASTIC STABILITY OF A ROTOR IN THE PRESENCE OF GUSTS AND OTHER LARGE DISTURBANCES.

1978-0671 MILLER R H, DUGUNDJI J, MARTINEZ-SANCHEZ M, GOHARD J, CHUNG S
METHODS FOR DESIGN ANALYSIS OF HORIZONTAL AXIS WIND TURBINES. WIND ENERGY CONVERSION.
NTIS, SEPTEMBER 1978. 259 P.
COO-4131-T1(VOL.1)

THE MATERIAL IS PRESENTED AS FAR AS POSSIBLE IN THE FORM OF CHARTS, EITHER TABLES OR GRAPHS, FROM WHICH SPECIFIC DESIGN INFORMATION MAY BE SELECTED OR TRENDS DETERMINED WITHOUT THE NEED FOR COMPUTATIONAL FACILITIES. FOR DESIGN PURPOSES, OR WHEN ATTEMPTING TO CORRECT A DESIGN DEFICIENCY, TRENDS ARE FREQUENTLY MORE USEFUL THAN ABSOLUTE INFORMATION. SINCE IT IS IMPOSSIBLE TO COVER ALL POSSIBLE CONFIGURATIONS FOR A SYSTEM WITH AS MANY PARAMETERS AS A WIND TURBINE, INTERPOLATION WILL BE NECESSARY IN MANY CASES.

1978-0672 MILLER R H, DUGUNDJI J, MARTINEZ-SANCHEZ M, GOHARD J, CHUNG S, HUMES T
WIND ENERGY CONVERSION. VOLUME 2. AERODYNAMICS OF HORIZONTAL AXIS WIND TURBINES. ASRL-TR-184-8.
NTIS, SEPTEMBER 1978. 213 P.
COO-4131-T1(VOL.2)

THE BASIC AERODYNAMIC THEORY OF THE WIND TURBINE IS PRESENTED, STARTING WITH THE SIMPLE MOMENTUM THEORY BASED ON UNIFORM INFLOW AND AN INFINITE NUMBER OF BLADES. THE BASIC VORTEX THEORY IS THEN DEVELOPED. FOLLOWING THESE BASICS, THE MORE COMPLETE MOMENTUM THEORY, INCLUDING SWIRL, NON-UNIFORM INFLOW, THE EFFECT OF A FINITE NUMBER OF BLADES, AND EMPIRICAL CORRECTION FOR THE VORTEX RING CONDITION IS PRESENTED. THE MORE COMPLETE VORTEX THEORY IS PRESENTED WHICH INCLUDES UNSTEADY AERODYNAMIC EFFECTS BUT BASED ON A SEMI-RIGID WAKE. METHODS OF APPLYING THIS THEORY FOR PERFORMANCE ESTIMATION ARE DISCUSSED AS WELL AS FOR THE PURPOSE OF COMPUTING TIME VARYING AIRLOADS DUE TO WINDSHEAR AND TOWER INTERFERENCE.

1978-0673 MILLER R, DUGUNDJI J, CHOPRA I, SHEU D, WENDELL J
WIND ENERGY CONVERSION. VOLUME 3. DYNAMICS OF HORIZONTAL AXIS WIND TURBINES. ASRL-TR-184-9.
NTIS, SEPTEMBER 1978. 149 P.
COO-4131-T1(VOL.3)

THE UNDERLYING THEORY IS PRESENTED FOR DETERMINING BLADE AND ROTOR/TOWER VIBRATION AND DYNAMIC STABILITY CHARACTERISTICS. THE DYNAMIC ANALYSIS OF HORIZONTAL AXIS TURBINES MAY BE DIVIDED INTO TWO CONVENIENT AREAS, NAMELY, (A) THE INVESTIGATION OF THE AEROELASTIC AND RESPONSE OF A SINGLE BLADE ON A RIGID TOWER, AND (B) THE INVESTIGATION OF THE MECHANICAL STABILITY AND VIBRATIONS OF THE ROTOR SYSTEM ON A FLEXIBLE TOWER. WITH A REASONABLE UNDERSTANDING OF THE BEHAVIOR IN THESE TWO AREAS, THE COMPLETELY COUPLED BLADE-TOWER AEROELASTIC SYSTEM CAN BE BETTER UNDERSTOOD, AND DYNAMIC PROBLEMS CAN BE BETTER ASSESSED.

1978-0674 MINARDI J E, LAWSON M O
PROGRESS IN ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR RESEARCH.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 843-853.
CONF-770921/2

THE ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS EXCEPT POSSIBLY FOR DIVERTING IT INTO THE WIND. IN AN EFD GENERATOR CHARGES OF ONE POLARITY ARE SEEDED INTO A FLOWING NEUTRAL GAS. VISCOUS INTERACTIONS DRIVE THE CHARGED PARTICLES AGAINST AN ELECTRICAL POTENTIAL AND PRODUCE D.C. POWER. THIS REPORT DIAGRAMS A SIMPLE EFD WIND GENERATOR WITH A BREAKDOWN ON THE ACTUAL EXPERIMENTAL PROGRAM.

1978-0675 MINARDI J E, LAWSON M O
RESEARCH IN THE ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR.
NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE, NAECON '78, DAYTON, OHIO, MAY 16-18, 1978. NEW YORK, IEEE 78CH1336-7, 1978. P. 869-873.

THE ELECTROFLUID DYNAMIC WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS. CONVENTIONAL WIND TURBINES ARE CURRENTLY LIMITED IN SIZE, WITH THE GREATEST DIAMETER PRESENTLY ENVISAGED BEING 300 TO 400 FEET. FOR THE EFD WIND DRIVEN GENERATOR THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE AND FAR LARGER POWERS THAN CONVENTIONAL SYSTEMS CAN BE REALIZED.

1978-0676 MOHAN N, RIAZ M
WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATORS FOR RESIDENTIAL ELECTRIC HEATING.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, JANUARY 29-FEBRUARY 3, 1978. NEW YORK, IEEE, 1978. P. 50-57.

A SCHEME USING A WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATOR IS DESCRIBED TO SUPPLY FREQUENCY-INSENSITIVE HEATING LOADS. DESPITE THE WIDE VARIATION IN ROTOR SPEED, THE SLIP REMAINS SMALL, THEREBY PROVIDING A HIGH EFFICIENCY OPERATION. THE ELECTRIC POWER OUTPUT CAN BE CONTROLLED OVER A SUBSTANTIAL RANGE TO MATCH THE WIND-TURBINE SPEED-POWER CHARACTERISTIC BY ADJUSTING THE EXCITATION-CAPACITANCE. A STEADY-STATE ANALYSIS OF SELF-EXCITATION IS PRESENTED. COMPARISON OF THE PREDICTED BEHAVIOR WITH THE EXPERIMENTAL RESULTS SHOWS GOOD AGREEMENT BETWEEN THE TWO.

1978-0677 MOHR E
WINDPOWER PLANT IN OPERATION.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 3(6): 18-22, NOVEMBER-DECEMBER 1978. (IN GERMAN)

THE ARTICLE GIVES A SURVEY OF THE WINDPOWER PLANTS WHICH ARE ALREADY IN OPERATION, WHICH DOES NOT CLAIM TO BE COMPLETE. THE VARIOUS PLANTS IN GERMANY AND DENMARK ARE DESCRIBED WITH REGARD TO THEIR OUTPUT, THEIR CONSTRUCTION AND THEIR MANUFACTURING COSTS. THERE ARE REFERENCES TO THE MANUFACTURERS OF INDIVIDUAL PLANTS. THE RANGE OF APPLICATION OF THE PLAN IS POWER GENERATION, E.G. FOR SPACE HEATING, AND ALSO FOR DRIVING WATER PUMPS AND COMPRESSORS.

1978-0678 MOLLY J P
WINDENERGIE IN THEORIE UND PRAXIS. GRUNDLAGEN UND EINSATZ. (WIND ENERGY IN THEORY AND PRACTICE. BASICS AND APPLICATIONS.)
KARLSRUHE, GERMANY, F.R., C.F. MUELLER, 1978. 138 P. (IN GERMAN)

THE FIRST CHAPTER OF THE BOOK DEALS WITH THE THEORY OF WIND TURBINES. AFTER AN OUTLINE OF THE DISTRIBUTION OF WIND CURRENTS ON THE EARTH AND CHARACTERISTIC FEATURES OF WIND CURRENTS, THE THIRD CHAPTER THEN DISCUSSES THE DESIGN OF WIND ENERGY CONVERTERS. THE 4TH AND 5TH CHAPTERS GIVE A SURVEY OF PROJECTS REALIZED AND OF THE RESULTS OF RESEARCH PROGRAMS IN THIS FIELD. FINALLY, THE AUTHOR DEALS WITH THE PROBLEM OF INVESTMENT AND OPERATING COSTS OF WIND POWER PLANTS.

1978-0679 MOMENT R L
SYSTEMS DEVELOPMENT AND TEST CENTER ACTIVITIES IN THE WIND SYSTEMS PROGRAM AT ROCKY FLATS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 131-140.
CONF-770921/1

THE OVERALL OBJECTIVE OF THIS PROGRAM IS TO STIMULATE MANUFACTURE OF SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) BY THE PRIVATE SECTOR AND UTILIZATION OF THESE SYSTEMS BY THE PUBLIC. TO MEET THE OVERALL OBJECTIVES OF THIS PROGRAM TWO MAJOR AREAS OF EFFORT ARE PLANNED. THE FIRST ONE IS TO ESTABLISH AND OPERATE A NATIONAL WIND SYSTEMS TEST CENTER WHERE SWECS WOULD BE TESTED, THEREBY HELPING TO ESTABLISH THE CURRENT STATE OF THE TECHNOLOGY AND TO EVALUATE TECHNOLOGY IMPROVEMENTS. FUNDING NECESSARY RESEARCH AND DEVELOPMENT TO ADVANCE THE TECHNOLOGY AND ASSIST EVOLUTION OF MORE ECONOMICAL AND RELIABLE SWECS IS THE SECOND MAJOR ACTIVITY. ACTIVITIES IN BOTH THE AREAS OF TEST CENTER ESTABLISHMENT AND FUNDING OF TECHNOLOGY DEVELOPMENT PROGRAMS ARE DESCRIBED.

1978-0680 MONTES J S
IMPROVEMENT OF WINDMILL EFFICIENCY BY BOUNDARY LAYER CONTROL.
WIND ENG. 2(2): 103-114, 1978.

THE POSSIBILITY OF EMPLOYING BOUNDARY LAYER SUCTION TO INCREASE THE EFFICIENCY OF CONVENTIONAL WINDMILLS IS DISCUSSED. THE ROTATION OF THE WINDMILL BLADES PROVIDES A SOURCE OF INTERNAL FLOW WHICH MAY BE UTILIZED AS A SIMPLE PUMP FOR THE BOUNDARY LAYER SUCTION. A SIMPLIFIED MATHEMATICAL MODEL OF THE INTERNAL FLOW IS DESCRIBED. THE RESULTING EQUATIONS ARE INTEGRATED NUMERICALLY FOR SOME ASSUMED VALUES OF THE WINDMILL GEOMETRICAL PARAMETERS. IT IS SHOWN THAT ADVANTAGES OF SOME 20% IN THE OPERATIONAL EFFICIENCY OF A VARIABLE PITCH WINDMILL AND 33% FOR THE FIXED PITCH WINDMILL MAY BE OBTAINED.

1978-0681 MORAN K E, KORZENIEWSKI E C
LOAD CONTROL FOR WIND-DRIVEN ELECTRIC GENERATORS.
U.S. PATENT NO. 4,095,120, JUNE 13, 1978. 26 P.

A GENERATOR LOAD CURVE IS PRECISELY MATCHED TO A WINDDRIVEN MOTOR CHARACTERISTIC BY MEANS OF A ROTOR SPEED-RESPONSIVE TACHOMETER EFFECTING STEPWISE CONTROL OF FIELD CURRENT IN THE GENERATOR. SEVERAL VARIATIONS OF THE TACHOMETER CIRCUIT ARE DESCRIBED. FIELD CURRENT IS CONTROLLED BY AN AMPLIFIER, AND VOLTAGE REGULATION IS EFFECTED BY AN OVERRIDE CIRCUIT DISABLING THE AMPLIFIER.

1978-0682 MORRISON B A
HARNESSING THE WIND FOR GENERATING ELECTRICAL POWER AND PUMPING WATER.
ENG. STAT. RES. INST., AGRIC. CAN., RES. BRANCH, REPORT 1-13, APRIL 1978. 12 P.

1978-0683 MOSS J
WIND POWER GETS ITS FEET WET.
ELECTR. REV. 203(3): 16-17, JULY 21, 1978.

DEPARTMENT OF ENERGY FUNDING OF WIND POWER SCHEMES HAS INCREASED, AND THE CEGB IS CO-OPERATING IN STUDYING POSSIBLE MAJOR SCHEMES BASED ON A CLUSTER OF 2.5 MW WINDMILLS IN SHALLOW WATER OF THE NORTH SEA. THE AUTHOR HAS FOUND ENTHUSIASM FOR SUCH LARGE SCHEMES GROWING, AND SOME INTERESTING SMALLER ONES ARE BEING DEVELOPED BY INCREASING NUMBERS OF WIND POWER SPECIALISTS.

1978-0684 MURPHY R D
WIND MOTOR MACHINE.
U.S. PATENT NO. 4,127,356, NOVEMBER 28, 1978.

IN A WIND MACHINE TO EXTRACT ENERGY FROM THE WIND HAVING A HOUSING, AN IMPELLER IN THE HOUSING, A SHAFT ON THE IMPELLER JOURNALED TO THE HOUSING, VANES ON THE IMPELLER WHICH CAUSE THE IMPELLER TO TURN IN THE WIND, A FUNNEL

FORMING A PORTION OF THE HOUSING TO INCREASE THE WIND AT THE IMPELLER, AND MOUNTING MEANS ON THE HOUSING FOR ROTATING THE HOUSING ABOUT A VERTICAL AXIS, THE IMPROVED STRUCTURE FOR REGULATING THE SPEED OF THE WHEEL COMPRISING AT LEAST ONE FLAP MOUNTED FOR MOVEMENT OF AND CONNECTED TO THE FLAP FOR REDUCING THE WIND ON THE IMPELLER, AND SAID FLAP IS MOUNTED UPON THE FUNNEL PORTION OF THE HOUSING, AND SAID FLAP ACTS TO ROTATE THE ENTIRE HOUSING SO THAT THE FUNNEL NO LONGER FACES DIRECTLY INTO THE WIND BUT AT AN ANGLE THERETO, THUS REDUCING THE WIND ON THE IMPELLER.

1978-0685 MUSGROVE P J
VERTICAL AXIS WIND TURBINES.
U.S. PATENT NO. 4,087,202, MAY 2, 1978. 8 P.

A VERTICAL AXIS WIND TURBINE COMPRISES ONE OR MORE AEROFOIL SECTION BLADES ATTACHED TO A SUPPORT STRUCTURE. THE BLADE HAS AT LEAST ONE PART THEREOF WHICH IS ACTED ON BY CENTRIFUGAL FORCES AS THE BLADE ROTATES WITH THE SUPPORT STRUCTURE AND THEREBY CAUSED TO INCREASE ITS ANGLE OF INCLINATION TO THE VERTICAL AXIS WHEN THE SPEED OF ROTATION INCREASES BEYOND THE NORMAL OPERATING RANGE, WHEREBY THE RATE OF INCREASE OF ROTATIONAL SPEED WITH WIND SPEED IS REDUCED.

1978-0686 WILLEM R A
A WIND ENERGY REVIEW: LOW-COST MACHINES FOR AGRICULTURAL AND RURAL APPLICATIONS.
NTIS, 1978. 11 P.
PB-297858

SMALL-SCALE IRRIGATION APPEARS TO BE THE MOST EFFECTIVE USE OF WIND ENERGY IN THE THIRD WORLD. THIS COINCIDES WITH THE FACT THAT IMPROVING THE AGRICULTURAL OUTPUT AND LIVING STANDARDS OF THE SMALL SCALE FARMER IS ONE OF THE MOST PRESSING DEVELOPMENTAL GOALS IN THESE AREAS. SEVERAL WIND-POWERED WATER-PUMPING SYSTEMS OF AN INTERMEDIATE-TECHNOLOGY LEVEL ARE REVIEWED AND SOURCES OF FURTHER INFORMATION ARE INDICATED.

1978-0687 MUSGROVE P
OFFSHORE WIND ENERGY SYSTEMS.
PHYS. EDUC. 13(4): 210-213, MAY 1978.

WIND ENERGY SYSTEMS DEPLOYED IN THE SHALLOW BUT WINDY WATERS OF THE SOUTHERN NORTH SEA HAVE THE POTENTIAL TO PROVIDE MORE THAN 30 PERCENT OF UK ELECTRICITY NEEDS. WITH EXISTING EXPERIENCE OF WINDMILLS, AND OF AIRCRAFT AND OFFSHORE STRUCTURES, SUCH WIND ENERGY SYSTEMS COULD BE DEVELOPED WITHIN A RELATIVELY SHORT TIMESCALE. A PRELIMINARY ASSESSMENT OF THE ECONOMICS OF OFFHORE WIND ENERGY SYSTEMS IS ENCOURAGING.

1978-0688 MUSGROVE P
WIND ENERGY PROSPECTS IN THE UK.
COAL ENERGY Q. NO. 16: 15-21, SPRING 1978.

THE AUTHOR CLAIMS THAT CONVERTING WIND ENERGY TO ELECTRICITY ON A LARGE SCALE IS A MUCH MORE PRACTICABLE PROPOSITION THAN THE LARGE-SCALE CONVERSION OF SOLAR RADIATION TO ELECTRICITY, AND THEN EXPLORES WIND ENERGY'S POTENTIAL TO CONTRIBUTE VERY SIGNIFICANTLY TO THE U.K. ENERGY NEEDS. THE ECONOMICS OF SUCH A CONVERSION ARE FOUND TO BE ENCOURAGING. IF ENVIRONMENTAL REASONS PRECLUDED HILL TOP WINDMILLS THEY COULD BE DEPLOYED IN SHALLOW WATERS OFF THE COAST, PROVIDING AT LEAST 25% OF THE COUNTRY'S ELECTRICITY NEEDS. THE BASIC TECHNOLOGY FOR THE DEVELOPMENT OF LARGE WINDMILLS IS SAID TO BE ALREADY AVAILABLE IN THE ENGINEERING INDUSTRY.

1978-0689 NELSON V
PROCEEDINGS OF THE NATIONAL CONFERENCE: AMERICAN WIND ENERGY ASSOCIATION.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. 187 P.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978.

1978-0690 NEUMANN R, WINDHEIM R
WIND ENERGY R & D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY AND MAIN LINES OF DEVELOPMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 438-443.
CONF-770921/1

THE WIND ENERGY R & D PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY FOLLOWS TWO LINES; ADAPTION OF SMALL WECS WITH HORIZONTAL OR VERTICAL AXIS TO SPECIAL USES, AND ELECTRICITY GENERATION BY LARGE WECS FOR THE NATIONAL GRID: THE ACTIVITIES OF THESE LINES ARE EXPLAINED IN STEPS WITHIN THIS REPORT.

1978-0691 NEWMAN B G, NGAGO T M
THE DESIGN AND TESTING OF A VERTICAL-AXIS WIND TURBINE USING SAILS.
ENERGY CONVERS. 18(3): 141-154, 1978.

A VERTICAL-AXIS WIND TURBINE USING SAILS RATHER THAN SOLID BLADES HAS BEEN DESIGNED AND TESTED AT LARGE MODEL SCALE IN A 15 FT. DIAMETER WIND TUNNEL. THE TURBINE HAS A RELATIVELY HIGH SOLIDITY, THREE BLADES AND AN OPERATING RANGE OF TIP SPEED RATIOS FROM ZERO TO ABOUT 2.5. TWO TYPES OF SAIL HAVE BEEN TESTED-A DOUBLE SAIL CONSISTING OF TWO LAYERS OF CLOTH WRAPPED ROUND A CIRCULAR LEADING EDGE DOWEL, AND A JIB SAIL CONSISTING OF A SINGLE LAYER OF CLOTH WITH LEADING EDGE HELD BY A TAUT WIRE.

1978-0692 NILSSON K, SCHIBBYE B, SELLBERG C, SKAERBAECK E
VINDKRAFTEN I LANDSKAPET. (WINDPOWER IN THE LANDSCAPE.)
ALNARP, SWEDEN, SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES, 1978. 132 P. (IN SWEDISH)

THE ENVIRONMENTAL CONSEQUENCES OF THE CONSTRUCTION OF A LARGE NUMBER OF WINDPOWER STATIONS IN SWEDEN ARE DISCUSSED, IN PARTICULAR THE EFFECTS ON THE LANDSCAPE, I.E. THE VISUAL EFFECTS. IT IS CONCLUDED, AMONG OTHER THINGS, THAT A PERSON'S ATTITUDE TOWARD WIND POWER IS OF HIGH IMPORTANCE FOR HIS OPINIONS ABOUT THESE MATTERS.

1978-0693 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
ENERGY FROM HUMID AIR.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 865-872.
CONF-770921/2

THIS IS A SUMMARY OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. A VAST AMOUNT OF ENERGY IS CONTAINED IN THE LATENT HEAT OF VAPORIZATION OF THE WATER VAPOR IN HUMID AIR. IF THE WATER VAPOR IS MADE TO

CONDENSE, THE LATENT HEAT IS RELEASED INTO THE SURROUNDING AIR. THE MECHANIZATIONS FOR CONVERTING THE ENERGY IN HUMID AIR WHICH ARE BEING CONSIDERED IN THIS PROJECT CAN BE THOUGHT OF AS HEAT ENGINES IN WHICH THE AIR ITSELF SERVES AS THE WORKING FLUID. THE RESEARCH IS BEING CARRIED OUT PRIMARILY BY COMPUTER MODELING.

1978-0694 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
CLEAN ENERGY FROM HUMID AIR.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977.
ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978.
VOL. 4, P. 1887-1900.

THIS IS A SUMMARY OF RESULTS TO DATE OF A RESEARCH PROJECT WHICH IS IN PROGRESS AT THE SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY. THE GOAL OF THE RESEARCH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK, WHICH WILL BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT PRIMARILY BY COMPUTER MODELING.

1978-0695 OMAN R A
TECHNICAL AND ECONOMIC CHALLENGES IN ADVANCED SYSTEMS DEVELOPMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 912-920.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0696 OMAN R A, FOREMAN K M, GILBERT B L
A PROGRESS REPORT ON THE DIFFUSER AUGMENTED WIND TURBINE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 319-328.
CONF-770921/2

GRUMMAN AEROSPACE HAS BEEN INVESTIGATING COST-EFFECTIVE DIFFUSERS TO OBTAIN AUGMENTED POWER FROM WIND TURBINES. THE PRIMARY ASPECTS OF THE PROBLEM THAT HAVE BEEN EXAMINED IN THIS WORK ARE DESIGN CONCEPTS AND AERODYNAMIC PERFORMANCE OF COMPACT DIFFUSERS, AND THE COMPARATIVE ECONOMICS OF POWER PRODUCED BY DIFFUSER AUGMENTED WIND TURBINES (DAWT) TO THOSE OF CONVENTIONAL, HORIZONTAL AXIS, WIND ENERGY CONVERSION SYSTEMS (WECS). THE BASIC TECHNICAL FEASIBILITY OF THE DAWT CONCEPT HAS BEEN EXPERIMENTALLY CONFIRMED, AND A RATIONAL CASE FOR DAWT ECONOMIC VIABILITY IN THE 50 TO 100 KW AND MW POWER RATING RANGES PRESENTED. A 46 CM (18 IN.) DIAMETER TURBINE WILL SOON BE TESTED IN THE BASELINE DIFFUSER CONFIGURATION.

1978-0697 OPPENGARD M
WIND POWER (FOR TEACHERS).
PHYS. TEACH. 16(5): 299-300, MAY 1978.

AN EXPERIMENTAL ARRANGEMENT IS DESCRIBED FOR TESTING A KINETIC THEORY PREDICTION FOR THE POWER ABSORBED BY A PROPELLER PLACED IN A WIND STREAM. THE PROPELLER IS ATTACHED TO A PERMANENT FIELD DC MOTOR. THE POWER DELIVERED TO THE PROPELLER IS ASSESSED AS THE AMOUNT OF ELECTRICAL ENERGY REQUIRED TO STILL THE PROPELLERS ROTATION.

1978-0698 OSSENBRUGGEN P, PREGENT G
COASTAL AND OFFSHORE WINDS.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978.
GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-17-1. (ABSTRACT ONLY)

1978-0699 OTTENS H H, ZWAAN R J
INVESTIGATIONS ON THE AEROELASTIC STABILITY OF LARGE WIND TURBINES.
NTIS, APRIL 10, 1978. 21 P.
N79-32731/8, NPL-MP-78014-U

THE AEROELASTIC STABILITY OF WIND TURBINES WITH VERTICAL AXIS (VAWT) AND WITH HORIZONTAL AXIS (HAWT) IS DISCUSSED. RESULTS ARE GIVEN FOR AN EXISTING 5 M VAWT TEST-BED WITH AND WITHOUT A TIE-DOWN SYSTEM. FINALLY, DIFFICULTIES ARE DISCUSSED IN INTERPRETING PRELIMINARY RESULTS FOR A HORIZONTAL AXIS WIND TURBINE. STABILITY DIAGRAMS ARE SHOWN.

1978-0700 WHITFORD D H, MINARDI J E, WEST B S, DOMINIC R J
AN ANALYSIS OF THE MADARAS ROTOR POWER PLANT -- AN ALTERNATE METHOD FOR EXTRACTING LARGE AMOUNTS OF POWER FROM THE WIND. VOLUME 1. EXECUTIVE SUMMARY.
NTIS, JUNE 1978. 50 P.
DSE-2554-78/2(VOL.1)

THE PURPOSE OF THIS PROGRAM WAS TO ANALYZE AND UP-DATE THE DESIGN OF THE MADARAS ROTOR POWER PLANT CONCEPT THAT HAD BEEN DEVELOPED IN THE 1930'S TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF THIS SYSTEM TO BE COMPETITIVE WITH CONVENTIONAL HORIZONTAL AXIS WIND TURBINES. THE MADARAS CONCEPT USES ROTATING CYLINDERS, VERTICALLY MOUNTED ON FLAT CARS, TO REACT WITH THE WIND LIKE A SAIL AND PROPEL AN ENDLESS TRAIN OF CONNECTED CARS AROUND A CLOSED TRACK AT CONSTANT SPEED. ELECTRICITY IS GENERATED BY ALTERNATORS ON EACH CAR THAT ARE GEARED TO THE WHEELS. ELECTRICAL POWER IS TRANSMITTED FROM EACH CAR TO THE POWER HOUSE BY A TROLLEY SYSTEM. THE OBJECTIVE OF THIS PROGRAM IS TO DEMONSTRATE THE DEGREE IN WHICH MADARAS POWER PLANTS HAVING CAPACITIES IN THE 10 MW TO 200 MW RANGE ARE COMPETITIVE WITH HORIZONTAL AXIS WIND TURBINES.

1978-0701 PAL D
FIELD TESTING OF 5-KW COMMERCIAL WIND GENERATOR WITH AN AUTOMATIC LOAD-MATCHING DEVICE FOR UTILIZING ITS OUTPUT.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON 1978. VOL. III, P. 1833-1837.

THE CONCEPT, DESIGN, AND FIELD TESTING OF AN AUTOMATIC LOAD-MATCHING SYSTEM FOR UTILIZING THE OUTPUT OF A COMMERCIAL 5-KW WIND-DRIVEN AC GENERATOR ARE DESCRIBED IN DETAIL. BOTH SYSTEMS WERE TESTED AT THREE SITES LOCATED AT PORT HUENEME, LAGUNA PEAK, AND SAN NICOLAS ISLAND; THESE SITES HAVE AVERAGE ANNUAL WIND SPEEDS OF 2.88, 4.33, AND 5.1 M/SEC. RESPECTIVELY.

1978-0702 PAL D, PARKER C E
TECHNIQUE FOR LONGITUDINAL CORRELATION OF WIND DATA--THEORY AND ITS APPLICATIONS TO SITING OF WIND POWER PLANTS.

SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1854-1857.

AN ACCURATE ESTIMATE OF WIND POWER POTENTIAL AT A PROSPECTIVE SITE IS VERY IMPORTANT TO ECONOMICALLY JUSTIFY THE INSTALLATION OF WIND POWER GENERATING EQUIPMENT. SINCE THE INSTANTANEOUS POWER AVAILABLE IN THE WIND AT A SITE IS PROPORTIONAL TO THE CUBE OF THE PREVAILING WIND SPEED, A SMALL CHANGE IN WIND SPEED CAN CORRESPOND TO A LARGER CHANGE IN THE AVAILABLE POWER. THUS, TO OBTAIN THE MAXIMUM OUTPUT FROM A WIND PLANT, IT IS NECESSARY TO LOCATE IT AT THE WINDIEST SITE POSSIBLE. TAKING LONG-TERM WIND SPEED AND DIRECTION MEASUREMENTS AT PROSPECTIVE SITES MAY NOT BE ECONOMICALLY FEASIBLE. HENCE, RELIABLE AND INEXPENSIVE METHODS FOR OPTIMUM SITING OF WIND POWER GENERATORS ARE REQUIRED FOR COST-EFFECTIVE UTILIZATION OF THIS LOCAL ENERGY SOURCE. THE REPORT SHOWS THAT BY APPLYING THE STATISTICAL THEORY OF TURBULENCE TO THE SURFACE LAYERS IN THE ATMOSPHERE, A SIMPLE FORMULA FOR THE ENERGY PATTERN FACTOR CAN BE DERIVED.

1978-0703 PALMA F N
DOUBLE WIND TURBINE WITH FOUR FUNCTION BLADE SET.
U.S. PATENT NO. 4,129,787, DECEMBER 12, 1978. 8 P.

A FREE STANDING, VERTICAL AXIS ROTOR EMPLOYS BOTH FIXED AND PIVOTED AIRFOIL BLADES ASSEMBLED ON A TRIANGULAR ROTOR FRAME. THE ANGLE OF ATTACK OF THE PIVOTED BLADES IS CONTROLLED WITH REFERENCE TO THE PREVAILING WINDS. THE ROTOR BASE TERMINATES ON A RING SHAPED TOWER MOUNTED ON GUIDING WHEELS DISPOSED IN A CIRCULAR PATTERN ON PILLARS. THE REVOLVING RING SHAPED BASE FORMS THE ARMATURE OF AN ENERGY CONVERTER BY ELECTROMAGNETIC INDUCTION ALLOWING THEREBY THE CONVERSION OF ROTARY MOTION TO ELECTRIC ENERGY AT GROUND LEVEL.

1978-0704 PANTALONE D K, FOUAD A A
MODES OF OSCILLATIONS OF WIND GENERATORS IN LARGE POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY, SUMMER MEETING, JULY 16-21, 1978. NEW YORK, IEEE, 1978. P. 579-585.

THIS PAPER DEALS WITH A POTENTIAL PROBLEM RESULTING FROM THE PRESENCE OF MANY LARGE WIND GENERATORS TIED TO AN INTERCONNECTED POWER SYSTEM. THIS PROBLEM IS ASSOCIATED WITH DYNAMIC STABILITY FOR WHICH POORLY DAMPED NATURAL FREQUENCIES OF OSCILLATION OF THE POWER SYSTEM ARE OF CONCERN. THESE FREQUENCIES MAY BE EXCITED WHEN THE NATURAL MODES OF OSCILLATION OF THE WIND GENERATOR SYSTEMS COINCIDE WITH THOSE OF THE POWER SYSTEM. A PARAMETRIC EIGENVALUE ANALYSIS OF THREE CONCLUSIONS ARE DRAWN WITH RESPECT TO WIND GENERATOR SYSTEM DESIGN AND NETWORK CONFIGURATION.

1978-0705 PARASCHIVOIU I, BILGEN E, DA MATHA SANT'ANNA F
THEORETICAL STUDY OF A HYBRID WIND TURBINE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P. 1693-1702.

IN THIS PAPER, A THEORETICAL STUDY IS PRESENTED ON A HYBRID WIND TURBINE WHICH CONSISTS OF TWO VERTICAL AXIS COAXIAL TURBINES, ONE OF SAVONIUS TYPE AND THE OTHER A SCREW TYPE. THE SAVONIUS TYPE TURBINE HAS N// HELIOCOIDAL BLADES AND ROTATES IN A UNIFORM VELOCITY FIELD WHILE THE SECOND, THE SCREW TYPE CONVERTS THE KINETIC ENERGY OF THE VORTEX FLOW GENERATED IN THE CENTER OF THE FIRST TURBINE. EACH SYSTEM IS SEPARATELY TREATED FROM THE AERODYNAMICS POINT OF VIEW AND THE CORRESPONDING DEVELOPED POWERS AND EFFICIENCIES ARE CALCULATED. THEN THE TWO TYPES ARE COMBINED TOGETHER AS ONE UNIT TO GIVE THE FINAL RESULTS FOR A HYBRID TURBINE.

1978-0706 PARK J, SCHWIND D
WIND POWER FOR FARMS, HOMES, AND SMALL INDUSTRY.
NTIS, SEPTEMBER 1978. 229 P.
RFP-2841/1270/78/4

INFORMATION IS PRESENTED CONCERNING BASIC WIND TURBINE ENERGY CONVERSION; WIND BEHAVIOR AND SITE SELECTION; POWER AND ENERGY REQUIREMENTS; THE COMPONENTS OF A WIND ENERGY CONVERSION SYSTEM; SELECTING A WIND ENERGY CONVERSION SYSTEM AND SYSTEM ECONOMICS; AND LEGAL ASPECTS.

1978-0707 WHITFORD D H, MINARDI J E, WEST B S, DOMINIC R J
ANALYSIS OF THE MADARAS ROTOR POWER PLANT -- AN ALTERNATE METHOD FOR EXTRACTING LARGE AMOUNTS OF POWER FROM THE WIND. VOLUME 2. TECHNICAL REPORT.
NTIS, JUNE 1978. 423 P.
DSE-2554-78/2(VOL.2)

THE PURPOSE OF THE PROGRAM WAS TO ANALYZE AND UP-DATE THE DESIGN OF THE MADARAS ROTOR POWER PLANT CONCEPT THAT HAD BEEN DEVELOPED IN THE 1930'S TO DETERMINE THE TECHNICAL AND ECONOMIC FEASIBILITY OF THIS SYSTEM TO BE COMPETITIVE WITH CONVENTIONAL HORIZONTAL AXIS WIND TURBINES. A FOUR-TASK PROGRAM CONSISTING OF A SERIES OF WIND TUNNEL TESTS, AND ELECTRO-MECHANICAL ANALYSIS, A PERFORMANCE ANALYSIS, AND A COST ANALYSIS WAS CONDUCTED.

1978-0708 PEARSON E
VERTICAL-ACCESS WINDMILL PASSES ITS COLLEGE TESTS.
ENERGY USER NEWS 3(49): 15, DECEMBER 4, 1978.

RECENT DEMONSTRATION OF A VERTICAL-ACCESS WINDMILL AT CLARKSON COLLEGE IN NEW YORK HAS ENCOURAGED DOE TO EXPAND ITS ESTIMATE OF POSSIBLE APPLICATIONS. THE SILO-MOUNTED WINDMILL OPERATES ON 12-MILE-PER-HOUR OR MORE WIND AND CAN BE USED FOR LIGHT INDUSTRY, DAIRY FARMS, SHOPPING CENTERS, SCHOOLS, AND SIMILAR FACILITIES. ALCOA ALLIED IS DEVELOPING FIVE BASIC COMMERCIAL MODELS THAT WILL BE COST-EFFECTIVE AND WILL PROBABLY QUALIFY FOR THE NEW TAX CREDIT. THE WINDMILLS WILL RANGE FROM 12 TO 500 KILOWATT CAPACITY AND CAN OPERATE IN CONJUNCTION WITH A UTILITY SO THAT UNUSED ELECTRICITY IS PUT INTO THE POWER GRID. THE NEW CANTILEVERED DESIGN ELIMINATES THE NEED FOR A CLEAR GROUND AREA AND ALLOWS ADDITIONAL WIND TO BE UTILIZED BECAUSE OF ITS HEIGHT.

1978-0709 PELKA D G, PARK R T, SINGH R
ENERGY FROM THE WIND.
AM. J. PHYS. 46(5): 495-498, MAY 1978.

THE SUBJECT OF THE UTILIZATION OF WIND ENERGY AS AN ALTERNATIVE ENERGY SOURCE IS PRESENTED FOR A COURSE IN ENERGY SCIENCE. A GENERALIZED WIND MACHINE MODEL IS USED TO CALCULATE THE AVAILABLE WIND ENERGY AND A WIND ENERGY UTILIZATION SCHEME IS DESCRIBED. THE FRACTION OF THE AVAILABLE WIND POWER WHICH CAN BE EXTRACTED FOR USE BY A WIND TURBINE IS CALCULATED. THE AVERAGE ANNUAL ELECTRICAL POWER GENERATED FROM A WIND TURBINE FIELD IS ALSO ESTIMATED.

1978-0710 PETERSON J N
WIND GENERATORS AND ENERGY STORAGE.
ELECTRONICS FOR RESOURCES MANAGEMENT, IEEE REGION 6 CONFERENCE, ALAMOGORDO, N.M., APRIL 12-14, 1978. CONFERENCE RECORD. NEW YORK, IEEE, 1978. P. 9-14.

WIND SPEED DATA OVER ONE YEAR FROM SIX LOCATIONS IN THE PACIFIC NORTHWEST ARE ANALYZED TO DETERMINE ENERGY STORAGE AMOUNTS SUFFICIENT TO SMOOTH THE FLUCTUATIONS IN WIND-GENERATED ELECTRICAL POWER. HYDROPOWER RESERVOIRS ARE CONSIDERED AS THE ENERGY STORAGE METHOD AND A DEFINITE RELATIONSHIP IS DETERMINED BETWEEN THE NUMBER OF WIND GENERATORS AND AMOUNT OF HYDRO STORAGE.

1978-0711 WIND POWER IN THE UNITED KINGDOM: PROCEEDINGS OF A ONE DAY SYMPOSIUM.
LONDON, MULTI-SCIENCE PUBLISHING CO., LTD., 1978. 112 P.
BWEA WIND ENERGY WORKSHOP, 1ST, LONDON, JULY 13, 1978.

PAPERS PRESENTED AT THE CONFERENCE COVERED TOPICS SUCH AS DESIGN AND PERFORMANCE CHARACTERISTICS OF VARIOUS TYPES OF WIND TURBINES; WIND TURBINE APPLICATIONS IN TELECOMMUNICATIONS; AND FEASIBILITY OF WIND POWER UTILIZATION IN THE UNITED KINGDOM.

1978-0712 PIEPERS G G, SENS P F
THE NETHERLANDS RESEARCH PROGRAM ON WIND ENERGY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 467-473.
CONF-770921/1

A ROUGH ESTIMATION OF THE POTENTIALITY OF WIND ENERGY IN THE NETHERLANDS INDICATES THAT ABOUT 20% OF THE PRESENT DAY ELECTRICITY PRODUCTION COULD BE OBTAINED FROM THE WIND IN AREAS WITH HIGH WIND ENERGY DENSITY. THE PURPOSE OF THIS PROGRAM IS TO INVESTIGATE THE FEASIBILITY OF APPLICATION OF WIND ENERGY ON A LARGE SCALE TO PRODUCE ELECTRICITY THAT CAN BE FED INTO THE EXISTING GRID.

1978-0713 PLACE T W
RESIDENTIAL FLYWHEEL WITH TURBINE SUPPLY.
NTIS, 1978. P. 228-233
CONF-781046

THIS PAPER EXAMINES A FLYWHEEL SYSTEM THAT STORES ENERGY FROM A WIND TURBINE SOURCE AND CONVERTS THE ENERGY TO 60-HZ, 220-V OUTPUT FOR RESIDENTIAL USE. THE TYPICAL RESIDENCE HAS A 1500-SQ. FT. FLOOR AREA WITH A MAXIMUM POWER LEVEL OF 5 KW. THE PURPOSE OF THIS STUDY WAS TO DETERMINE THE COST/BENEFITS OF STORING WIND ENERGY IN A FLYWHEEL AND USING IT ON A DEMAND BASIS. THE STUDY EXAMINES THE SYSTEMS AND THE FLYWHEEL ROTOR MATERIALS THAT OFFER THE GREATEST PROMISE FOR REDUCING THE INITIAL COST. THE PAPER PRESENTS THE PROGRESS TO DATE ON THIS PROGRAM AND DESCRIBES THE WORK PLANNED TO COMPLETE THE STUDY.

1978-0714 PLANTES W J
IMPLEMENTATION OF MOD-0A INSTALLATIONS TO NASA'S SPECIFICATIONS.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 73-84.
CONF-780357

TO OBTAIN EXPERIENCE WITH THE OPERATION OF WIND TURBINES IN UTILITY POWER SYSTEMS, THREE 200 KW MACHINES (MOD-0A) WILL BE CONSTRUCTED AND OPERATED IN EXISTING UTILITY POWER SYSTEMS. NASA STUDIES WERE CONDUCTED TO DEFINE COST EFFECTIVE CONFIGURATIONS FOR LARGE HORIZONTAL AXIS WIND TURBINES. THESE STUDIES SHOWED THAT 200 KW AND LARGER WIND TURBINES SHOULD BE COST EFFECTIVE IF PRODUCED IN SUFFICIENT QUANTITY. UPGRADING OF A 100 KW WIND TURBINE PREVIOUSLY TESTED AND EVALUATED APPEARED TO BE A SATISFACTORY APPROACH FOR OBTAINING EARLY EXPERIENCE WITH THIS TYPE CONFIGURATION IN UTILITY SYSTEMS. THE ROTOR BLADE DESIGN FOR THE 200 KW TURBINE IS THE SAME AS FOR THE 100 KW PLUMBROOK MOD-0 TURBINE, EXCEPT FOR MINOR STRUCTURAL CHANGES TO IMPROVE BLADE FATIGUE LIFE; THE DRIVE TRAIN DESIGN WAS UPRATED FOR THE HIGHER POWER; A HIGHER POWER GEAR BOX WAS SELECTED; THE TOWER WAS DESIGNED TO USE PIPE INSTEAD OF STRUCTURAL SHAPES, AND A 200 KW ALTERNATOR WITH ASSOCIATED ELECTRICAL EQUIPMENT WAS SELECTED.

1978-0715 PLEN A
WIND ENERGY ACCUMULATOR.
U.S. PATENT NO. 4,109,465, AUGUST 29, 1978. 2 P.

A DEVICE IS PROPOSED WHICH ACCUMULATES AND STORES ENERGY OF BLOWING WIND. ROTATABLE MEANS TURN THE DEVICE INTO THE DIRECTION OF THE BLOWING WIND, SO THAT ARTICULATED FLAPS ARE FULLY EXPOSED TO THE WIND. THESE FLAPS ARE CONNECTED WITH AIR PUMPING MEANS WHICH DELIVERS A QUANTITY OF AIR INTO A STORAGE CONTAINER, THE AIR BEING SUCCESSIVELY COMPRESSED WITHIN THE CONTAINER.

1978-0716 PLUNKETT J
PRESENT STATUS AND FUTURE OF WIND ENERGY DEVELOPMENT IN MONTANA.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 162-166.
CONF-780357

RESEARCH AND DEVELOPMENT PROGRAMS IN MONTANA CONCERNING THE UTILIZATION OF WIND ENERGY ARE REVIEWED.

1978-0717 PREUSS R D, SMOLKA S A, SUCIU E O, MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR-WINDS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 624-634.
CONF-770921/2

PRESENTED HERE IS A SUMMARY OF RESEARCH PERFORMED FOR THE DEVELOPMENT OF COMPUTER PROGRAMS DESIGNED FOR STUDYING THREE DIMENSIONAL NONPOTENTIAL INCOMPRESSIBLE STEADY AND UNSTEADY FLOW AROUND COMPLEX HORIZONTAL-AXIS WINDMILL CONFIGURATIONS.

1978-0718 PURPER G
WIND ENERGY PLANTS FOR PRODUCTION OF POWER: ECONOMIC SIGNIFICANCE AND TEST EXAMPLE.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 377-387. (IN GERMAN)

IN ORDER TO SAVE ENERGY, THE USE OF WIND-ENERGY PRESENTS ITSELF. ITS USE FOR ENERGY PRODUCTION DOES NOT PLAY A ROLE ANYMORE, BECAUSE THE NATURAL AND ECONOMIC RESTRICTIONS ARE ESTIMATED TO BE TOO HIGH. NEVERTHELESS THE EXAMPLE WILDHAEUSER HOF IN BRAKEL/WESTPHALIA SHOWS THAT WIND-ENERGY HAS BEEN AND STILL IS IN A POSITION TO COMPETE IN CERTAIN AREAS.

1978-0719 PYTLINSKI J T
ASSESSMENT OF ENERGY CONSERVATION USING SOLAR ENERGY IN KANSAS.
J. ENERGY 2(4): 250-253, JULY 1978.

TABLES OF MEASURED AND CALCULATED DATA WHICH INDICATE THE AMOUNT OF FOSSIL ENERGY THAT COULD BE CONSERVED BY USING SOLAR AND WIND ENERGY IN KANSAS ARE PRESENTED. DATA INCLUDE SOLAR ENERGY RECEIVED; ESTIMATED ENERGY CONSUMPTION; ENERGY AVAILABLE DAILY FROM DIRECT USE OF SOLAR ENERGY FOR AN AVERAGE HOME; MINIMUM POTENTIAL DAILY AND ANNUAL ENERGY SAVINGS USING SOLAR ENERGY FOR SPACE HEATING, SPACE COOLING, AND WATER HEATING; ENERGY CONSUMPTION IN PUMPING IRRIGATION WATER; POSSIBLE ENERGY CONSERVATION IN PUMPING IRRIGATION WATER USING WIND OR SOLAR ENERGY; ESTIMATED ENERGY CONSERVATION USING SOLAR ENERGY FOR SPACE HEATING; ESTIMATED ENERGY CONSERVATION USING WINDMILLS FOR WATER PUMPING; ESTIMATED ENERGY CONSERVATION USING BIOMASS FOR ELECTRICITY GENERATION OR SPACE HEATING; AND THE POTENTIAL CONTRIBUTION OF SOLAR ENERGY TO THE TOTAL ENERGY DEMAND IN THE U.S.

1978-0720 QAZI A Q, RAMAKUMAR R
ON THE USE OF EDDY-CURRENT COUPLINGS IN WIND-DRIVEN SYNCHRONOUS MACHINES.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 242-246.

THIS PAPER DISCUSSES THE SUITABILITY OF EDDY-CURRENT COUPLINGS IN THE MECHANICAL INTERFACES OF WIND-DRIVEN SYNCHRONOUS MACHINES. BASED ON THE COMPUTER SIMULATION RESULTS PRESENTED UNDER GUSTING WIND CONDITIONS, RECOMMENDATIONS ARE MADE FOR CHOOSING THE COUPLING DESIGN PARAMETERS FOR SATISFACTORY OPERATION. EDDY-CURRENT COUPLINGS TURN OUT A VERY GOOD PERFORMANCE EVEN UNDER SEVERE GUSTING AND HIGHLY VARIABLE WIND REGIMES AND THEREFORE ARE STRONGLY RECOMMENDED FOR APPLICATION IN WIND-ELECTRIC CONVERSION SYSTEMS.

1978-0721 RAGHAVA A K, AGRAWAL D P
A VERTICAL AXIS WIND TURBINE.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1832.

THIS IS AN ABSTRACT OF A PAPER PRESENTED AT THE CONFERENCE. THE RAGHAVA WIND TURBINE IS DESCRIBED, WHICH HAS POTENTIAL ADVANTAGES OF STRONG STRUCTURE, LARGE WIND COLLECTION AREA, HIGH EFFICIENCY, HIGH WIND POWER OUTPUT, SELF-GOVERNING AND SELF-STARTING PROPERTY AND SMALLER AND LESS EXPENSIVE ROTOR.

1978-0722 RAJAGOPALAN V, SANKARA RAO K, SWAMY M N S
EFFICIENT USE OF WIND ENERGY BY USING STATIC SLIP RECOVERY SYSTEMS-A SIMULATOR STUDY.
ENERGY '78. IEEE 1978 REGION V ANNUAL CONFERENCE. NEW YORK, IEEE, 78CH1283-1 REG 5, 1978. P. 250-254.

A WIND ENERGY SYSTEM USING STATIC SLIP RECOVERY SCHEME IS PROPOSED. A DIGITAL SIMULATOR, WESS, WHICH CAN SIMULATE WIND ENERGY SYSTEMS IS ALSO PROPOSED IN THIS PAPER. WESS IS CAPABLE OF SIMULATING NORMAL OPERATING CONDITIONS OF THE SYSTEM AS WELL AS FAULT CONDITIONS, LIKE, COMMUTATION FAILURE, FIRING CONTROL FAILURE, FAILURE OF AN SCR ETC. EXPERIMENTAL RESULTS ON A 2 KW SCHEME TOGETHER WITH RESULTS OBTAINED FROM SIMULATOR RUN ARE PRESENTED AND COMPARED.

1978-0723 RAJAGOPALAN V, VEILLETTE D
CONTRIBUTION TO THE DEVELOPMENT OF WIND ENERGY SYSTEMS USING STATIC POWER ELECTRONIC CONVERTERS.
IEEE POWER ELECTRON. SPEC. CONF., SYRACUSE, N.Y., JUNE 13-15, 1978. PESC RECORD. NEW YORK, IEEE, NO. 78CH1337-5AES, 1978. P. 69-75.

A WIND ENERGY SYSTEM, USING A SQUIRREL CAGE INDUCTION MACHINE AND A STATIC POWER ELECTRONIC CONVERSION EQUIPMENT, INCORPORATING A NOVEL AND ECONOMICAL PULSE FREQUENCY MODULATED THREE PHASE AUXILIARY IMPULSE COMMUTATED INVERTER, IS DESCRIBED. A COMPLETE DESCRIPTION OF THE PROPOSED POWER AS WELL AS CONTROL SCHEMES IS GIVEN, WITH SPECIAL REFERENCE TO ITS POSSIBLE APPLICATION IN VARIABLE SPEED WIND POWER CONVERSION SCHEME.

1978-0724 RAMAKUMAR R
WIND-ELECTRIC CONVERSION UTILIZING FIELD MODULATED GENERATOR SYSTEMS.
SOL. ENERGY 20(2): 109-117, 1978.

VARIABLE-SPEED CONSTANT-FREQUENCY WIND ELECTRIC SYSTEMS OPERATE AT A CONSTANT TIP SPEED RATIO WITH VARYING WIND SPEEDS AND ENABLE THE EXTRACTION OF A PART OF THE ENERGY SPILLED BY CONSTANT-SPEED CONSTANT-FREQUENCY SYSTEMS. THIS PAPER DESCRIBES THE VARIABLE-SPEED CONSTANT-FREQUENCY WIND-DRIVEN FIELD MODULATED GENERATOR SYSTEM, UNDER DEVELOPMENT AT OKLAHOMA STATE UNIVERSITY. SUCH SYSTEMS APPEAR TO BE MOST ATTRACTIVE IN THE "SMALL" (10-50 KW) AND "100 KW SCALE" (50-250 KW) SIZES AND FOR USE IN LARGE CAPACITY "MULTIROTOR ON ONE TOWER" CONCEPTS.

1978-0725 RAMSDELL J V
TECHNICAL OVERVIEW OF THE WIND CHARACTERISTICS PROGRAM ELEMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 291-296.
CONF-770921/1

BATTELLE, PACIFIC NORTHWEST LABORATORIES (PNL), HAS BEEN PROVIDING TECHNICAL AND MANAGEMENT SUPPORT FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) OF THE WIND ENERGY CONVERSION PROGRAM SINCE APRIL 1976. WITHIN THE WIND ENERGY CONVERSION PROGRAM, THE WCPE IS A SERVICE ELEMENT TO PROVIDE PLANNING, DESIGN AND EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS) SELECTION OF SITES FOR INSTALLATION OF WECS, AND OPERATION THEREOF.

1978-0726 RAMSDELL J V
WIND SHEAR FLUCTUATIONS DOWNWIND OF LARGE SURFACE ROUGHNESS ELEMENTS.
J. APPL. METEOROL. 17(4): 436-443, APRIL 1978.

WIND MEASUREMENTS IN THE LOWEST 50 M OF THE ATMOSPHERE APPROXIMATELY 1 MILE DOWNWIND OF AN URBAN AREA ARE EXAMINED TO PROVIDE ESTIMATES OF THE SHORT-TERM FLUCTUATIONS OF THE VERTICAL AND LATERAL SHEAR OF THE LONGITUDINAL COMPONENT OF THE WIND DURING SIX PERIODS OF SLIGHTLY TO MODERATELY UNSTABLE ATMOSPHERIC CONDITIONS. THE FLUCTUATIONS ARE DESCRIBED BY A PEARSON TYPE IV PROBABILITY DISTRIBUTION. MODELS ARE PRESENTED FOR THE STANDARD DEVIATION, SKEWNESS, AND KURTOSIS OF THE DISTRIBUTIONS. THE DISTRIBUTIONS ARE SLIGHTLY SKEWED AND MORE PEAKED THAN GAUSIAN BUT TEND TOWARD GAUSIAN AS SEPARATION INCREASES. TIME SCALES FOR THE SHEAR FLUCTUATIONS ARE DESCRIBED. THESE RESULTS ARE RELEVANT TO THE DESIGN AND CONSTRUCTION OF LARGE EXPERIMENTAL

WIND ENERGY CONVERSION SYSTEMS.

1978-0727 RANGARAJAN S, DESIKAN V
WIND POWER AS A SUPPLEMENT TO SOLAR POWER IN INDIA.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1810-1811.

EXTENSIVE DATA ON SURFACE WINDS FROM A NETWORK OF 340 STATIONS IN INDIA WERE STUDIED WITH A VIEW TO IDENTIFY THE MAJOR REGIONS WELL SUITED FOR THE LARGE SCALE APPLICATION OF WIND ENERGY. THE STUDY BROUGHT OUT THE FACT THAT THE ENTIRE COUNTRY COULD BE DIVIDED INTO THREE REGIONS FROM POINT OF VIEW OF UTILIZATION OF WIND ENERGY USING WINDMILLS WITH A CUT-IN SPEED OF 8 KILOMETERS/HOUR. IT IS SUGGESTED BEFORE SITING ARRAYS OF WINDMILLS OVER THE FAVORED AREAS IT WOULD BE ADVANTAGEOUS TO CONDUCT A MESO-SCALE WIND SURVEY USING PORTABLE INSTRUMENTS SO AS TO YIELD ONE YEAR'S DATA AT EACH PROSPECTIVE SITE.

1978-0728 RANGI R S, SOUTH P, TEMPLIN R J
NRC'S WIND ENERGY PROGRAM.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 1, PAP. 4.3.2. 15 P.

THIS PAPER DESCRIBES CURRENT WORK ON WIND POWER ASSESSMENT AND ON THE VERTICAL AXIS WIND TURBINES AT THE NATIONAL RESEARCH COUNCIL (NRC) OTTAWA. A MAP SHOWING THE ANNUAL AVERAGE WIND POWER DENSITY IS PRESENTED. THE ELECTRICAL WIND POWER POTENTIAL FOR ALL OF CANADA AND INDIVIDUAL PROVINCES HAS BEEN CALCULATED FROM THE WIND POWER DENSITY. THE WIND POWER POTENTIAL IS ALSO ASSESSED FOR: (A) ALL LAND AREA, (B) EXISTING ELECTRICAL NETWORK + 300 KM. (C) EXISTING ELECTRICAL NETWORK + 150 KM.

1978-0729 REED J W
METEOROLOGICAL STUDIES FOR WIND POWER -- A PROGRESS REPORT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 371-380.
CONF-770921/1

TEN-YEAR TIME SERIES OF HOURLY WIND SPEED OBSERVATIONS AT FIFTEEN SELECTED STATIONS HAVE BEEN USED TO GENERATE TIME SERIES OF AVAILABLE WIND POWER. THESE HAVE BEEN RUN THROUGH COMPUTER-SIMULATED TURBINE SYSTEMS TO STUDY LONG TERM, PARTICULARLY ANNUAL AND LONGER, VARIATIONS IN POTENTIAL SUPPLY. THESE VARIATIONS WERE SO LARGE THAT STAND-ALONE GENERATING SYSTEMS WOULD REQUIRE HUGE, UNECONOMICAL STORAGE CAPACITIES TO PROVIDE RELIABLE SERVICE.

1978-0730 REED J W
AVAILABILITY OF WIND POWER.
NTIS, 1978. 15 P.
CONF-780253-1, SAND-78-0548C

METEOROLOGICAL STUDIES OF AVAILABLE WIND POWER WERE BEGUN AT SANDIA IN 1973 TO SUPPORT THE DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE (VAWT, "EGG-BEATER"). THIS PRESENTATION REVIEWS WORK TO DATE. COPIES OF SEVEN SOURCE REPORTS WERE PROVIDED TO ELETROBRAS; SCIENTIA, LTDA., HAS INCLUDED THEM IN AN EXTENSIVE BIBLIOGRAPHY THAT WAS DISTRIBUTED AT THE SEMINAR. THIS REPORT SUMMARIZES THOSE CLIMATOLOGICAL STUDIES THAT ARE NEEDED TO ASSIST AND PROMOTE WIND ENERGY EXPLOITATION IN BRAZIL.

1978-0731 REED J W
WIND TIME SERIES ANALYSES FOR WECS APPLICATIONS.
NTIS, DECEMBER 1978. 44 P.
SAND-77-1701

A METHODOLOGY FOR WIND POWER ANALYSES OF WIND SPEED TIME SERIES IS DESCRIBED, INCLUDING COMPUTATION FLOW DIAGRAMS AND A FORTRAN PROGRAM LISTING. EXAMPLES OF RESULTS ARE PRESENTED BUT COMPLETE OUTPUTS WILL FOLLOW IN SPECIALIZED REPORTS. PRIMARY CALCULATION STAGES ARE (A) DATA HOMOGENIZATION FOR MOVED ANEMOMETERS, (B) EXTRAPOLATIONS TO SELECTED STANDARDIZED HEIGHTS, (C) DISTRIBUTION SMOOTHING FOR OBSERVATION BIAS, (D) POWER DISTRIBUTION FUNCTION CALCULATION, (E) TURBINE SPEED LIMIT EFFECTS ANALYSIS, (F) TIME VARIABILITY ASSESSMENT, AND (G) ANALYSIS OF LIGHT WIND DURATIONS.

1978-0732 REGAR K N
WIND POWER STATION FOR ELECTRICITY GENERATION.
GERMAN (FRG) PATENT NO. 2,722,990/A/, NOVEMBER 23, 1978. 28 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND POWER STATION FOR POWER GENERATION WITH A WIND DRIVEN ROTOR AND AN ELECTRICAL GENERATOR, WHICH IS COUPLED TO THE ROTOR. ACCORDING TO THE INVENTION A FLY WHEEL STORE IS PROVIDED, WHICH IS COUPLED TO THE GENERATOR AND THE ROTOR VIA A DEVICE FOR SETTING THE ENERGY INTAKE AND OUTPUTS, WHICH ARE CONNECTED TO THE ROTOR, THE ELECTRICAL GENERATOR, THE FLYWHEEL STORE AND A DEVICE WHICH CAN ACT AS A MOTOR OR GENERATOR WHICH IS COUPLED TO A PNEUMATIC ENERGY STORE. A FREEWHEEL IS SITUATED BETWEEN THE SUMMATION GEARING AND THE ROTOR.

1978-0733 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: WESTERN REGION.
NTIS, DECEMBER 1978. 442 P.
LBL-7821, DOE/TIC-10114/2

THIS DOCUMENT PRCVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE WEST. ITS INTENDED USES ARE TO PROVIDE DATA FOR POLICY ANALYSIS AND GENERIC IMPACT ASSESSMENTS; ASSIST THE LABS IN DEVELOPING RELEVANT DATA TO BE USED IN GROUPS AND INSTITUTIONS; AND IDENTIFY THE GAPS IN REGIONAL DATA BASES SO THAT THE DEPARTMENT OF ENERGY (DOE) MAY BE BETTER ABLE TO ALLOCATE RESOURCES FOR DATA AND PROGRAM DEVELOPMENT.

1978-0734 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: SOUTHERN REGION.
NTIS, DECEMBER 1978. 854 P.
ORNL-5443, DOE/TIC-10114/4

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE SOUTH.

1978-0735 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: MIDWEST REGION.
NTIS, DECEMBER 1978. 870 P.
ANL/EES-TM-25, DOE/TIC-10114/6

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE MIDWEST.

1978-0736 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: NORTHEAST REGION.
NTIS, DECEMBER 1978. 715 P.
BNL-24867, DOE/TIC-10114/3

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE NORTHEAST.

1978-0737 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: NORTHWEST REGION.
NTIS, DECEMBER 1978. 849 P.
PNL-RAP-28, DOE/TIC-10114/5

THIS DOCUMENT PROVIDES A COMPILATION OF REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE NORTHWEST.

1978-0738 REGIONAL ENVIRONMENT-ENERGY DATA BOOK: ROCKY MOUNTAIN REGION.
NTIS, DECEMBER 1978. 902 P.
DOE/TIC-10114/1

REGIONAL DATA RELATING TO THE ENERGY, ENVIRONMENTAL, SOCIOECONOMIC, AND INSTITUTIONAL CHARACTERISTICS OF THE ROCKY MOUNTAINS ARE COMPILED.

1978-0739 WEISBRICH A L
TORIODAL ACCELERATOR ROTOR PLATFORMS FOR WIND ENERGY CONVERSION.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2099-2107.

A TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) DESIGN FOR WIND ENERGY CONVERSION SYSTEMS (WECS) APPLICATION IS PRESENTED. A TARP WECS IS ANALYZED FOR PERFORMANCE AND ECONOMIC VIABILITY USING BOTH EXPERIMENTAL RESULTS AND ANALYTICAL APPROACHES. RESULTS INDICATE A TARP WECS TO HAVE UNUSUAL PROMISE AND POTENTIAL FOR MEETING THE DIVERSE PREREQUISITES FOR A WECS TO BECOME A VIABLE ENERGY SYSTEM ALTERNATIVE. THESE ARE REDUCED ENERGY COST, APPLICABILITY AND INTERFACE ADAPTABILITY TO A BROAD RANGE OF USES, ENVIRONMENTS AND STRUCTURES, AS WELL AS AESTHETIC DESIGN WITH MINIMAL ENVIRONMENTAL IMPACT.

1978-0740 RENEWABLE ENERGY RESOURCE AND TECHNOLOGY ASSESSMENT: SOUTHERN TIER CENTRAL REGION, NEW YORK, NEW YORK. RENEWABLE ENERGY RESOURCE INVENTORY: RENEWABLE ENERGY TECHNOLOGY HANDBOOK: TECHNOLOGY ASSESSMENT WORKBOOK.
NTIS, DECEMBER 1978. 191 P.
ORNL/SUB-7549/1

THE RENEWABLE ENERGY RESOURCE INVENTORY CONTAINS REGIONAL MAPS THAT RECORD THE LOCATION OF RENEWABLE ENERGY RESOURCES SUCH AS INSOLATION, WIND, BIOMASS, AND HYDROPOWER IN THE SOUTHERN TIER CENTRAL REGION OF NEW YORK STATE. IT CONTAINS AN OUTLINE OF A PROCESS BY WHICH COMMUNITIES CAN PREPARE LOCAL RENEWABLE ENERGY RESOURCE INVENTORIES USING MAPS AND OVERLAYS. THE PROCESS STARTS WITH THE MAPPING OF THE RESOURCES AT A REGIONAL SCALE AND TELESCOPES TO AN ANALYSIS OF RESOURCES AT A SITE-SPECIFIC SCALE. THE RESOURCE INVENTORY PRESENTS A SITE ANALYSIS OF SULLIVAN STREET INDUSTRIAL PARK, ELMIRA, NEW YORK.

1978-0741 RENNE D S, ELLIOTT D L
OVERVIEW OF TECHNIQUES FOR ANALYZING THE WIND ENERGY POTENTIAL OVER LARGE AREAS.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 14, 1978. PROCEEDINGS. NTIS, 1978. P. 176-184.
CONF-780754

ADDITIONAL WIND DATA AND OBSERVATIONAL AND ANALYTICAL METHODS PROVIDE A MORE THOROUGH LARGE-AREA ANALYSIS OF WIND ENERGY POTENTIAL. PROCEDURES ARE DESCRIBED FOR IDENTIFYING AND ANALYZING VARIOUS TYPES OF DATA. OBSERVATIONAL AND ANALYTICAL METHODOLOGIES, WHICH AID IN ESTIMATING WIND CHARACTERISTICS IN REGIONS LACKING SUFFICIENT WIND DATA, ARE PRESENTED. IN THE PACIFIC NORTHWEST PNL IS TESTING AND DEMONSTRATING TECHNIQUES FOR LARGE-AREA ANALYSIS. THE PRELIMINARY ANALYSIS FOR THE NORTHWEST HAS REVEALED SIGNIFICANTLY GREATER DETAIL IN WIND ENERGY PATTERNS THAN DID THE NATIONAL WIND ENERGY ASSESSMENTS. OVER REGIONS WHERE WIND DATA ARE LACKING OR LIMITED AND OVER AREAS OF COMPLEX TERRAIN, ADDITIONAL MEASUREMENTS ARE NEEDED TO DETERMINE THE BEST AREAS FOR SITING.

1978-0742 REUTER R C
TOPICS ON THE DYNAMICS OF VERTICAL AXIS WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 759-766.
CONF-770921/2

ROTATING MACHINERY COMPONENTS ARE GENERALLY EXAMINED CLOSELY FOR DYNAMIC PROBLEMS BECAUSE OF EVER PRESENT, PERIODIC, BODY AND/OR EXTERNAL FORCES. DARRIEUS VERTICAL AXIS WIND TURBINES, WITH THEIR LONG, SLENDER BLADES, ROTATING SHAFTS AND TIE-DOWN CABLES ARE NO EXCEPTION. RELATIVELY LOW OPERATING FREQUENCIES AND MULTIPLE FREQUENCY EXCITATION FORCES MAKE VIBRATIONS AND DYNAMIC INSTABILITIES OF VAWTS A CONSTANT CONCERN TO THE DESIGNER. THIS PAPER BRIEFLY DISCUSSES SEVERAL DYNAMICS PROBLEMS THAT WERE TREATED WITH A VIEW TOWARD INFLUENCING DESIGN AND OPERATION OF THE SANDIA 17 METER VAWT, PRESENTLY OPERATING IN ALBUQUERQUE, NEW MEXICO.

1978-0743 REUTER R C, WORSTELL M H
TORQUE RIPPLE IN A VERTICAL AXIS WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2090-2098.

TORQUE RIPPLE IS A NAME GIVEN TO TIME VARIATIONS IN TORQUE WHICH ARE PROPAGATED THROUGH THE DRIVE TRAIN OF WIND ENERGY CONVERSION SYSTEMS. THIS PAPER COVERS AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF TORQUE RIPPLE IN A DARRIEUS VERTICAL AXIS WIND TURBINE. AN ANALYTICAL MODEL OF THE TURBINE IS DESCRIBED AND NUMERICAL RESULTS FROM A SOLUTION TO THE EQUATIONS OF THIS MODEL ARE COMPARED TO EXPERIMENTAL RESULTS OBTAINED FROM THE EXISTING DOE/SANDIA 17 METER VERTICAL AXIS WIND TURBINE. DISCUSSIONS ON THE SOURCES OF TORQUE RIPPLE, THEORETICAL AND EXPERIMENTAL CORRELATION, AND MEANS OF SUPPRESSING ITS MAGNITUDE ARE INCLUDED.

1978-0744 RICHARDS T R, NEUSTADTER H E
DOE/NASA MOD-0A WIND TURBINE PERFORMANCE.

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 13TH. PROCEEDINGS. WARRENDALE, PA., SAE, 1978. ALSO: NEW YORK, IEEE, 78-CH1372-2, 1978. VOL. 3, P. 2060-2063.

AS PART OF THE NATIONAL WIND ENERGY PROGRAM UNDER THE DIRECTION OF THE DEPARTMENT OF ENERGY, THE NASA-LEWIS RESEARCH CENTER HAS DESIGNED AND BUILT, AND IS NOW OPERATING, A LARGE WIND TURBINE AT CLAYTON, N.M. DESIGNATED THE MOD-0A-1, THIS IS THE FIRST OF THREE IDENTICAL 200-KW WIND TURBINES TO BE OPERATED ON ELECTRIC UTILITY NETWORKS. THIS MACHINE WAS INSTALLED AT CLAYTON IN NOVEMBER 1977. THIS PAPER PRESENTS A COMPARISON BETWEEN ITS PREDICTED AND MEASURED POWER VERSUS WIND SPEED PERFORMANCE.

1978-0745 ROBBINS W H, SHOLES J E
ERDA/NASA 200 KW MOD-0A WIND TURBINE PROGRAM.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 59-75.
CONF-770921/1

THIS PAPER PRESENTS AN OVERVIEW OF THE MOD-0A PROGRAM. THE MOD-0A PROGRAM IS DIRECTED TO THE DESIGN, MANUFACTURE, INSTALLATION AND OPERATION OF 200 KW WIND TURBINES IN UTILITY POWER SYSTEMS TO DEFINE AND RESOLVE PROBLEMS ASSOCIATED WITH WIND TURBINES IN USER SYSTEMS. A MOD-0A SYSTEM DESCRIPTION, DEVELOPMENT PROGRAM AND PROGRAMMATIC STATUS IS INCLUDED.

1978-0746 ROBINSON J W
GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, 1978.
LOS ANGELES COUNCIL OF ENGINEEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 4. NORTH HOLLYWOOD, CAL., WESTERN PERIODICAL CO., 1978. 293 P.
GREATER LOS ANGELES AREA SYMPOSIUM, CALIFORNIA, MAY 23, 1978.

THE PROCEEDINGS INCLUDE 53 PAPERS DEVOTED TO ENERGY PROBLEMS, INCLUDING: SOLAR, ALTERNATIVE ENERGY SOURCES, CONVENTIONAL, AND NUCLEAR POWER; CITIZENS WORKSHOP; CONSERVATION AND ENVIRONMENTAL ASPECTS; CO-GENERATION; ECONOMIC AND POLITICAL ASPECTS.

1978-0747 ROGERS P
WIND ENERGY GENERATION WITH HYPERBOLIC COOLING TOWERS.
LOS ANGELES COUNCIL OF ENGINEEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 4: GREATER LOS ANGELES AREA SYMPOSIUM, CALIFORNIA, MAY 23, 1978. NORTH HOLLYWOOD, WESTERN PERIODICAL CO., 1978. P. 68-72.

THE METHOD DESCRIBED IN THIS ARTICLE PERTAINS TO THE SECONDARY UTILIZATION OF THE EXTERIOR OF HYPERBOLIC COOLING TOWER SHELLS FOR SUPPORTING WIND-ROTORS, AND FOR PRODUCING ELECTRIC ENERGY DIRECTLY AND AT A VERY REDUCED COST.

1978-0748 ROGERS S E
WIND ENERGY CONVERSION--ENVIRONMENTAL EFFECTS ASSESSMENT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 402-406.
CONF-770921/1

A BIOPHYSICAL IMPACT ASSESSMENT WAS UNDERTAKEN TO EVALUATE THE POSSIBLE ENVIRONMENTAL EFFECTS OF THE EMERGING WIND ENERGY CONVERSION TECHNOLOGY. THE MICROMETEOROLOGICAL FIELD PROGRAM SOUGHT TO MEASURE THE EFFECT OF THE 100 KW WTG ON THE DOWNSTREAM WAKE. THE PARAMETERS STUDIED WERE: THE HORIZONTAL VARIATION IN INCIDENT PRECIPITATION AND IN INCIDENT RADIATION, AND THE HORIZONTAL AND VERTICAL DISTRIBUTIONS OF AIR/SURFACE TEMPERATURE, WIND SPEED, AND ATMOSPHERIC CARBONE DIOXIDE CONCENTRATIONS.

1978-0749 ROOT D H
SURVEY AND APPRAISAL OF PRIMARY FUTURE ENERGY SOURCES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 10, P. 4667-4695.

SOME BASIC DATA AND A CONSIDERATION OF CERTAIN PHYSICAL LAWS MAY BE USED TO ESTIMATE THE MAGNITUDE OF THE FOLLOWING ENERGY SOURCES: WINDPOWER, WATERPOWER, LOW-TEMPERATURE SOLAR ENERGY, SOLAR POWER THROUGH PHOTOSYNTHESIS, TIDAL POWER, GEOTHERMAL ENERGY AND FISSION ENERGY (WITHOUT BREEDERS), COAL, SOLAR ELECTRIC GENERATION, AND FISSION WITH BREEDERS. THE PRINCIPAL CONCLUSION IS THAT IF THE U.S. WERE TO DEVELOP DOMESTICALLY THE ABOVE SOURCES, AND IF GEOTHERMAL ENERGY AND FISSION ENERGY (WITHOUT BREEDERS) WERE MADE TO LAST 50 YEARS, THEN THE FIRST SEVEN ENERGY SOURCES WOULD SUPPLY ENERGY AT ABOUT 50 PERCENT OF THE 1973 U.S. CONSUMPTION RATE. HENCE, WITHOUT OIL AND GAS, HALF THE U.S. ENERGY WOULD HAVE TO COME FROM ONE OR MORE OF THE THREE SOURCES: NUCLEAR FISSION WITH BREEDERS, SOLAR ELECTRIC GENERATION, AND COAL.

1978-0750 ROSEN A, FRIEDMANN P P
NONLINEAR EQUATIONS OF EQUILIBRIUM FOR ELASTIC HELICOPTER OR WIND TURBINE BLADES UNDERGOING MODERATE DEFORMATION.
NTIS, DECEMBER 1978. 105 P.
DOE/NASA/3082-78/1, NASA-CR-159478, UCLA-ENG-7718, N79-19414

A SET OF NONLINEAR EQUATIONS OF EQUILIBRIUM FOR AN ELASTIC WIND TURBINE OR HELICOPTER BLADE IS PRESENTED. THESE EQUATIONS ARE DERIVED FOR THE CASE OF SMALL STRAINS AND MODERATE ROTATIONS (SLOPES). THE DERIVATION INCLUDES SEVERAL ASSUMPTIONS WHICH ARE CAREFULLY STATED. FOR THE CONVENIENCE OF POTENTIAL USERS THE EQUATIONS ARE DEVELOPED WITH RESPECT TO TWO DIFFERENT SYSTEMS OF COORDINATES, THE UNDEFORMED AND THE DEFORMED COORDINATES OF THE BLADE. FURTHERMORE, THE LOADS ACTING ON THE BLADE ARE GIVEN IN A GENERAL FORM SO AS TO MAKE THEM SUITABLE FOR A VARIETY OF APPLICATIONS. THE EQUATIONS OBTAINED IN THE PRESENT STUDY ARE COMPARED WITH THOSE OBTAINED IN PREVIOUS STUDIES. FINALLY, IT SHOULD BE NOTED THAT THIS REPORT REPRESENTS THE FIRST IN A SERIES OF THREE REPORTS DOCUMENTING THE RESEARCH PERFORMED UNDER THE GRANT. THE SECOND REPORT (UCLA-ENG-7880) DEALS WITH THE AEROELASTIC STABILITY AND RESPONSE OF AN ISOLATED HORIZONTAL AXIS WIND TURBINE BLADE. THE THIRD REPORT (UCLA-ENG-7881) DEALS WITH THE AEROELASTIC STABILITY AND RESPONSE OF THE COMPLETE COUPLED ROTOR/TOWER SYSTEM SIMULATING ESSENTIALLY THE DYNAMICS OF THE NASA/DOE MOD-0 CONFIGURATION.

1978-0751 ROTATING ENERGY TRANSFORMER AND DEVICE FOR THE EXTRACTION OF ENERGY FROM SURFACE WAVES.
GERMAN (FRG) PATENT NO. 2,750,616/A/, MAY 24, 1978. 15 P. (IN GERMAN)

ROTATING ENERGY CONVERTER WITH AN IMPELLER HAVING A NUMBER OF VANES, WHICH CAN BE DRIVEN BY AIR FLOWING THROUGH, IS CHARACTERISED BY THE FACT THAT EACH VANE HAS AN AEROFOIL CROSS SECTION AND IS FIXED WITH ITS ZERO DRIVE AEROFOIL AT RIGHT ANGLES TO AXIAL DIRECTION, PRODUCING A ROTATION OF THE SAME IN THE SAME DIRECTION.

EQUIPMENT FOR EXTRACTING ENERGY FROM SURFACE WAVES, PARTICULARLY SEA WAVES, IS CHARACTERISED BY THE FACT THAT A LIMITER IS PRESENT WHICH MARKS OUT AN AREA OF THE SURFACE OF THE WAVE MEDIUM, AND THAT A ROTATING ENERGY CONVERTER IS ARRANGED SO THAT IT CAN BE DRIVEN BY THE AIR MOVEMENT PRODUCED IN THE AREA OF THE EXISTING WAVE MOVEMENT.

1978-0752 WHITFORD D H, MINARDI J E, WEST B S
AN EVALUATION OF THE MADARAS ROTOR POWER PLANT CONCEPT.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 829-842.
CONF-770921/2

THE OBJECTIVE OF THIS PROGRAM IS TO DEMONSTRATE THE DEGREE THAT MADARAS POWER PLANTS HAVING CAPACITIES IN THE 10 MW TO 100 MW RANGE ARE COST COMPETITIVE WITH HORIZONTAL-AXIS WIND GENERATORS AND FOSSIL-FUEL-FIRED POWER PLANTS. THE PROGRAM CONSISTS OF FOUR PHASES: A PERFORMANCE ANALYSIS, AN AERODYNAMIC STUDY, A STRUCTURAL, ELECTRO-MECHANICAL SYSTEM STUDY, AND AN ECONOMIC STUDY. THE RESULTS OBTAINED TO DATE ARE PRESENTED.

1978-0753 ROTHMAN E A
COMPOSITE BLADES FOR MOD-0.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 540-551.
CONF-770921/2

ON THE BASIS OF THE DATA AND ARGUMENTS IN THE PAPER "MATERIALS AND PROCESSING APPROACHES TO COST COMPETITIVE WIND TURBINE ROTOR BLADES", PRESENTED AT THE 8TH ANNUAL SAMPE TECHNICAL CONFERENCE IN OCTOBER 1976, IT WAS CONCLUDED THAT A FIBERGLASS FILAMENT-WOUND WIND TURBINE BLADE WOULD REDUCE FIRST COST AND COULD REDUCE OPERATING COST AS WELL BY WAY OF LONGER LIFE AND LOWER MAINTENANCE. AS A FIRST STEP, A PROTOTYPE FIBERGLASS BLADE WAS DESIGNED, BUILT AND GROUND-TESTED UNDER A CONTRACT FROM NASA/LEWIS RESEARCH CENTER TO HAMILTON STANDARD. THIS REPORT IS A BRIEF SUMMARY OF THIS FIRST STEP.

1978-0754 RUHLMANN T E
SELECTION AND APPLICATION OF PASTED PLATE LEAD-ACID BATTERIES FOR WIND AND SOLAR POWER ENERGY STORAGE.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 85-91.

THE OPTIMUM COMPONENT CHARACTERISTICS OF LEAD-ACID BATTERIES REQUIRED FOR 5 AND 20 DAY ENERGY RESERVES ARE PRESENTED AND COMPARED WITH THE CHARACTERISTICS OF: STANDARD AUTOMOTIVE-LIGHTING-IGNITION (SLI) BATTERIES; MAINTENANCE FREE AUTOMOTIVE SLI BATTERIES; STANDARD HEAVY DUTY SLI AND MARINE BATTERIES; ELECTRIC VEHICLE (EV) BATTERIES; INDUSTRIAL LIFT TRUCK BATTERIES; AND STATIONARY BATTERIES. IN ADDITION, BRIEF REMARKS ARE PRESENTED RELATED TO PERSONAL AND EQUIPMENT SAFETY WITH RESPECT TO HANDLING AND USING LEAD-ACID BATTERIES.

1978-0755 RUP R
EXPERIMENTAL INVESTIGATIONS OF A PHYSICAL SYSTEM CAPABLE OF USING SOLAR ENERGY.
J. PHYS. D11(18): L207-L209, DECEMBER 21, 1978.

A PHYSICAL SYSTEM CAPABLE OF USING LOW TEMPERATURE DIFFERENCES IS INVESTIGATED. IN AN EARLIER PUBLICATION, BASED ON A SIMPLE THEORETICAL MODEL, THE AUTHOR, IN COLLABORATION WITH OTHERS, OBTAINED THE DYNAMICS OF A SYSTEM WITH TWO WORKING FLUIDS, VIZ. DRY AIR (DRY SYSTEM) AND AIR SATURATED WITH WATER VAPOR (WET SYSTEM). THIS NOTE REPORTS A COMPARISON BETWEEN THE EXPERIMENTAL AND THEORETICAL RESULTS, BOTH FOR THE DRY SYSTEM AND THE WET SYSTEM. THE RESULTS ARE FOUND TO BE IN GOOD AGREEMENT.

1978-0756 WHITE H O
WIND MOTOR.
U.S. PATENT NO. 4,097,190, JUNE 27, 1978. 14 P.

A WIND DRIVEN BLADE IS PIVOTALLY CARRIED BY A ROTATABLE CRANK ARM. THE BLADE ROTATES RELATIVE THE CRANK ARM FROM A POSITION PERPENDICULAR TO THE WIND DURING THE POWER STROKE TO A POSITION PARALLEL TO THE WIND DURING THE RETURN STROKE. THE MOVING MASS IS DYNAMICALLY BALANCED TO PROVIDE A SELF-CONTAINED SINGLE BLADE MODULAR UNIT. A SELECTED NUMBER OF THE MODULAR UNITS ARE ADJOINABLE TO FORM A MULTI-BLADE WIND MOTOR IN WHICH ANY GIVEN MODULE MAY BE FUNCTIONALLY DISCONNECTED.

1978-0757 SAIFUL M R
COMPARATIVE COSTS OF WATER PUMPING WITH SOLAR ENERGY, WIND POWER, PETROL ENGINE AND ELECTRIC WATER PUMP.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 2143-2146.

WITH RENEWED INTEREST IN SOLAR ENERGY UTILIZATION, CERTAIN COMMERCIAL FIRMS ARE CLAIMING OPTIMISTIC AND UNREALISTICALLY HIGH PERFORMANCE FIGURES AND COMPETITIVE ECONOMICS FOR THEIR SOLAR WATER PUMPING UNITS AND OTHER POWER DEVICES. TO KEEP THE CONSUMER, ENGINEER, AND THE GOVERNMENT AGENCIES INFORMED OF THE PRESENT STATE OF SOLAR WATER PUMPING TECHNOLOGY AND COMPARATIVE ECONOMICS OF SUCH DEVICES, THE NEED FOR STANDARDIZATION, PERFORMANCE ANALYSIS, AND ECONOMIC ASSESSMENT IS SELF-EVIDENT.

1978-0758 SALIEVA R B
SELECTION OF METHOD FOR CALCULATING THE PARAMETERS OF WIND AND SOLAR POWER STATION STORAGE FACILITIES.
GELIOTEKHNIKA 14(1): 67-71, 1978. TRANSL.: APPL. SOL. ENERGY 14(1): 55-58, 1978.

IT IS SHOWN THAT WHEN USING THE CALENDAR METHOD TO DETERMINE THE PARAMETERS OF WIND AND SOLAR POWER STATION STORAGE FACILITIES IT IS NECESSARY TO UTILIZE AS THE BASIC DATA FOR SEASONAL REGULATION CALCULATIONS, A 20-YEAR SERIES OF ACTUAL STANDARD OBSERVATIONS OF THE WIND AND SOLAR RADIATION REGIMES FOR VALID DETERMINATION OF THE STORAGE FACILITY PARAMETERS. A TEN-YEAR OBSERVATION PERIOD CAN BE USED ONLY FOR THE SUMMER SEASON. COMPARATIVE EVALUATION OF THE PARAMETERS CALCULATED ON THE BASIS OF STANDARD AND HOURLY OBSERVATIONS YIELDS A BASIS TO CONSIDER THAT RELIABLE INFORMATION CAN BE OBTAINED FROM THE DATA OF STANDARD OBSERVATIONS IF THE OVERALL SAMPLE SIZE IS SUFFICIENT.

1978-0759 SALTER E L
WIND-DRIVEN GENERATOR.
U.S. PATENT NO. 4,110,631, AUGUST 29, 1978. 16 P.

A WIND-DRIVEN GENERATOR IS DESCRIBED WHICH HAS A PLURALITY OF ROTORS EACH HAVING A RIM IN FRICTIONAL ENGAGEMENT WITH A POWER TAKE-OFF DRUM WHICH IS MOUNTED ON THE SHAFT OF AN ELECTRICAL GENERATOR, AND IN WHICH THE ROTOR RIMS ARE PRESSED AGAINST THE DRUM BY THE WIND FORCE ON THE ROTORS AND WITH A REDUCED FORCE WHICH VARIES AS A

POSITIVE FUNCTION OF THE WIND FORCE.

1978-0760 SAMPSON A R
WIND POWERED HYDRAULIC HEATING SYSTEM.
U.S. PATENT NO. 4,114,809 SEPTEMBER 19, 1978. 6 P.

A HEATING APPARATUS IS DESCRIBED WHICH INCLUDES A CIRCULATION SYSTEM FOR HYDRAULIC FLUID, A PUMP FOR PUMPING THE FLUID, A WINDMILL FOR DRIVING THE PUMP, AN ADJUSTABLE PRESSURE RESPONSIVE RELIEF VALVE FOR RESTRICTING THE FLOW OF HYDRAULIC FLUID IN THE CIRCULATION SYSTEM AND ESTABLISHING THEREIN AN ADJUSTABLE FLUID PRESSURE REDUCTION, A SENSOR RESPONSIVE TO THE WIND VELOCITY ENCOUNTERED BY THE WINDMILL, A VALVE CONTROL MECHANISM RESPONSIVE TO THE SENSOR FOR AUTOMATICALLY ADJUSTING THE FLUID PRESSURE REDUCTION PROVIDED BY THE RELIEF VALVE AND A HEAT EXCHANGER FOR REMOVING HEAT FROM THE HYDRAULIC FLUID. THE WORK PERFORMED BY THE WIND IN PUMPING THE HYDRAULIC FLUID THROUGH THE RELIEF VALVE IS CONVERTED DIRECTLY INTO HEAT THAT IS CONVEYED TO THE HEAT EXCHANGER FOR CONVERSION INTO A USEFUL FORM. BY ADJUSTING THE RELIEF VALVE TO ESTABLISH INCREASING PRESSURE REDUCTIONS WITH INCREASING WIND VELOCITY, THE SYSTEM OPTIMIZES THE RATE OF WIND ENERGY UTILIZATION.

1978-0761 SCHENZLE P
WIND-POWERED SHIPS: POSSIBILITIES OF MODERN WIND-POWERED SEA TRANSPORT SYSTEMS.
INTERNATIONAL SOLAR FORUM, 2ND, HAMBURG, GERMANY, FR, JULY 12, 1978. PROCEEDINGS. MUNICH, GERMANY, DEUTSCHE GESELLSCHAFT FUER SONNENENERGIE E.V., 1978. VOL. 3, P. 325-345. (IN GERMAN)

DURING THOUSANDS OF YEARS THE EXTENSIVE WIND SYSTEMS OF THE OCEANS SERVED AS THE NATURAL ENERGY SOURCE FOR SEA TRANSPORTATION. TODAY THE TECHNICAL MEANS ARE AVAILABLE FOR A FAR MORE EFFICIENT UTILIZATION OF THE WIND FOR SHIP PROPULSION. WITH THE GROWING AWARENESS OF THE SERIOUS ECOLOGICAL PROBLEMS OF THE OCEANS A GREAT VARIETY OF PROPOSALS FOR COMMERCIAL WIND PROPULSION SYSTEMS WAS PUBLISHED. HERE A STANDARD PERFORMANCE PREDICTION MODEL IS PRESENTED AS A BASIS FOR A FAIR COMPARISON OF DIFFERENT SYSTEMS. RESULTS ARE PRESENTED FOR DIFFERENT TYPES OF WINDPROPELLED CARGOSHIPS.

1978-0762 SCOTT D
HYDRAULIC WINDMILLS SMOOTH THE CHANGING WINDS.
POP. SCI. 212(4): 6, 10, 192, APRIL 1978.

TWO BRITISH CONCEPTS FOR WIND TURBINE POWER CONVERSION SYSTEMS UTILIZING HYDRAULIC SYSTEMS ARE DESCRIBED. ONE SYSTEM IS USED TO GENERATE ELECTRICITY AND THE OTHER SYSTEM GENERATES HEAT FOR SPACE HEATING.

1978-0763 SEIDEL R C
POWER OSCILLATIONS OF A 100 KW WIND TURBINE GENERATOR.
CECON '78 RECORD. CLEVELAND ELECTRICAL/ELECTRONICS CONFERENCE AND EXPOSITION, 25TH, CLEVELAND, MAY 9-11, 1978. NEW YORK, IEEE, 78CH1300-3REG 2, 1978. P. 112-113.

PROGRESS IN EXPLAINING A 100 KW EXPERIMENTAL WIND TURBINE GENERATOR'S POWER OSCILLATION AT A FREQUENCY OF TWICE PER ROTOR REVOLUTION (2P) IS REPORTED. THE 2P POWER CONTENT IS ON AVERAGE SOME FOUR TIMES MORE THAN PREDICTED, ASSUMING LINEAR WIND SHEAR AND NEGLECTED EXCITATION FROM RANDOM LOCAL TURBULENCES.

1978-0764 SEIDEL M
WIND ENERGY. A CONTRIBUTION TO ENSURING THE ENERGY SUPPLY OF THE FEDERAL REPUBLIC OF GERMANY.
TECH. BAU. 9(8): 653-658, 1978. (IN GERMAN)

INCLUDED WITHIN IS A HISTORICAL REVIEW OF THE USE OF WIND ENERGY, AND AN ESTIMATION OF THE AVAILABLE ENERGY AMOUNT USING THE EXAMPLE OF WEST GERMANY AND A STATION NEAR AACHEN. THE TYPES OF WIND ENERGY PLANTS, AVAILABLE EFFICIENCIES, AND SPECIFIC LOSS-FACTORS ARE ALSO INCLUDED. THE REPORT CONTAINS A FORECAST OF THE USE OF WIND ENERGY FOR ELECTRIC POWER GENERATION AND THE PRODUCTION OF HEAT ENERGY.

1978-0765 SELECTING WATER-PUMPING WINDMILLS.
NTIS, JANUARY 1978. 19 P.
PB80-149776

THIS SHORT PAPER IS AN INTRODUCTORY GUIDE FOR THOSE CONSIDERING A WINDMILL FOR WATER PUMPING. TOPICS DISCUSSED INCLUDE: PARTS AND ASSEMBLY, THE TOWER, THE WELL SEAL AND PUMP ROD ASSEMBLY, THE PACKERHEAD, THE DROP PIPE, THE CYLINDER AND SCREEN, THE DISCHARGE PIPE, BOOSTER MILL AND STORAGE TANKS. ALSO MENTIONED ARE SUGGESTIONS FOR WINDMILL SIZE SELECTION AND PROPER SITE INSTALLATION.

1978-0766 SEMINAR UND STATUSREPORT WINDENERGIE. (SEMINAR AND STATUS REPORT ON WIND ENERGY.)
BONN, GERMANY, FR, BMFT, 1978. 490 P. (IN GERMAN)
SEMINAR AND STATUS REPORT ON WIND ENERGY, JUELICH, GERMANY, FR, OCTOBER 23-24, 1978.

THIS REPORT CONTAINS PAPERS ON THE METEOROLOGICAL REQUIREMENTS FOR THE OPERATION OF WIND ENERGY SYSTEMS AND DESCRIPTIONS OF SMALL AND LARGER PLANTS, PART OF THEM IN THE PLANNING STAGE AND PART OF THEM ALREADY IN OPERATION.

1978-0767 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE TO TV RECEPTION CAUSED BY WINDMILLS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 407-412.
CONF-770921/1

THE PAPER INVESTIGATES THE INTERFERENCE TO TV RECEPTION CAUSED BY THE SCATTERING OF TV SIGNALS BY WINDMILLS. IN THE VICINITY OF AN APPROPRIATELY ORIENTED WINDMILL, A TV RECEIVER WILL RECEIVE THE WINDMILL SCATTERED SIGNALS IN ADDITION TO THE DIRECT SIGNALS. THE SCATTERING BY THE ROTATING BLADES OF THE WINDMILL WILL PRODUCE BOTH AMPLITUDE AND PHASE MODULATIONS OF THE SIGNALS AT THE RECEIVER; IN PRACTICE THE FORMER EFFECTS DOMINATE. SINCE THE VIDEO INFORMATION IN TV SIGNALS IS TRANSMITTED BY AMPLITUDE MODULATION, ANY EXTRANEOUS AMPLITUDE MODULATION WILL, IF SUFFICIENTLY STRONG, DISTORT THE VIDEO RECEPTION.

1978-0768 SENGUPTA D L, SENIOR T B A
ELECTROMAGNETIC INTERFERENCE BY WIND TURBINE GENERATORS. FINAL REPORT.
NTIS, MARCH 1978. 169 P.
TID-28828

THE INTERFERENCE PRODUCED BY HORIZONTAL AXIS WIND TURBINE GENERATORS ON A NUMBER OF ELECTROMAGNETIC SYSTEMS HAS BEEN EXHAUSTIVELY STUDIED, AND A METHOD HAS BEEN DEVELOPED TO APPROXIMATE THE INTERFERENCE ZONE OF A WTG.

1978-0769 SENIOR T B A, SENGUPTA D L
WIND TURBINE GENERATOR SITING AND TV RECEPTION HANDBOOK. TECHNICAL REPORT NO. 1.
NTIS, JANUARY 1978. 39 P.
COO-2846-1

THE ROTATING BLADES OF A HORIZONTAL AXIS WIND TURBINE GENERATOR (WTG) CAN DISTORT THE VIDEO PORTION OF A TV SIGNAL AND THEREBY INTERFERE WITH TV RECEPTION IN THE VICINITY OF THE WTG. THE NATURE OF THIS INTERFERENCE IS DISCUSSED AND METHODS ARE DESCRIBED FOR CALCULATING THE APPROXIMATE ZONE WITHIN WHICH THE INTERFERENCE IS JUDGED SEVERE.

1978-0770 SFORZA P M
VORTEX AUGMENTORS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 803-807.
CONF-770921/2

A DISCUSSION OF RESEARCH, DESIGN AND DEVELOPMENT ON AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH POWER DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF RELATIVELY LOW POWER DENSITY. PROPERLY DESIGNED TURBINES ARE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED VORTEX FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT.

1978-0771 SFORZA P M, STASI W, PAZIENZA J, SMORTO M
FLOW MEASUREMENTS IN LEADING-EDGE VORTICES.
AIAA J. 16(3): 218-224, MARCH 1978.

AN EXPERIMENTAL STUDY OF THE VORTEX FLOWFIELD OVER SLENDER DELTA PLANFORMS WITH SHARP LEADING EDGES IS PRESENTED. COMPLETE VELOCITY MEASUREMENTS IN THIS THREE-DIMENSIONAL FLOWFIELD ARE OBTAINED BY MEANS OF A CONRAD-TYPE PROBE USED IN CONJUNCTION WITH A FIVE-DEGREE-OF-FREEDOM TRAVERSING MECHANISM, AND FLOW VISUALIZATION IS ACHIEVED BY AN OIL FOG TECHNIQUE. EFFECTS OF ANGLE OF ATTACK, CAMBER, SWEEPBACK, ETC. ARE DESCRIBED.

1978-0772 SFORZA P M, STASI W
WIND POWER DISTRIBUTION, CONTROL, AND CONVERSION IN VORTEX AUGMENTORS.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 45-57.

THE VORTEX AUGMENTOR CONCEPT (VAC) FOR FLUID POWER CONVERSION EMPLOYS SEVERAL BASIC ASPECTS OF FLUIDS ENGINEERING. THE FOLLOWING FEATURES OF VAC ARE DISCUSSED: THE GENERATION OF AN ALTERED POWER DISTRIBUTION IN SPACE BY AERODYNAMIC INTERACTION BETWEEN THE NATURAL WIND AND AN AERODYNAMIC INTERACTION BETWEEN THE NATURAL WIND AND AN AUGMENTOR SURFACE, THE CONTROL OF THIS POWER DISTRIBUTION BY MEANS OF CONFIGURATIONAL CHANGES IN THE AUGMENTOR SURFACE, AND THE DEVELOPMENT OF SUITABLE TURBOMACHINERY FOR EXTRACTING POWER FROM THE TRANSFORMED FLOW FIELD.

1978-0773 SHAW E
NORTHEAST YELLOW PAGES OF SOLAR ENERGY RESOURCES.
BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1978. 74 P.

THIS IS A DIRECTORY OF SOLAR AND OTHER ALTERNATE ENERGY PRODUCTS AND SERVICES AVAILABLE TO THE CONSUMER TODAY. BECAUSE OF INCREASING INTEREST IN CONSERVING ALL TYPES OF ENERGY, THE SECTION ON INSULATION WAS EXPANDED, AND A SECTION ON ENERGY SAVING DEVICES WAS ADDED. ALTHOUGH THIS DIRECTORY DOES NOT ATTEMPT TO BE COMPREHENSIVE IN ITS COVERAGE, WE HOPE OUR READERS WILL FIND THIS A VALUABLE RESOURCE FOR LOCATING PRODUCTS AND SERVICES IN THE FIELDS OF ENERGY CONSERVATION AND ALTERNATE ENERGY RESOURCES. THE DIRECTORY IS ARRANGED IN THREE BASIC SECTIONS: ALPHABETICAL, GEOGRAPHICAL, AND CLASSIFIED CODES IN THE ALPHABETICAL AND GEOGRAPHICAL SECTIONS DIRECT THE READER TO THE APPROPRIATE CLASSIFIED CATEGORIES.

1978-0774 SHEIH C M
WINDMILL IMBALANCE MOMENT INDUCED BY VERTICAL GRADIENTS OF WIND SPEED AND DIRECTION.
NTIS, 1978. P. 113-119.
ANL-78-65(PT.4)

AN IMPORTANT FACTOR TO CONSIDER IN DESIGNING A HORIZONTAL-AXIS WINDMILL IS THE IMBALANCE MOMENT CAUSED BY THE WINDMILL BLADES EXPERIENCING VERTICAL GRADIENTS OF HORIZONTAL WIND SPEED AND DIRECTION. ROTATING WINDMILL BLADES ARE SUBJECT TO LIFT FORCES IN THE DIRECTION OF ROTATION AND DRAG FORCES IN THE DIRECTION OF THE WIND. LIFT FORCES ARE THE PRIMARY SOURCES OF THE NET TURNING MOMENT; DRAG FORCES DO NOT CONTRIBUTE TO THE EXTRACTION OF WIND ENERGY AND MAY CAUSE STRUCTURAL DESIGN PROBLEMS. IF THE WIND IS CONSTANT IN SPACE AND TIME, THEN THE DRAG WILL APPEAR ONLY AS A PRESSURE OR TENSION FORCE BETWEEN THE BLADES AND THE SUPPORTING STRUCTURE. HOWEVER, IF THE WIND VELOCITY IS NOT UNIFORM, AS IS USUALLY THE CASE, DIFFERENT DRAG FORCES WILL ACT ON DIFFERENT BLADES AND WILL RESULT IN AN IMBALANCE MOMENT WITH RESPECT TO THE AXIS OF ROTATION, IN ADDITION TO THE PRESSURE FORCE MENTIONED EARLIER. SINCE THE RADIUS OF THE MOMENT EXERTED BY THE WIND ON THE BLADES COULD BE TWO ORDERS OF MAGNITUDE LARGER THAN THAT OF THE BEARING ASSEMBLY SUPPORTING THE BLADES, THE CORRESPONDING IMBALANCE DRAG FORCE COULD BE AMPLIFIED BY TWO ORDERS OF MAGNITUDE WHEN TRANSMITTED TO THE BEARINGS. FURTHER, THIS DIFFERENCE IN DRAG FORCE OSCILLATES SINUSOIDALLY AS THE BLADES ROTATE THROUGH REGIONS OF HIGHER AND LOWER WIND SPEED, PLACING EVEN MORE STRAIN ON THE STRUCTURE. THE IMBALANCE MOMENT AS A FUNCTION OF VERTICAL GRADIENTS OF WIND SPEED AND DIRECTION FOR VARIOUS ATMOSPHERIC STABILITIES AND WINDMILL DIMENSIONS IS INVESTIGATED.

1978-0775 SHEU D L
WIND ENERGY CONVERSION. VOLUME 7. EFFECTS OF TOWER MOTION ON THE DYNAMIC RESPONSE OF WINDMILL ROTOR.
ASRL-TR-184-13.
NTIS, SEPTEMBER 1978. 61 P.
COO-4131-T1(VOL.7)

THE EFFECTS OF TOWER MOTION ON THE DYNAMIC RESPONSE OF A WINDMILL ROTOR ARE STUDIED. THE BLADE LAGGING AND SIDE TOWER MOTION ARE TAKEN INTO CONSIDERATION IN THE ANALYSIS. THE EQUATIONS OF MOTION FOR THE SYSTEM ARE A SET OF LINEAR ORDINARY DIFFERENTIAL EQUATIONS HAVING PERIODIC COEFFICIENTS. THE PERIODIC COEFFICIENTS OF THE EQUATIONS OF MOTION FOR A THREE BLADED ROTOR ARE ELIMINATED BY USING THE MULTIBLADE COORDINATE TRANSFORMATION METHOD. FOR A TWO BLADED ROTOR, THE EQUATIONS OF MOTION ARE SOLVED BY USING THE HARMONIC BALANCE METHOD. IN ADDITION TO BOTH METHODS, THE FLOQUET TRANSITION MATRIX METHOD IS SHOWN TO BE AN EFFECTIVE WAY OF DEALING WITH

THE LINEAR ORDINARY DIFFERENTIAL EQUATIONS HAVING PERIODIC COEFFICIENTS. THE DIFFERENCES BETWEEN THE INSTABILITY REGIONS FOR A THREE BLADED SYSTEM AND FOR A TWO BLADED SYSTEM ARE DISCUSSED.

1978-0776 SHURTLEFF W W
SOLAR ENERGY SYSTEM TESTING: SOME EXPERIENCES WITH MINICOMPUTERS.
SEMINAR ON TESTING SOLAR ENERGY MATERIALS AND SYSTEMS, GAITHERSBURG, MD., MAY 22-24, 1978. PROCEEDINGS. MT. PROSPECT, ILL., INST. ENVIRON. SCI., 1978. P. 265-269.

SANDIA LABORATORIES HAS FIVE MINICOMPUTER BASED CONTROLLERS WHICH AID IN DATA ACQUISITION AND CONTROL OF SUCH PROJECTS AS THE SOLAR TOTAL ENERGY PROJECT, PHOTOVOLTAIC TEST PROJECT, SOLAR COLLECTOR PROJECT, SOLAR THERMAL TEST FACILITY (POWER TOWER), AND THE VERTICAL AXIS WIND TURBINE. THE EXPERIENCES ASSOCIATED WITH THESE PROJECTS HAVE GIVEN SOME INSIGHT INTO DEVELOPING A "PHILOSOPHY APPLICATION" OF MINICOMPUTERS OR MICROPROCESSORS TO THIS TYPE OF TESTING. IN THIS PAPER, SUCH IDEAS AS VERSATILITY OF HARDWARE AND SOFTWARE AND "DISTRIBUTED" SYSTEMS ARE EXPLAINED WITH THE PURPOSE OF OUTLINING THIS PHILOSOPHY.

1978-0777 SIMPSON J
CITIZENS' ENERGY DIRECTORY.
WASHINGTON, D.C., CITIZENS' ENERGY PROJECT, INC., 1978. 157 P.

LISTED IN THIS DIRECTORY ARE PROJECTS, ADDRESSES, ORGANIZATIONAL DATA, PURPOSES, GOALS, AND SERVICES RENDERED IN 48 STATES, DISTRICT OF COLUMBIA, AND THE VIRGIN ISLANDS. A LISTING OF PROJECTS IS NOT GIVEN FOR NORTH DAKOTA AND LOUISIANA. LISTINGS BY INTEREST AREAS INCLUDE CONSERVATION, GENERAL ALTERNATIVES, WIND, GEOTHERMAL, HYDRO POWER, WOOD, METHANE/PROPANE, APPROPRIATE TECHNOLOGY, ANTI-NUCLEAR, AND SOLAR. RESOURCE LISTINGS INCLUDE APPROPRIATE TECHNOLOGY, SOLAR NEWSLETTERS AND MAGAZINES, WIND, GEOTHERMAL, AND CITIZEN ENERGY NEWSLETTERS.

1978-0778 SISTERSON D L, HICKS B B
ARGONNE WIND ENERGY STUDY.
NTIS, 1978. P. 107-112.
ANL-78-65(PT.4)

A STUDY OF THE NATURE, FREQUENCY, AND DISTRIBUTION OF NOCTURNAL, LOW-LEVEL WIND MAXIMA IN THE MIDWEST AND GREAT PLAINS IS MAKING USE OF WIND DATA FROM AN INSTRUMENTED TELEVISION TOWER IN CENTRAL OKLAHOMA AND THE ANL METEOROLOGY TOWER IN NORTHERN ILLINOIS. SINCE THE USE OF POWER-LAW WIND PROFILES IS COMMON IN ENGINEERING DESIGN STUDIES, POWER LAWS HAVE BEEN FITTED TO ACTUAL WIND PROFILES, AND THE FREQUENCY DISTRIBUTION OF THE POWER-LAW EXPONENT HAS BEEN EXAMINED ACCORDING TO HOURLY, SEASONAL, AND ANNUAL TIME INTERVALS. THE RESULTS OBTAINED FROM THE ANL TOWER DATA ARE SUMMARIZED; IT IS BASICALLY AN EXTENSION OF EARLIER ANALYSES PRESENTED BY MOSES AND BOGNER (1967).

1978-0779 SISTERSON D L, FRENZEN P
NOCTURNAL BOUNDARY-LAYER WIND MAXIMA AND THE PROBLEM OF WIND POWER ASSESSMENT.
ENVIRON. SCI. TECHNOL. 12(2): 218-221, FEBRUARY 1978.

HIGH-RESOLUTION MEASUREMENTS OF WIND PROFILES COLLECTED OVER CENTRAL ILLINOIS INDICATE THAT NOCTURNAL, LOW-LEVEL WIND MAXIMA OCCUR MORE FREQUENTLY THAN PREVIOUSLY SUPPOSED. AN ALTERNATIVE METHOD OF PROFILE REPRESENTATION APPROPRIATE TO STABILITY CONDITIONS CHARACTERISTIC OF NOCTURNAL WIND MAXIMA IS REVIEWED, AND IT IS SUGGESTED THAT THE STRONG WIND SHEARS ASSOCIATED WITH THESE PHENOMENA MAY PRESENT A SPECIAL HAZARD TO THE LONG ROTOR BLADES OF LARGE, HORIZONTAL AXIS WIND ENERGY CONVERSION SYSTEMS.

1978-0780 SLAGER W
WIND ENERGY IN WEST MICHIGAN.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 23-30.

A WIND ENERGY ASSESSMENT MODEL IS DESCRIBED, AND RESULTS RELATING TO WEST MICHIGAN ARE PRESENTED.

1978-0781 SMALL FARM ENERGY PROJECT.
COMPOST SCI./LAND UTIL. 19(3): V, MAY-JUNE 1978.

SPONSORED BY THE CENTER FOR RURAL AFFAIRS, WALTHILL, NEBRASKA, THE SMALL FARM ENERGY PROJECT RELAYS THE LATEST INFORMATION IN ALTERNATE ENERGY DEVELOPMENTS TO FARMERS THROUGHOUT THE COUNTRY. ECONOMIC ENERGY-SAVING IDEAS ARE RECOMMENDED, E.G., COMPOSTING, METHANE RECOVERY, WIND RECYCLING, AND WASTE AND SOLAR ENERGY, BASED ON INDIVIDUAL FARM FEASIBILITY.

1978-0782 SMALL WIND ENERGY: FOCUS GROUP RESULTS.
NTIS, 1978. 43 P.
DOE/TIC-10018

THIS REPORT OF THE FOCUS GROUP RESEARCH ON SMALL WIND ENERGY SYSTEMS WAS PREPARED FOR THE DEPARTMENT OF ENERGY AS PART OF THE COMMERCIALIZATON PROGRAM. THE PURPOSE OF THIS RESEARCH IS TO EVALUATE THE POTENTIAL FOR COMMERCIALIZATION OF SMALL WIND ENERGY SYSTEMS, TO DETERMINE THE BARRIERS TO DEVELOPMENT OF THIS RESOURCE, AND TO JUDGE WHAT ACTIONS ARE REQUIRED BY THE FEDERAL GOVERNMENT TO PROMOTE COMMERCIALIZATION.

1978-0783 SMALL WIND POWER UNIT. TECHNOLOGY--COAL COMPETITIVENESS--POTENTIAL MARKET.
STOCKHOLM, SWEDEN, NAEMNDEN FOER ENERGIPRODUKTIONSFORSKNING, 1978. 477 P. (IN SWEDISH)

THIS STUDY CONCERNS SMALL-SCALE LOCAL WIND POWER SYSTEMS DEFINED AS POWER UNITS IN THE 1 TO 40 KW RANGE DESIGNED FOR CONVERSION OF WIND ENERGY TO ELECTRICAL ENERGY.

1978-0784 WALTON J J
STRUCTURE AND FUNCTION OF THE PRINCIPAL COMPONENTS ANALYSIS (PCA) CODE.
NTIS, JUNE 1978. 41 P.
UCID-17827

1978-0785 SMEDMAN-HOEGSTROM A S, HOEGSTROM U
PRACTICAL METHOD FOR DETERMINING WIND FREQUENCY DISTRIBUTIONS FOR THE LOWEST 200 M FROM ROUTINE METEOROLOGICAL DATA.
J. APPL. METEOROL. 17(7): 942-954, JULY 1978.

A METHOD IS DESCRIBED FOR DETERMINING WIND SPEED FREQUENCY DISTRIBUTIONS AT ANY HEIGHT UP TO 200 M ABOVE GROUND FOR A METEOROLOGICAL STATION WHERE WIND SPEED AND DIRECTION IS MEASURED AT A LOW REFERENCE LEVEL (USUALLY 10 M)

AND WHICH REPORTS ROUTINE METEOROLOGICAL DATA AT LEAST ONCE EVERY 3 H. THE ROUGHNESS CHARACTERISTICS OF THE TERRAIN SURROUNDING THE STATION MUST BE KNOWN IN DETAIL, BECAUSE THE MODEL CALCULATES THE RATE OF GROWTH OF INTERNAL BOUNDARY LAYERS RESULTING FROM DISCONTINUITIES IN ROUGHNESS AS WELL AS THE SHAPE OF THE WIND PROFILE IN THE VARIOUS LAYERS. THE SHAPE CHARACTERISTICS OF THE PROFILE ARE DETERMINED AS A FUNCTION OF ROUGHNESS LENGTH AND OF STABILITY BY THE AID OF MEASUREMENTS FROM THREE SWEDISH 100 M MASTS.

1978-0786 SMITH O J M
SOW WIND TURBINES AND REAP THE WIND.
SYMPOSIUM ON COMMERCIALIZATION OF SOLAR AND CONSERVATION TECHNOLOGIES, MIAMI BEACH, FLORIDA, DECEMBER 11, 1978. NTIS, 1978. P. 191-192.
CONF-781235-P1

1978-0787 SMITH M C
OPTIMIZATION OF WIND ENERGY CONVERSION SYSTEMS.
POLICY ANAL. INF. SYST. 2(1): 149-171, JULY 15, 1978.

TECHNICAL OPTIMIZATION OF WIND ENERGY CONVERSION SYSTEMS, INCLUDING SITE SELECTION, IS DESCRIBED AND AN EXAMPLE GIVEN. IT IS SHOWN THAT ONLY SYSTEM EFFICIENCY, WIND CHARACTERISTICS, ENERGY DESIRED, AND THE SYSTEM COST STRUCTURE ARE REQUIRED. ELECTRIC GRID ENERGY USAGE WITH NO STORAGE IS ASSUMED.

1978-0788 SNOW J W, GARSTANG M, PIELKE R, COOPER H
THE WIND POWER POTENTIAL OF THE COASTAL ZONE.
U.S. NATIONAL CONFERENCE WIND ENGINEERING RESEARCH, 3D, GAINESVILLE, FLORIDA, FEBRUARY 26-MARCH 1, 1978. GAINESVILLE, FLORIDA, UNIVERSITY OF FLORIDA, 1978. P. II-19-1. (ABSTRACT ONLY)

1978-0789 SNYDER M H
AIRFOIL DATA FOR USE OF WIND TURBINE DESIGNERS.
ANNUAL UMR-DNR CONFERENCE ON ENERGY, 4TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 11-13, 1977. ROLLA, MO., UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 578-587.

THIS PAPER REVIEWS DESIGN PROCEDURES FOR WIND-AXIS TURBINE ROTORS. AN "ON DESIGN" ROUTINE FOR ROTOR BLADE DESIGN IS PRESENTED AS WELL AS AN "OFF-DESIGN" PERFORMANCE CALCULATION PROGRAM. RESULTING FROM THIS REVIEW ARE ANALYSES OF DESIRABLE CHARACTERISTICS OF AIRFOIL SECTIONS AND OF TYPES OF DATA WHICH ROTOR DESIGNERS NEED. INCLUDED IN THE PAPER ARE AIRFOIL CHARACTERISTICS FOR CANDIDATE BLADE SECTIONS INCLUDING 360 DEGREE DATA FOR GA(W)-1 AND GA(W)-2 AIRFOILS.

1978-0790 SORENSEN B
ON THE FLUCTUATING POWER GENERATION OF LARGE WIND ENERGY CONVERTERS, WITH AND WITHOUT STORAGE FACILITIES.
SOL. ENERGY 20(4): 321-331, 1978.

THE POWER FLUCTUATIONS AND TIME DURATION PATTERNS OF LARGE, HYPOTHETICAL WIND ENERGY GENERATORS ARE ANALYSED, USING METEOROLOGICAL DATA FOR DENMARK. IT IS FOUND THAT THE FLUCTUATIONS, RELATIVE TO A LOAD WHICH VARIES THROUGH THE YEAR IN A MANNER SIMILAR TO THE ACTUAL LOAD, ARE NO GREATER THAN THE FLUCTUATIONS RELATIVE TO A CONSTANT LOAD (BASE-LOAD APPLICATION). THE ADDITION OF A HYPOTHETICAL SHORT-TERM STORAGE, CAPABLE OF DELIVERING THE AVERAGE POWER FOR 10-20 HR, MAKES THE WIND ENERGY SYSTEM AS DEPENDABLE AS ONE LARGE NUCLEAR POWER PLANT, BEING CAPABLE OF DELIVERING THE AVERAGE POWER FOR ABOUT 70 PERCENT OF THE TIME. FOR FULL COVERAGE BY A WIND ENERGY SYSTEM, AN ADDITIONAL LONG-TERM STORAGE FACILITY MUST BE ADDED. THE PROSPECTS FOR DEVELOPING SUITABLE STORAGE FACILITIES, THE COST OF TOTAL WIND ENERGY SYSTEMS RELATIVE TO OTHER MEANS OF PRODUCING ELECTRICITY ARE DISCUSSED.

1978-0791 ALVES R
LIVING WITH ENERGY.
NEW YORK, PENGUIN BOOKS, 1978. 128 P.

MANY DESIGNS ARE DESCRIBED IN THIS BOOK BY PIONEERS UTILIZING BETTER BUILDING DESIGN, SOLAR HEATING, AND WIND POWER. THROUGH THEIR EXPERIENCES, THESE PEOPLE WILL ENABLE US TO TEMPER THE TRANSITION FROM A FOSSIL FUEL/NUCLEAR-BASED EXISTENCE TO A MORE STEADY-STATE, CONSERVATION-CONSCIOUS VITALITY. THEIR HOMES, GENERATORS, AND INTEGRATED SYSTEMS ARE SHOWN TO INTRODUCE THE AVAILABLE ALTERNATIVES. WHEN IT IS THOUGHT THAT ENERGY FROM THE SUN AND WIND IS NOT ECONOMICALLY FEASIBLE, TWO POINTS ARE OVERLOOKED, I.E., MANY ENERGY ALTERNATIVES ARE ALREADY COST COMPETITIVE AND NO AMOUNT OF MONEY CAN PURCHASE SOMETHING THAT DOES NOT EXIST, AND IT IS ONLY A MATTER OF TIME BEFORE FOSSIL FUELS WILL BE DEPLETED.

1978-0792 WELTE D
WIND TURBINE PLANT WITH MAIN ROTOR AND ONE OR MORE STARTING AUXILIARY ROTORS.
GERMAN (FRG) PATENT NO. 2,757,266/B/, NOVEMBER 2, 1978. 9 P. (IN GERMAN)

THE INVENTION CONCERNS WIND TURBINE PLANTS WITH ROTOR SHAFTS VERTICAL TO THE FLOW AIR. THE WIND TURBINE PLANT CONSISTS OF A MAIN ROTOR AND ONE OR MORE STARTING AUXILIARY ROTORS. THE MAIN ROTOR HAS SEVERAL PROFILE BLADES IN THE DIRECTION OF THE ROTOR SHAFT, WHILE THE STARTING AUXILIARY ROTORS HAVE BOWL-SHAPED BLADES. ACCORDING TO THE INVENTION THE BOWLS OF THE STARTING AUXILIARY ROTORS CAN ROTATE WITH THE ROTOR SHAFT, BUT ARE FREE TO MOVE RADIALLY IN DIFFERENT POSITIONS. CENTRIFUGAL FORCE CAUSES THE BOWLS OF THE STARTING AUXILIARY ROTORS TO MOVE FROM A POSITION OF MAXIMUM DISTANCE TO ONE OF MINIMUM DISTANCE FROM THE ROTOR SHAFT WITH INCREASING (SPEED OF) ROTATION, SO THAT THE OUTPUT OF THE STARTING AUXILIARY ROTORS BECOMES LESS AND LESS WITH INCREASING SPEED OF ROTATION.

1978-0793 SPERA D A
SUMMARY OF COMPARISON OF COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN WIND TURBINES.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 502-516.
CONF-770921/2

THE OBJECTIVES OF THIS STUDY ARE TO PRESENT A BRIEF OVERVIEW OF EACH CODE (COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN HORIZONTAL-AXIS WIND TURBINES), AND IDENTIFY SOURCES FOR FURTHER DETAILED INFORMATION, AND TO COMPARE THE PERFORMANCE OF EACH CODE AGAINST TWO SETS OF TEST DATA MEASURED ON THE 100 KW MOD-0 WIND TURBINE.

1978-0794 SPIERINGS P A M
SIMPLIFYING WIND TURBINES WITH THE COMPOSITE BEARINGLESS ROTOR CONCEPT.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 119-125.

MATERIAL PROPERTIES, AERODYNAMIC CHARACTERISTICS, AND DESIGN PARAMETERS INVOLVED WITH COMPOSITE BEARINGLESS ROTORS FOR WIND TURBINES ARE REVIEWED.

1978-0795 SPIERINGS P A M, CHENEY M C
SUMMARY OF THE DESIGN OF A SELF-REGULATING WIND TURBINE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 612-624.
CONF-770921/2

THE CONCEPT OF THE COMPOSITE BEARINGLESS ROTOR, SUCH AS USED IN SOME HELICOPTERS FOR REASONS OF WEIGHT, COST AND SIMPLICITY, IS SHOWN FEASIBLE FOR WIND TURBINES. SELF ALIGNMENT WITH THE WIND DIRECTION AND SELF REGULATION WITH THE WIND VELOCITY WERE DEMONSTRATED IN WIND TUNNEL TESTS OF A 4.5 FT DIAMETER DYNAMICALLY SCALED MODEL. THE MODEL CONSISTED OF A HUB SUPPORTED PENDULUM INTEGRATED WITH THE BLADE TO MAKE BLADE PITCH A FUNCTION OF ROTOR SPEED. THE EFFECTS OF SCALE ON THE CONCEPT WERE STUDIED IN THE DESIGN OF A 40-FT DIAMETER WIND TURBINE. FOR THIS 5 KW (AT 12 MPH) MACHINE, RESULTS OF PERFORMANCE TRADEOFF STUDIES, STRESS ANALYSIS OF THE BLADE AND TOWER STRUCTURE, AND A STABILITY INVESTIGATION ARE PRESENTED. ENGINEERING DRAWINGS OF THE COMPLETE SYSTEM HAVE BEEN PREPARED WHICH COULD LEAD TO FULL-SCALE FABRICATION AND DEMONSTRATION.

1978-0796 SPIERINGS P A M, CHENEY M C
DESIGN OF A SELF-REGULATING COMPOSITE BEARINGLESS BLADE WIND TURBINE. FINAL REPORT FOR OCTOBER 15, 1976-AUGUST 15, 1977.
NTIS, JANUARY 1978. 67 P.
COO-4150-77/8, R77-912668-8

A STUDY WAS UNDERTAKEN TO DESIGN A 40-FT DIAMETER WIND TURBINE EMPLOYING THE UTRC/ERDA SELF-REGULATING COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT. THE CBR CONCEPT WAS DEVELOPED AT UNITED TECHNOLOGIES FOR ROTARY WING APPLICATIONS AND IS NOW IN USE ON SIKORSKY HELICOPTERS. THE CONCEPT WAS FURTHER DEVELOPED FOR WIND TURBINE APPLICATIONS AT UTRC UNDER AN ERDA CONTRACT IN 1975-76. SUCCESSFUL WIND TUNNEL TESTS WERE CONDUCTED DURING THAT CONTRACT, WHICH DEMONSTRATED THE SELF-STARTING AND SELF-REGULATING FEATURES. THE LATEST CONTRACT WAS TO DESIGN A 40-FT SYSTEM IN THE 5 KW - 15 KW POWER RANGE. THIS EFFORT INCLUDED PERFORMANCE TRADEOFF STUDIES, STRESS ANALYSES OF THE BLADE AND TOWER STRUCTURE, A STABILITY INVESTIGATION, AND ENGINEERING DRAWINGS OF THE COMPLETE SYSTEM. HOWEVER AN OVERALL COST ANALYSIS WAS NOT PERFORMED IN THIS STUDY.

1978-0797 STEWART D A, ESSENWANGER C M
FREQUENCY DISTRIBUTION OF WIND SPEED NEAR THE SURFACE.
J. APPL. METEOROL. 17(11): 1633-1642, NOVEMBER 1978.

FREQUENCY DISTRIBUTIONS OF WIND SPEED FROM A LARGE COLLECTION OF DATA ARE EXAMINED. MOST DISTRIBUTIONS ARE SKEWED TO THE RIGHT AND THE MEAN IS USUALLY GREATER THAN THE MEDIAN. EXPERIENCE HAS SHOWN THAT THE WEIBULL DISTRIBUTION PROVIDES A GOOD ANALYTICAL APPROXIMATION TO THE CUMULATIVE DISTRIBUTION AND IS PARTICULARLY USEFUL FOR THE 9-99% THRESHOLDS. TWO METHODS OF FITTING A WEIBULL DISTRIBUTION WITH A NONZERO LOCATION PARAMETER ARE DISCUSSED. BOTH OF THESE METHODS REQUIRE LESS COMPUTATIONAL EFFORT THAN THE MAXIMUM LIKELIHOOD SOLUTION FOR A THREE-PARAMETER MODEL AND ARE SUITABLE FOR PRACTICAL USE BY THE ENGINEER. IT IS SHOWN THAT THE THREE-PARAMETER MODEL IS BETTER THAN THE TWO-PARAMETER MODEL FOR PREDICTING EXTREME VALUES. THESE RESULTS ARE RELEVANT TO WIND POWER.

1978-0798 STEWART H J
TECHNICAL IMPROVEMENTS IN LARGE SYSTEM DESIGN.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 873-877.
CONF-770921/2

THIS IS A SUMMARY OF THE SESSIONS OF THIS WORKING GROUP.

1978-0799 STIEFELD B, TOMLINSON R N
DATA ACQUISITION AND SIGNAL PROCESSING FOR A VERTICAL AXIS WIND ENERGY CONVERSION SYSTEM.
SEMINAR ON TESTING SOLAR ENERGY MATERIALS AND SYSTEMS, GAITHERSBURG, MD., MAY 22-24, 1978. PROCEEDINGS. MT. PROSPECT, ILL., INST. ENVIRON. SCI., 1978. P. 241-244.

THE DATA ACQUISITION AND ANALYSIS SYSTEM DEVELOPED TO MEET THE NEEDS OF THE 17-METER VERTICAL AXIS WIND TURBINE AT KIRTLAND AIR FORCE BASE, NEW MEXICO, IS DESCRIBED. THE SYSTEM EMPLOYS A MINICOMPUTER-BASED DATA ACQUISITION SYSTEM WITH SPECIAL PERIPHERAL EQUIPMENT. STATISTICAL METHODS ARE DESCRIBED THAT ARE EMPLOYED TO EVALUATE THE PERFORMANCE OF THE SYSTEM. THE OBJECTIVE OF THIS PROGRAM IS THE DEVELOPMENT OF AN INSTRUMENTED OUTDOOR WIND LABORATORY. THIS LABORATORY HAS THE CAPABILITY OF EVALUATING VARIOUS ASPECTS OF WIND TURBINE PERFORMANCE AS WELL AS STUDIES INVOLVED IN DETAILED ANALYSIS OF WIND FLOW PROPERTIES.

1978-0800 STODDARD F S
STRUCTURAL DYNAMICS, STABILITY, AND CONTROL OF HIGH ASPECT RATIO WIND TURBINES.
NTIS, DECEMBER 1978. 311 P.
RFP-3027/67025/3533/79-9

THE BLADE DYNAMICS AND VIBRATION OF WIND TURBINE GENERATORS WITH HIGH ASPECT RATIO (SLENDER) BLADES ARE DEVELOPED. EQUATIONS OF MOTION ARE DERIVED, AND BLADE MOTIONS AND FORCES ARE FOUND, FOR DEGREES OF FREEDOM IN FLAPPING, LEAD-LAG AND FEATHERING SUBJECT TO GRAVITY, CROSSWIND, YAW RATE, AND AXISYMMETRIC AERODYNAMIC FORCES. TOWER DEGREES OF FREEDOM ARE ADDED TO ASSESS TOWER LOADS AND VIBRATION. SIGNIFICANT MECHANICAL AND AEROELASTIC INSTABILITIES WHICH MAY OCCUR ARE PREDICTED AND DISCUSSED. METHODS ARE DEVELOPED, AND QUANTITATIVE COMPUTER PROGRAMS ARE GIVEN, FOR THE STRUCTURAL AND VIBRATION ANALYSIS OF TWISTED, TAPERED, COMPOSITE SHELL BLADES. THE UNIVERSITY OF MASSACHUSETTS WIND FURNACE I, WHICH IS THE IMPETUS OF THIS STUDY, IS DESCRIBED.

1978-0801 STOTZ K C
WIND POWER IN COASTAL NEW ENGLAND.
POWER ENG. 82(12): 46-49, DECEMBER 1978.

PROJECTIONS OF POTENTIAL OPERATING EFFICIENCY OF WIND-POWERED GENERATORS, USING CALCULATIONS FOR WIND ON THE NEW ENGLAND COAST, SEEM TO INDICATE THAT MORE FAVORABLE RESULTS MAY COME FROM THE INDIVIDUAL USE OF SMALL MACHINES THAN FROM THE USE OF LARGE MACHINES IN CENTRAL STATIONS.

1978-0802 STUDENTS CULTIVATE FISH AND VEGETABLES IN SOLAR GREENHOUSE.
SOL. HEAT. COOL. 3(4): 15-17, AUGUST 1978.

THE SOLAR GREENHOUSE ADDITION TO THE NOBLE AND GREENOUGH SCHOOL AT DEDHAM, MASS., CALLED UMBILICUS HAS BOTH ACTIVE AND PASSIVE SOLAR HEAT SYSTEMS AND 75 PERCENT OF THE ELECTRICAL DEMAND IS SUPPLIED BY A 3 KILOWATT WIND TURBINE. THE GREENHOUSE AND ITS USE FOR THE SCHOOL IS DESCRIBED BRIEFLY.

1978-0803 SUAGEE D B
THE WIND ENERGY POTENTIAL: AN ECONOMIC AND POLITICAL OVERVIEW.
TECHNOLOGY FOR ENERGY CONSERVATION. PROCEEDINGS OF THE 1978 NATIONAL CONFERENCE ON TECHNOLOGY FOR ENERGY CONSERVATION, ALBUQUERQUE, JANUARY 24-27, 1978. ROCKVILLE, MD., INFORMATION TRANSFER INC., 1978. P. 222-232.

1978-0804 SULLIVAN W N
EFFORTS ON THE ECONOMIC ANALYSIS OF DARRIEUS VERTICAL-AXIS WIND TURBINE SYSTEMS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 767-774.
CONF-770921/2

AS PART OF THE VERTICAL-AXIS WIND TURBINE PROGRAM AT SANDIA LABORATORIES, THERE HAVE BEEN EFFORTS TO UNDERSTAND THE ECONOMICS OF THE DARRIEUS TURBINE IN THE UTILITY GRID (CONSTANT RPM) APPLICATION. THERE ARE TWO MAJOR OBJECTIVES TO THESE EFFORTS. THE FIRST OBJECTIVE IS TO PROVIDE TOOLS TO PERMIT AN ECONOMIC BASIS FOR MAKING FUNDAMENTAL DESIGN DECISIONS. SUCH DECISIONS INCLUDE, FOR EXAMPLE, THE CHOICE OF THE "BEST" OPERATING RPM, NUMBER OF BLADES, ROTOR SOLIDITY, TURBINE HEIGHT TO DIAMETER RATIO, ETC. THE SECOND OBJECTIVE IS TO ESTIMATE WHAT THE ABSOLUTE COST OF SUCH SYSTEMS WILL BE, SO THAT THERE IS A BASIS FOR DECIDING WHETHER OR NOT FURTHER DEVELOPMENT OF THE CONCEPT IS DESIRABLE.

1978-0805 SULLIVAN W N
EFFORTS ON THE ECONOMIC ANALYSIS OF DARRIEUS VERTICAL AXIS WIND TURBINES.
NTIS, 1978. 8 P.
SAND-78-1851C, CONF-780972-1

THERE IS AN ONGOING PROGRAM AT SANDIA LABORATORIES DESIGNED TO ESTABLISH REASONABLE ESTIMATES FOR THE COST OF UTILITY GRID ENERGY PRODUCED BY DARRIEUS VAWT SYSTEMS. THE ECONOMIC ANALYSIS IS BASED ON THE DETAILED EXAMINATION OF ACTUAL POINT DESIGNS WHICH COVER A RANGE OF SYSTEM SIZES. THE APPROACH IS UNIQUE IN THAT IN ADDITION TO DETERMINING THE DIRECT COST OF SYSTEM COMPONENTS, AN EFFORT IS MADE TO INCLUDE THE INDIRECT COSTS AND PROFITS OF THE MANUFACTURING, MARKETING, DISTRIBUTION, AND SALES TASKS OF THE ENTERPRISE PRODUCING THE SYSTEMS. THE POINT DESIGN SPECIFICATIONS AND DRAWINGS WERE DEVELOPED BY SANDIA LABORATORIES AND PROVIDE THE BASELINE FOR THIS STUDY. THE SPECIFICATIONS REPRESENT OPTIMUM DESIGNS, AS DETERMINED BY AN ECONOMIC OPTIMIZATION MODEL. THIS MODEL, WITH MATHEMATICAL FORMULAS FOR THE COSTS OF MAJOR SYSTEM ELEMENTS, WAS USED TO SELECT FROM MANY POSSIBILITIES AN OPTIMUM SET OF DESIGN SPECIFICATIONS.

1978-0806 SUOMI V E, MASSMAN W, HINTON B, AFANASJEVS J
SCIENTIFIC INVESTIGATIONS OF TROPICAL WIND, ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE). FINAL TECHNICAL REPORT, JULY 1976--SEPTEMBER 1977.
NTIS, JANUARY 1978. 42 P.
NP-23761

THE RESULTS FROM THE TROPICAL WINDS, ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENTS (TWERLE) FOR THE PERIOD JULY 1976 THROUGH 6 SEPTEMBER 1977 ARE SUMMARIZED. THESE RESULTS ARE: A LATITUDE PROFILE OF THE RATE OF CONVERSION FROM KINETIC TO POTENTIAL ENERGY FOR THE PERIOD FROM 12 JUNE 1975 TO 1 AUGUST 1976; EVIDENCE THAT GRAVITY WAVES GENERATED IN THE TROPOSPHERE SYSTEMATICALLY DEPOSIT ENERGY IN THE VICINITY OF THE TROPOPAUSE, AND ARE A MECHANISM FOR THE DISSIPATION OF KINETIC ENERGY ON THE GLOBAL SCALE; AND EVIDENCE THAT THE JET STREAM IS AN IMPORTANT MECHANISM FOR GENERATING THESE WAVES.

1978-0807 SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION. EXECUTIVE SUMMARY.
NTIS, FEBRUARY 15, 1978. 11 P.
DSE-2332-T1

THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE EFFECT OF WIND VARIABILITY AND WIND MACHINES ON THE STABILITY OF THE ELECTRICAL POWER SYSTEM AND TO PROVIDE DESIGN INFORMATION FOR THE MACHINE DESIGNER AND THE UTILITY USER.

1978-0808 SYSTEM DYNAMICS OF MULTI-UNIT WIND ENERGY CONVERSION SYSTEMS APPLICATION. FINAL REPORT.
NTIS, FEBRUARY 1978. 347 P.
DSE-2332-T2

FLUCTUATION IN WIND SPEED CAUSES A VARIABILITY IN WIND POWER OUTPUT WHICH IS UNIQUE AMONG UTILITY LEVEL POWER SOURCES. IT IS IMPORTANT THAT THE FEASIBILITY AND THE CONSTRAINTS OF INSTALLING A SIGNIFICANT NUMBER OF WIND TURBINE GENERATORS INTO THE NATIONAL POWER SYSTEM BE INVESTIGATED. THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE EFFECT OF WIND VARIABILITY AND WIND MACHINES ON THE STABILITY OF THE ELECTRICAL POWER SYSTEM AND TO PROVIDE DESIGN INFORMATION FOR THE MACHINE DESIGNER AND THE UTILITY USER.

1978-0809 WENDELL L
WIND CHARACTERISTICS AND SITING CONSIDERATIONS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 908-911.
CONF-770921/2

THIS IS A SUMMARY OF THE DISCUSSIONS OF THIS WORKING GROUP.

1978-0810 TAMMELIN B
WIND ENERGY ON THE SOUTH COAST OF FINLAND.
SAEHKOE 51(2): 48-50, FEBRUARY 1978. (IN FINNISH)

THE VERTICAL SHEAR OF WIND SPEED AND THUS THE AMOUNT OF KINETIC ENERGY NEAR THE GROUND DEPEND ESSENTIALLY ON THE ROUGHNESS OF THE SURFACE. FOR INSTANCE, ABOVE THE SEA THE SAME AMOUNT OF ENERGY CAN BE PRODUCED AT MUCH LOWER LEVELS THAN ABOVE THE GROUND. THE ARTICLE ALSO DEALS WITH THE ANNUAL AND DIURNAL FLUCTUATIONS IN POWER BASED ON WIND SPEED MEASUREMENTS MADE IN A 150 M METEOROLOGICAL TOWER.

1978-0811 TAYLOR R H
WIND POWER -- THE POTENTIAL LIES OFFSHORE.
ELECTR. REV. 203(20): 39-40, NOVEMBER 24, 1978.

THE FUTURE CONTRIBUTION OF WIND POWER TO ELECTRICITY SUPPLY IN THE UK CAN BEST BE REALIZED BY SITING

AEROGENERATORS OFFSHORE. BUT THE OPERATIONAL CONDITIONS, OPTIMUM SHAPE AND SPREAD OF GROUPS OF GENERATORS, AND THE AVAILABILITY AND INTEGRATION OF THE POWER INTO THE GRID ALL RAISE QUESTIONS NEEDING FURTHER INVESTIGATION.

1978-0812 TEMPLIN R J
WIND ENERGY RESEARCH IN CANADA.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 423-431.
CONF-770921/1

CANADA IS A COUNTRY WITH A HUGE AREA AND A SMALL POPULATION. THIS MAKES IT EASY TO SHOW THAT THE THEORETICAL POTENTIAL FOR WIND ENERGY DEVELOPMENT IS LARGE IN RELATION TO TOTAL ELECTRICITY DEMAND. THERE IS, THEREFORE, A GROWING REALIZATION THAT ALL POTENTIAL SOURCES OF ENERGY, INCLUDING RENEWABLE SOURCES, SUCH AS TIDAL, SOLAR AND WIND SHOULD BE EXPLOITED WHEREVER THIS IS ECONOMICALLY FEASIBLE.

1978-0813 TENNYSON G P
WIND ENERGY: AN ACCELERATING PROGRAM.
AMERICAN WIND ENERGY ASSOCIATION, NATIONAL CONFERENCE, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 153-161.
CONF-780357

WIND TURBINE RESEARCH AND DEVELOPMENT PROGRAMS IN THE U.S. ARE REVIEWED. PLANNED PROGRAMS AND PROJECTED MARKETING ASPECTS ARE DISCUSSED.

1978-0814 TEWARI S K
EVALUATION OF THE STRATEGY OF LOW COST HORIZONTAL AXIS WINDMILLS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 1848-1853.

WITH THE LIMITED DATA PRESENTLY AVAILABLE, AN ATTEMPT IS MADE IN THIS PAPER TO ASSESS RELATIVE COST EFFECTIVENESS OF THREE TYPES OF WINDMILLS. THE LOW-TECHNOLOGY WINDMILLS OF MADURAI AND CRETAN TYPES ARE COMPARED ALONG WITH A CONVENTIONAL FACTORY BUILT ALL METAL WINDMILL. COSTS HAVE BEEN DISCOUNTED TO PRESENT A MORE REALISTIC PICTURE OF THE ECONOMICS OF THESE WINDMILLS. WITH THE DATA PROCESSED IN THIS PAPER, A NEED FOR HYBRIDIZATION OF LOW COST CONCEPT WITH THE HIGH MECHANICAL INTEGRITY OF CONVENTIONAL WINDMILLS IS HIGHLIGHTED AS A STRATEGY FOR BEST ACCEPTANCE FOR WIND ENERGY UTILIZATION.

1978-0815 TEWARI S K
WIND ENERGY CONVERSION IN INDIA.
RENEWABLE ENERGY RESOURCES AND RURAL APPLICATIONS IN THE DEVELOPING WORLD, BOULDER, COLORADO, WESTVIEW PRESS, FOR AAAS, 1978. P. 77-87.

THE CURRENT STATUS OF WIND ENERGY RESEARCH IN INDIA IS DISCUSSED.

1978-0816 THOMANN G C, JONG M, SNYDER M H
SMALL HORIZONTAL AXIS WIND TURBINE FEEDING POWER INTO THE UTILITY GRID.
ANNUAL UMR-DNR CONFERENCE ON ENERGY, 4TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 11-13, 1977. ROLLA, MISSOURI, UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 588-602.

A SMALL HORIZONTAL AXIS WIND TURBINE, WITH ABOUT A 2 KW POWER OUTPUT, WAS CONSTRUCTED TO CONVERT WIND ENERGY INTO AC POWER TO BE FED INTO THE UTILITY GRID. THE MACHINE IS INTENDED TO MODEL OPERATION OF THE LARGER WIND GENERATORS NOW BEING BUILT. THE VARIABLE PITCH ROTOR IS 18 FT IN DIAMETER AND HAS A GA(W)-1 BLADE AIRFOIL. THE ROTOR IS FABRICATED FROM SITKA SPRUCE MOUNTED ON A COMMERCIAL PROPELLER/HUB SYSTEM. ROTOR SPEEDS OF FROM 75 TO 150 RPM ARE USED IN OPERATION. A CHAIN DRIVE AND HELICAL GEAR DRIVE SYSTEM STEPS UP ROTOR SPEED TO 1800-3600 RPM TO DRIVE A GENERATOR CONNECTED TO THE UTILITY GRID. THE GENERATOR CAN BE OPERATED IN EITHER AN INDUCTION OR SYNCHRONOUS MODE; ONLY THE INDUCTION MODE HAS BEEN USED AT THE PRESENT TIME. ROTOR SPEED, ROTOR PITCH, TURBINE AZIMUTH, WIND SPEED AND DIRECTION, AND POWER OUTPUT ARE MONITORED DURING OPERATION. TOWER AZIMUTH AND ROTOF PITCH ARE CONTROLLED DURING EXPERIMENTS. AN AUTOMATIC DATA RECORDING SYSTEM IS PRESENTLY BEING INSTALLED. A MICROPROCESSOR AUTOMATIC CONTROL SYSTEM FOR ADJUSTING AZIMUTH DIRECTION AND ROTOR PITCH WILL BE INSTALLED SHORTLY. A COMPLETE SET OF EXPERIMENTS IS PLANNED FOR THE SPRING OF 1978.

1978-0817 THOMAS R L, RICHARDS T R
ERDA/NASA 100 KW MOD-0 WIND TURBINE OPERATIONS AND PERFORMANCE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 35-58.
CONF-770921/1

AS A PART OF THE FEDERAL WIND ENERGY PROGRAM, THE NASA LEWIS RESEARCH CENTER WAS DELEGATED BY ERDA TO DESIGN, BUILD AND TEST A 100 KW WIND TURBINE AT THE NASA PLUM BROOK STATION NEAR SANDUSKY, OHIO. THE PURPOSE OF THIS WIND TURBINE WAS TO PROVIDE EARLY OPERATION AND PERFORMANCE DATA OF A LARGE WIND TURBINE, IN VARIOUS CONFIGURATIONS, TO AID IN THE DESIGN OF FOLLOW-ON LARGE WIND TURBINES. THE 100 KW WIND TURBINE WAS DESIGNED, BUILT AND ASSEMBLED IN 18 MONTHS AND BECAME OPERATIONAL IN SEPTEMBER 1975. OPERATION OF THE 100KW WIND TURBINE HAS BEEN FULLY DEMONSTRATED AND INCLUDES STARTUP, SYNCHRONIZATION TO THE UTILITY NETWORK, BLADE PITCH CONTROL FOR CONTROL OF POWER AND SPEED, AND SHUTDOWN. ALSO FULLY AUTOMATIC OPERATION HAS BEEN DEMONSTRATED BY USE OF A REMOTE CONTROL PANEL, 50 MILES FROM THE SITE, SIMILAR TO WHAT A UTILITY DISPATCHER MIGHT USE. THIS REPORT BRIEFLY DESCRIBES THE OPERATION SYSTEMS AND EXPERIENCE WITH THE WIND TURBINE AND THE LOADS, ELECTRICAL POWER AND AERODYNAMIC PERFORMANCE OBTAINED FROM TESTING.

1978-0818 THOMAS R L, DONOVON R M
LARGE WIND TURBINE GENERATORS.
ENERGY TECHNOLOGY CONFERENCE, 5TH, WASHINGTON, D.C., FEBRUARY 27 - MARCH 1, 1978. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., APRIL 1978. P. 64-82.

A 5-YEAR WIND ENERGY PROGRAM PLAN WAS DEVELOPED IN 1974 AS PART OF THE SOLAR ENERGY PLAN OF THE PROJECT INDEPENDENCE BLUEPRINT. THIS WIND ENERGY PROGRAM INCLUDED A RECOMMENDATION TO PROCEED WITH THE DESIGN, BUILDING AND TESTING OF A NOMINAL 100 KW, 125-FOOT-DIAMETER ROTOR WIND TURBINE; THIS WIND TURBINE WAS DESIGNATED MOD-0. OTHER PROJECTS UNDERTAKEN SINCE THEN INCLUDE THREE 200 KW WIND TURBINES SIMILAR TO MOD-0 AND DESIGNATED MOD-0A, ONE 200-FOOT-DIAMETER 2000 KW WIND TURBINE DESIGNATED MOD-1, AND SEVERAL 300-FOOT-DIAMETER 2500 KW WIND TURBINES DESIGNATED MOD-2. A DESCRIPTION OF THESE WIND TURBINE SYSTEMS, THEIR PROGRAMMATIC STATUS, AND A SUMMARY OF THEIR POTENTIAL COSTS ARE PRESENTED.

1978-0819 THOMAS R B, LITTLER J G F

SOLAR HEATING FOR A NOVEL DWELLING INDEPENDENT OF SERVING NETWORKS.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 16, 1978.
ELMSFORD, NEW YORK, PERGAMON PRESS INC., 1978. P. 1667-1671.

THE AUTARKIC HOUSE WHICH IS INDEPENDENT OF ALL MAIN SERVICING NETWORKS USES SOLAR ENERGY ACTIVELY AND PASSIVELY FOR SPACE AND DOMESTIC HOT WATER HEATING. A COMPUTER SIMULATION HAS BEEN DEVELOPED WHICH MODELS BOTH THE ENERGY DEMAND AND SUPPLY OF THE HOUSE. ITS USE IN CONJUNCTION WITH WEATHER DATA HAS PERMITTED SIZING OF THE SOLAR COLLECTORS AND STORAGE TANKS AND ESTIMATING THE IMPORTANCE OF PASSIVE GAIN.

1978-0820 KATZENBERG R
IN THE WIND.
SOL. AGE 3(9): 36-37, SEPTEMBER 1978.

THE ROLE OF THE US DOE IN DEVELOPING WIND ENERGY CONVERSION SYSTEMS IS DISCUSSED.

1978-0821 TODD R W
LOW ENERGY HOUSING AT THE NATIONAL CENTRE FOR ALTERNATIVE TECHNOLOGY.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977.
LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 75-89.

THREE BUILDINGS WHICH FORM PART OF THE PERMANENT EXHIBITION AT THE CENTRE ARE DESCRIBED. COMMENTS ARE MADE ON THE PHILOSOPHY UNDERLYING THE PROJECT. THE BUILDINGS ARE THE WATES CONSERVATION HOUSE, THE WIND-POWERED COTTAGE, AND THE SOLAR HEATED EXHIBITION AND OFFICE BUILDING.

1978-0822 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRIC POWER GENERATION FROM THE WIND: A SYSTEM LINKING WIND-POWER WITH HYDROELECTRIC STORAGE AND LONG-DISTANCE TRANSMISSION.
WIND ENG. 2(1): 10-24, 1978.

THE IDEA OF GENERATING WIND POWER AT THE WINDIEST AVAILABLE SITES (WIND-FARMS) IS EXAMINED FOR ITS EFFECT ON FEASIBILITY OF LARGE-SCALE WIND POWER INPUT TO THE NATIONWIDE ELECTRIC POWER NETWORK IN THE USA. WIND POWER IS CONSIDERED IN ASSOCIATION WITH PUMPED-STORAGE HYDROELECTRIC PLANTS FOR LOAD LEVELING AND EXISTING TYPES OF TRANSMISSION LINES FOR INTERCONNECTING THE WIND FARMS AND ENERGY-STORAGE SITES WITH LOAD CENTERS UP TO 2000 KM AWAY. POTENTIAL ENERGY HARVEST FROM WIND FARM SITES IN THE 17 WESTERN STATES IS ESTIMATED AT WELL OVER 100 GW, AND MANY TIMES THIS MUCH IN ARCTIC NORTH AMERICA. AT THE 100-GW LEVEL OF DEVELOPMENT, BUS BAR COST AT THE WIND FARM WOULD BE ABOUT 3 MILLS/MJ (10 MILLS/KWH). ENERGY STORAGE REQUIRED FOR LOAD LEVELING WOULD ADD ABOUT 1.8 MILLS/MJ AND TRANSMISSION COSTS ANOTHER 2.1 MILLS/MJ, FOR A TOTAL COST AT THE LOAD CENTER OF 6 MILLS/MJ (21 MILLS/KWH), ALL IN 1976 DOLLARS. THIS WOULD BE COMPETITIVE WITH ENERGY GENERATED NEAR LOAD CENTERS BY NEW NUCLEAR OR FOSSIL-FUEL POWER-PLANTS. WIND POWER APPEARS ENVIRONMENTALLY ACCEPTABLE AND AVOIDS MANY OF THE ENVIRONMENTAL LIABILITIES OF CONVENTIONAL SOURCES.

1978-0823 TORDA T P
OPTIMAL LOCATION OF WINDMILLS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977.
ALTERNATIVE ENERGY SOURCES: AN INTERNATIONAL COMPENDIUM. WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978.
VOL. 4, P. 1779-1785.

THE STATE OF THE ART IN SITING WIND MILLS AS WELL AS LAND USE PROBLEMS ARE DISCUSSED. SPECIFIC RECOMMENDATIONS ARE MADE FOR FURTHERING PRESENT KNOWLEDGE IN THESE AREAS.

1978-0824 TRACI R M, PHILLIPS G T, PATNAIK P C
DEVELOPING A SITE SELECTION METHODOLOGY FOR WIND ENERGY CONVERSION SYSTEMS. FINAL REPORT, 15 JUNE 1977 - 15 SEPTEMBER 1978.
NTIS, SEPTEMBER 1978. 306 P.
DOE/ET/20280-3

PROGRESS ON THE DEVELOPMENT OF A NEW WIND ENERGY SITE SELECTION METHODOLOGY ACHIEVED DURING THE FINAL DEVELOPMENT PHASE OF THE PROGRAM IS DESCRIBED. THE SITING APPROACH PROVIDES A USEFUL PRELIMINARY TO, AND PARTIAL SUBSTITUTE FOR, CONVENTIONAL SITING STUDIES INVOLVING LARGE FIELD TEST PROGRAMS BY EMPLOYING MATHEMATICAL MODELS OF MESO- AND MICROMETEOROLOGY IN REGIONS OF COMPLEX TERRAIN. THE MODELS MAKE USE OF DATA FROM METEOROLOGICAL STATIONS WHERE WEATHER RECORDS ARE AVAILABLE AND PREDICT THE WINDFIELD CLIMATOLOGY OF SITES, WITHIN THE REGION OF INTEREST, WHERE DATA ARE UNAVAILABLE. THESE FORECASTS ARE SUBSEQUENTLY ANALYZED TO PREDICT SITE WIND CHARACTERISTICS AND TO AID IN THE DESIGN OF DETAILED FIELD PROGRAM TO QUANTIFY THE WIND CHARACTERISTICS AT PROMISING WIND ENERGY SITES.

1978-0825 TRACI R M, PHILLIPS G T, PATNAIK P C, FREEMAN B E
THE UTILITY OF MATHEMATICAL WINDFIELD MODELS IN A WECS SITING METHODOLOGY: A CASE STUDY.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF. MAY 1978. VOL. 2, P. 677-688.
CONF-770921/2

AN IMPORTANT LINK IN THE CHAIN OF ACTIVITIES FOR DEVELOPING PRACTICAL WIND ENERGY CONVERSION SYSTEMS (WECS) IS THE PROSPECTING OR SITE SELECTION ACTIVITY FOR IDENTIFYING OPTIMUM LOCATIONS FOR WECS SITING. PRESENT TECHNIQUES RELY ON METEOROLOGICAL RECORDS, WHICH ARE OFTEN UNAVAILABLE FOR THE MOST PROMISING SITES, AND METEOROLOGISTS' "RULES OF THUMB." SUCH TECHNIQUES HAVE BEEN INADEQUATE IN THE PAST. THUS, THE MAIN GOAL OF THE PRESENT PROGRAM IS TO PROVIDE AN IMPROVED SITING METHODOLOGY WHICH MAKES USE OF MATHEMATICAL WINDFIELD MODELING TO ACCURATELY EXTRAPOLATE CLIMATOLOGICAL DATA FROM A GIVEN SITE (OR SITES) IN A REGION OF INTEREST TO OTHER POTENTIALLY "WINDIER" SITES THROUGHOUT THE REGION.

1978-0826 TRAN V-V
TECHNICAL AND ECONOMICAL ASPECTS OF A SOLAR STILL COUPLED WITH A GREENHOUSE IN ARID LANDS OF DEVELOPING COUNTRIES.
SUN: MANKIND'S FUTURE SOURCE OF ENERGY. INTERNATIONAL SOLAR ENERGY CONGRESS, NEW DELHI, JANUARY 1978. OXFORD, ENGLAND, PERGAMON, 1978. VOL. III, P. 2031-2035.

THERE IS A MOUNTING SHORTAGE OF FOOD CAUSED BY THE EVER INCREASING EARTH POPULATION, BY THE UNCONTROLLED WEATHER, AND THE RISING COST OF FUEL AROUND THE GLOBE, ESPECIALLY IN ARID ZONES OF DEVELOPING COUNTRIES. SINCE THE NEEDS OF SUCH SMALL COMMUNITIES ARE FOOD AND DRINKING WATER, THE INSTALLATION OF A SOLAR STILL COMBINED WITH A GREENHOUSE MAY BE JUSTIFIED. A MATHEMATICAL MODEL OF THE PROPOSED SOLAR STILL GREENHOUSE, CALCULATED AND BASED ON THE METEOROLOGICAL DATA OF 1971 AT ANKARA, WAS TESTED USING EXPERIMENTAL DATA AND AGREEMENT IS

EXCELLENT. THE COST OF A SOLAR STILL COUPLED WITH A GREENHOUSE USING ONLY SOLAR AND WIND ENERGY IS MORE EXPENSIVE THAN ONE WITH CONVENTIONAL FUELS, BUT PROVIDES FOR INDEPENDENCE FROM ENERGY SOURCES OUTSIDE THE COMMUNITY. ALTERNATIVE DESIGNS AND FUTURE RESEARCH OF THE SOLAR STILL GREENHOUSE IN ARID ZONES ARE RECOMMENDED.

1978-0827 TRENKA A R
ROCKY FLATS TEST ACTIVITIES TO FEBRUARY 1978.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 126-147.

AN OVERVIEW IS PRESENTED OF THE TESTING ACTIVITIES BEING CONDUCTED AT ROCKY FLATS ON WIND TURBINE GENERATORS. THREE MAJOR AREAS ARE COVERED: THE PURPOSE AND PHILOSOPHY OF TESTING AT ROCKY FLATS TEST CENTER; A DESCRIPTION OF THE TEST FACILITIES; AND SOME CURRENT TEST RESULTS, BOTH QUANTITATIVE AND QUALITATIVE OBTAINED AT THE ROCKY FLATS TEST CENTER.

1978-0828 TRENKA A
INTRODUCTION TO THE 1 KW HIGH RELIABILITY WTG.
NATIONAL CONFERENCE OF THE AMERICAN WIND ENERGY ASSOCIATION, AMARILLO, TEXAS, MARCH 1, 1978. PROCEEDINGS. CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, 1978. P. 38-39.

THE DOE SMALL WIND TURBINE RESEARCH AND DEVELOPMENT PROGRAM IS REVIEWED.

1978-0829 URBANEK A
TVINDKRAFT, THE LARGEST WINDMILL IN THE WORLD.
DTSCH. GES. SONNENENERG. MITTEILUNGSBL. 3(6): 23-24, NOVEMBER-DECEMBER 1978. (IN GERMAN)

A WIND POWER PLANT WITH AN OUTPUT OF 100 KW IS DESCRIBED. THE PLANT CONSISTS MAINLY OF A WIND ROTOR WITH A DIAMETER OF 19 METERS. THE ROTOR HAS 350 SHEET STEEL BLADES OF 1 SQ. METER SURFACE AREA EACH. THE PLANT WAS PRODUCED BY PRIVATE INDUSTRY.

1978-0830 BHUMRALKAR C M
ESTIMATION OF WIND CHARACTERISTICS AT POTENTIAL WIND ENERGY CONVERSION SITES.
MENLO PARK, CALIFORNIA, SRI INTERNATIONAL, APRIL 1978. 149 P.

A PRACTICAL METHOD HAS BEEN DEVELOPED AND APPLIED TO THE PROBLEM OF DETERMINING WIND CHARACTERISTICS AT CANDIDATE WIND ENERGY CONVERSION SITES WHERE THERE ARE NO AVAILABLE HISTORICAL DATA. THE METHOD USES A MASS CONSISTENT FLOW MODEL (CALLED "COMPLEX") TO INTERPOLATE BETWEEN STATIONS WHERE WIND DATA ARE AVAILABLE. THE COMPLEX MODEL INCORPORATES THE EFFECTS OF TERRAIN FEATURES AND AIRFLOW. THE KEY TO THE PRACTICAL APPLICATION OF COMPLEX TO THE DERIVATION OF WIND STATISTICS IS THE MODEL'S LINEARITY. THIS ALLOWS THE INPUT DATA SETS TO BE RESOLVED INTO ORTHOGONAL COMPONENTS ALONG THE SET OF EIGENVECTORS OF THE COVARIANCE MATRIX. THE SOLUTION FOR EACH EIGENVECTOR IS DETERMINED WITH COMPLEX; THE HOURLY INTERPOLATED WINDS ARE THEN FORMED FROM LINEAR COMBINATIONS OF THESE SOLUTIONS.

1978-0831 USMANI I H
RURAL ELECTRIFICATION: AN ALTERNATIVE FOR THE THIRD WORLD.
NAT. RESOUR. FORUM 2(3): 271-277, APRIL 1978.

RURAL ELECTRIFICATION IS AN ESSENTIAL ELEMENT IN DEVELOPMENT PLANNING IN DEVELOPING COUNTRIES. IN THE PAST, THE CONVENTIONAL APPROACH TO RURAL ELECTRIFICATION HAS BEEN EITHER TO EXTEND NATIONAL GRIDS FROM CENTRAL POWER STATIONS, OR TO INSTALL SMALL DIESEL GENERATORS. THIS ARTICLE EXPLORES A THIRD ALTERNATIVE, NAMELY THE HARNESSING OF SUCH RENEWABLE SOURCES OF ENERGY AS SOLAR, WIND AND BIOMASS FOR THE PRODUCTION OF LOCAL ELECTRIC POWER. THE AUTHOR OUTLINES THE CONCEPT OF THE RURAL ENERGY CENTRE IN COMPARISON WITH THE STRUCTURE OF ENERGY NEEDS, AND RESPONDS TO CRITICS OF THIS INTEGRATED APPROACH TO THE PROBLEM OF RURAL ELECTRIFICATION.

1978-0832 UTILITIES PUT THE SUN TO WORK.
EPRI J. 3(2): 26-32, MARCH 1978.

SAMPLES OF SOLAR APPLICATIONS ILLUSTRATE HOW UTILITIES ARE COMMITTING FUNDS FOR RESEARCH AND DEVELOPMENT OF SOLAR ENERGY IN ANTICIPATION OF ITS BECOMING A SIGNIFICANT CONTRIBUTOR TO THEIR ENERGY MIX. THE EXAMPLES, CHOSEN FROM 458 PROGRAMS, INCLUDE A HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) PROJECT, BIOMASS, CLIMATIC DATA COLLECTION, WIND ENERGY, SOLAR COLLECTOR TESTING, PHOTOVOLTAICS, AND VARIOUS SOLAR HEATING AND COOLING (SHAC) EFFORTS. FUNDING LEVELS AND EXTENT OF ACTIVE PARTICIPATION ON THE PART OF UTILITIES ARE INDICATED. THE INFORMATION WAS GATHERED THROUGH A TELEPHONE SURVEY BY THE ELECTRIC POWER RESEARCH INSTITUTE, BUT DOES NOT INCLUDE EPRI-FUNDED PROJECTS. SHAC AND RELATED RESEARCH ACCOUNTS FOR 74% OF THE TOTAL $15 TO $20 MILLION COMMITMENT MADE BY 150 INVESTOR-OWNED, PUBLIC, AND COOPERATIVE UTILITIES.

1978-0833 VAN DUSEN E S, KIRCHHOFF R H
A TWO DIMENSIONAL VORTEX SHEET MODEL OF A SAVONIUS ROTOR.
FLUIDS ENGINEERING IN ADVANCED ENERGY SYSTEMS, SAN FRANCISCO, DECEMBER 10-15, 1978. NEW YORK, ASME, 1978. P. 15-31.

A TWO-DIMENSIONAL INVISCID FLOW MODEL IS DEVELOPED FOR A VERTICAL AXIS WINDMILL OF THE SAVONIUS ROTOR TYPE WITH TWO FOILS OF ARBITRARY SHAPE. THE SOLUTION IS CONSTRUCTED BY THE SUPERPOSITION OF STREAMFUNCTIONS FOR THE UNIFORM FLOWS AND THE VORTEX SHEETS REPRESENTED THE FOILS AND THE WAKE VORTICITY. CALCULATIONS ARE PERFORMED IN THE REFERENCE FRAME OF THE ROTATING FOILS AND INCLUDE A TIME DEVELOPING WAKE AS VORTICITY IS SHED FROM THE TRAILING EDGE OF EACH FOIL. THE RESULTS FROM DIFFERENT TIME STEPS, HENCE ROTOR ORIENTATIONS, ARE PRESENTED AS PLOTS OF TORQUE, STREAMLINES, AND POWER COEFFICIENT OVER A WIDE RANGE OF TIP SPEED RATIOS. RESULTS INVESTIGATING THE TIME STEP BETWEEN SOLUTIONS AND DIFFERENT GEOMETRIES ARE ALSO PRESENTED AND COMPARED TO EMPIRICAL VALUES. A HEURISTIC STALL MODEL TO ACCOUNT FOR FLOW SEPARATION IS INCLUDED IN A MANNER THAT ANTICIPATES FUTURE VISCOUS ANALYSIS.

1978-0834 BOLT J B D H
NETHERLANDS EXPERIMENTAL VERTICAL AXIS WIND TURBINE.
NEDERLANDSE VERENIGING VOOR LUCHTVAARTTECHNIEK, YEARBOOK 1977. AMSTERDAM, NEDERLANDSE VERENIGING VOOR LUCHTVAARTTECHNIEK, 1978. P. 5.1--5.8.

THE PAPER GIVES A GENERAL DESCRIPTION OF AN EXPERIMENTAL 5.3-M-DIAM VERTICAL AXIS WIND TURBINE AND ITS ASSOCIATED POWER CONVERSION SYSTEM AND OTHER SUBSYSTEMS. THE TWO GLASS-FIBER REINFORCED PLASTIC BLADES ARE STRENGTHENED BY BONDED LIGHT-METAL PLATES. AS DESIGN-CRITERIA FOR THE STATIC STRENGTH OF THE BLADES, A MAXIMUM BLADE ROTATION SPEED OF 450 RPM IN CALM WEATHER CONDITIONS AND A REDUCING SPEED OF 2.5 RAD/SQ SEC AT 325 RPM

ARE USED. THE ROTOR OPERATES IN TWO MODES: CONSTANT SPEED, AND CONSTANT BLADE-SPEED/WIND-SPEED RATIO. BLOCK DIAGRAMS OF THE MECHANICAL-HYDRAULIC ENERGY CONVERSION SYSTEM AND THE CONTROL AND PROTECTION SYSTEMS ARE PRESENTED. THE TEST PROGRAM WILL COMPRISE MEASUREMENT OF VIBRATION CHARACTERISTICS OF THE TURBINE WHEN STATIONARY AND RUNNING, WITH OR WITHOUT TETHERING, MEASUREMENT OF TURBINE EFFICIENCY AT CONSTANT ROTOR RPM AND BLADE-SPEED/WIND-SPEED RATIO, MEASUREMENT OF TENSION IN THE BLADE ROOTS, AND MEASUREMENT OF THE INFLUENCE OF TENSION IN THE GUY WIRES ON DYNAMIC BEHAVIOR OF THE TURBINE.

1978-0835 DEBONTRIDDER J, VANDENPUT A, MARCELIS R, GEYSEN W, DE KEUSTER C, FIERENS E
COMBINATION ASYNCHRONOUS GENERATOR-VERTICAL AXIS WIND TURBINE FOR SMALL POWER APPLICATIONS.
PROCEEDINGS: INTERNATIONAL CONFERENCE ON ELECTRIC MACHINERY, VOL. 2. LOUVAIN, BELGIUM, KATHOLIC UNIVERSITAIRE, 1978. P. G5.5.1--G5.5.11.

THE PAPER DISCUSSES THEORETICAL WORKING PRINCIPLES OF COUPLING AN ASYNCHRONOUS GENERATOR AND A WIND-DRIVEN VERTICAL AXIS TURBINE, CONSIDERING CHOICE OF THE GENERATOR, LIMITING THE TURBINE SPEED, EFFICIENCY OF THE SYSTEM AND THE MINIMUM WIND VELOCITY FOR STARTING.

1978-0836 VAN HOLTEN T
WIND POWER ENHANCEMENT BY THE TIPVANE SYSTEM.
NED. TIDSCHR. NATUURKD. A. A44(1): 42-46, MARCH 1978. (IN DUTCH)

AIR FLOW PATTERNS ARE ILLUSTRATED FOR CONVENTIONAL WIND TURBINES AND FOR THOSE WITH TIP-WAVES. WIND TUNNEL TESTS HAVE SHOWN A MASS FLOW ENHANCEMENT OF 4 TIMES WITH TIPVANES RELATIVE TO NORMAL TURBINES. AN INTERESTING ANALOGY IS DRAWN BETWEEN THE AERODYNAMIC FLOW CONDITIONS AND THE MAGNETIC FIELD IN MAGNETIC LENSES OF THE SHORT SOLENOID TYPE.

1978-0837 VAN HOLTEN T
PROPELLER OR A SET OF WINGS FOR A WIND MILL.
U.S. PATENT NO. 4,093,402, JUNE 6, 1978. 4 P.

A PROPELLER FOR A WIND MILL COMPRISING A ROTATABLE SUPPORTED HUB WITH AT LEAST ONE MAINLY RADIALLY EXTENDING BLADE HAVING A CROSS SECTION IN THE SHAPE OF A "WING PROFILE", EACH BLADE BEING PROVIDED WITH AT LEAST ONE AUXILIARY BLADE WITH A CROSS SECTION IN THE SHAPE OF WING PROFILE AND BEING POSITIONED SUCH THAT THE AUXILIARY BLADE WILL GENERATE A "VENTURY EFFECT" BY WHICH A PART OF THE FLUID, WHICH NORMALLY SHOULD PASS OUTSIDE THE PROPELLER DISC AREA, IS DRAWN INTO THE PROPELLER.

1978-0838 HEWSON E W, BAKER R W, BARBER D A, PETERSON B
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST.
NTIS, SEPTEMBER 1978. 171 P.
DOE/BP/10552-T1

SINCE 1975 THE BONNEVILLE POWER ADMINISTRATION (BPA) HAS BEEN SPONSORING WIND POWER RESEARCH AT OREGON STATE UNIVERSITY. A FEASIBILITY STUDY THAT INITIALLY CONCENTRATED ON THE WIND POWER POTENTIAL IN THE COLUMBIA RIVER GORGE HAS EXPANDED TO THE BPA SERVICE AREA WHICH COVERS WASHINGTON, OREGON, IDAHO, WESTERN MONTANA AND NORTHERN NEVADA. PREVIOUS BPA REPORTS HAVE DOCUMENTED THE PROGRESS OF THIS RESEARCH. THE OBJECTIVES AND CONCLUSIONS OF THE INVESTIGATIONS DURING THE NINE MONTH PERIOD, DECEMBER 1977 TO AUGUST 1978, ARE SUMMARIZED. THE DETAILS OF THE RESEARCH ARE PRESENTED.

1978-0839 VAS I E
WIND ENERGY INNOVATIVE SYSTEMS. TECHNICAL STATUS REPORT, JULY 1978.
NTIS, AUGUST 1978. 58 P.
SERI/PR-13-054

THE SOLAR ENERGY RESEARCH INSTITUTE HAS BEEN AUTHORIZED BY THE DEPARTMENT OF ENERGY TO PROVIDE TECHNICAL MANAGEMENT OF THE WIND ENERGY INNOVATIVE SYSTEMS (WEIS) PROGRAM CURRENTLY COMPRISED OF EIGHT RESEARCH AND DEVELOPMENT CONTRACTS. THESE RESEARCH EFFORTS ARE AIMED AT DETERMINING TECHNICAL AND ECONOMIC FEASIBILITY OF INNOVATIVE CONCEPTS AND SYSTEMS UTILIZING WIND ENERGY. THE CURRENT REPORT IS THE SECOND OF THE MONTHLY TECHNICAL STATUS REPORTS AND REVIEWS THE PROGRESS OF THE CONTINUING TASKS.

1978-0840 VAUGHAN D H, MOSES H L, O'BRIEN W F
APPLICATION OF WIND POWER TO REFRIGERATE APPLE STORAGES.
ASAE PAPER 78-3526, FOR WINTER MEETING, CHICAGO, DECEMBER 18-20, 1978. ST. JOSEPH, MICHIGAN, ASAE, 1978. 25 P.

A WIND-POWERED COLD STORAGE FACILITY, WHICH INCLUDES A 10-KILOWATT WIND GENERATOR MOUNTED ON A 90-FT. TOWER, A DC VAPOR COMPRESSION REFRIGERATION SYSTEM, A 100-BUSHEL APPLE STORAGE BUILDING, AN ICE/TANK THERMAL STORAGE UNIT, AND AN ELECTRICAL (BATTERY BANK) ENERGY STORAGE, IS DESCRIBED. OPERATION OF THE SYSTEM, WITH APPLES STORED IN THE BUILDING, BEGAN ON MARCH 7, 1978. TYPICAL PERFORMNCE DATA FOR THE COOLING SYSTEM ARE GIVEN.

1978-0841 VAUGHAN D H, MOSES H L, BLANTON J C, BALDWIN J D
DESIGN OF A WIND-POWERED COLD STORAGE FACILITY.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 71-83.

THE DESIGN AND CONSTRUCTION OF A COLD STORAGE FACILITY FOR USE WITH WIND POWER IS DESCRIBED. THE FACILITY INCLUDES A 10-KILOWATT WIND GENERATOR, A COLD STORAGE BUILDING, A VAPOR-COMPRESSION REFRIGERATION SYSTEM, AND A THERMAL STORAGE UNIT. WHEN POWER FROM THE WIND IS SUFFICIENT, HEAT IS REMOVED FROM THE SOLUTION WHICH THEN ACTS AS A THERMAL STORAGE FOR PERIODS WHEN WIND ENERGY IS UNAVAILABLE. THE FREEZING POINT OF THE ETHYLENE GLYCOL/WATER MIXTURE IS ADJUSTED TO PROVIDE THE LATENT HEAT OF FUSION AT THE TEMPERATURE DESIRED IN THE STORAGE ROOM. THE DESIGN ANALYSIS OF THE COMPLETE SYSTEM INCLUDED A STUDY OF THE STORAGE REQUIREMENTS FOR APPLES, THE COOLING LOAD CALCULATIONS FOR THE BUILDING, SPECIFICATIONS OF THE SYSTEM COMPONENTS, AND THERMAL STORAGE REQUIREMENTS.

1978-0842 WENDELL L L, ELDERKIN C E
PROGRAM OVERVIEW FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE UNITED STATES FEDERAL WIND ENERGY PROGRAM.
NTIS, APRIL 1978. 15 P.
CONF-781014-2, PNL-SA-6918

WITHIN THE FEDERAL WIND ENERGY PROGRAM OF THE UNITED STATES OF AMERICA, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) HAS BEEN ESTABLISHED WITH THE RESPONSIBILITY FOR ASSEMBLING AND DEVELOPING WIND CHARACTERISTICS INFORMATION APPROPRIATE TO THE NEEDS OF THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND PERFORMANCE OF

WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR WECS INSTALLATION, AND THE OPERATION OF WECS. THE U.S. DEPARTMENT OF ENERGY (DOE) IS ADDRESSING THIS RESPONSIBILITY THROUGH A MANAGEMENT/RESEARCH PROGRAM WHICH INCLUDES: RELIABLE WIND AND TURBULENCE DESCRIPTIONS PERTINENT TO WECS DESIGN AND PERFORMANCE EVALUATION; EFFECTIVE ANALYSES AND METHODS FOR THE DETERMINATION OF WIND ENERGY POTENTIAL OVER LARGE AREAS; DEPENDABLE AND COST-EFFECTIVE METHODOLOGIES FOR THE SITING OF WECS; AND DESCRIPTIONS OF DAY-TO-DAY WIND VARIABILITY AND PREDICTABILITY FOR WECS OPERATIONS.

1978-0843 VON KOENING F
WIE MAN WINDRAEDER BAUT. BERECHNUNG, KONSTRUKTION UND AUSFUEHRUNG.
MUENCHEN, GERMANY, F.R., PFRIEMER, 1978. 190 P. (IN GERMAN)

AFTER SOME INTRODUCING REFLECTIONS ABOUT THE ENERGY AMOUNT OF AIR STREAMS, THE FOLLOWING PROBLEMS ARE DISCUSSED IN DIFFERENT CHAPTERS: 1) WINDPOWER ON THE BLADE 2) SIZE AND SHAPING OF THE BLADES 3) PROJECT OF AN AMERICAN WIND TURBINE 4) MODERN HIGH SPEED ROTORS 5) WIND TURBINE OF MEDIUM ROTATIONAL SPEED 6) PERFORMANCE OF A LA TOUR-BLADE 7) WIND WHEEL WITH TRIANGULAR SAILS 8) VERTICAL AXLE TURBINE. AT THE END WORK SHOP ASSEMBLY INFORMATION FOR WIND TURBINES ARE SPECIFIED.

1978-0844 VON KOENING F
WINDENERGIE IN PRAKTISCHER NUTZUNG: RAEDER, ROTOREN, MUEHLEN, WINDDRAFTWERKE. (WIND ENERGY IN PRACTICAL UTILIZATION: WHEELS, ROTORS, MILLS, WIND POWER PLANTS.)
MUNICH, GERMANY, FR, UDO PFRIEMER VERLAG, 1978. 211 P.

THE PRACTICAL USE OF WIND ENERGY FROM THE EARLIEST CULTURES UP TO THE PRESENT TIME IS REVIEWED. THE WIND AS AN ENERGY SOURCE, PRACTICAL APPLICATIONS, LARGE-SCALE WIND POWER PROJECTS, NEW WIND ENERGY RESEARCH, AND WIND POWER UTILIZATION AND ECONOMICS ARE THE TOPICS DISCUSSED.

1978-0845 VUKOVICH F M, CLAYTON C A
A TECHNIQUE TO PREDICT WIND STATISTICS FOR WIND ENERGY CONVERSION SYSTEMS IN REMOTE LOCATIONS.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 1, P. 321-334.
CONF-770921/1

A TECHNIQUE WAS DEVELOPED TO PREDICT WIND STATISTICS IN REMOTE LOCATIONS UTILIZING HISTORICAL WIND DATA FROM A SYNOPTIC WEATHER STATION, WIND FIELD SIMULATIONS FROM A PRIMITIVE EQUATION MODEL, AND A STATISTICAL MODEL. THE RESULTS SUGGEST THAT REASONABLE PREDICTIONS OF WIND STATISTICS CAN BE ACHIEVED PROVIDED GOOD PARAMETERIZATION OF THE HYDRODYNAMIC MODEL IS ACCOMPLISHED.

1978-0846 WADE J E, HEWSON E W
TREES AS AN INDICATOR OF WIND POWER POTENTIAL.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, 1978. PROCEEDINGS. NTIS, 1978. P. 156-165.
CONF-780754

TREE DEFORMATION APPEARS TO BE A SENSITIVE INDICATOR OF ANNUAL MEAN WIND SPEED AND DIRECTION AND TREES MAY BE USED TO ESTIMATE BOTH THE ANNUAL MEAN WIND SPEED (MEAN ERROR +- 17%) AND PERCENT OF USABLE WINDS (MEAN ERROR +- 22%). THIS TECHNIQUE COULD APPROPRIATELY BE USED AS A FIRST STAGE IN A WIND SURVEY PRIOR TO INSTRUMENTATION WITH ANEMOMETERS.

1978-0847 WAKE N S
DIRECTORY OF ENERGY-RELATED EDUCATIONAL PROGRAMS.
NTIS, DECEMBER 1978. 79 P.
BNL-50988

THIS REPORT PRESENTS AN INVENTORY OF ENERGY-RELATED TRAINING PROGRAMS BEING OFFERED WITHIN UNITED STATES EDUCATIONAL INSTITUTIONS THAT MIGHT MEET THE TRAINING NEEDS OF LESS DEVELOPED COUNTRIES. TRAINING PROGRAMS IN THE ENERGY AREA INCLUDE THE AREAS OF ENERGY RESOURCES, ENERGY PLANNING AND ANALYSIS, THE DEVELOPMENT AND UTILIZATION OF DIFFERENT ENERGY TECHNOLOGIES INCLUDING RENEWABLE SOURCES, AND ENGINEERING.

1978-0848 WALLENSTEIN A R
BARRIERS AND INCENTIVES TO SOLAR ENERGY DEVELOPMENT. AN ANALYSIS OF LEGAL AND INSTITUTIONAL ISSUES IN THE NORTHEAST.
NTIS, DECEMBER 1978. 115 P.
NESEC-1

THE LEGAL AND INSTITUTIONAL BARRIERS AND INCENTIVES TO COMMERCIALIZING ALTERNATE ENERGY SOURCES ARE ANALYZED WITH PARTICULAR EMPHASIS ON SOLAR ENERGY. THE LAWS THAT CONSTITUTE EITHER LEGAL BARRIERS OR POSSIBLE INCENTIVES IN THE COMMERCIALIZATION OF SOLAR ENERGY IN THE NINE STATES IN THE NORTHEAST SOLAR ENERGY CENTER ARE DETAILED. THE NINE STATES ARE: CONNECTICUT, MAINE, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, AND VERMONT.

1978-0849 WALTERS R E, MIGLIORE P G
THE CIRCULATION CONTROLLED VERTICAL AXIS WIND TURBINE.
THIRD WIND ENERGY WORKSHOP. CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3RD BIENNIAL, PROCEEDINGS. WASHINGTON, D.C., U.S. GOV. PRINT. OFF., MAY 1978. VOL. 2, P. 784-793.
CONF-770921/2

THIS NSF/ERDA STUDY STARTED IN 1975. THE MAJOR EMPHASIS HAS BEEN TO THEORETICALLY AND EXPERIMENTALLY INVESTIGATE THE AERODYNAMIC PERFORMANCE AND STRUCTURAL REQUIREMENTS OF A STRAIGHT-BLADED VERTICAL AXIS WIND TURBINE (VAWT). SYSTEM AND COST STUDIES ARE INCLUDED. OF PARTICULAR INTEREST IS THE EVALUATION OF HIGH-LIFT, VARIABLE BLADE PITCH, CIRCULATION-CONTROLLED (C.C.) AIRFOILS.

1978-0850 WALTERS R E, FANUCCI J B, HILL P W, MIGLIORE P G, SQUIRE W
INNOVATIVE WIND TURBINES. CIRCULATION CONTROLLED VERTICAL AXIS WIND TURBINE. PROGRESS REPORT, MARCH 1-DECEMBER 31, 1976.
NTIS, OCTOBER 1978. 140 P.
ORO-5135-77/1

THEORETICAL AND EXPERIMENTAL RESEARCH EFFORTS IN EVALUATING AN INNOVATIVE CONCEPT FOR VERTICAL AXIS WIND TURBINES (VAWT) ARE DESCRIBED. THE CONCEPT IS THAT OF USING STRAIGHT BLADES COMPOSED OF CIRCULATION CONTROLLED AIRFOIL SECTIONS. THE THEORETICAL ANALYSIS HAS BEEN DEVELOPED TO DETERMINE THE UNSTEADY LIFT AND MOMENT CHARACTERISTICS OF MULTIPLE-BLADE CROSS-FLOW WIND TURBINES.

1978-0851 WANG P N, HUANG I
WIND POWER FROM A VORTEX CHAMBER.
RENEWABLE ALTERNATIVES. SOLAR ENERGY SOCIETY OF CANADA, 4TH ANNUAL CONFERENCE, LONDON, ONTARIO, AUGUST 20-24, 1978. PROCEEDINGS. WINNIPEG, MANITOBA, SOLAR ENERGY SOCIETY OF CANADA, 1978. VOL. 1, PAP. 4.3.1. 9 P.

TO STUDY THE WIND POWER THROUGH A TORNADO TYPE VORTEX FLOW, A SPIRAL SHAPE VORTEX CHAMBER WAS TESTED IN AN OPEN CIRCUIT, SUCTION TYPE WIND TUNNEL. THE VORTEX CHAMBER WAS PLACED ON THE FLOOR OF THE TUNNEL WITH THE CENTRAL REGION OF THE CHAMBER BOTTOM CONNECTED OUT OF THE WIND TUNNEL TO A BLOWER. WITH THE PREVAILING WIND SPEED, BLOWING FLOW RATE, CENTRAL OPENING AREA AND HEIGHT OF THE CHAMBER AS CONTROL PARAMETERS, THE WIND POWER CHARACTERISTICS CAN BE STUDIED.

1978-0852 WARMBRODT W
AEROELASTIC RESPONSE AND STABILITY OF A COUPLED ROTOR/SUPPORT SYSTEM WITH APPLICATION TO LARGE HORIZONTAL AXIS WIND TURBINES. PH.D. THESIS.
LOS ANGELES, U.C.L.A., 1978. AVAIL.: ANN ARBOR, UNIVERSITY MICROFILMS, 1978. 326 P. ORDER NO. 79-01415.

THE DERIVATION OF A GOVERNING SET OF NONLINEAR EQUATIONS OF MOTION FOR A COUPLED ROTOR/SUPPORT SYSTEM IS PRESENTED. THE MODEL INCLUDES AN N-BLADED ROTOR WITH ELASTIC BLADE FLAP AND LEAD-LAG DEGREES OF FREEDOM. THE BLADES CAN HAVE PRECONE, PITCH BEARING OFFSET, BUILT-IN TWIST, AND CROSS SECTIONAL OFFSETS BETWEEN THE AERODYNAMIC CENTER, THE CENTER OF MASS, AND THE ELASTIC AXIS. THE ROTOR SUPPORT HAS TWO TRANSLATIONAL DEGREES OF FREEDOM AND THREE ROTATIONAL DEGREES OF FREEDOM. THE GENERAL SET OF EQUATIONS WERE SPECIALIZED TO ANALYTICALLY REPRESENT A COUPLED N-BLADED ROTOR/FUSELAGE MODEL OF A HELICOPTER IN HOVER OF FORWARD FLIGHT. THE FUSELAGE WAS MODELED AS A RIGID BODY. INERTIA, AERODYNAMIC, STRUCTURAL, AND GRAVITATIONAL LOADS ARE CONSIDERED. WIND GUSTS IN ALL THREE DIRECTIONS WAS INCLUDED. ROTOR/FUSELAGE MATCHING WAS PERFORMED BY REQUIRING FORCE AND MOMENT EQUILIBRIUM BETWEEN THE ROTOR AND THE FUSELAGE.

1978-0853 WARMBRODT W, FRIEDMANN P P
AEROELASTIC RESPONSE AND STABILITY OF A COUPLED ROTOR/SUPPORT SYSTEM WITH APPLICATION TO LARGE HORIZONTAL AXIS WIND TURBINES.
LOS ANGELES, UNIV. CAL. SCHOOL OF ENG. AND APPL. SCI., MECH. AND STRUCT. DEPT., 1978. 299 P.
UCLA-ENG-7881

THE DERIVATION OF A GOVERNING SET OF NONLINEAR EQUATIONS OF MOTION FOR A COUPLED ROTOR/SUPPORT SYSTEM IS PRESENTED. THE MODEL INCLUDES AN N-BLADED ROTOR WITH ELASTIC BLADE FLAP AND LEAD-LAG DEGREES OF FREEDOM.

1978-0854 WENDELL L L, CONNELL J R, PENNELL W T, RENNE D S, WEGLEY H L
ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD JULY 1977 THROUGH JULY 1978.
NTIS, DECEMBER 1978. 138 P.
PNL-2545

AS A SERVICE ELEMENT WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS ESTABLISHED TO PROVIDE THE APPROPRIATE WIND CHARACTERISTICS INFORMATION TO THOSE INVOLVED IN THE DESIGN AND EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS), IN ENERGY PROGRAM PLANNING, IN SELECTING SITES FOR WECS INSTALLATION, AND IN THE OPERATION OF WECS.

1978-0855 WARNE D F
MEDIUM SCALE WIND TURBINES FOR SMALL POWER SYSTEMS.
INT. POWER GENERATION 1(8): 31-33, DECEMBER 1978-JANUARY 1979.

MEDIUM SCALE WIND TURBINES ARE DEFINED AS BETWEEN 100 KW TO 1 MW, WITH A ROTOR DIAMETER OF BETWEEN 10 AND 30 M. THE TECHNICAL AND ECONOMIC FACTORS OF EMPLOYING SUCH TURBINES IN SMALL NETWORKS ARE DISCUSSED, AND THEIR SUITABILITY FOR ISLAND COMMUNITIES STRESSED. A 925 KW DESIGN IS DESCRIBED, WHICH HAS A 30 M ROTOR WITH TWO WELDED MILD STEEL BLADES ROTATING AT 70 RPM TO DRIVE AN INDUCTION GENERATOR VIA A SPEED INCREASING GEARBOX.

1978-0856 WARNE D F
USABLE ENERGY FROM WIND.
AMBIENT ENERGY AND BUILDING DESIGN. AMBIENT ENERGY AND BUILDING DESIGN CONFERENCE, WELWYN, U.K., APRIL 1977. LANCASTER, ENGLAND, CONSTRUCTION PRESS, 1978. P. 39-49.

THE FOLLOWING TOPICS ARE DISCUSSED: THE BASIS FOR ASSESSING WIND GENERATORS AGAINST INDIVIDUAL APPLICATIONS, A PRACTICAL WIND GENERATOR REVIEW, ENERGY STORAGE, AND ECONOMICS.

1978-0857 WEBER R C, GIES P, SEIFERT J
ENERGY CONSERVATION ON FORKLIFT TRUCK OPERATIONS.
ANNUAL CONFERENCE ON ENERGY, 5TH, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1978. PROCEEDINGS. ROLLA, MO., UNIVERSITY OF MISSOURI-ROLLA, EXTENSION DIVISION, 1978. P. 554-558.

A TWO-FOLD STUDY OF WIND ENERGY IN AN INDUSTRIAL APPLICATION IS PRESENTED IN THIS PAPER. THE FIRST PHASE OF THE STUDY CONCERNED THE POSSIBILITY OF USING WIND ENERGY TO SUPPLY POWER FOR ELECTRIC FORKLIFT TRUCKS. THE SECOND PHASE RELATED THE FEASIBILITY OF PROPANE POWER VERSUS ELECTRIC POWER IN FORKLIFT TRUCK OPERATIONS.

1977-0496 ARNOLD J E
ON THE CORRELATION BETWEEN DAILY AMOUNTS OF SOLAR AND WIND ENERGY AND MONTHLY TRENDS OF THE TWO ENERGY SOURCES. AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, SESS. B.2. 5 P.

THE CORRELATION BETWEEN DAILY AMOUNTS OF SOLAR AND WIND ENERGY AS WELL AS THE MONTHLY CORRELATION BETWEEN THE TWO ENERGY SOURCES WAS EXAMINED FOR 30 OF THE 36 MONTHS FOR THE PERIOD OF 1973 TO 1975 AT COLLEGE STATION, TEXAS. ALTHOUGH THE MONTHLY PAIRS OF DATA HAD A NEGATIVE CORRELATION COEFFICIENT, DAILY PAIRS OF DATA EXHIBITED BOTH POSITIVE AND NEGATIVE CORRELATION COEFFICIENTS WHEN THE DATA WAS GROUPED BY MONTHS. DURING MOST OF THE MONTHS, THE CORRELATION BETWEEN DAILY VALUES OF SOLAR AND WIND ENERGY WAS NOT SIGNIFICANT. MONTHLY TOTALS OF WIND AND SOLAR ENERGY TENDED TO COMPLIMENT EACH OTHER TO YIELD A FAIRLY UNIFORM TOTAL ENERGY SUPPLY. IF WIND ENERGY IS TAKEN AT AN ELEVATED HEIGHT, A PRONOUNCED PEAK IN THE ENERTOTALS IS OBSERVED DURING THE HIGH WIND MONTHS OF THE YEAR.

1977-0497 AWALT T Y
AIR CONDITIONED SHELTER.
U.S. PATENT NO. 4,059,969, NOVEMBER 29, 1977. 8 P.

A MECHANICALLY AIR CONDITIONED SHELTER INCLUDES WIND DEFLECTORS, AS PART OF THE OUTER WALLS OF THE SHELTER, AND A SERIES OF BLADES MOVING ABOUT A GENERALLY VERTICAL AXIS, THE WIND BEING FUNNELED INTO WORKING ENGAGEMENT WITH THE BLADES. IN A PREFERRED EMBODIMENT, POWER FROM THE BLADES IS USED TO COMPRESS A FLUID WHICH IS REVERSIBLY DISTRIBUTED TO COILS LOCATED OUTSIDE OF THE SHELTER, AND TO ANOTHER WITHIN A LIQUID STORAGE TANK, THEREBY TO EITHER HEAT OR COOL THE LIQUID IN THE STORAGE TANK. THIS LIQUID IS USED FOR HEATING OR COOLING OF THE SHELTER. A SUFFICIENT VOLUME OF LIQUID IS MAINTAINED IN THE STORAGE TANK TO KEEP THE SHELTER COOLED OR HEATED DURING THOSE PERIODS IN WHICH THERE IS LITTLE OR NO WIND.

1977-0498 BANKWITZ H, FRITZSCHE A, WELTE D, DOERNER H, MOLLY J P
POSSIBILITIES FOR THE USE OF WIND POWER STATIONS IN DEVELOPING COUNTRIES. PART 1.
NTIS, 1977. 51 P. (IN GERMAN)
NP-23666

INFORMATION IS PRESENTED CONCERNING REQUIREMENTS OF WIND POWER PLANTS FOR DEVELOPING COUNTRIES; STATE-OF-THE-ART FOR WIND TURBINES; BASIC DESIGN PRINCIPLES; WIND ENERGY STATISTICS; ENERGY CONVERSION, MATCHING SUPPLY AND DEMAND; SAFETY AND MAINTENANCE; CONSIDERATIONS OF APPROPRIATE TECHNOLOGY; AND ECONOMICS.

1977-0499 BARIEAU R E
IMPROVED COMPUTER PROGRAM FOR CALCULATING THE THEORETICAL PERFORMANCE PARAMETERS OF A PROPELLER TYPE WIND TURBINE. AN APPENDIX TO THE FINAL REPORT ON FEASIBILITY OF USING WIND POWER TO PUMP IRRIGATION WATER (TEXAS).
NTIS, MARCH 1977. 71 P.
TR-77/101-A, PB-294017

THE PROP PROGRAM OF WILSON AND LISSAMAN HAS BEEN MODIFIED BY ADDING THE NEWTON-RAPHSON METHOD AND A STEP WISE SEARCH METHOD, AS OPTIONS FOR THE METHOD OF SOLUTION. IN ADDITION, AN OPTIMIZATION METHOD IS INCLUDED. TWIST ANGLES, TIP SPEED RATIO AND THE PITCH ANGLE MAY BE VARIED TO PRODUCE MAXIMUM POWER COEFFICIENT. THE COMPUTER PROGRAM LISTING IS PRESENTED ALONG WITH SAMPLE INPUT AND OUTPUT DATA. FURTHER IMPROVEMENTS TO THE PROGRAM ARE DISCUSSED.

1977-0500 BERENY J A
SURVEY OF THE EMERGING SOLAR ENERGY INDUSTRY--1977 EDITION.
NTIS, 1977. 417 P.
SEIS-77/01, PB-281200

SEE 1977-0031 FOR ABSTRACT.

1977-0501 BEUSSE H
ARRANGEMENT FOR ADAPTING A WIND WHEEL TO AN ELECTRIC POWER GENERATOR.
GERMAN (FRG) PATENT NO. 2,623,233/B/, AUGUST 11, 1977. 6 P. (IN GERMAN)

THE INVENTION IS CONCERNED WITH A DEVICE FOR ADAPTING A WIND WHEEL TO AN ELECTRIC POWER GENERATOR IN SUCH A WAY THAT THE WIND WHEEL WILL ALWAYS BE OPERATED WITH A MAXIMUM PERFORMANCE COEFFICIENT, THAT ANOTHER SOURCE OF ENERGY, E.G. A PRIME MOVER, CAN SUPPLY THE POWER DEFICIT IF THE WIND POWER IS NOT SUFFICIENT, AND THAT THE GENERATOR AT THE OUTPUT OF THE FACILITY IS KEPT MAINS-SYNCHRONOUS OF CONSTANT SPEED AND CONSTANT VOLTAGE. ACCORDING TO THE INVENTION, THE SHAFT POWER OF THE WIND POWER ENGINE IS TRANSMITTED TO A FIRST GENERATOR DRIVING AN ELECTROMOTOR. THE MOTOR IS COUPLED TO A SECOND GENERATOR FEEDING INTO A CONSUMER GRID. BY MEANS OF AN ANEMOMETER THE EXCITATION OUTPUT OF THE MOTOR IS CONTROLLED IN SUCH MANNER THAT THE SPEED OF THE GENERATOR IS PRACTICALLY CONSTANT--PROVIDED A SUFFICIENT SUPPLY OF WIND IS AVAILABLE. ON THE SHAFT OF THE OUTPUT GENERATOR A PRIME MOVER, E.G. A DIESEL ENGINE, IS MOUNTED BEING CONTROLLABLE FOR CONSTANT SPEED BY MEANS OF A CONTROL DEVICE IN SUCH A WAY THAT THE PRIME MOVER TAKES OVER THE MISSING AMOUNT OF POWER IF THE WIND SUPPLY FALLS SHORT OF THE POWER TAKEN OFF AT THE GENERATOR OUTPUT.

1977-0502 WOOD R R
ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS.
EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, SEMIANNUAL, MONTEREY, CALIFORNIA, MARCH 16, 1977. NTIS, 1977. P. 23.1-23.39.
EPRI-ER-515-SR

THIS PROGRAM IS AN ANALYSIS OF SOLAR ENERGY POWER PLANTS IN RELATION TO THE REQUIREMENTS OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA). NEPA REQUIRES THE PREPARATION OF A DETAILED STATEMENT OF THE IMPACTS ASSOCIATED WITH ANY MAJOR FEDERAL ACTION SIGNIFICANTLY AFFECTING THE QUALITY OF THE HUMAN ENVIRONMENT. THE FOLLOWING FIVE SOLAR ENERGY CONCEPTS ARE BEING CONSIDERED: SOLAR THERMAL; PHOTOVOLTAIC; WIND; OCEAN THERMAL; AND PHOTOPRODUCTION. THE WORK ASSOCIATED WITH THIS PROGRAM HAS INCLUDED REFERENCE PLANT DESCRIPTIONS, REFERENCE SITE SELECTIONS, AND ENVIRONMENTAL ASSESSMENT.

1977-0503 BOGERS A J, QUAKERNAAT J
LE ROLE EVENTUEL DE L'HYDROGENE DANS LE DOMAINE D'ENERGIE DES PLAYS BAS. (POSSIBLE ROLE OF HYDROGEN IN THE ENERGY SUPPLY SECTOR OF THE NETHERLANDS.)
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 3, 18 P. (IN FRENCH)

NUCLEAR ENERGY HAS TO BE CONSIDERED AS A MAJOR SOURCE OF ENERGY FOR THE NETHERLANDS WHEN IN THE FUTURE GAS AND OIL BECOME SCARCE. THE FACT THAT BOTH NUCLEAR ENERGY AND WIND ENERGY ARE, NEARLY EXCLUSIVELY, TO BE TRANSFORMED INTO ELECTRICITY AND THIS ELECTRICITY CANNOT BE STORED IN LARGE QUANTITIES, MAKES IT NECESSARY TO LOOK FOR AN ALTERNATIVE TO THE EXCLUSIVE USE OF ELECTRICITY. THIS ALTERNATIVE CAN BE FOUND IN HYDROGEN. A SYSTEM BASED ON BOTH ELECTRICITY AND HYDROGEN AS THE MAIN ENERGY CARRIERS IS TO BE PREFERRED TO A SYSTEM BASED ON EITHER ELECTRICITY OR HYDROGEN ALONE. THE MAIN REASON FOR THIS IS THE FACT THAT HYDROGEN CAN BE STORED AND USED FOR PEAK SHAVING. SINCE HOLLAND HAS A NUMBER OF SMALL AND MEDIUM SIZED NATURAL GAS WELLS, EXCELLENT POSSIBILITIES OF STORAGE ARE AVAILABLE IN THESE WELLS, ONCE THE NATURAL GAS HAS BEEN TAKEN OUT. MOREOVER THE PRESENT NATURAL GAS LINES CAN BE USED AND WILL HAVE SUFFICIENT CAPACITY FOR TRANSFER AND DISTRIBUTION OF HYDROGEN.

1977-0504 BOOTHROYD P
COMPARATIVE SOLAR IMPACT ASSESSMENT OF LARGE-SCALE COMMUNITY-SCALE, AND HOUSEHOLD-SCALE SOLAR TECHNOLOGIES.
SOLAR ENERGY UPDATE '77: CANADA. SOLAR ENERGY SOCIETY OF CANADA, CONFERENCE, 3D, EDMUNTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. PAPER 45, 15 P.

AN ANALYSIS AND EVALUATION OF THE SOCIAL IMPACTS OF VARIOUS SCALES OF SOLAR ENERGY SYSTEMS (HEATING, PHOTOVOLTAICS, WIND, BIOMASS, WAVES) SUGGEST THAT COMMUNITY-SCALE SYSTEMS PROVIDE THE MOST FAVORABLE BALANCE IN PROMOTING POSITIVE SOCIAL-ENVIRONMENTAL CONDITIONS FOR THE BROADEST RANGE OF TYPES OF PERSONS, THOUGH THERE ARE SOME BENEFITS OF, AND CONDITIONS APPROPRIATE TO, THE DEVELOPMENT OF LARGE SCALE AND HOUSEHOLD SCALE SYSTEMS. THE CONCLUSIONS ARE BASED ON THEORETICAL/DEDUCTIVE CONSIDERATIONS, NOT ON THE DATA FROM A SPECIFIC EMPIRICAL RESEARCH PROJECT.

1977-0505 BRULLE R V
FEASIBILITY INVESTIGATION OF THE GIROMILL FOR GENERATION OF ELECTRICAL POWER. VOLUME I. EXECUTIVE SUMMARY.
FINAL REPORT, APRIL 1975-APRIL 1976.
NTIS, JANUARY 1977. 29 P.
COO-2617-76/1/1

THE FEASIBILITY OF THE GIROMILL FOR THE COST EFFECTIVE PRODUCTION OF ELECTRICAL ENERGY IS STUDIED. TWENTY-ONE DIFFERENT GIROMILL CONFIGURATIONS COVERING THREE SIZES OF GIROMILL SYSTEMS (120, 500 AND 1500 KW) WERE ANALYZED, VARYING SUCH PARAMETERS AS ROTOR SOLIDITY, ROTOR ASPECT RATIO, RATED WIND VELOCITY, AND NUMBER OF ROTOR BLADES. THE GIROMILL SYSTEM ANALYSIS EMPLOYED THE SAME GROUND RULES BEING USED FOR CONVENTIONAL WINDMILL ANALYSES TO FACILITATE COMPARISONS BETWEEN THESE SYSTEMS. THE RESULTS INDICATE THAT A GIROMILL IS A VERY EFFICIENT DEVICE, AND COUPLED WITH ITS RELATIVELY SIMPLE CONSTRUCTION APPEARS QUITE COST EFFECTIVE WHEN COMPARED TO CONVENTIONAL WINDMILLS.

1977-0506 BUNDGAARD R
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 56-57.
CONF-7705119, PB-282565

THE FABRICATION OF A 17 METER DARRIEUS ROTOR AND A 300 FOOT DIAMETER HORIZONTAL AXIS ROTOR SYSTEM IS DESCRIBED.

1977-0507 CALLAHAN H L
ALTERNATE ENERGY CHOICES FOR PLANT STUDIES.
ERDA ENERGY MANAGEMENT SYMPOSIUM, 3RD, KNOXVILLE, TENNESSEE, SEPTEMBER 19, 1977.

CHARACTERISTICS, AVAILABILITY, AND TECHNOLOGY ASSESSMENTS ARE PRESENTED FOR 13 ALTERNATE ENERGY CHOICES. COAL AND LIGNITE, OIL AND GAS, AND THE ALL ELECTRIC SYSTEM ARE CONSIDERED FOR CONVENTIONAL ENERGY SYSTEMS. UNDER SPECIAL SITUATIONS, REFUSE DERIVED FUELS AND ENERGY RECOVERY, PURCHASED STEAM HEAT, COAL GASIFICATION, NUCLEAR, AND HEAT PUMPS ARE CONSIDERED. ENERGY ALTERNATIVES FOR OCEAN POWER, GEOTHERMAL DEVELOPMENT, DISSOLVED METHANE ENERGY SOURCES, WIND POWER, AND SOLAR POWER ARE SITE SPECIFIC.

1977-0508 CANFIELD M
WIND ENERGY PROGRAM CRITIQUE.
WASHINGTON, D.C., GENERAL ACCOUNTING OFFICES, 1977. 7 P.
EMD-77-33

RECOMMENDATIONS BY THE U.S. GENERAL ACCOUNTING OFFICE ON HOW THE DOE SPONSORED WIND ENERGY PROGRAM SHOULD BE STRUCTURED ARE PRESENTED. THE RECOMMENDATIONS URGE RE-EVALUATION OF PROGRAMS DIRECTED TO ONLY LARGE-SCALE WIND ENERGY SYSTEMS.

1977-0509 CARLIN P
SMALL WIND SYSTEMS PROGRAM DEVELOPMENT.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 413-425.

THE DOE-SPONSORED SMALL WIND TURBINE TESTING PROGRAM AT THE ROCKY FLATS PLANT IS DESCRIBED.

1977-0510 CATANIA P J, FULLER G A, STEWART W D
RENEWABLE ENERGY EDUCATION AT THE UNIVERSITY OF REGINA.
SOLAR ENERGY UPDATE '77: CANADA. SOLAR ENERGY SOCIETY OF CANADA, CONFERENCE, 3D, EDMUNTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. PAPER 54, 10 P.

FOUR YEARS OF RENEWABLE ENERGY EDUCATION CONDUCTED BY FACULTY OF ENGINEERING MEMBERS ARE REVIEWED. FROM THE REVIEW, A NUMBER OF RECOMMENDATIONS ON ENERGY EDUCATIONAL GOALS, PRIORITIES AND INFORMATION NEEDS, PARTICULARLY IN THE FIELDS OF ENERGY CONSERVATION AND RENEWABLE ENERGY SOURCES, ARE EVOLVED. SOLAR AND WIND ENERGY ARE CONSIDERED IN THE OVERALL ENERGY CONTEXT OF THE ABOVE AND OUTLINES THE OBJECTIVES AND NEEDS OF AN EXTENSIVE TEACHING AND EXTENSION PROGRAM FOR THE NEXT FEW YEARS.

1977-0511 WIND POWER FOR QUEBEC'S MAGDALEN ISLANDS.
CIM BULL. 70(779): 213-214, MARCH 1977.

1977-0512 CHARACTERIZATION AND APPLICATIONS ANALYSIS OF ENERGY STORAGE SYSTEMS.
NTIS, DECEMBER 1977. 523 P.
PB-299261, ATR-77(7538)-1

A SYSTEMATIC CHARACTERIZATION OF KNOWN ENERGY STORAGE DEVICES/CONCEPTS AND AN ANALYSIS OF ENERGY SYSTEMS EMPLOYING THESE DEVICES/CONCEPTS IN TRANSPORTATION, ELECTRIC UTILITY, INDUSTRIAL, AND RESIDENTIAL/COMMERCE

APPLICATIONS ARE PRESENTED. EACH ENERGY SYSTEM IS CHARACTERIZED IN TERMS OF ITS DESIGN AND OPERATING PARAMETERS, INCLUDING CONFIGURATION, PHYSICAL AND/OR CHEMICAL PROPERTIES, ENERGY SOURCES, METHOD OF OPERATION, EFFICIENCY, COSTS, AND LIFETIME, AS WELL AS ITS STATE OF DEVELOPMENT AND CRITICAL PROBLEMS. AN ANALYSIS OF ENERGY STORAGE APPLICATIONS IS BASED ON THE DESCRIBED CHARACTERIZATION EFFORT. MAJOR APPLICATION VARIABLES AFFECTING THE CHARACTERISTICS OF THE STORAGE SYSTEM ARE IDENTIFIED AND IT IS SHOWN HOW THEY VARY AS THE VALUES OF THE PARAMETERS FOR ENERGY GENERATION, CONVERSION, AND STORAGE ARE ALTERED. IN ADDITION, A BRIEF REVIEW AND PRELIMINARY ASSESSMENT IS MADE OF POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS WHICH COULD OCCUR AS RESULT OF THE IMPLEMENTATION OF ENERGY STORAGE SYSTEMS IN VARIOUS APPLICATION AREAS. THE REPORT INCLUDES A CONCISE DISPLAY AND COMPARISON OF STORAGE SYSTEM CHARACTERISTICS, A GENERAL OVERVIEW OF THE STUDY SCOPE, AND SUMMARY OF FINDINGS RELATED TO STORAGE SYSTEM IMPLEMATATION IMPACTS.

1977-0513 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X28-X33.

COST REDUCTIONS RELATED TO INITIAL BLADE COSTS AND MAINTENANCE HAVE BEEN DEMONSTRATED WITH THE COMPOSITE BEARINGLESS ROTOR (CBR) FOR HELICOPTER APPLICATIONS. THESE HAVE EVOLVED AS A RESULT OF THE CONSTRUCTION OF THE CBR ROTOR. ADDITIONAL SAVINGS RELATED TO WIND TURBINES ARE ASSOCIATED WITH THE CONTROLS REQUIRED TO OPTIMIZE PERFORMANCE. WORK WAS PERFORMED UNDER AN ERDA CONTRACT TO INVESTIGATE THE FEASIBILITY OF THE CBR FOR USE IN WIND TURBINES AND TO EXPLORE CONTROL CONCEPTS WHICH WOULD RESULT IN A FULLY SELF-REGULATING SYSTEM.

1977-0514 CLOUTIER G G
IMPACT OF NEW SOURCES OF ENERGY ON THE EQUILIBRIUM OF NATURAL RESOURCES.
R. SOC. CAN. TRANS. 15: 83-94, 1977. (IN FRENCH)

THE STATE OF THE ART OF WIND, SOLAR, AND FUSION POWER IS DESCRIBED. CONSTRAINTS ON THEIR USE ARE ANALYZED AS WELL AS THE IMPLICATIONS OF THEIR WIDESPREAD ADOPTION.

1977-0515 COLIN R
NEW ENERGIES IN TELECOMMUNICATIONS.
INTERNATIONAL CONFEFENCE ON PHOTOVOLTAIC SOLAR ENERGY, LUXEMBOURG, SEPTEMBER 27-30, 1977. PROCEEDINGS. DORDRECHT, NETHERLANDS, REIDEL, 1977. P. 801-808. (IN FRENCH)

TESTS ON TWO TYPES OF APPLICATIONS ARE DESCRIBED WITH PERMANENT POWER BETWEEN ONE WATT AND SEVERAL HUNDRED WATTS. THE AEROSOLEC STATION IS DESIGNED TO SUPPLY RADIO-RELAYS IN REMOTE LOCATIONS. THIS PLANT IS MADE UP OF A SOLAR GENERATOR AND A WIND-DRIVEN GENERATOR CONNECTED IN PARALLEL, WHICH SHARE POWER PRODUCTION ACCORDING TO THE PREVAILING CONDITIONS AT THE SITE. A STORAGE BATTERY ENSURES CONTINUITY AND REGULARITY OF THE OUTPUT POWER. EMERGENCY CALL PILLARS INSTALLED ALONG MOTORWAYS ARE SUPPLIED FOR TWO YEARS BY CHEMICAL BATTERIES. WHERE THE PROCUREMENT OF THESE IS DIFFICULT AND EXPENSIVE, MORE PARTICULARLY IN DEVELOPING COUNTRIES, THE USE OF A SOLAR GENERATOR MAY BE A SATISFACTORY SOLUTION.

1977-0516 CONSIDINE D M
ENERGY TECHNOLOGY HANDBOOK.
NEW YORK, MCGRAW-HILL, INC., 1977. 1857 P.

THE HANDBOOK SETS FORTH THE FUNDAMENTAL AND BASIC DATA ON TODAY'S MAJOR ENERGY SOURCES, THE LATEST ENERGY CONVERSION PROCESSES, ENERGY TRANSPORTATION AND TRANSMISSION, AND THE MOST PROMISING TRENDS IN POWER TECHNOLOGY.

1977-0517 COROTIS R B
PROBABILITY MODELS OF WIND VELOCITY AND WIND POWER.
ADVANCES IN CIVIL ENG NEERING THOUGH ENGINEERING MECHANICS, ASCE ENGINEERING MECHANICS DIVISION, SPECIALTY CONFERENCE, RALEIGH, N.C., MAY 25, 1977. NEW YORK, ASCE, 1977. P. 55-58.

WIND STUDIES HAVE GENERALLY BEEN CONCERNED DIRECTLY WITH THE FORCE OF THE WIND. IN THIS RESEARCH THE RATE OF POTENTIAL WIND ENERGY TRANSFER, WHICH IS PROPORTIONAL TO THE CUBE OF THE VELOCITY, IS INVESTIGATED. WHILE FINE SCALE MEASUREMENTS IN BOTH TIME AND SPACE ARE NECESSARY FOR A DETAILED STUDY OF ENERGY TRANSFER, IT IS POSSIBLE TO CHARACTERIZE THE PROBABILITY DISTRIBUTION OF THE INSTANTANEOUS POWER THOUGH AN ANALYSIS OF THE CUBED VELOCITY READINGS OBTAINED DIRECTLY FROM HOURLY WEATHER BUREAU RECORDS. THE EMPHASIS IN THE STUDY HAS BEEN ON THE FULL RANGE OF OBSERVED VALUES, SINCE THE RATE OF POTENTIAL WIND ENERGY TRANSFER IS OF INTEREST FOR WIND ENERGY GENERATION AS WELL AS ACTIVE CONTROL OF STRUCTURES, EVALUATION OF OCCUPANCY COMFORT, AND HEAT TRANSFER FOR HEATING AND AIR CONDITIONING LOADS.

1977-0518 COTY U, VAUGHN L
IMPLEMENTATION ISSUES OF WIND ENERGY.
NEW OPTIONS IN ENERGY TECHNOLOGY, SAN FRANCISCO, CALIFORNIA, AUGUST 2-4, 1977. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1977. P. 97-105.

THE EFFECT OF INITIAL PRODUCTION QUANTITY ON THE SELLING PRICE OF A TWO MEGAWATT WIND TURBINE GENERATOR IS DETERMINED. TO THIS IS ADDED THE EFFECT OF LOAN INTEREST RATES, TAXES, AND OTHER ANNUAL OPERATING EXPENSES. THE COST OF ELECTRICAL ENERGY GENERATED IS DETERMINED AND COMPARED TO THE COST OF FUEL FOR PRIVATE UTILITIES AND TO THE COST OF BUYING ENERGY WHOLESALE FOR PUBLIC UTILITIES. FROM THIS COMPARISON, THE INITIAL PRODUCTION QUANTITIES OF WIND TURBINE GENERATORS IS DETERMINED WHICH WOULD BRING COST OF WIND ENERGY DOWN TO A COMPETITIVE LEVEL. IT IS CONCLUDED THAT WITHOUT INCENTIVES, AND WITH WIND SITES HAVING 7 M/S ANNUAL AVERAGE WINDSPEED, THE INITIAL PRODUCTION QUANTITY IS 260 UNITS TO BRING THE COST OF WIND ENERGY DOWN TO THE PRESENT PRICE OF OIL (2.6/KW) FOR PRIVATE UTILITIES AND DOWN TO 1.5/KW FOR PUBLIC UTILITIES. FEDERAL POWER AGENCIES COULD MEET THE PRESENT COST OF OIL WITH ENERGY FROM WIND TURBINE GENERATORS WITH INITIAL PRODUCTION ORDER OF 40 UNITS.

1977-0519 COX K E
HYDROGEN FROM SOLAR ENERGY.
HYDROGEN: ITS TECHNOLOGY AND IMPLICATIONS. VOLUME I. HYDROGEN PRODUCTION TECHNOLOGY. CLEVELAND, OHIO, CRC PRESS, INC., 1977. P. 145-175.

TOPICS DISCUSSED INCLUDE OCEAN THERMAL ENERGY CONVERSION, POWER FROM WIND, BIOMASS, ARTIFICIAL SOLAR COLLECTION SCHEMES, METHODS OF SOLAR ENERGY CONVERSION TO HYDROGEN (WATER ELECTROLYSIS, PHOTOELECTROLYSIS, BIOPHOTOLYSIS, AND THERMOCHEMICAL DECOMPOSITION OF WATER), AND ECONOMICS OF HYDROGEN PRODUCTION FROM SOLAR ENERGY.

1977-0520 CROMACK D E
WIND FURNACE PROJECT.

NESEA '77: BETTER THEMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2D, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 427-432.

ONE OF THE MOST COST EFFECTIVE APPLICATIONS FOR WIND POWER IS THOUGHT TO BE FOR SPACE HEATING. A BRIEF DESCRIPTION IS PRESENTED FOR THE UMASS WIND FURNACE. THE DESIGN AND CONSTRUCTION ASPECTS ALONG WITH A DISCUSSION OF THE PRELIMINARY COMPONENT TESTS AND INITIAL OPERATIONAL EXPERIENCE ARE INCLUDED. THE WIND FURNACE WILL BE DEMONSTRATED UNDER FULLY AUTOMATIC OPERATION DURING THE 1977-1978 HEATING SEASON.

1977-0521 CURTO P, MILLER G
ENGINEERING COST ESTIMATES FOR SOLAR TECHNOLOGIES.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 29, SESS. L-3. 5 P.

THE PAPER REPORTS ON A STUDY TO ESTIMATE ENGINEERING COSTS FOR EACH OF SEVERAL DESIGNS FOR SOLAR TECHNOLOGIES. THESE TECHNOLOGIES INCLUDE: WIND ENERGY CONVERSION SYSTEMS, SOLAR THERMAL ELECTRIC AND TOTAL ENERGY SYSTEMS, PHOTOVOLTAIC SYSTEMS, OCEAN THERMAL ENERGY CONVERSION SYSTEMS, BIOMASS-DERIVED FUELS AND ENERGY CONVERSION SYSTEMS, AGRICULTURAL AND INDUSTRIAL PROCESS HEAT SYSTEMS, AND SOLAR HEATING AND COOLING OF BUILDING SYSTEMS. THESE DATA PROVIDE, IN A SINGLE SOURCE, THE MOST COMPLETE AND THE LATEST INFORMATION ON SOLAR TECHNOLOGY STATE-OF-THE-ART AND RESEARCH AND DEVELOPMENT RESULTS. THE APPLICATIONS FOR USE OF THIS DATA ARE WIDESPREAD, AND MAY INCLUDE MARKET PENETRATION STUDIES, REGIONAL AND NATIONAL IMPACTS, ENVIRONMENTAL ASSESSMENT, RESOURCE MANAGEMENT (MANPOWER, MATERIALS AND FINANCIAL), AND SCENARIO STUDIES.

1977-0522 DAMBOLENA I G, RIKKERS R F, KAMINSKY F C
COMPUTER MODEL FOR LARGE-SCALE OFFSHORE WIND-POWER SYSTEMS.
WIND ENG. 1(3): 163-168, 1977.

A COMPUTER-BASED PLANNING MODEL HAS BEEN DEVELOPED TO EVALUATE THE COST AND SIMULATE THE PERFORMANCE OF OFFSHORE WIND-POWER SYSTEMS. IN THESE SYSTEMS, THE ELECTRICITY PRODUCED BY WIND GENERATORS EITHER SATISFIES DIRECTLY DEMAND OR PRODUCES HYDROGEN BY WATER ELECTROLYSIS. THE HYDROGEN IS STORED AND LATER USED TO PRODUCE ELECTRICITY IN FUEL CELLS. USING AS INPUTS BASIC CHARACTERISTICS OF THE SYSTEM AND HISTORICAL OR COMPUTER-GENERATED TIME SERIES FOR WIND SPEED AND ELECTRICITY DEMAND, THE MODEL SIMULATES SYSTEM PERFORMANCE OVER TIME. A HISTORY OF THE ENERGY PRODUCED AND THE DISCOUNTED ANNUAL COST OF THE SYSTEM ARE USED TO EVALUATE ALTERNATIVES. THE OUTPUT ALSO CONTAINS THE INFORMATION WHICH IS USEFUL IN POINTING TOWARDS MORE FAVORABLE DESIGN ALTERNATIVES. USE OF THE MODEL TO ANALYZE A SPECIFIC WIND-POWER SYSTEM FOR NEW ENGLAND INDICATES THAT ELECTRIC ENERGY COULD PERHAPS BE GENERATED AT A COMPETITIVE COST.

1977-0523 DAVIDSON M, GRETHER D
EFFECTS OF SOLAR ENERGY CONVERSION ON CLIMATE.
CLIMATE AND SOLAR ENERGY CONVERSION. ACOUSTIC EMISSION MEETING, LONDON, UK, DECEMBER 20, 1976. LAXENBURG AUSTRIA, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS, 1977. P. 91-108.

THE POSSIBLE CLIMATIC EFFECTS OF IMPLEMENTING SOLAR ENERGY TECHNOLOGY ARE CONSIDERED. MOST OF THE ANALYSIS IS QUALITATIVE IN NATURE OWING TO THE IMMENSE COMPLEXITY OF THE ATMOSPHERIC ECOSYSTEM. THE CLIMATOLOGICAL EFFECTS OF SOLAR THERMAL CONVERSION SYSTEM AND CENTRAL RECEIVER POWER PLANTS ARE CONSIDERED IN DETAIL.

1977-0524 DEMEO E A
OVERVIEW AND SUMMARY OF EPRI WIND ENERGY CONVERSION PROGRAM.
EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, SEMIANNUAL, MONTEREY, CALIFORNIA, MARCH 16, 1977. NTIS, 1977. P. 19.1.
EPRI-ER-515-SR

1977-0525 DOERNER H
EXPERT OPINION ON WIND ENERGY CONVERSION SYSTEMS DESIGNED BY HERMANN HONNEF.
NTIS, DECEMBER 1977. 80 P.
BMFT-FB-T-77-35, N79-18456

THE PLANS BY HERMANN HONNEF FOR USING WIND POWER BY MEANS OF LARGE-SCALE WIND ENERGY CONVERSION SYSTEMS WITH REGARD TO THE PROPOSED TECHNICAL DESIGN AND THEIR PRESENTLY EXPECTED COST-EFFECTIVENESS WERE ASSESSED. THE CONCLUSION THAT THE FINDINGS AND EXPERIENCE OF THE PAST FEW DECADES HAVE SHOWN THAT THIS TYPE OF WIND ENERGY CONVERSION SYSTEMS USING CONTRA-ROTATING, MULTI-BLADE TURBINES ARE NOT ECONOMICAL. THE COST-EFFECTIVENESS OF THIS TYPE WAS COMPARED UNFAVOURABLY WITH THE ADVANCED TYPE OF FREE-RUNNING, TWO-BLADED TURBINES. THE ASSERTION THAT WIND CONDITIONS AT ALTITUDES BETWEEN 200 AND 500 M WERE SUFFICIENTLY EXPLORED FOR THE PURPOSE OF WIND ENERGY FACILITIES, IS NOT VALID.

1977-0526 DORY B
LARGEST SOURCE OF MECHANICAL ENERGY.
ENERG. ATOMTECH. 30(12): 559-564, DECEMBER 1977. (IN HUNGARIAN)

THIS ARTICLE DISCUSSES WIND ENERGY AS A POWER SOURCE, AND SUGGESTS SOME QUESTIONS THAT NEED ANSWERS.

1977-0527 DOUGLAS J H
WIND ENERGY FROM THE YEN TORNADO.
SCI. NEWS 111(2): 31, JANUARY 8, 1977.

BY WHIPPING WIND INTO A CONTROLLED VORTEX INSIDE A LARGE TOWER, AT THE BOTTOM A VACUUM IS CREATED THAT INCREASES BY SEVERAL TIMES THE VELOCITY OF AIR DRIVING A TURBINE. SUCH A TURBINE COULD PRODUCE MORE ELECTRICITY THAN A SINGLE WINDMILL TYPE ENERGY CONVERTER COULD, AND WOULD APPEAR TO HAVE ADVANTAGES OVER CONVENTIONAL SYSTEMS. JAMES T. YEN OF THE GRUMMAN AEROSPACE CO. IS WORKING ON SUCH A PROJECT UNDER COMMISSION FROM ERDA.

1977-0528 DRAKE R L
METHODS FOR SITING SMALL WIND MACHINES.
NTIS, MAY 1977. 52 P.
CONF-770539-4, BNWL-SA-6297

THE QUESTION OF SITING WIND ENERGY CONVERSION SYSTEMS (WECS) REPRESENTS A BALANCE BETWEEN THE ECONOMIC, TECHNICAL AND SOCIAL VALUES OF THE USER AND THE LOCAL CITIZENS. THE TECHNICAL ISSUES ARE DISCUSSED. BEFORE ADDRESSING THE TECHNICAL SITING ISSUES, AS WELL AS THE SOCIAL AND ECONOMIC ONES, A DETERMINATION OF THE POTENTIAL USER, THE APPLICATION OF THE WECS, AND THE GEOGRAPHICAL LOCATION OF THE INSTALLATION MUST BE MADE.

ONCE THESE THREE DETERMINATIONS HAVE BEEN MADE, THE METEOROLOGICAL AND TOPOGRAPHICAL CHARACTERISTICS OF SPECIFIC CANDIDATE SITES MUST BE ASSESSED. SOME OF THE TOPOGRAPHICAL ISSUES DISCUSSED ARE THE EFFECTS OF SITING WECS NEAR BODIES OF WATER, NEAR OR IN TREES AND FORESTS, AROUND STRUCTURES AND BUILDINGS, AND IN HILLY TERRAIN; AND SOME OF THE METEOROLOGICAL FEATURES CONSIDERED ARE THE EFFECTS OF LOCAL WIND CIRCULATIONS, VELOCITY PROFILES, LOCAL TURBULENCE, AND HAZARDOUS WEATHER ELEMENTS.

1977-0529 DRAKE R L
SITE SELECTION TECHNIQUES AND METHODOLOGIES FOR WECS.
NTIS, AUGUST 1977. 13 P.
BNWL-SA-6457

THE QUESTION OF SITING A WIND ENERGY CONVERSION SYSTEM, OR SYSTEMS (WECS), REPRESENTS A BALANCE BETWEEN ECONOMIC AND TECHNICAL CRITERIA AND THE ENVIRONMENTAL AND SOCIAL VALUES OF THE USER AND THE LOCAL CITIZENS, WHETHER THE WECS IS FOR A SMALL FARM OR A UTILITY SERVING A MULTI-STATE REGION. THE TECHNICAL SITING ISSUES INCLUDE THE METEOROLOGICAL CHARACTERISTICS OF THE CANDIDATE SITE THAT CONTRIBUTE TO THE EFFICIENT AND SAFE PRODUCTION OF POWER BY WIND, THE POTENTIAL WEATHER HAZARDS OF THE SITE IN QUESTION, AND THE TERRAIN AND SEISMIC FEATURES OF THE SITE. THESE TECHNICAL ISSUES ARE HIGHLY RELATED TO THE SIZE AND TYPE OF THE PROPOSED WECS AND THE TYPE OF STORAGE SYSTEM (IF THERE IS ONE) REQUIRED FOR THE INSTALLATION. A GOOD SITING POLICY IS ONE THAT OPTIMIZES THE POWER OUTPUT BASED ON THE CONSTRAINTS IMPOSED BY THESE VARIOUS ISSUES.

1977-0530 DREES H M
CYCLOTURBINE AND ITS POTENTIAL.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 433-436.

PINSON ENERGY CORPORATION, A PRIVATELY FUNDED COMPANY, WAS FORMED TO DEVELOP AND PRODUCE THE CYCLOTURBINE, A WIND ENERGY CONVERTER. PINSON ENERGY HAS ITS OFFICES IN MARSTONS MILLS, MASSACHUSETTS, AND A TEST FACILITY AT NEW SEABURY, MASSACHUSETTS, BOTH ON WINDY CAPE COD. TESTING OF A PROTOTYPE CYCLOTURBINE WAS INITIATED EARLY IN 1976. THE TEST PROGRAM YIELDED VALUABLE DATA UTILIZED IN THE DESIGN OF AN IMPROVED SECOND PROTOTYPE. TESTING OF THIS SECOND MACHINE IS NEARING COMPLETION AND PRESENTLY FOUR PREPRODUCTION UNITS ARE BEING INSTALLED AS PART OF PINSON ENERGY CORPORATION'S FIELD TEST AND DEMONSTRATION PROGRAM. IT IS ANTICIPATED THAT PRODUCTION-RUN CYCLOTURBINES WILL BE AVAILABLE ON A LIMITED AND SELECTIVE BASIS IN MID 1978.

1977-0531 DUBEY M
HOW TO MAKE FERTILIZER FROM WIND, AIR, AND WATER.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 3. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, APRIL 26, 1977. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS CO., 1977. P. 62-67.

NITROGENOUS FERTILIZERS, SUCH AS AMMONIA AND AMMONIUM NITRATE, CAN BE MADE FROM WIND, AIR AND WATER. THESE THREE INGREDIENTS ARE ABUNDANT, REPLENISHABLE SOURCES OF ENERGY AND THE BASIC CHEMICAL FEEDSTOCKS FOR THE PROCESS. THE SYNTHESIS OF AMMONIA, AS WE MAKE IT TODAY, USES NATURAL GAS AS THE PRIMARY FEEDSTOCK. THE GROWING SHORTAGE OF NATURAL GAS HAS CAUSED MUCH CONCERN, FOR ITS FUTURE SUPPLY IS UNCERTAIN, AND THE RESULTING PRICE INCREASES FOR AMMONIA BASED FERTILIZERS ARE FORCING THE PRICES OF FOOD HIGHER AND HIGHER. THE WIND POWERED PROCESS SUGGESTED HERE IS AN ATTRACTIVE ALTERNATIVE.

1977-0532 DUNCAN C N
SOLAR AND WIND POWER-SOME METEOROLOGICAL ASPECTS.
WEATHER 32(12): 451-456, DECEMBER 1977.

THE EXCEPTIONAL WEATHER IN BRITAIN DURING SOME SUMMERS, COUPLED WITH THE RISING COST OF FUEL, HAS GENERATED AN INCREASING INTEREST IN THE USE OF SOLAR ENERGY FOR DOMESTIC HEATING. THE INTENTION OF THIS ARTICLE IS TO ILLUSTRATE SOME RELATED METEOROLOGICAL ASPECTS BY PRESENTING A SIMPLE FEASIBILITY STUDY. IT IS POSSIBLE TO ESTIMATE THE ENERGY WHICH CAN BE OBTAINED FROM THE SUN AND WIND BY USING READILY AVAILABLE METEOROLOGICAL OBSERVATIONS. ALL THAT IS REQUIRED IS A LARGE NUMBER OF WIND-SPEED AND SUNSHINE-DURATION OBSERVATIONS, ALTHOUGH CONTINUOUS ANEMOGRAPH AND SOLARIGRAPH RECORDS ARE PREFERABLE.

1977-0533 DUNHAM D C
ALTERNATIVE ENERGY SYSTEMS IN RURAL MAURITANIA.
NTIS, SEPTEMBER 1977. 67 P.
PB-296364

THIS REPORT CONTAINS BACKGROUND DATA AND RECOMMENDATIONS ON THE POTENTIAL OF SIMPLE DEMONSTRATION PROJECTS IN THE USE OF ALTERNATE ENERGY SOURCES IN MAURITANIA, WEST AFRICA. THE STUDY IS LIMITED TO THOSE ENERGY APPLICATIONS WHICH WOULD USE THE MATERIALS AND TECHNICAL SKILLS AVAILABLE IN THE AREA AT THIS TIME, I.E., SOLAR ENERGY, WIND ENERGY, AND WATER POWER.

1977-0534 ELDERKIN C E, RAMSDELL J V, TENNYSON G P
MEETING REVIEW. WIND CHARACTERISTICS WORKSHOP, 2-4 JUNE 1976, BOSTON, MASS.
AM. METEOROL. SOC. BULL. 58(1): 45-51, JANUARY 1977.

THIS WORKSHOP CONSISTED OF ERDA CONTRACTORS AND ATMOSPHERIC SCIENTISTS INVOLVED IN WIND CHARACTERISTICS RESEARCH TO EXCHANGE INFORMATION WITH THOSE RESPONSIBLE FOR DEVELOPMENT AND APPLICATION OF WECS. THREE GENERAL SUBJECT AREAS WERE CONSIDERED IN THE DISCUSSIONS. THESE WERE: THE RELATIONSHIP BETWEEN WIND CHARACTERISTICS AND THE DESIGN OF LARGE-SCALE WECS; THE RELATIONSHIP BETWEEN WIND CHARACTERISTICS AND LARGE SYSTEM APPLICATIONS; AND THE RELATIONSHIP BETWEEN WIND CHARACTERISTICS AND SMALL CONVERSION SYSTEMS AND THEIR APPLICATIONS. THE DIVISION BETWEEN LARGE AND SMALL SYSTEMS WAS ARBITRARILY PLACED AT 100KW.

1977-0535 ELLIOTT D L
SYNTHESIS OF NATIONAL WIND ENERGY ASSESSMENTS.
NTIS, JULY 1977. 59 P.
BNWL/WIND-5

THE OBJECTIVE OF THIS STUDY IS TO PERFORM A SYNTHESIS OF EXISTING NATIONAL WIND ENERGY ASSESSMENTS TO DEVELOP AN IMPROVED CONSISTENT ASSESSMENT OF THE GEOGRAPHICAL DISTRIBUTION OF THE AVAILABLE WIND POWER OVER THE UNITED STATES. PREVIOUS NATIONAL WIND ENERGY ASSESSMENTS HAVE BEEN REVIEWED WITH RESPECT TO TECHNIQUES, ASSUMPTIONS, DATA SETS/SUMMARIES, AND INTERPOLATION SCHEMES USED. THE OVERALL REPRESENTATIVENESS OF THE RESOURCE MAPS PRODUCED HAS BEEN EVALUATED. DISCREPANCIES EXIST AMONG PREVIOUS ASSESSMENTS WITH REGARD TO GEOGRAPHICAL VARIATIONS AND THE ESTIMATED VALUES OF WIND POWER.

1977-0536 ENERGIE VOM WIND. (ENERGY FROM WIND).

MUENCHEN, DEUTCHE GESELLSCHAFT FUR SONNENENERGIE E.V., 1977. 379 P. (IN GERMAN AND ENGLISH)
ENERGIE VOM WIND, CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. (4TH MEETING OF THE GERMAN SOCIETY FOR SOLAR ENERGY).

INFORMATION IS PRESENTED FROM VARIOUS EUROPEAN COUNTRIES CONCERNING WIND POWER AVAILABILITY; WIND TURBINE DESIGN AND PERFORMANCE TESTING; AND FEASIBILITY OF LARGE WIND POWER PLANTS.

1977-0537 L'ENERGIE ET LE DEVELOPPEMENT RURAL: RESSOURCES RENOUVELABLES ET OPTIONS TECHNIQUES POUR LES PAYS EN DEVELOPPEMENT (ENERGY FOR RURAL DEVELOPMENT: RENEWABLE RESOURCES AND ALTERNATIVE TECHNOLOGIES FOR DEVELOPING COUNTRIES).
NTIS, 1977. 331 P. (IN FRENCH)
PB-286467

THIS REPORT PROVIDES A SUMMARY OF THE STATE OF THE ART OF ALTERNATIVE (APPROPRIATE OR SOFT) TECHNOLOGIES FREQUENTLY SUGGESTED AS SOLUTIONS TO RURAL OR INDIVIDUAL-FAMILY ENERGY NEEDS. MOREOVER, IT INFORMS BOTH THE TECHNOLOGIST AND THE PLANNER WHERE TO GO FOR MORE DETAILED INFORMATION AND WHAT KINDS OF RESEARCH AND DEVELOPMENT ARE NEEDED BEFORE A PARTICULAR DEVICE OR PROCESS IS READY FOR USE. THUS, IT SHOULD BE OF CONSIDERABLE ASSISTANCE IN EVALUATING THE POTENTIAL OF EACH ENERGY SOURCE IN EACH CANDIDATE SITUATION. THIS IS THE FRENCH EDITION OF THE ORIGINAL REPORT WHICH WAS PRINTED IN 1976.

1977-0538 ENERGY CONSERVATION RESOURCES FOR EDUCATION.
COLLEGE STATION, TEXAS, TEXAS A AND M UNIVERSITY, 1977. 431 P.

THIS INFORMATION WAS DESIGNED FOR USE AT THE JUNIOR HIGH AND MIDDLE SCHOOL EDUCATION LEVELS. THE MATERIAL AND ACTIVITIES HAVE BEEN FIELD TESTED IN AND ARE APPROPRIATE FOR INDUSTRIAL ARTS OR FOR SCIENCE CLASSES. SUBJECTS COVERED ARE ENERGY SOURCES, PRODUCTION, CONSERVATION, AND ALTERNATIVE ENERGY SOURCES.

1977-0539 ENERGY DEVELOPMENT CENTER: A CONCEPT FOR ORDERLY ENERGY DEVELOPMENT AND COMMUNITY GROWTH.
WASHINGTON, D.C., SYSTEMS CONSULTANTS, INC , 1977. 10 P.

CONCEIVED AND PREPARED BY SYSTEMS CONSULTANTS, INC., THIS REPORT SPECIFIES THE NEED FOR A SERIES OF ENERGY DEVELOPMENT CENTERS OR COMMUNITIES TO BE LOCATED IN AREAS OF THE UNITED STATES THAT ARE NOW OR WILL SOON UNDERGO RAPID GROWTH AS DOMESTIC ENERGY RESOURCES, IN PARTICULAR COAL, AS WELL AS SOLAR, GEOTHERMAL, AND WIND POWER ARE DEVELOPED. THE CONCEPT PRESENTS A RATIONAL ALTERNATIVE TO THE RAPID AND UNPLANNED GROWTH THAT IS TAKING PLACE AROUND SUCH SMALL ENERGY-ORIENTED TOWNS AS GILLETTE, WYOMING; PAGE, ARIZONA; AND PORT VALDEZ, ALASKA. THIS CONCEPT FOR AN ENERGY DEVELOPMENT CENTER IS DIRECTED AT THE CRITICAL ISSUES OF CONSERVATION, SUPPLY DEVELOPMENT, ENVIRONMENT AND INTERGOVERNMENTAL RELATIONS, AS SPECIFIED IN THE PUBLIC NOTICE FROM THE PRESIDENT'S ENERGY POLICY PLANNING OFFICE.

1977-0540 ENERGY FACTS. A REPORT TO THE IDAHO STATE LEGISLATURE.
NTIS, JANUARY 18, 1977. 94 P.
PB-291839

THIS REPORT IS THE FIRST ATTEMPT TO COLLECT AND SUMMARIZE IDAHO ENERGY DATA ON A STATEWIDE BASIS. THE ACCUMULATION OF THIS DATA IS AN IMPORTANT INITIAL REQUIREMENT FOR THE DEVELOPMENT OF A SOUND STATE ENERGY POLICY THAT CAN ASSURE STABLE ENERGY SUPPLIES FOR THE NEAR AND DISTANT FUTURE.

1977-0541 ENERGY IN MINNESOTA. ENERGY TECHNOLOGY INFORMATION FOR DECISION MAKERS.
NTIS, AUGUST 1977. 430 P.
ENERGY IN MINNESOTA. ENERGY TECHNOLOGY INFORMATION FOR DECISION MAKERS, NORTHFIELD, MINNESOTA, AUGUST 14-16, 1977.
PB-299277

THE ENERGY WORKSHOP WAS PLANNED TO PROVIDE INFORMATION ON THE TECHNICAL RAMIFICATIONS OF THE ENERGY DECISIONS WHICH MUST BE MADE NOW AND IN THE FUTURE. THE WORKSHOP WAS DIVIDED INTO THE FOLLOWING THREE DISCUSSION SECTIONS: (1) MAKING AND MOVING ENERGY, HOW ENERGY IS USED AND WASTED, AND ALTERNATIVE ENERGY SOURCES; (2) APPLICATIONS IN MAKING AND MOVING ENERGY, INCLUDING NUCLEAR, COAL, WASTE HEAT, TRANSMISSION LINES, EFFICIENCY OF CARS AND TRUCKS, HEATING HOMES, AND ENERGY PRICING OPTIONS; AND (3) ALTERNATE ENERGY SOURCES INCLUDING SOLAR AND WIND, BIOMASS, FERMENTATION AND AGRICULTURAL SOURCES, PEAT AND WOOD, COAL GASIFICATION, APPROPRIATE TECHNOLOGY, HEAT PUMPS, AND FUSION. FOLLOWING THESE BASIC DISCUSSION SECTIONS, A PANEL DISCUSSED SEVERAL ASPECTS OF THE MINNESOTA ENERGY PICTURE.

1977-0542 ENERGY: RESEARCH, DEVELOPMENT, AND DEMONSTRATION. PROGRAMME OF THE IEA.
PARIS, FRANCE, ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, 1977. 24 P.

THE OBJECTIVES OF THE IEA'S ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACTIVITIES ARE TO DEVELOP A STRATEGY FOR ENERGY R AND D, FOSTER EFFECTIVE NATIONAL PROGRAMS OF ENERGY R AND D, AND UNDERTAKE COOPERATIVE ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS IN HIGH-PRIORITY AREAS. THE WORKING PARTY (DESIGNATED TO DEVELOP R AND D COOPERATION) IS COMPCSED OF 14 WORKING BODIES. THEY DEAL WITH ENERGY CONSERVATION TECHNOLOGY; COAL TECHNOLOGY; SAFETY, RADIOACTIVE WASTES, AND HIGH-TEMPERATURE REACTORS FOR PROCESS HEAT (NUCLEAR POWER); GEOTHERMAL ENERGY; HEATING AND COOLING OF BUILDINGS AND ELECTRIC POWER GENERATION (SOLAR ENERGY); BIOMASS CONVERSION; OCEAN ENERGY SYSTEMS; WIND POWER; FUSION POWER; AND HYDROGEN PRODUCTION FROM WATER.

1977-0543 ENERGY STATISTICS: NORTH AMERICAN AND WORLD SOURCES.
ARLINGTON, VIRGINIA, AMERICAN GAS ASSOCIATION, 1977.

THIS REFERENCE TOOL HAS BEEN COMPILED TO SERVE AS A STARTING POINT FOR LOCATING STATISTICAL DATA IN THE ENERGY FIELD. THE SOURCES INDEXED REPRESENT A DEFINED BODY OF THE ENERGY STATISTICAL INFORMATION SOURCES AVAILABLE. SECTION I CONSISTS OF A LIST OF THE STATISTICAL SOURCES INDEXED. SECTION II CONTAINS THE INDEXED STATISTICAL DATA FOR EACH ENERGY SOURCE. WIND ENERGY IS ONE OF THE MANY SOURCES INCLUDED.

1977-0544 ENGSTROM S
STORA VINDKRAFTVERK KAN PRODUCERA BILLIG ELENERGI. (LARGE WIND POWER PLANTS CAN GENERATE CHEAP POWER).
TEK. TIDSKR. 107(15): 17-19, 1977. (IN SWEDISH)

THE ARTICLE PRESENTS RESULTS OF AN EXTENSIVE STUDY OF THE POSSIBILITIES OF INDUSTRIAL UTILIZATION OF WIND POWER IN SWEDEN. TOPICS COVER OPTIMUM SELECTION OF WIND POWER PLANT SITES, HEIGHT OF POWER PLANT TOWERS AND THEIR LOCATION, AND THE DESIGN AND OPERATION OF A LARGE HORIZONTAL-SHAFT WIND TURBINE.

1977-0545 ESBENSEN T V, STRABO F
DESIGN OF A LOW-ENERGY HOUSE IN DENMARK HEATED BY A COMBINATION OF SOLAR AND WIND ENERGY.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977.
VOL. 2, P. 437-447.

THE PAPER DESCRIBES THE PROJECT FOR A LOW-ENERGY HOUSE CONSTRUCTED IN SKIVE, JUTLAND IN DENMARK. WITH ENERGY CONSERVATION ARRANGEMENTS SUCH AS HIGH-INSULATED CONSTRUCTIONS, MOBILE INSULATION OF THE WINDOWS AND HEAT RECOVERY IN THE VENTILATING SYSTEM, THE HEAT REQUIREMENT FOR SPACE HEATING IS CALCULATED TO 6,000 KWH PER YEAR. THE ENERGY SYSTEM CONSISTS OF A 13 M2 FLAT-PLATE SOLAR COLLECTOR INTEGRATED INTO THE ROOF CONSTRUCTION, A WIND ROTOR WITH A COATED AREA OF 25 M2 AND A WATER STORAGE TANK WITH A CAPACITY OF 4 M3. THE STORAGE TANK IS PROVIDED WITH A WATER BRAKE DRIVEN BY THE WIND ROTOR. THIS ENERGY SYSTEM SUPPLIES THE HOUSE WITH 7,200 KWH, WHICH IS 67% OF THE TOTAL HEAT REQUIREMENT FOR SPACE HEATING AND HOT WATER SUPPLY.

1977-0546 FEDERAL WIND ENERGY PROGRAM.
NTIS, JANUARY 1, 1977 56 P.
ERDA-77-32

TO ACCELERATE THE DEVELOPMENT, COMMERCIALIZATION, AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS IS THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM, MANAGED BY THE WIND SYSTEMS BRANCH (WSB) OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S DIVISION OF SOLAR ENERGY. THE PROJECTS BEING SUPPORTED BY THE PROGRAM THROUGH FY 76 ARE OUTLINED. THE PROGRAM'S GENERAL ORGANIZATION AND THE PROGRAM ELEMENTS WHICH MAKE IT WORK ARE ALSO OUTLINED.

1977-0547 FIESTER K
ENERGY WAR IS GENERATING JOBS.
WORKLIFE 2(10): 14-20. OCTOBER 1977.

THE FACT THAT A PERMANENT RETURN FROM AN ENERGY-INTENSIVE TO A LABOR-INTENSIVE SOCIETY WILL CREATE MANY NEW JOBS HAS BEEN OVERSHADOWED BY FEARS OF SACRIFICE AND DISCOMFORT. ALTHOUGH THE FIRST VISIBLE JOBS TO BE CREATED BY CONSERVATION PROGRAMS WERE FOR LOW-SKILL SHORT-TERM WEATHERIZATION, MUCH OF THIS WORK WAS ALSO DONE BY HOMEOWNERS. LONG-TERM EMPLOYMENT OPPORTUNITIES WILL DEVELOP FROM SOLAR ENERGY AND WIND SYSTEM PROJECTS, INCREASED COAL PRODUCTION, AND NEW RAIL SERVICE. EACH OF THESE WILL INVOLVE PUBLIC AND PRIVATE INVESTMENT THAT WILL EFFECTIVELY REDUCE UNEMPLOYMENT TO A MINIMAL LEVEL WHILE IMPROVING THE ENVIRONMENT. PROJECTIONS AND ILLUSTRATIONS OF THE IMPACT OF EXISTING AND PLANNED PROGRAMS ARE GIVEN TO SHOW HOW CONSERVATION GOALS CAN BE MET AND PERMANENT SKILLED JOBS CAN BE CREATED.

1977-0548 FLATT R
SPEED POLAR OF A WIND TURBINE POWERED CARGO BOAT.
WIND ENG. 1(3): 218-230, 1977.

THE FEASIBILITY OF WIND TURBINE PROPULSION, DISCOVERED MORE THAN HALF A CENTURY AGO, HAS REGAINED SOME INTEREST DUE TO THE PRESENT ENERGY CRISIS. A SOUND PREREQUISITE CONCERNING THE CONSTRUCTIVE AND ECONOMIC ASPECTS OF SUCH AN ENDEAVOR LIES IN THE ASSESSMENT OF ITS DYNAMICAL POTENTIALITY. THIS PAPER DESCRIBES A SIMPLE ANALYSIS FOR THE SPEED POLAR OF SUCH A BOAT. APPLIED TO A 45,000 TON CARGO BOAT, THE CALCULATION RESULTS IN A NEARLY CIRCULAR POLAR, THE AVERAGE SPEED OF WHICH IS ABOUT 4 M/S (APPROX. 8 KNOTS) FOR AN ASSUMED TRUE WIND SPEED OF 10 M/S (APPROX. 20 KNOTS).

1977-0549 FRANK A
SMALL WIND-ENERGY-CONVERSION SYSTEMS.
SOL. AGE 2(12): 28-29, DECEMBER 1977.

THOUGH THE FEDERAL GOVERNMENT IS UNWILLING TO INVEST IN SMALL-SCALE WIND-ENERGY-CONVERSION SYSTEMS, STUDIES BY THE MITRE CORP. INDICATE THAT THE SYSTEMS ARE HIGHLY ECONOMICAL FOR ELECTRICITY GENERATION AND FOR SPACE HEATING. APPLICATION OF SUCH SYSTEMS COULD SAVE AS MUCH AS 1.4 MILLION BPD OF OIL. IN CERTAIN INSTANCES, WIND-ENERGY-CONVERSION SYSTEMS CAN BE MORE ECONOMICAL THAN SOLAR ENERGY. IF SUCH SYSTEMS ARE TO BECOME A REALITY, HOWEVER THE FEDERAL GOVERNMENT MUST PLAY THE KEY ROLE.

1977-0550 FULLER G A
WIND ENERGY CONVERSION SYSTEMS.
SOLAR ENERGY UPDATE '77: CANADA. CONFERENCE OF THE SOLAR ENERGY SOCIETY OF CANADA, 3D, EDMONTON, ALBERTA, AUGUST 22, 1977. EDMONTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. 2 P., PAP. 44.

THIS PAPER PRESENTS AN OVERVIEW OF WIND ENERGY CONVERSION. BASIC PRINCIPLES OF WIND ENERGY CONVERSION FOR VARIOUS TYPES OF SYSTEMS ARE DISCUSSED WITH SPECIAL EMPHASIS GIVEN TO DARRIEUS VERTICAL AXIS TURBINES SIMILAR TO THOSE WHICH WERE TESTED BY THE NATIONAL RESEARCH COUNCIL OF CANADA. METHODS OF ENERGY STORAGE ARE DISCUSSED ALONG WITH THE ECONOMICS AND POSSIBLE FUTURE TYPES OF WIND ENERGY CONVERSION SYSTEMS.

1977-0551 GADSBY G N
SYSTEMS DESCRIPTIONS AND ENGINEERING COSTS FOR SOLAR-RELATED TECHNOLOGIES. APPENDIX TO VOLUME I. EXPERIENCE CURVES AND COST TRENDS: A PRELIMINARY CONSIDERATION OF SOME FACTORS LIKELY TO INFLUENCE CAPITAL COSTS IN SELECTED SOLAR ENERGY SYSTEMS.
NTIS, JUNE 1977. 130 P.
MTR-7485(APP.)(VOL.1)

THIS APPENDIX TO MITRE/METREK REPORT MTR-7485 PRESENTS THE FINDINGS OF A LIMITED STUDY OF EXPERIENCE CURVE AND COST TREND HISTORIES WITHIN A WIDE RANGE OF COMMODITIES RELEVANT TO PROJECTED SOLAR ENERGY SYSTEM CONCEPTS. TWO FORMS OF DATA PRESENTATION ARE USED: (1) EXPERIENCE CURVES DERIVED FROM PRODUCTION VOLUME AND UNIT COST INPUTS AND (2) COST TREND CURVES WHERE DATA ON ACCUMULATED PRODUCTION VOLUMES ARE READILY AVAILABLE.

1977-0552 GALANIS N
PRODUCTION OF ELECTRICITY FROM THE WIND: A PRELIMINARY FEASIBILITY STUDY FOR GREECE.
WIND ENG. 1(4): 241-249, 1977.

WIND STATISTICS FOR GREECE SHOW THAT THE CONDITIONS PREVAILING ON THE AEGEAN ISLANDS--I.E. CONSIDERABLE AMOUNTS OF WIND ENERGY, SMALL ELECTRICAL LOADS AND HIGH GENERATION COSTS--ARE ESPECIALLY FAVORABLE FOR THE INSTALLATION OF WIND TURBINE GENERATORS (WTGS). THIS STUDY GIVES PRELIMINARY DESIGN PARAMETERS FOR WTGS AT SIX LOCATIONS AND EVALUATES THEIR PERFORMANCE. THE DURATION OF OPERATION VARIES FROM 5000 TO 7400 HOURS ANNUALLY AND THE SPECIFIC PRODUCTION IS BETWEEN 2300 AND 3600 KWH/KW. THE INSTALLATION OF THE WTGS WOULD RESULT IN DIESEL FUEL SAVINGS CORRESPONDING TO A MONTH'S CONSUMPTION. FINALLY, THE COST OF WIND GENERATED ELECTRICITY WILL BE LOWER THAN THAT FROM DIESEL ENGINES ONE TO THREE YEARS AFTER THE INSTALLATION OF THE WTGS.

1977-0553 GARSTANG M, ASPLIDEN C, PIELKE R
COASTAL ZONE WIND ENERGY. SEMI-ANNUAL PROGRESS REPORT, 15 DECEMBER 1976--15 MARCH 1977.
NTIS, APRIL 11, 1977. 8 P.
RLO-2344-4

WORK ON THE CONTRACT DURING THE FIRST HALF YEAR HAS FOLLOWED THE SUBDIVISION OF: CLIMATOLOGICAL STUDY; AND MODELLING. IN BOTH AREAS THE WORK HAS CONCENTRATED UPON ESTABLISHMENT OF A RATIONAL FRAMEWORK AND THE ACQUISITION OF THE NECESSARY DATA TO TEST HYPOTHESES USED IN ESTABLISHING THE FRAMEWORK. THUS TANGIBLE RESULTS ARE ONLY IN THE FORM OF RECENTLY ACQUIRED DATA AND METHODOLOGY WHICH WILL EMPLOY THESE DATA. RESULTS FROM THESE EFFORTS WILL BEGIN TO ACCRUE DURING THE THIRD QUARTER.

1977-0554 GOODRICH R W
SOME EFFECTS OF WIND ENERGY CONVERSION SYSTEMS ON ELECTRIC DISTRIBUTION SYSTEM.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 367-370.

AN OVERVIEW IS PRESENTED OF HOW EACH TYPE OF WIND ENERGY CONVERSION SYSTEM ELECTRIC GENERATOR AFFECTS THE SAFETY AND QUALITY OF SERVICE OF ELECTRIC UTILITIES.

1977-0555 GOSLICH H D
LOW-COST CONCEPT FOR THE ENERGY SUPPLY FROM THE WIND
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977.
VOL. 2, P. 425-436.

AFTER A NUMBER OF YEARS OF PRACTICAL EXPERIENCE WITH WINDMILLS (TWO-ROTOR KW AT SYLT; 11KW, 10 METER DIAMETER AND ALSO SMALLER PLANTS AT HAMBURG) TWO-BLADE, HIGH R.P.M. PLANTS WERE DESIGNED WITH THE ROTOR ON THE LEE SIDE OF THE TOWER, BOTH IN ORDER TO SINK SIGNIFICANTLY THE CONSTRUCTION AND MAINTENANCE COST AND TO INCREASE THE LIFE OF THE WINDMILL. THE ROTOR BLADES ARE JOINTED AT THE HUB AND ROTATE ON A "SPHERICAL RADIUS" DURING PERIODS OF HIGH WIND VELOCITY. FULL POWER IS PRODUCED DURING STORMY PERIODS. A CONCEPT OF LARGE SCALE POWER GENERATION, ALONG WITH COST COMPARISONS, WILL BE DESCRIBED.

1977-0556 GOTTLIEB R, TENENBOM B
SOLAR GREENHOUSE EXPERIENCE AT THE INSTITUTE FOR SOCIAL ECOLOGY.
CONFERENCE ON ENERGY-CONSERVING SOLAR HEATED GREENHOUSES, MARLBORO, VERMONT, NOVEMBER 19, 1977. MARLBORO, VERMONT, MARLBORO COLLEGE, 1977. P. 229-236.

EXPERIENCE WITH THE HYBRID SOLAR HEATED WINDPOWERED AQUACULTURE GREENHOUSE COMPLEX IS DESCRIBED. THE DESIGN AND PREDICTED PERFORMANCE OF A PASSIVE SOLAR GREENHOUSE NEARING COMPLETION ARE PRESENTED.

1977-0557 GREENWALD M L
ALTERNATE ENERGY AS A CURRICULUM BASE FOR TEACHING INDUSTRIAL ARTS ON THE SECONDARY-POST SECONDARY LEVEL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7 1977.
PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 609-610.

1977-0558 GROSSMAN W C
ENERGY CONVERSION SYSTEM USING WINDMILL.
U.S. PATENT NO. 4,055,950, NOVEMBER 1, 1977. 6 P.

A SYSTEM IS DESCRIBED FOR RECOVERING THE ENERGY FROM ATMOSPHERIC WIND WHEREIN A WINDMILL OPERATES A COMPRESSOR FOR COMPRESSING AIR WHICH IS STORED IN ONE OR MORE TANKS. THE COMPRESSED AIR IS USED TO DRIVE A PRIME MOVER COUPLED BY GEAR MEANS TO AN ELECTRICAL GENERATOR OR OTHER WORK-PRODUCING APPARATUS. THE PRIME MOVER IS OPERATED BY HYDRAULIC FLUID RESPONSIVE TO THE APPLICATION OF THE COMPRESSED AIR TO FLUID TANKS BY VALVE MEANS RESPONSIVE TO THE OPERATION OF THE PRIME MOVER. THE COMPRESSOR HAS A UNIQUE MEANS FOR LUBRICATING THE SAME. ALTERNATELY, THE PRIME MOVER CAN BE OPERATED BY CONVENTIONAL WATER PRESSURE DURING PERIODS OF LITTLE OR NO WIND.

1977-0559 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1977. 189 P.
NTIS/PS-77/0882/9ST

1977-0560 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, OCTOBER 1977. 187 P.
NTIS/PS-77/0883/7ST

1977-0561 HAGEN H
VACATION HOMES NEAR THE SEA WITH SOLAR AND WIND ENERGY UTILIZATION.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977.
VOL. 2, P. 449-458.

THE GOAL OF THIS STUDY WAS TO CONSIDER THE UTILIZATION OF A COMBINATION OF SOLAR AND WIND ENERGY FOR VACATION HOMES, IN ORDER TO ACHIEVE ENERGY AUTONOMY AND YET TO PROVIDE A MINIMUM ROOM TEMPERATURE LEVEL, WITH 100% OF THE HEATING LOADS FOR SHORT TIME PERIODS BEING SUPPLIED EVEN IN THE WINTER. THIS WOULD INCREASE THE VALUE OF THESE HOMES. A MAIN CONSIDERATION HERE WAS TO DEVELOP AN ADEQUATE ARCHITECTURE ASSOCIATED WITH SOLAR AND WIND ENERGY UTILIZATION.

1977-0562 HALEY D
OPERATION BOOTSTRAP: RENEWABLE AND EFFICIENT ENERGY FOR NEW YORK STATE.
NTIS, 1977. 110 P.
NP-23796

OPERATION BOOTSTRAP IS A SELF-HELP PROGRAM DESIGNED TO MAKE SURE THAT THE VAST SUMS SPENT ON ENERGY IN NEW YORK STATE ARE SPENT TO THE EXTENT SENSIBLE AND POSSIBLE WITHIN NEW YORK, CREATING JOBS AND STIMULATING BUSINESS. THE THEME OF THE REPORT IS HOW MUCH CAN BE ACCOMPLISHED AND HOW QUICKLY BY CONSERVATION AND RENEWABLE ENERGY SYSTEMS APPLICABLE TO NEW YORK. WIND POWER IS INCLUDED IN THE DISCUSSION.

1977-0563 HAWAII NATURAL ENERGY INSTITUTE ANNUAL REPORT, 1977.
HONOLULU, HAWAII, UNIVERSITY OF HAWAII, 1977. 40 P.

THIS REPORT DESCRIBES THE ACTIVITIES OF HNEI FOR 1977. THE SEED PROJECTS SUPPORTED BY HNEI AND THE ONGOING PROJECTS IN WHICH HNEI HAS PARTICIPATED ARE DISCUSSED IN THE FIVE SECTIONS: GEOTHERMAL ENERGY, BIOCONVERSION AND SOLID WASTE, OCEAN THERMAL ENERGY CONVERSION, DIRECT SOLAR RADIATION, AND WIND ENERGY. EACH SECTION FIRST PRESENTS AN OVERVIEW OF AN ENERGY PROGRAM AREA OF INTEREST AND IMPORTANCE TO HAWAII, FOLLOWED BY SHORT NARRATIVES OF INDIVIDUAL RESEARCH PROJECTS, IDENTIFYING FOR EACH THE NATURE OF THE PROBLEM, THE METHODS EMPLOYED, AND THE RESULTS OBTAINED.

1977-0564 HERWIG L O
REVIEW OF OVERSEAS SOLAR TECHNOLOGIES RELATIVE TO INTERNATIONAL COOPERATION.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 26-38, P. 30.6-30.11.

A BRIEF REVIEW IS PRESENTED OF THE OVERSEAS INTERESTS AND ACTIVITIES IN SOLAR TECHNOLOGY AND COOPERATIVE PROGRAMS AND OF THE INCREASING COOPERATIVE RELATIONSHIPS BETWEEN THE U.S. AND VARIOUS OTHER COUNTRIES. A MORE DETAILED REVIEW OF OVERSEAS INTERESTS AND COOPERATION IN SMALL SOLAR THERMAL POWER SYSTEMS IS PRESENTED TO ILLUSTRATE THE BROADENING INTEREST IN SOME TECHNOLOGIES. IN PARTICULAR, TECHNOLOGIES AS DEVELOPING IN JAPAN, THE U.S.S.R., FRANCE, GERMANY AND OTHER COUNTRIES ARE SUMMARIZED. THOSE TECHNOLOGIES WITH GREATEST INTERNATIONAL INTEREST INCLUDE WATER AND AIR HEATING FOR VARIED USES: HEATING AND COOLING OF SPACE FOR RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL USE; PUMPING OF WATER FOR GENERAL USES AND FOR IRRIGATION; AND PRODUCTION OF ELECTRICITY BY SMALLER POWER SYSTEMS INCLUDING SOLAR THERMAL, PHOTOVOLTAIC, AND WIND SYSTEMS.

1977-0565 HOULT C P
ANEMONITOR: A NEW INSTRUMENT FOR WIND POWER SITE SELECTION.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 3. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, APRIL 26, 1977. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS CO., 1977. P. 51-61.

FOR WIND POWER TO BE ECONOMICALLY FEASIBLE, IT WILL BE NECESSARY TO PUT WIND ENERGY CONVERSION SYSTEMS (WECS'S) IN VERY WINDY PLACES. THIS PAPER DISCUSSES THE SITE SELECTION PROCESS FOR WECS'S, IN GENERAL, AND DESCRIBES A UNIQUE INSTRUMENT, THE ANEMONITOR, WHICH MEASURES THE WIND POWER AVAILABLE AT A SPECIFIC SITE. STUDIES OF THE DURATION OF ANEMONITOR MEASUREMENT, AND OF THE USE OF THE ANEMONITOR TO FIND OPTIMUM SITES FOR WEC'S ARE ALSO REPORTED.

1977-0566 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY (A BIBLIOGRAPHY WITH ABSTRACTS).
NTIS, JUNE 1977. 128 P.
NTIS/PS-77/0520

1977-0567 HWANG H H, GILBERT L J
SYNCHRONIZATION OF THE ERDA-NASA 100 KW WIND TURBINE GENERATOR WITH LARGE UTILITY NETWORKS.
NTIS, 1977. 16 P.
DOE/NASA/1004-77/12, NASA-TM-X-73613, CONF-770384-1

THE SYNCHRONIZING OF A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS UNDER RANDOM CONDITIONS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORGUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS.

1977-0568 HWANG H H, GILBERT L J
DIGITAL SIMULATION OF SYNCHRONIZING THE ERDA-NASA 100 KW WIND TURBINE GENERATOR AGAINST AN INFINITE BUS.
PICA '77. IEEE POWER IND. COMPUT. APPL. CONF., 10TH, TORONTO, MAY 24-27, 1977. PROCEEDINGS. NEW YORK, IEEE, 77CH1131-2-PWR, 1977. P. 326-333.

THE PROBLEM OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS.

1977-0569 HWANG H H, GILBERT L J
SYNCHRONIZATION OF WIND TURBINE GENERATORS AGAINST AN INFINITE BUS UNDER GUSTING WIND CONDITIONS.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, MEXICO CITY, JULY 17-22, 1977. PREPRINT. NEW YORK, IEEE, PAPER F 77 675-2, 1977. 9 P.

SYNCHRONIZATION IS THE PROCESS OF MATCHING THE WIND TURBINE'S SYNCHRONOUS ALTERNATOR OUTPUT WITH THE ELECTRIC UTILITY IN FREQUENCY, PHASE, AND VOLTAGE WITHOUT SEVERE TRANSIENTS. STUDIES OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS ARE PERFORMED ON A DIGITAL COMPUTER. IN DIGITAL SIMULATION, WIND GUSTS OF DIFFERENT MAGNITUDES AND DURATIONS ARE HYPOTHESIZED.

1977-0570 HWANG H H, GILBERT L J
RANDOM SYNCHRONIZATION OF THE ERDA--NASA 100 KW WIND TURBINE GENERATOR WITH LARGE UTILITY NETWORKS.
1977 CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION. CONTROL OF POWER SYSTEMS CONFERENCE AND EXHIBITION, COLLEGE STATION, TEXAS, MARCH 14, 1977. N.Y., INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, 1977. P. 26-30.

THE PROBLEM OF SYNCHRONIZING A WIND TURBINE GENERATOR AGAINST AN INFINITE BUS UNDER RANDOM CONDITIONS IS STUDIED FOR THE FIRST TIME. WITH A DIGITAL COMPUTER, COMPLETE SOLUTIONS FOR ROTOR SPEED, GENERATOR POWER ANGLE, ELECTROMAGNETIC TORQUE, WIND TURBINE TORQUE, WIND TURBINE BLADE PITCH ANGLE, AND ARMATURE CURRENT ARE OBTAINED AND PRESENTED BY GRAPHS. EXPERIMENTS HAVE BEEN RECENTLY PERFORMED ON THE ERDA-NASA 100 KW WIND TURBINE. EXPERIMENTAL RESULTS MATCHED COMPUTER STUDY RESULTS VERY CLOSELY AND CONFIRMED THAT THE RANDOM SYNCHRONIZATION CAN BE ACCOMPLISHED BY MEANS OF THE EXISTING SPEED CONTROL SYSTEM AND THE AUTOMATIC SYNCHRONIZER.

1977-0571 HWANG H H, GUO T, MOZEICO H V
TECHNIQUES FOR STABILIZING WIND TURBINE GENERATORS CONNECTED TO POWER SYSTEMS.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, JANUARY 29 - FEBRUARY 3, 1978. PREPRINT. NEW YORK, IEEE, PAPER A 78 280-0, 1977. 7 P.

THIS STUDY PRESENTS AN ANALYTICAL REPRESENTATION OF A WIND TURBINE GENERATOR WHICH EMPLOYS BLADE PITCH ANGLE FEEDBACK CONTROL. A MATHEMATICAL MODEL IS FORMULATED. WITH THE FUNCTIONING MOD-0 WIND TURBINE (ERDA-NASA 100 KW UNIT) SERVING AS A PRACTICAL CASE STUDY, RESULTS OF A COMPUTER SIMULATION OF THE MODEL AS APPLIED TO THE

PROBLEM OF DYNAMIC STABILITY AT RATED LOAD IS PRESENTED. THE EFFECT OF THE TOWER SHADOW IS INCLUDED IN THE INPUT TO THE SYSTEM. DIFFERENT CONFIGURATIONS OF THE DRIVE TRAIN, AND OPTIMAL VALUES OF THE TIE LINE ARE USED IN THE SIMULATIONS. COMPUTER RESULTS REVEAL THAT A STATIC EXCITATION CONTROL SYSTEM COUPLED WITH OPTIMAL VALUES OF THE TIME LINE WILL EFFECTIVELY REDUCE OSCILLATIONS OF THE POWER OUTPUT, WITHOUT THE USE OF A SLIP CLUTCH.

1977-0572 ILLIES K
ENERGY FOR MARINE PROPULSION. A LOOK INTO THE FUTURE.
SCHIFF HAFEN 29(12): 1119-1123, 1977. (IN GERMAN)

THE ARTICLE DISCUSSES POSSIBLE ENERGY SOURCES, INCLUDING WIND, FOR MARINE PROPULSION WHEN PETROLEUM IS NO LONGER AVAILABLE.

1977-0573 AN INFORMAL DIRECTORY OF U.S. WINDPLANT MANUFACTURERS, DISTRIBUTORS, AND RESOURCE GROUPS.
MOTHER EARTH NEWS NO. 46: 34-35, JULY/AUGUST 1977.

THIS IS A LIST OF OVER 30 OF THE MOST ACTIVE AND INFLUENTIAL WINDPLANT MANUFACTURERS, DISTRIBUTORS, AND ORGANIZATIONS IN THE U.S. THIS DIRECTORY REPRESENTS A CROSS SECTION OF THE INDUSTRY.

1977-0574 INGLIS D R
THE ANSWER IS BLOWING IN THE WIND.
PROGRESSIVE 41(1): 43-46, JANUARY 1977.

A COMMON FEATURE OF WIND POWER PROJECTS IS THAT THEY WERE ABANDONED FOR ECONOMIC REASONS ALONE IN AN AGE OF CHEAP FOSSIL FUEL. WIND POWER IS TECHNICALLY READY TO GO. STARTING WITH AN ANNUAL BUDGET OF $200,000 ABOUT THREE YEARS AGO, THE WIND ENERGY DEVELOPMENT PROGRAM IN ERDA GREW TO $15 MILLION/YR. YET THE ONLY SUBSTANTIAL HARDWARE TO SHOW FOR THE EXPENDITURES IS A 100 KW TURBINE NEAR SANDUSKY, OHIO. THE REST OF ERDA'S WIND POWER FUNDS ARE MOSTLY SCATTERED, GIVING THE IMPRESSION THAT THE AGENCY WANTS TO GO SLOWLY ENOUGH TO MAKE SURE THAT SOME MORE FAVORABLE POSSIBILITY HAS TIME TO SHOW UP BEFORE A COMMITMENT IS MADE TO THE CONVENTIONAL, RAPIDLY ROTATING, HORIZONTAL-AXIS CONCEPT. A DRASTICALLY ACCELERATED WIND POWER DEMONSTRATION PROGRAM IS OUTLINED.

1977-0575 IVANOVIC V, KOPRIVICA O
ANALIZA VENTILACIONIH KARAKTERISTIKA PRIRODNOG PROVETRAVANJA U POVSINSKOM OTKOPU RUDNIKA BAKRA MAJDANPEK.
(ANALYSIS OF THE CHARACTERISTICS OF NATURAL VENTILATION IN THE OPEN PIT OF THE MAJDANPEK COPPER MINE).
RUD. GLAS. NO. 3: 56-66, 1977. (IN SERBO-CROATIAN)

THE OPEN PIT OF YUGOSLAVIA'S MAJDANPEK COPPER MINE IS CURRENTLY AT A DEPTH AT WHICH WIND POWER CAN GENERATE SUFFICIENT AIR FLOW TO PROVIDE AN EFFECTIVE NATURAL VENTILATION AND DUST CONTROL WITHIN THE PIT. THESE FINDINGS WERE MADE BY CARRYING OUT AN ANALYSIS OF THE PIT'S NATURAL-VENTILATION CHARACTERISTICS. THE ANALYSIS WAS BASED ON THE GEOMETRICAL AND MATHEMATICAL CALCULATIONS OF SUCH WIND PARAMETERS AS VELOCITY, DIRECTION AND POWER. DEEPENING OF THE PIT WILL, OF COURSE, CREATE MAJOR CHANGES IN THE VENTILATION SITUATION.

1977-0576 JACOBS M L, JACOBS P R
WIND ELECTRIC PLANT WITH IMPROVED ALTERNATOR FIELD EXCITATION.
U.S. PATENT NO. 4,059,771, NOVEMBER 22, 1977. 6 P.

IN A WIND ELECTRIC PLANT OF THE TYPE INCLUDING A WIND-DRIVEN PROPELLER OR THE LIKE AND AN ALTERNATING CURRENT ALTERNATOR CONNECTED TO BE DRIVEN THEREBY TO GENERATE ELECTRICAL ENERGY FOR CHARGING STORAGE BATTERIES OR OTHER DESIRED USE, ELECTRICAL CIRCUITRY CONNECTED WITH THE ALTERNATOR AND A STORAGE BATTERY IS DESCRIBED WHICH INCLUDES CONTROLS RESPONSIVE TO ALTERNATOR SPEED AND BATTERY VOLTAGE TO PROVIDE A RELATIVELY CONSTANT EXCITATION CURRENT FOR THE FIELD WINDING OF THE ALTERNATOR FROM A STORAGE BATTERY. THE ALTERNATOR FIELD IS FULLY EXCITED AT SUBSTANTIALLY ALL SPEEDS OF OPERATION AND THE NEED FOR A CONVENTIONAL ALTERNATOR EXCITER IS ELIMINATED.

1977-0577 JOHANSON E E
ECONOMICS OF WIND ENERGY CONVERSION SYSTEMS FOR ELECTRICAL POWER GENERATION.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 437-444.

THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) HAS FUNDED EIGHT STUDIES ON THE ECONONICS OF WIND ENERGY CONVERSION SYSTEMS (WECS). THESE EIGHT STUDIES HAVE BEEN REVIEWED, THE RESULTS PUT ON A COMMON ECONOMIC BASIS, AND ARE PRESENTED HERE IN 1975 DOLLARS. A COPY OF THE FULL REPORT, PREPARED UNDER CONTRACT TO ERDA, WILL BE AVAILABLE FROM NTIS IN THE FALL OF 1977.

1977-0578 JOHNSON A W
ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS.
SEMIANNUAL REVIEW MEETING ON SILICON TECHNOLOGY, WILLIAMSBURG, VIRGINIA, AUGUST 23,1977. PROCEEDINGS. NTIS, DECEMBER 1977. P. 667-689.
CONF-770865

1977-0579 JOHNSON G L
IMPACT OF WIND ELECTRIC GENERATORS ON ELECTRIC UTILITIES.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, STILLWATER, OKLAHOMA, OCTOBER 26, 1977. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1977. P. 10.1-10.14.

IT HAS BEEN SHOWN THAT WIND ELECTRIC GENERATION CAN BE CONSIDERED AS BASE GENERATION IF A STRONG EFFORT TO REDUCE THE PEAK SYSTEM DEMAND IS SUCCESSFUL. UNDER SUCH CIRCUMSTANCES, INDIVIDUALLY OWNED WIND GENERATORS SHOULD BE TREATED GENEROUSLY BY THE ELECTRIC UTILITIES. THEY SHOULD PAY A REASONABLE CAPITAL CHARGE FOR THE ELECTRICAL SERVICE AND DISTRIBUTION LINES, BUT NOT PAY FOR TRANSMISSION LINES OR UTILITY GENERATION (NO DEMAND CHARGE). THEIR KWH METER SHOULD BE ALLOWED TO RUN BACKWARDS SO THAT THEIR NET YEARLY ENERGY BILL CAN BE REDUCED TO ZERO. THE UTILITY SHOULD NOT PAY THE WIND GENERATOR OWNER FOR NET GENERATION BECAUSE THE UTILITY SHOULD BE THE BULK ENERGY SUPPLIER FOR ITS SERVICE REGION, WITH ALL NET GENERATION, PERHAPS INCLUDING SOME WIND GENERATORS, UNDER ITS CONTROL.

1977-0580 JOHNSON G L
ECONOMIC DESIGN OF WIND ELECTRIC SYSTEMS.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, MEXICO CITY, JULY 17-22, 1977. PREPRINT. NEW YORK, IEEE, PAPER F 77 679-4, 1977. 9 P.

LONG TERM WIND RECORDS ARE USED TO SELECT THE RATED WIND SPEED FOR WIND ELECTRIC GENERATORS. THE WIND IS

CHARACTERIZED BY A WEIBULL DENSITY FUNCTION. DETAILED RESULTS ARE PRESENTED FOR WESTERN KANSAS. GRAPHS ARE PRESENTED WHICH CAN BE USED TO DESIGN A WIND SYSTEM FOR MAXIMUM SPECIFIC OUTPUT FOR A SPECIFIED LOAD FACTOR AT A GIVEN SITE. IT IS SHOWN THAT A WIND TURBINE RATED AT A WIND SPEED OF 9 M/S HAS A SPECIFIC OUTPUT WITHIN 80% OF THE MAXIMUM FOR A WIDE RANGE OF WIND CONDITIONS.

1977-0581 JOHNSON G L, WALKER H S
THREE-PHASE INDUCTION MOTOR LOADS ON A VARIABLE FREQUENCY WIND ELECTRIC GENERATOR.
WIND ENG. 1(4): 268-276, 1977.

A DC MOTOR DRIVING AN AC ALTERNATOR WAS USED TO SIMULATE AN ASYNCHRONOUS WIND ELECTRIC GENERATOR. THE OUTPUT WAS USED TO DRIVE A COMMERCIAL AIR CONDITIONING UNIT CONTAINING A HERMETICALLY SEALED THREE-PHASE INDUCTION MOTOR. THE AIR CONDITIONER STARTED EASILY AS FREQUENCY WAS INCREASED FROM ZERO AND RAN WITHIN RATINGS AT ALL FREQUENCIES BETWEEN ZERO AND 60 HZ. THE ONLY CHANGE FROM COMMERCIAL EQUIPMENT WHICH MIGHT BE DESIRABLE IS A VARIABLE EXPANSION VALVE AT THE EVAPORATOR WHICH WOULD MAINTAIN A CONSTANT PRESSURE UPSTREAM OF THE EVAPORATOR WITH VARIABLE FLOW RATES. THIS WOULD MAINTAIN THE EVAPORATOR TEMPERATURE BETTER THAN THE FIXED EXPANSION VALVE USUALLY USED.

1977-0582 JOHNSON R
SWEDISH WIND-POWER—SQUALLY WINDS ARE A PROBLEM IN ELECTRICAL-POWER GENERATION.
ELTEK. MED AKTUELL ELEKTRON. 29(15): 38-40, OCTOBER 1977. (IN SWEDISH)

WIND POWER IS ONE OF THE ALTERNATIVE SOURCES OF ENERGY WHICH IS BEING CONSIDERED FOR RESEARCH. GENERATION OF ELECTRICITY BY WIND POWER HAS ITS OWN SPECIAL PROBLEMS SINCE THE WIND CANNOT BE CONTROLLED. THIS PRESENTS SPECIAL REQUIREMENTS IN THE DESIGN OF THE GENERATOR AND CONTROL EQUIPMENT.

1977-0583 JONES B W, MORETTI P M
EVALUATION OF WIND GENERATOR ECONOMICS IN A LOAD DURATION CONTEXT.
ENERGY DEVELOPMENT. NO. 3. IEEE POWER ENGINEERING SOCIETY PAP. NEW YORK, IEEE, 77CH1215-3-PWR, 1977. P. 25-29.

WIND GENERATORS USED WITHOUT ENERGY STORAGE ARE USUALLY CONSIDERED TO COMPETE WITH OTHER GENERATION FACILITIES ON THE BASIS OF THE AVERAGE INCREMENTAL COST OF GENERATION. THIS APPROACH CAN SIGNIFICANTLY UNDERESTIMATE THE ACTUAL COMPETITIVENESS OF THE WIND GENERATORS. BY ANALYZING THE EFFECT OF THE WIND GENERATORS ON THE REMAINING LOAD CHARACTERISTICS FOR AN ELECTRIC UTILITY'S GENERATION SYSTEM, THEY ARE SHOWN TO AFFECT THE REQUIRED INVESTMENT IN OTHER GENERATION FACILITIES CONSIDERABLY MORE THAN THEY AFFECT OPERATING COSTS.

1977-0584 JONES W J, RUANE M
ALTERNATIVE ELECTRICAL ENERGY SOURCES FOR MAINE. SUMMARY REPORT.
NTIS, DECEMBER 1977. 554 P.
PB-287909

AN EVALUATION OF ELEVEN TECHNOLOGIES AS POSSIBLE ALTERNATIVES TO THE CONSTRUCTION OF A BASE-LOAD TYPE 600 MW COAL-FIRED GENERATING PLANT, CENTRAL MAINE SEARS ISLAND NO. 1, IN 1986 IS PRESENTED. CONSIDERED ALTERNATIVES ARE GEOTHERMAL, OCEAN THERMAL, OCEAN AND RIVERINE CURRENT, WAVE, WIND, AND SOLAR ENERGY CONVERSION; CONSERVATION; FUEL CELLS; CONVERSION OF BIOMASS AND SOLID WASTES; AND THE ENVIRONMENTAL IMPACTS OF THESE TECHNOLOGIES.

1977-0585 KALS W S
THE RIDDLE OF THE WINDS.
GARDEN CITY, N.Y., DOUBLEDAY, 1977. 201 P.

CHAPTER 17, "POWER FROM THE WIND", IS A BRIEF REVIEW OF THE USE OF WIND FOR ENERGY PRODUCTION.

1977-0586 KANE W
A PERSPECTIVE AS TO THE TOTAL COST OF "SOFT" ENERGY.
ELECTR. PERSPECT. 77(3): 12-15, 1977.

THE ECONOMICS OF SOLAR HEATING SYSTEMS ARE DISCUSSED IN RELATION TO AMORY LOVIN'S PROPOSALS FOR "SOFT" ENERGY PATHS. CURRENTLY, SOLAR ENERGY HEATING SYSTEMS SELL FOR $7,000 TO $10,000 OR MORE INSTALLED, AND THE PRICE IS NOT LIKELY TO BE REDUCED RADICALLY IN THE NEAR FUTURE SINCE A SIGNIFICANT PORTION OF THE TOTAL COST IS DUE TO INSTALLATION CHARGES. ASSUMING THAT THE SOLAR HEATING CUSTOMER BORROWS MONEY FROM THE BANK FOR SUCH A SYSTEM AT INTEREST RATES BETWEEN 8.75% AND 12%, HIS YEARLY GAS BILL WOULD HAVE TO EXCEED ANYWHERE FROM $1300 TO $2400 IN ORDER FOR HIM TO BREAK EVEN. ASSUMING THAT A $7,000 SOLAR PANEL HEATING SYSTEM WERE REQUIRED PER HOME OR PER TWO APARTMENTS AND THAT THE SYSTEM WAS INSTALLED IN VIRTUALLY ALL AMERICAN HOMES AND APARTMENTS, THE RESULTANT COST TC THE AMERICAN PUBLIC WOULD BE $364 BILLION. SIMILAR ECONOMICS PRESENTED FOR "HOME" WINDMILLS AND "ALCOHOL POWER" SHOW THEIR COSTS AND NECESSARY SCALE OF PRODUCTION TO BE EVEN MORE INFEASIBLE, AS FAR AS SUPPLANTING TRADITIONAL SOURCES.

1977-0587 KAUFMAN V
SURVEY OF RESEARCH ACTIVITIES OF THE DIVISION OF SOLAR ENERGY, ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL. 1. ORLANDO, FLORIDA, JUNE 6-19, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 26-38, P. 30.1-30.5.

THE PRIMARY GOAL OF THE SOLAR ENERGY PROGRAM OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION IS TO DEVELOP AND INTRODUCE, AT AN EARLY DATE, ECONOMICALLY COMPETITIVE AND ENVIRONMENTALLY ACCEPTABLE SOLAR ENERGY SYSTEMS TO MEET A SIGNIFICANT FRACTION OF THE NATIONAL ENERGY REQUIREMENTS COMMENSURATE WITH ITS POTENTIAL. THE PROGRAM IS ACCOMPLISHED THROUGH THE FUNDING OF SPECIFIC PROJECTS IN EACH OF THE SOLAR TECHNOLOGIES. INFORMATION ON THE ALLOCATION OF FUNDS AMONG THE VARIOUS TYPES OF R AND D INSTITUTIONS AND THE DIVISION OF FUNDS BETWEEN BASIC AND APPLIED RESEARCH AND DEVELOPMENTS IS GIVEN. THE TOTAL OPERATING FUNDS OF THE DIVISION OF SOLAR ENERGY FOR FY 1977 HAVE MORE THAN DOUBLED OVER THOSE OF FY 1976 WHICH, IN TURN, WERE MORE THAN TWICE THOSE OF PREVIOUS YEARS.

1977-0588 KEABLE J
HEAT PUMP IN RELATION TO SOLAR ENERGY.
ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION. CONFERENCE ON ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION, LONDON, JULY 1977. LONDON, INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. P. 43-48.

THE COMPONENTS OF A HEAT-PUMPING SYSTEM ARE BRIEFLY REVIEWED. ELECTRICITY AND ALTERNATE POWER SOURCES

INCLUDING GAS, OIL, WIND-POWER, METHANE AND ALCOHOL ARE DISCUSSED AS FEASIBLE POWER SOURCES FOR HEAT PUMPS. IT IS NOTED THAT HEAT PUMPING IS SUITABLE IN THE MAJORITY OF ENERGY USE CATEGORIES, INCLUDING SPACE-HEATING, FOOD PRESERVATION BY COOLING, HOT WATER HEATING AS WELL AS MANY INDUSTRIAL APPLICATIONS. COST IN USE (CAPITAL COST OF A SYSTEM DIVIDED BY AN ASSUMED INSTALLATION LIFE SPAN) IS USED AS A FIGURE OF MERIT TO COMPARE A CONVENTIONAL HOT AIR HEATING SYSTEM WITH A SOLAR SYSTEM AND AN ELECTRICALLY DRIVEN HEAT PUMP. NO ADVERSE ENVIRONMENTAL SIDE EFFECTS ARE FORESEEN IF HEAT PUMPS ARE PRODUCED IN LARGE QUANTITIES.

1977-0589 KIDDER T
TINKERING WITH SUNSHINE.
ATL. MON.: 70-83, OCTOBER 1977.

SOME OF THE OUTSTANDING PEOPLE IN THE FIELD OF SOLAR ENERGY AND GENERAL ENERGY CONSERVATION ARE DISCUSSED. EXAMPLES OF PEOPLE UPGRADING THE CURRENT SOLAR TECHNOLOGY ARE GIVEN. A SURVEY OF PEOPLE MANUFACTURING AND INVENTING NEW EQUIPMENT FOR SOLAR SYSTEMS. PHOTOVOLTAIC, TECHNOLOGY AND COSTS ARE ALSO MENTIONED. WIND ENERGY AND WIND EQUIPMENT AS WELL AS THE PEOPLE INTERESTED IN THIS FIELD ARE ALSO DISCUSSED.

1977-0590 KIRSCHBAUM H S, SULZBERGER V T, SOMERS E V
EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION.
ENERGY DEVELOPMENT, NO. 3. IEEE POWER ENGINEERING SOCIETY PAP. NEW YORK, IEEE, 77CH1215-3-PWR, 1977. P. 108-114.

AN ANALYSIS OF THE POTENTIAL FOR WIND GENERATION AT AN OFFSHORE SITE IDENTIFIED BY PUBLIC SERVICE ELECTRIC AND GAS COMPANY OF NEWARK, N.J. INDICATES A POTENTIAL IN EXCESS OF 5700 KWH/KW FOR A 1 MW WINDMILL RATED AT 20 MI/H AND A HUB HEIGHT OF 235 FEET. THE PRELIMINARY ECONOMICS OF THE APPLICATION OF WIND POWER, AS A LIMITED SUPPLEMENT TO BASE LOADED NUCLEAR AND OTHER FORMS OF GENERATION, APPEARS TO OFFER ENOUGH PROMISE SUCH THAT A MORE SERIOUS STUDY IS WARRANTED TO DETERMINE THE OVERALL ECONOMIC, TECHNICAL, AND ENVIRONMENTAL FEASIBILITY OF SUCH AN APPLICATION. IN ADDITION SOME OF THE STATISTICAL PROPERTIES OF THE WIND AT THE OFFSHORE SITE HAVE BEEN ANALYZED.

1977-0591 KISS A L
ORDER OF MAGNITUDE OF HUNGARY'S WIND POWER RESERVE.
ENERG. ATOMTECH. 30(10): 461-464, OCTOBER 1977. (IN HUNGARIAN)

WIND POWER RESEARCH AND DEVELOPMENT PROGRESS IN HUNGARY IS SURVEYED.

1977-0592 KLEMS J H
CALIFORNIA WIND ENERGY RESOURCE.
NTIS, SEPTEMBER 1977. 41 P.
LBL-6835

THE SIZE OF THE WIND ENERGY RESOURCE FOR CALIFORNIA IS ESTIMATED BY SEVERAL METHODS AND FOUND TO BE LARGE RELATIVE TO THE CURRENT STATE ELECTRICAL CONSUMPTION. CENTRALIZED AND DISPERSED SYSTEMS FOR UTILIZING LARGE AMOUNTS OF WIND ENERGY ARE COMPARED.

1977-0593 KOIDE G T, TAKAHASHI P K
WIND AND SOLAR ENERGY APPLICATIONS STUDY.
NTIS, AUGUST 1977. 113 P.
PB-287593

THE STUDY ON SOLAR RADIATION AND WIND POWER APPLICATIONS IS A FACET OF THE TOTAL SOLAR ASSESSMENT PROGRAM. ENGINEERING CONSULTANTS, GOVERNMENT AUTHORITIES, TECHNOLOGY ASSESSMENT SPECIALISTS AND BUSINESSMEN WERE CONTACTED FOR INPUT INTO THE REPORT. THE RESULT IS A BROAD IMPLEMENTATION PLAN HIGHLIGHTING SEVEN TYPICAL APPLICATIONS--THREE SOLAR, THREE WIND AND ONE COMBINATION.

1977-0594 KOLM K E
PREDICTING THE SURFACE WIND CHARACTERISTICS OF SOUTHERN WYOMING FROM REMOTE SENSING AND EOLIAN GEOMORPHOLOGY. FINAL REPORT.
NTIS, SEPTEMBER 30, 1977. 166 P.
RLO/2343-78/1

EOLIAN GEOMORPHOLOGICAL FEATURES CAN BE USED TO SUCCESSFULLY LOCATE AREAS OF HIGH-WIND ENERGY BECAUSE EOLIAN FEATURES CAN BE EASILY AND ECONOMICALLY IDENTIFIED AND MAPPED FROM COLOR COMPOSITE LANDSAT IMAGERY. IN THIS STUDY LANDSAT IMAGE INTERPRETATIONS WERE CORRELATED WITH METEOROLOGICAL DATA TO SHOW THAT ACTIVE EOLIAN FEATURES INDICATE A WINDY CLIMATE.

1977-0595 LANDA H C
THE SOLAR ENERGY HANDBOOK.
MILWAUKEE, WISCONSIN, FICOA/SEECOA, 1977. 92 P.

1977-0596 LANDA H C, LANDA M C, LANDA J M, LANDA D C
SOLAR ENERGY HANDBOOK.
MILWAUKEE, WISCONSIN, FILM INSTRUCTION CO. OF AMERICA, 1977. 5TH. EDITION. 183 P.

1977-0597 LAPIN E E
MULTIMEGAWATT VERTICAL AXIS WINDMILLS.
LOS ANGELES COUNCIL OF ENGINEERS & SCIENTISTS, PROCEEDINGS SERIES VOL. 3. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, APRIL 26, 1977. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS, CO., 1977. P. 43-50.

ON THE BASIS OF AN ELEMENTARY THEORY FOR VERTICAL AXIS WINDMILLS, WHICH COMBINE BLADE ELEMENT AND ACTUATOR DISC CONSIDERATIONS, THE NET POWER EXTRACTIVE PERFORMANCE FOR SEVERAL MILLS IS ESTIMATED. A COMPARISON IS MADE BETWEEN ROTORS AND WINGS AS THE PROPULSIVE ELEMENTS. THE CONDITIONS UNDER WHICH WINDMILLS AS FUEL-SUBSTITUTES BECOME COMPETITIVE WITH FOSSIL FUELED PLANTS ARE SHOWN.

1977-0598 LEBOST B A
FLUID TURBINE.
U.S. PATENT NO. 4,057,270, NOVEMBER 8, 1977. 10 P.

A TURBINE FOR GENERATING ELECTRIC POWER WHEN EXPOSED TO A FLUID SOURCE, SUCH AS A LIQUID OR GASEOUS CURRENT IS DESCRIBED. THE TURBINE HAS TWO SUBSTANTIALLY ANNULAR ROTOR HOUSINGS SPACED IN PARALLEL, HORIZONTAL PLANES. EACH HOUSING IS PROVIDED WITH A PLURALITY OF RADIALLY EXTENDING BLADES WHICH ARE CONNECTED TO COAXIAL SHAFTS.

ONE OF THE SHAFTS IS CONNECTED TO THE FIELD WINDINGS OF AN ELECTRIC GENERATOR WHILE THE OTHER SHAFT IS CONNECTED TO THE ARMATURE WINDINGS. THE RADIAL BLADES IN EACH ROTOR HOUSING WHEN EXPOSED TO THE LIQUID OR GASEOUS CURRENT ROTATE IN OPPOSITE DIRECTIONS CAUSING THE FIELD AND ARMATURE WINDINGS OF THE GENERATOR TO ROTATE IN OPPOSITE DIRECTIONS TO INCREASE THE POWER OUTPUT OF THE GENERATOR.

1977-0599 LEIGHTON L H, WRIGHT J K, SYRETT J J
POTENTIAL FOR UNCONVENTIONAL ENERGY SOURCES FOR THE UNITED KINGDOM.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 18 P.

THE UNCONVENTIONAL SOURCES CONSIDERED IN THE PAPER ARE SOLAR ENERGY, WIND POWER, WAVE AND TIDAL POWER, AND GEOTHERMAL HEAT. THEIR POTENTIAL CONTRIBUTION TO ENERGY SUPPLY IN THE UK IS BEING ASSESSED AS PART OF A WIDER EXERCISE AIMED AT FORMULATING A NATIONAL ENERGY RESEARCH DEVELOPMENT (R&D) STRATEGY SUFFICIENTLY ROBUST TO BE VALID FOR A WIDE RANGE OF POSSIBLE FUTURE CONDITIONS.

1977-0600 LINACRE J K
CHALLENGE OF ENERGY ALTERNATIVES.
ENERGY DIG. 6(4): 7-9, OCTOBER 1977.

THIS ARTICLE CONSIDERS THE FOLLOWING ALTERNATIVES TO FOSSIL FUELS, DEVELOPMENT OF SOME OF WHICH HAVE RECEIVED SUPPORT FROM THE BRITISH GOVERNMENT; GEOTHERMAL ENERGY, SOLAR ENERGY, WIND ENERGY, AND TIDAL ENERGY. PREDICTED CONTRIBUTIONS TO JNITED KINGDOM ENERGY BY THE YEAR 2000 ARE GIVEN AS FOLLOWS, IN MILLIONS OF TONS OF COAL EQUIVALENT (MTCE): WAVES = 15 MTCE; SOLAR FOR WATER AND SPACE HEATING = 4 TO 5 MTCE; SOLAR FROM BIOMASS CONVERSION = 5 MTCE; WIND = 6 MTCE; TIDES = 3 TO 10 MTCE. IT IS STATED THAT THE TOTAL CONTRIBUTION IS 40 MILLION TONS COAL EQUIVALENT OR APPROXIMATELY 25 MILLION TONS OIL EQUIVALENT. THIS IS CONSIDERABLY IN EXCESS OF THE CURRENT REQUIREMENTS FOR PETROCHEMICAL FEED STOCK, AND PROBABLY EXCEEDS THE PREDICTED REQUIREMENT FOR 2000.

1977-0601 LINKE S, TESHOME A, YEHSAKUL P D
TRANSMISSION AND PROTECTION FOR WIND-ENERGY GENERATION SYSTEMS.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXHIBITION, TORONTO, SEPTEMBER 26-28, 1977. NEW YORK, IEEE, 1977. P. 218-219.

THIS PAPER REPORTS RESULTS OF A TECHNICAL AND ECONOMIC STUDY OF TRANSMISSION, DISTRIBUTION, AND PROTECTION SYSTEMS FOR 1500 KW WIND-ENERGY GENERATORS CONNECTED TO AN ELECTRIC-UTILITY GRID IN SEVERAL CONFIGURATIONS. COST OF CONVENTIONAL PROTECTIVE EQUIPMENT IS FOUND TO BE EQUAL TO OR GREATER THAN TRANSMISSION-LINE COSTS FOR MOST INSTANCES.

1977-0602 LINSCOTT B S, GLASGOW J, ANDERSON W D, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH. PROCEEDINGS. LA GRANGE PARK, ILL., ANS, IEEE, 77CH12633 ENERGY, 1977. VOL. 2, P. 1633-1650, PAPER 779273.

THE DESIGN AND THE ERECTION OF AN EXPERIMENTAL WIND TURBINE BY THE NASA-LEWIS RESEARCH CENTER IS DISCUSSED. THIS 100 KW TURBINE, DESIGNATED THE MOD-0, IS LOCATED AT THE NASA PLUM BROOK SITE NEAR SANDUSKY, OHIO. EXPERIMENTAL TEST DATA HAVE BEEN CORRELATED WITH ANALYSES OF TURBINE LOADS AND COMPLETE SYSTEM BEHAVIOR OF THE ERDA-NASA 100 KW MOD-0 WIND TURBINE GENERATOR OVER A BROAD RANGE OF STEADY STATE CONDITIONS, AS WELL AS DURING TRANSIENT CONDITIONS.

1977-0603 LITTLER J G F, THOMAS R B
ECONOMIC CONSIDERATIONS IN THE ENERGY SUPPLY OF AUTARKIC DWELLINGS.
ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION. CONFERENCE ON ECONOMIC AND COMMERCIAL ASSESSMENT OF SOLAR ENERGY CONVERSION, LONDON, JULY 1977. LONDON, INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. P. 64-77.

DATA FROM COMPUTER SIMULATIONS RUN IN CONJUNCTION WITH LIVE WEATHER DATA ARE PRESENTED SHOWING ENERGY REQUIREMENTS FOR THE AUTARKIC HOUSE. MEETING THE ENERGY REQUIREMENTS BY EITHER A SOLAR HEATING SYSTEM OR A WIND GENERATOR SYSTEM USING RESISTANCE HEATING IS CONSIDERED. A COMPUTER SIMULATION IS USED TO VARY THE ELEMENTS OF THESE TWO SYSTEMS. A COMPARISON OF VARYING VOLUMES OF STORAGE MEDIUM AND INSULATION IS PRESENTED FOR THE SOLAR HEATING SYSTEM. A TABLE OF LOSSES ASSOCIATED WITH SUPPLYING ELECTRICITY FROM WINDMILLS IS GIVEN. THE TRADE-OFF BETWEEN MILL SIZE AND STORAGE VOLUME AND THE COSTS OF A WINDMILL SYSTEM ARE DISCUSSED.

1977-0604 LOTH J L
WIND ENERGY CONCENTRATORS.
U.S. PATENT NO. 4,045,144, AUGUST 30, 1977. 8 P.

THE HORIZONTAL AND VERTICAL WIND ENERGY CONCENTRATORS ARE STRUCTURALLY SIMPLE AND LIGHT AND ARE CAPABLE OF CONCENTRATING THE WIND ENERGY AT LEAST SIX TIMES WITH VERY HIGH EFFICIENCY. THIS PERMITS A CORRESPONDING REDUCTION IN THE FRONTAL AREA OF THE WIND TURBINE AND INCREASES ITS SPEED WITHOUT SACRIFICE IN WIND ENERGY HARNESSED. THE WIND ENERGY CONCENTRATOR IS A HIGH LIFT, SHORT ASPECT RATIO WING, WHICH IS DESIGNED TO MAXIMIZE THE INDUCED DRAG. THIS INDUCED DRAG TAKES THE VELOCITY OUT OF THE WIND BUT TRANSFORMS THE WIND ENERGY INTO ROTATIONAL ENERGY PRESENT IN THE SHED VORTEX SYSTEM. THE DESIGN IS SUCH THAT MOST OF THIS ROTATIONAL ENERGY CAN BE HARNESSED BY A SMALL HIGH SPEED WIND TURBINE PLACED IN THE ROLLED UP WING TIP VORTEX.

1977-0605 LOTH J L
BETZ TYPE LIMITATION OF VORTEX WIND MACHINES.
WIND ENG. 1(3): 169-185, 1977.

THE THEORETICAL FOWER LIMITATIONS ARE DESCRIBED FOR FOUR VORTEX TYPE WIND MACHINES. THE MAXIMUM POSSIBLE POWER OUTPUT IS PRESENTED IN THE FORM OF A BETZ-TYPE DIMENSIONLESS POWER COEFFICIENT. ALL THESE VORTEX WIND MACHINES USE A VORTEX GENERATOR IN THE FORM OF EITHER A LOW ASPECT RATIO WING OR VANES IN A TOWER. THESE PARTS DO NOT ROTATE BUT HAVE TO MOVE WITH THE WIND DIRECTION AND THEREFORE, ARE NON-STATIONARY; CONSEQUENTLY THEIR PROJECTED AREA HAS BEEN SELECTED FOR THE REFERENCE AREA. ALL FOUR MACHINES ARE PROVEN HERE TO HAVE A POWER COEFFICIENT BELOW THAT OF AN ACTUATOR DISK IN A FREE STREAM. THREE MACHINES USE A TURBINE ROTOR PLACED COAXIALLY WITH THE CORE OF A VORTEX. THE FIRST TWO MACHINES HAVE A VORTEX GENERATED UPSTREAM OF THE ROTOR AND INGEST THE VISCOUS PART OF THE VORTEX. THE TOTAL PRESSURE DEFICIT IN THE VISCOUS CORE OF THE VORTEX REDUCES THEIR POWER OUTPUT IN PROPORTION TO THE SQUARE OF THE VORTEX STRENGTH. THE SECOND TWO MACHINES HAVE A VORTEX GENERATED DOWNSTREAM OF THE ROTOR AND USE THE VISCOUS CORE AS A VACUUM PUMP TO DRIVE THE WIND TURBINE. THE VORTEX GENERATING DEVICE IS MUCH LARGER THAN THE TURBINE, EXPECIALLY FOR THE SECOND PAIR OF MACHINES, WHICH FURTHER LOWERS THE OBTAINABLE POWER COEFFICIENT.

1977-0606 LUCAS T
HOW TO USE SOLAR ENERGY IN YOUR HOME AND BUSINESS.
PASADENA, CALIFORNIA, WARD RITCHIE PRESS, 1977. 318 P.

THE BOOK ACCUMULATES EXPLANATIONS ABOUT SOLAR ENERGY AND SOLAR HARDWARE IN 12 CHAPTERS, NAMELY: HOW TO CUT YOUR UTILITY BILLS; SOLAR WATER HEATING--NEW TECHNIQUES FOR SAVING MONEY; INSTALLING A COMMERCIAL SOLAR WATER HEATER; SOLAR SPACE SYSTEMS, LIQUID-TYPE; ADVANTAGES OF AIR-TYPE SOLAR COLLECTOR SYSTEMS; SOLAR HEAT FOR SUMMER COOLING; PASSIVE SOLAR TECHNIQUES--VERSATILE AND LOW-COST; SOLAR HEATING FOR SWIMMING POOLS AND SPAS; SOLAR-HEATING SYSTEMS NEED AUTOMATIC CONTROLS; SOLAR ENERGY FOR YOUR BUSINESS--A NECESSITY SOON; SOLAR CELLS, SPACE STATIONS, AND ELECTRIC CARS; AND WINDMILLS AS POWER PLANTS.

1977-0607 MCLAUGHLIN T
MAKE YOUR OWN ELECTRICITY.
NORTH POMFRET, VERMONT, DAVID AND CHARLES INC., 1977. 128 P.

IN ORDER TO BUFFER ONESELF AGAINST THE INCREASING COST OF ELECTRICITY AND BREAKDOWNS IN SUPPLY CAUSED BY ACCIDENTS, OVERLOADING, OR STRIKES, THIS BOOK PRESENTS MANY PROJECTS AND SUGGESTIONS FOR THE HOMEOWNER. THE HOMEOWNER MUST DECIDE WHAT KIND OF SUPPLY TO INSTALL (ENERGY, PARTIAL OR COMPLETE REPLACEMENT) TO TAKE CARE OF HIS REQUIREMENTS. THE EQUIPMENT THAT CAN BE BOUGHT, RANGING FROM SOPHISTICATED ENGINE-RUN GENERATORS TO HOME-MADE WINDMILLS OR SOLAR PANELS, IS CONSIDERED IN DETAIL. CONSTRUCTIONAL DETAILS AND DIAGRAMS ARE INCLUDED ON ENGINE-DRIVEN GENERATORS, WIND GENERATORS, POWER FROM WATER AND THE SUN, THERMOELECTRIC POWER, STORAGE BATTERIES, INVERTERS AND CONVERTERS, AND CHANGEOVER SWITCHES.

1977-0608 MCVEIGH J C, PONTIN G W W
WIND-WALL: AN INTEGRATED WIND/SOLAR SYSTEM.
WIND ENG. 1(2): 150-158, 1977.

AN APPROACH IS DESCRIBED TO THE PROBLEM OF PROVIDING SPACE AND WATER HEATING TO A GROUP OF LOCAL AUTHORITY HOUSES IN THE SOUTH OF ENGLAND. WINDMILL SYSTEM IS GROUPED IN A "WIND-WALL", A NEW CONCEPT WITH FIXED DUCTED HORIZONTAL-AXIS, BI-DIRECTIONAL WINDMILLS BASED ON A 2 MC CUBE.

1977-0609 MCVEIGH J C
SUN POWER. AN INTRODUCTION TO THE APPLICATIONS OF SOLAR ENERGY.
NEW YORK, PERGAMON PRESS INC., 1977. 216 P.

THE FOLLOWING CHAPTERS ARE INCLUDED: HISTORICAL BACKGROUND; SOLAR RADIATION; WATER AND AIR HEATING APPLICATIONS; SPACE HEATING APPLICATIONS; THERMAL POWER AND OTHER THERMAL APPLICATIONS; METHODS OF ECONOMIC ANALYSIS; PHOTOVOLTAIC CELLS, BIOLOGICAL CONVERSION SYSTEMS, AND PHOTOCHEMISTRY; WIND POWER; AND SOME PRACTICAL HEATING APPLICATIONS. A GLOSSARY IS ALSO INCLUDED.

1977-0610 MACCREADY P B
ASSESSING THE LOCAL WIND FIELD FOR SITING OF WIND POWER SYSTEMS. FINAL REPORT, JULY 1976-JUNE 1977.
NTIS, SEPTEMBER 1977. 87 P.
RLO-2441-76/16

THE DETERMINING OF FLOW FIELD CHARACTERISTICS FOR A GIVEN WIND TURBINE SITE IS DIFFICULT. THE BEST MONITORING DEVICE WOULD BE SOME SORT OF REMOTE MONITOR WHICH CONTINUOUSLY DEFINES THE ENTIRE THREE-DIMENSIONAL FLOW FIELD FROM GROUND TO 100 M THROUGHOUT A HILLY REGION OF, SAY, 5 KM BY 5 KM. NONE EXISTS. THERE ARE MANY ALTERNATIVE SCHEMES WHICH ARE AVAILABLE, EACH WITH ITS STRENGTHS AND WEAKNESSES. THE SCHEMES ARE EXAMINED IN THIS REPORT, FROM THE PERSPECTIVE OF THEIR SUITABILITY FOR ECONOMICALLY PROVIDING FIELD OBSERVATIONS WITH WHICH EXACT SITES IN COMPLEX TERRAIN CAN BE SELECTED.

1977-0611 MAGOVENY G S, FORGO E J
HORIZONTAL MULTIDIRECTIONAL TURBINE WINDMILL.
U.S. PATENT NO. 4,047,834, SEPTEMBER 13, 1977. 6 P.

A HORIZONTAL MULTIDIRECTIONAL TURBINE WINDMILL IS DESCRIBED WHICH COMPRISES A HOUSING HAVING APERTURES ON ALL SIDES FOR INGRESS AND EGRESS OF AIR AND A ROTOR ON A DRIVE SHAFT WITHIN THE HOUSING, EACH APERTURE BEING THE LARGER END OF A FUNNEL-SHAPED PASSAGE, THE SMALLER ENDS OF THE PASSAGES BEING POSITIONED TO DELIVER AIR AT RELATIVELY HIGH VELOCITIES AGAINST THE ROTOR BUCKETS, THE AIR ENTERING THE HOUSING THROUGH ONE OR MORE APERTURES ON THE WINDWARD SIDE THEREOF AND BEING EXHAUSTED THROUGH APERTURES ON THE LEEWARD SIDE. THE HOUSING IS PREFERABLY SO SHAPED THAT AMBIENT AIR IMPINGING ON THE HOUSING SURFACE WITHOUT ENTERING AN APERTURE WILL FLOW AROUND THE HOUSING AND CREATE A LOW PRESSURE ZONE ADJACENT THE EXHAUST FUNNEL APERTURES, AND THE HOUSING IS ALSO PREFERABLY SO SHAPED THAT A PLURALITY OF UNITS CAN BE STACKED VERTICALLY WITH THEIR DRIVE SHAFTS COUPLED TOGETHER.

1977-0612 MAKOFSKE W
RAMAPO AQUACULTURE-GREENHOUSE SYSTEM.
CONFERENCE ON ENERGY-CONSERVING SOLAR HEATED GREENHOUSES, MARLBORO, VERMONT, NOVEMBER 19, 1977. MARLBORO, VERMONT, MARLBORO COLLEGE, 1977. P. 44-47.

IN RESPONSE TO A DETERIORATING WORLD ENVIRONMENT, A GROUP OF FACULTY AND STUDENTS AT RAMAPO COLLEGE FORMED THE RAMAPO ALTERNATIVE ENERGY CENTER. ITS PROGRAM CONSISTS OF A MULTI-FACETED APPROACH TO MEET THE ENERGY-ENVIRONMENT PROBLEM, AND INCLUDES EDUCATIONAL, RESEARCH, AND COMMUNITY ACTION COMPONENTS.

1977-0613 MARSH W D
REQUIREMENTS ASSESSMENT OF WIND ENERGY SYSTEMS.
EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, SEMIANNUAL, MONTEREY, CALIFORNIA, MARCH 16, 1977. NTIS, 1977.
P. 20.1--20.13.
EPRI-ER-515-SR

THE APPLICATION OF WIND ENERGY SYSTEMS(WES) IN A REAL ELECTRIC UTILITY SYSTEM IS INVESTIGATED WITH THE OBJECTIVES OF DEVELOPING AND APPLYING A METHODOLOGY FOR DETERMINING THE TECHNICAL AND ECONOMIC CHARACTERISTICS OF SUCH APPLICATIONS. THE PROGRAM BEGINS WITH THE SELECTION OF A GEOGRAPHIC AREA AND AN ASSOCIATED UTILITY WITHIN WHICH WES ARE TO BE STUDIED. INCLUDED IS A PRELIMINARY SITING ANALYSIS FOR WES. SEVERAL REPRESENTATIVE KINDS OF VERTICAL AND HORIZONTAL AXIS WIND MACHINES OF VARYING CONFIGURATIONS AND SIZES WERE CONSIDERED AND SELECTIVELY SCREENED TO PRODUCE FIVE REFERENCE SYSTEMS FOR FURTHER STUDY. ESTABLISHED ELECTRIC UTILITY INDUSTRY PROCEDURES FOR ECONOMIC AND PERFORMANCE ANALYSIS OF GENERATING SYSTEMS WERE MODIFIED FOR USE IN THIS STUDY AS REQUIRED BY THE INTERMITTENT NATURE OF THE WIND ENERGY SOURCE. USING THIS METHODOLOGY THE REFERENCE

SYSTEMS WILL BE STUDIED IN THE FRAMEWORK OF THE SELECTED ELECTRIC UTILITY TO APPRAISE THE ECONOMIC AND TECHNICAL ASPECTS OF WIND ENERGY SYSTEMS.

1977-0614 MELISS M, PAUL J, STEIMLE F
UTILIZABLE ENERGY FLOWS.
CONGRESS ON THE DEVELOPMENT OF ENERGY DEMAND AND POSSIBILITIES OF SUPPLY, BERLIN, DECEMBER 5-7, 1977. DUSSELDORF, F.R.G., VDI-VERL., 1977. P. 33-46. (IN GERMAN)

APART FROM FOSSIL AND NUCLEAR PRIMARY ENERGY SOURCES PREVAILINGLY USED UNTIL NOW, REGENERATIVE ENERGY FLOWS ARE AVAILABLE FOR MANKIND FOR COVERING ITS ENERGY REQUIREMENTS WHICH WILL EVEN INCREASE WITH A DEGREE OF CERTAINTY UNTIL THE END OF THIS CENTURY. YET ONLY A FEW OF THOSE PLENTIFUL, POSSIBLE UTILIZATION TECHNIQUES CAN BE USED IN THE FEDERAL REPUBLIC OF GERMANY: GEOTHERMAL HEATING AND POWER STATIONS, HYDROELECTRIC POWER PLANTS, SOLAR CELLS, WIND ENERGY CONVERTERS, HEAT PUMPS AND LOW-TEMPERATURE TYPE COLLECTOR INSTALLATIONS. THE ACTUAL AND EXPECTED SUBSTITUTIONAL POTENTIALS OF THESE TECHNOLOGIES ARE POINTED OUT. IT IS OBVIOUS THAT ONLY THE THREE ENERGY SOURCES MENTIONED LAST WILL BECOME INCREASINGLY IMPORTANT FOR THE ENERGY SUPPLY OF THE FRG.

1977-0615 MELISS M
CONTRIBUTION OF WIND ENERGY STILL UNCERTAIN. PUBLIC EXPECTATIONS OFTEN TOO HIGH--REPORT FROM A DGS MEETING IN BREMEN.
VDI NACHR. 31(39): 2, JULY 1977. (IN GERMAN)

ON JUNE 7 AND 8, 1977, THE 'DEUTSHE GESELLSCHAFT FUER SONNENENERGIE' HELD ITS MEETING IN BREMEN. THE ARTICLE IS A REVIEW OF THE MEETING. IT IS SHOWN THAT UTILIZATION OF WIND ENERGY WILL BE POSSIBLE IN THE FRG IN THE NEAR FUTURE. IT IS ESTIMATED THAT BY THE YEAR 2000, ABOUT 1% OF THE ANNUAL ENERGY DEMAND OF THE FRG WILL BE MET BY WIND ENERGY. POSSIBLE SYSTEMS FOR THE UTILIZATION OF WIND ENERGY ARE BRIEFLY DISCUSSED.

1977-0616 MICHAUD L M
ON THE ENERGY AND CONTROL OF ATMOSPHERIC VORTICES.
J. RECH. ATMOS. 11(2): 99-120, APRIL-JUNE 1977.

THIS ARTICLE EXPLAINS WHY IT MIGHT BE POSSIBLE TO CONTROL VORTICES OF THE TORNATO/DUST DEVIL TYPE IN ORDER TO PRODUCE ENERGY. EMPHASIS IS PLACED ON THE THERMODYNAMICS OF THE ENERGY PRODUCTION PROCESS. EQUATIONS ARE DERIVED FOR THE QUANTITY OF ENERGY PRODUCED DURING CONVECTION. THE EQUATIONS AND THE METHOD OF ANALYSIS ARE APPLICABLE NOT ONLY TO ATMOSPHERIC VORTICES BUT ALSO TO THE GENERAL ATMOSPHERIC ENERGETICS PROBLEM. CONTROL PARAMETERS IN NATURAL AND MAN-MADE VORTICES ARE DISCUSSED. A METHOD IS PROPOSED FOR PRODUCING A CONTROLLED VORTEX AND FOR OBTAINING ENERGY FROM THE PROCESS.

1977-0617 MIFFLIN R
ALGORITHM FOR CONSTRAINED OPTIMIZATION WITH SEMISMOOTH FUNCTIONS.
NTIS, FEBRUARY 1977. 36 P.
N78-11511

LARGE-SCALE OPTIMIZATION MODELS APPEAR IN MANY AREAS OF APPLICATION AT IIASA. FOR EXAMPLE, SUCH MODELS ARE USEFUL FOR ESTIMATING THE ECONOMIC VALUE OF INTRODUCING SOLAR AND WIND GENERATED ELECTRICAL ENERGY INTO AN EXISTING POWER GRID AND FOR DETERMINING EQUILIBRIUM PRICES FOR AGRICULTURAL COMMODITIES IN INTERNATIONAL TRADE AS A FUNCTION OF NATIONAL POLICIES. CERTAIN METHODS OF DECOMPOSITION FOR SOLVING SUCH OPTIMIZATION PROBLEMS REQUIRE THE SOLUTION OF A RELATIVELY SMALL PROBLEM, THE OBJECTIVE FUNCTION OF WHICH IS NOT EVERYWHERE DIFFERENTIABLE. AN IMPLEMENTABLE ALGORITHM THAT CAN BE USED TO SOLVE SUCH NONSMOOTH OPTIMIZATION PROBLEMS IS PRESENTED.

1977-0618 MIGLIORE P G, FANUCCI J B, KUHLKE K D, WOLFE W P
EXPERIMENTAL ANALYSIS OF A STRAIGHT BLADED DARRIEUS WIND TURBINE.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1265-1269.

AN EXPERIMENTAL PROGRAM FOR DETERMINING THE AERODYNAMIC CHARACTERISTICS OF A STRAIGHT BLADED DARRIEUS WIND TURBINE ARE DESCRIBED. DATA PRESENTED SHOW TORQUE, POWER COEFFICIENTS AND ZERO LIFT DRAG COEFFICIENTS.

1977-0619 MILLER K J
ALTERNATIVE ENERGY SOURCES.
FORUM ON NUCLEAR POWER AND THE ENERGY FUTURE, LONDON, OCTOBER 11, 1977. NUCLEAR POWER AND THE ENERGY FUTURE. A ROYAL INSTITUTION FORUM. LONDON, SYMPOSIUM PRESS, 1977. P. 143-150.

ALTERNATIVE OR RENEWABLE SOURCES OF ENERGY--PARTICULARLY WAVE AND WIND POWER--ARE EXAMINED, AND IT IS CONCLUDED THAT TOGETHER WITH CONSERVATION MEASURES THEY COULD MAKE A USEFUL CONTRIBUTION TO THE UK ENERGY NEEDS BY THE END OF THE CENTURY. THEIR ENGINEERING FEASIBILITY AND ECONOMICS ARE UNCERTAIN AND ONLY THE RESULTS OF FULL SCALE DEMONSTRATION UNITS WILL SHOW WHETHER THEY CAN BE COMPETITIVE WITH CONVENTIONAL AND NUCLEAR POWER SOURCES.

1977-0620 MILLER D R
WIND TURBINE STRUCTURAL DYNAMICS, 1977.
WASHINGTON, D.C., NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, 1977. 287 P.
WIND TURBINE STRUCTRUAL DYNAMICS CONFERENCE, CLEVELAND, OHIO, NOVEMBER 15, 1977.

TWENTY-NINE SHORT PAPERS BY VARIOUS AUTHORS ARE PRESENTED AT THIS WORKSHOP. THE FOLLOWING TOPICS WERE DISCUSSED IN RELATION TO WIND TURBINE STRUCTURAL DYNAMICS: METHODS FOR CALCULATING DYNAMIC LOADS; AEROELASTIC STABILITY; WIND LOADS, BOTH STEADY AND TRANSIENT; CRITICAL DESIGN CONDITIONS; DRIVE TRAIN DYNAMICS; SYSTEMS DYNAMICS; AND BEHAVIOR OF OPERATING WIND TURBINES.

1977-0621 MILLER G
SYSTEMS DESCRIPTIONS AND ENGINEERING COSTS FOR SOLAR-RELATED TECHNOLOGIES. VOLUME VI. WIND ENERGY CONVERSION SYSTEMS (WECS).
NTIS, JUNE 1977. 127 P.
MTR-7485(VOL.6)

A STUDY OF THE TECHNOLOGIC AND ECONOMIC CHARACTERISTICS OF WIND ENERGY CONVERSION SYSTEMS (WECS) WAS CARRIED OUT FOR THE SOLAR ENERGY DIVISION OF THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA). BASIC TECHNOLOGIC DATA INCLUDING COMPONENT DESCRIPTIONS, COSTS AND RESOURCE REQUIREMENTS ARE PRESENTED FOR SEVERAL DESIGNED AND PROPOSED WECS UNITS INCLUDING GENERAL ELECTRIC 500 AND 1500 KW UNITS, KAMAN AEROSPACE 500 AND 1500 KW UNITS, A METREK PROPOSED 1500 KW UNIT AND A METREK PROPOSED 1500 KW UNIT FOR LOW WIND REGIONS. THE DATA ARE

BASED PRIMARILY ON PREVIOUS DESIGN STUDIES CARRIED OUT UNDER THE AUSPICES OF THE WIND ENERGY OFFICE OF ERDA BY GENERAL ELECTRIC SPACE SYSTEMS DIVISION AND KAMAN AEROSPACE.

1977-0622 MINARDI J E
ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR RESEARCH.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1237-1247.

THE EFD WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS EXCEPT, POSSIBLY, FOR DIRECTING IT INTO THE WIND. THERE ARE SIGNIFICANT ADVANTAGES TO EFD WIND DRIVEN GENERATORS WHEN COMPARED WITH CONVENTIONAL WIND TURBINES. CONVENTIONAL WIND TURBINES ARE CURRENTLY LIMITED IN SIZE, WITH THE GREATEST DIAMETER PRESENTLY ENVISAGED BEING ABOUT 200 FEET. FOR THE EFD WIND DRIVEN GENERATOR THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE; THEREFORE, ECONOMICS OF SCALE CAN BE REALIZED.

1977-0623 MOHAN N, PETERSON H A, LONG W F, DREIFUERST G R, VITHAYATHIL J J
ACTIVE FILTERS FOR AC HARMONIC SUPPRESSION.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, JANUARY 30 - FEBRUARY 4, 1977. NEW YORK, IEEE, PAPER A 77 026-8, 1977. 7 P.

AC/DC CONVERTERS USED IN HVDC TRANSMISSION SYSTEMS INJECT HARMONICS INTO THEIR ASSOCIATED AC AND DC SYSTEMS. SUCH CONVERTERS ARE ALSO PROPOSED IN CONJUNCTION WITH WIND POWER GENERATION, FUEL CELLS AND SOME OTHER ENERGY STORAGE DEVICES. SERIES-TUNED PASSIVE FILTERS ARE USED TO PREVENT THE HARMONIC CURRENTS FROM ENTERING INTO THE AC NETWORK. HOWEVER, THE PASSIVE FILTERS GET DETUNED IF THE SYSTEM FREQUENCY CHANGES OR IF THE FILTER PARAMETERS CHANGE DUE TO TEMPERATURE VARIATION OR AGE. IN THIS PAPER, A NEW CONCEPT OF ACTIVE FILTERS IS PRESENTED, WHICH DO NOT HAVE THE LIMITATIONS MENTIONED ABOVE. BASIC CONCEPTS AND DESIGN OF ACTIVE FILTERS FOR ELIMINATING AC HARMONICS ARE CONSIDERED AND PRELIMINARY COMPUTER SIMULATION RESULTS ARE PRESENTED.

1977-0624 MOHAN N, RIAZ M
WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATORS FOR RESIDENTIAL ELECTRIC HEATING.
IEEE POWER ENGINEERING SOCIETY WINTER MEETING, NEW YORK, JANUARY 29 - FEBRUARY 3, 1978. PREPRINT. NEW YORK, IEEE, PAPER A 78 050-7, 1977. 6 P.

A SCHEME USING A WIND-DRIVEN, CAPACITOR-EXCITED INDUCTION GENERATOR IS DESCRIBED TO SUPPLY FREQENCY-INSENSITIVE HEATING LOADS. DESPITE THE WIDE VARIATION IN ROTOR SPEED, THE SLIP REMAINS SMALL, THEREBY, PROVIDING A HIGH-EFFICIENCY OPERATION. THE ELECTRIC POWER OUTPUT CAN BE CONTROLLED OVER A SUBSTANTIAL RANGE TO MATCH THE WIND-TURBINE SPEED-POWER CHARACTERISTIC, BY ADJUSTING THE EXCITATION-CAPACITANCE.

1977-0625 MOLLY J P
UTILIZATION AND STORAGE PROBLEMS IN WIND POWER PLANTS.
NTIS, 1977. 34 P. (IN GERMAN)
AED-CONF-77-139-013

THE ENERGY YIELD OF A POWER PLANT CONSISTING OF WIND ENERGY CONVERTER AND STORER IS CONSIDERABLY INFLUENCED BY THE CHOICE OF SPECIFIC CHARACTERISTIC VALUES OF BOTH COMPONENTS. BOUNDARY CONDITIONS OF THE OPTIMIZATION PROCESS ARE SITE, CONSUMER BEHAVIOR AND A MINIMUM DEMAND OF SUPPLY SAFETY. IF THE COSTS OF THE POWER PLANT COMPONENTS ARE KNOWN, THEN ONE MAY DETERMINE THE CHEAPEST WIND POWER PLANT TAKING ACCOUNT OF THE BOUNDARY CONDITIONS. THE PRECONDITIONS AND WAY OF CALCULATION FOR OPTIMUM ROTARY NUMBER, THE BEST SPECIFIC ROTOR DISK POWER AND THE NECESSARY STORAGE CAPACITY FOR A CERTAIN SUPPLY SAFETY ARE GIVEN.

1977-0626 MORAN E
STEPHAN SIERADSKI: WINDMILL ON A BOOM.
POP. SCI. 210(2): 22-23, FEBRUARY 1977.

THE DESIGN OF A SMALL WIND TURBINE WHICH DEVELOPS APPROXIMATELY 200 WATTS AT 12 VOLTS IN A 15 MPH WIND IS PRESENTED. IN HIGH WINDS THE ENTIRE WIND TURBINE AND COUNTERWEIGHTED TOW ASSEMBLY GRADUALLY PIVOT UNTIL A HORIZONTAL POSITION IS REACHED.

1977-0627 MOSES R
PROMISE AND PROBLEMS IN APPLYING NEW TECHNOLOGY IN LARGE-SCALE WIND ENERGY CONVERSION SYSTEMS.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2ND, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 361-364.

THE FEASIBILITY OF LARGE WIND POWER PLANTS CONNECTED TO ELECTRIC UTILITY POWER SYSTEMS IS ANALYZED. TECHNICAL AND ECONOMICAL ASPECTS ARE CONSIDERED.

1977-0628 MOTHER PUTS UP A 2-KW WINDPLANT IN TWO HOURS!
MOTHER EARTH NEWS NO. 43: 86-87, JANUARY/FEBRUARY, 1977.

THIS ARTICLE DESCRIBES THE PROCESS OF PUTTING UP A PREFAB WINDMILL WITH THE HELP OF A BOOM TRUCK IN A SHORT PERIOD OF TIME.

1977-0629 MUSGROVE P
WIND ENERGY SYSTEMS AND THEIR POTENTIAL IN THE UK.
WIND ENG. 1(4): 235-240, 1977.

WIND ENERGY SYSTEMS HAVE THE POTENTIAL TO PROVIDE AT LEAST ONE QUARTER OF OUR PRESENT ELECTRICITY REQUIREMENTS. THE UK HAS MUCH RELEVANT TECHNOLOGICAL EXPERIENCE, IN ITS AEROSPACE AND ENGINEERING INDUSTRY, AND IF A WIND ENERGY RESEARCH AND DEVELOPMENT PROGRAMME WERE ADEQUATELY FUNDED, WE COULD START TO PRODUCE SIGNIFICANT QUANTITIES OF WIND GENERATED ELECTRICITY IN LITTLE MORE THAN A DECADE.

1977-0630 NEBERAY Y I
DETERMINING MANPOWER TRAINING NEEDS IN EMERGING ENERGY AREAS IN NEW MEXICO AND ARIZONA. PH.D. THESIS.
NEW MEXICO STATE UNIVERSITY, LAS CRUCES, NEW MEXICO. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 77-25074, 1977. 126 P.

THIS STUDY MADE AN ATTEMPT TO DETERMINE HOW EMERGING ENERGY POLICIES IN THE SOUTHWEST RELATE TO MANPOWER NEEDS, TO IDENTIFY EMERGING ENERGY SOURCES, AND TO DISCOVER POSSIBLE MANPOWER TRAINING NEEDS IN EACH EMERGING AREA. THE POPULATION OF THE STUDY CONSISTED OF ORGANIZATIONS AND AGENCIES THAT HAVE SOME CONNECTION WITH SOLAR ENERGY, COAL GASIFICATION, WASTE PRODUCTS, WIND POWER, AND GEOTHERMAL ENERGY IN NEW MEXICO AND ARIZONA. THE FINDINGS OF THE STUDY INDICATE THAT SOLAR ENERGY TAX-INCENTIVE BILLS ENACTED BY THE STATES OF ARIZONA AND NEW

MEXICO HAVE SOME RELATION TO MANPOWER NEEDS IN THE REGION. BECAUSE OF THIS LINK IT WAS SUGGESTED THAT MORE TAX-INCENTIVE ENERGY POLICIES MUST EVOLVE TO ACCELERATE ECONOMIC ACTIVITIES IN EMERGING ENERGY SOURCES.

1977-0631 NEW MEXICO UTILITY WILL TEST 200-KW WIND TURBINE UNIT: EXPERIMENTAL POWER WINDMILL WILL BE BUILT ON CLAYTON MUNICIPAL SYSTEM.
PUBLIC POWER 35(1): 23, 1977.

A 200-KILOWATT WIND TURBINE UNIT WILL BE TESTED AT CLAYTON, NEW MEXICO, AS AN ERDA DEMONSTRATION PROGRAM OF A DUAL-FUEL UNIT FOR POWER GENERATION. BETWEEN 5 AND 15 PERCENT OF LOCAL POWER IS EXPECTED TO BE SUPPLIED ON A WINDY DAY. MODIFICATIONS WERE MADE IN THE SANDUSKY, OHIO, PROTOTYPE TO MAKE IT STRONGER AND THE BLADE DESIGN MORE EFFICIENT. A MAXIMUM OF 200 KW WILL BE PRODUCED, ENOUGH TO SERVE 60 FAMILIES. NEW FEATURES IN THE DESIGN WILL ALLOW THE UNIT TO RESPOND TO CHANGING WIND SPEEDS AND DIRECTION. TWIN ALUMINUM BLADES WILL MAINTAIN A CONSTANT ROTOR SPEED OF 40 REVOLUTIONS PER MINUTE. AFTER TESTS AT THE CLAYTON SITE, FOUR MORE SITES WILL BE SELECTED FOR SIMILAR AND LARGER INSTALLATIONS. POSSIBLE LOCATIONS ARE LISTED ALONG WITH THE NAME OF THE ADMINISTERING UTILITY.

1977-0632 1977 SOLAR ENERGY AND RESEARCH DIRECTORY.
ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBLISHERS, INC., 1977. 396 P.

THE DIRECTORY WAS COMPILED FROM ANN ARBOR SCIENCE QUESTIONNAIRES DISTRIBUTED TO INDIVIDUALS, COMPANIES AND RESEARCH FACILITIES INVOLVED IN SOLAR ACTIVITIES. THE DIRECTORY IS COMPOSED OF SEVEN CHAPTERS WHOSE TITLES REFLECT THE ENTRANT'S MAJOR AREA OF ACTIVITY. COMPLETE INFORMATION FOR EACH ENTRANT IS LISTED IN THE CHAPTER DESIGNATED ON THE QUESTIONNAIRE AS THE NUMBER 1 RANKED MAJOR CLASSIFICATION. ADDITIONAL MAJOR CLASSIFICATIONS ARE ALSO LISTED IN ORDER OF ENTRANT RANKING. MAJOR CLASSIFICATIONS ARE AS FOLLOWS: 1. ENERGY CONSERVATION; 2. MANUFACTURERS OF SOLAR COMPONENTS; 3. MANUFACURERS OF SOLAR TOTAL SYSTEMS; 4. DISTRIBUTORS OF SOLAR PRODUCTS; 5. DESIGN/CONSTRUCTION, RESIDENCES OR BUILDINGS; 6. SOLAR RESEARCH; AND 7. SOLAR ENERGY-OTHER RELATED AREAS.

1977-0633 ODDO S
WHY THE LOWER EAST SIDE DID.
SOL. AGE 2(4): 18-21, 35, APRIL 1977.

THE RENEWAL OF AN APARTMENT BUILDING USING INSULATION R-20 TO R-35, SOLAR HOT WATER HEATING, AND A 2KW WIND GENERATOR IS DESCRIBED. THIS PROJECT INCLUDED FINANCING, ON-THE-JOB TRAINING, BASIC EDUCATION, AND WORKING WITH VARIOUS FEDERAL AGENCIES FOR GRANTS FOR DIFFERENT PHASES OF THE PROJECT. THE SOCIO-ECONOMIC FACTORS ARE EMPHASIZED. GREENHOUSES ON ROOFS AND WINDOWS ARE PLANNED AS PART OF THE URBAN SURVIVAL PROGRAM.

1977-0634 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
COST-EFFECTIVE ENERGY FROM HUMID AIR.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1249-1252.

A VAST AMOUNT OF ENERGY IS CONTAINED IN THE LATENT HEAT OF VAPORIZATION OF THE WATER VAPOR IN HUMID AIR. THIS PAPER IS A REPORT ON RESEARCH IN PROGRESS, THE GOAL OF WHICH IS TO FIND A COST-EFFECTIVE PROCESS TO CONVERT THE ENERGY IN HUMID AIR INTO MECHANICAL WORK. THIS WOULD BE USED TO DRIVE AN ELECTRICAL GENERATOR. THE RESEARCH IS BEING CARRIED OUT PRIMARILY BY COMPUTER MODELING.

1977-0635 OLIVER T K, GROVES W N, GRUBER C L, CHEUNG A
CLEAN ENERGY FROM HUMID AIR.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 577-597.

1977-0636 OLSSON L E
METEOROLOGY AND UTILIZATION OF WIND AND SOLAR ENERGY.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 19 P.

IT IS DIFFICULT AT THIS EARLY STAGE OF THE WORLD-WIDE SOLAR ENERGY CONVERSION EFFORT TO SPECIFY ALL OF THE USER NEEDS IN THE FIELD OF SOLAR RADIATION AND OTHER METEOROLOGICAL DATA. HOWEVER, VARIANCE OF CLOUDINESS AND OTHER METEOROLOGICAL PARAMETERS CAN PROVIDE GUIDANCE TO THE ACCURACY REQUIREMENTS OF INSOLATION DATA. PRELIMINARY ANALYSIS BASED ON A SIMPLIFIED ERROR STRUCTURE OF EACH OBSERVATION SUGGESTS THAT THERE IS LITTLE REASON TO DEMAND THAT THE RANDOM ERROR OF OBSERVATION BE BETTER THAN 5 OR 10%. BUT PAST DATA FROM ONLY VERY LIMITED NETWORKS OVER THE WORLD MAY NOT ACHIEVE EVEN THIS ACCURACY. A METHOD HAS BEEN SUGGESTED BY WHICH THE PAST DATA MAY BE CORRECTED. THE METHOD REQUIRES COMPARING ACTUAL OBSERVATIONS FOR CLEAR TRUE SOLAR NOON WITH THOSE ESTIMATED FROM OTHER OBSERVATIONS FROM THEORY.

1977-0637 OMAN R A, YEN J T
AERODYNAMIC AUGMENTATION OF WIND TURBINES.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1271-1280.

THE HIGH INITIAL COST OF PRESENT WIND ENERGY CONVERSION SYSTEMS (WECS) IS PRIMARILY DUE TO THE VERY LOW ENERGY DENSITY OF THE WIND. TO CAPTURE SIGNIFICANT QUANTITIES OF POWER, LARGE STRUCTURES ARE NECESSARY. CONVENTIONAL WECS USE ROTATING BLADES TO EXTRACT ENERGY DIRECTLY, BUT THESE LARGE ROTATING ELEMENTS ARE THE SOURCE OF VERY CHALLENGING DYNAMIC PROBLEMS WHICH HAVE PROVEN VERY COSTLY TO SOLVE. THE AUTHORS BELIEVE THAT THE WAY TO DEVELOP A SIGNIFICANT ROLE FOR WIND POWER IN THE WORLD ENERGY ECONOMY IS TO MAKE USE OF STATIC SURFACES AS AERODYNAMIC AUGMENTORS. THESE AUGMENTING SURFACES CAN REDUCE SUBSTANTIALLY THE SIZE AND THE DYNAMIC LOADINGS OF THE LARGE ROTOR BLADES NECESSARY TO PRODUCE LARGE UNIT LEVELS OF POWER. ALTHOUGH THE AUGMENTING SURFACES ARE LARGE, AND WILL THEREFORE BE COSTLY, AT LARGE POWER RATING THE ADDITIONAL COST OF A LARGER ROTOR BECOMES EVEN GREATER. IT IS THE AUTHOR'S CONTENTION THAT THE ADVANTAGES OF AUGMENTATION WILL BECOME MORE EVIDENT AS EXPERIENCE WITH LARGE WECS IS ACCUMULATED, AND AS THE MARKET FOR LARGE WECS MATURES. THIS PAPER DISCUSSES THE PRESENT PROSPECTS FOR TWO SUCH AUGMENTATION CONCEPTS: THE DIFFUSER-AUGMENTED WIND TURBINE (DAWT) AND THE TORNADO WIND TURBINE (TWT).

1977-0638 OWEN J A
ANALYSIS OF A SOLAR-THERMAL, WIND ASSISTED, TURBOELECTRIC POWER SYSTEM WITH HEAT RECOVERY ASPECTS.
SOLAR ENERGY UPDATE '77: CANADA. SOLAR ENERGY SOCIETY OF CANADA, CONFERENCE, 3D, EDMUNTON, ALBERTA, UNIVERSITY OF ALBERTA, 1977. PAPER 27, 11 P.

A CASE FOR DECENTRALIZED CASCADED POWER WITH SOLAR-THERMAL AND WIND ENERGY SOURCES IS PRESENTED. THIS CONCEPT CAN BE ADAPTED TO VIRTUALLY ANY EXISTING OR PROPOSED COMMUNITY, FARMSTEAD, OR COMMERCIAL-INDUSTRIAL SITE; AND

IT IS FLEXIBLE IN APPLICATION FOR ELECTRICITY, DOMESTIC HOT WATER AND PROCESS HEAT. THE SOLAR-THERMAL PORTION OF THE SYSTEM UTILIZES CYLINDRICAL PARABOLIC CONCENTRATORS, WHILE THE WIND TURBINE IS A VERTICAL AXIS, VERTICAL AEROFOIL TYPE. BY COMBINING BOTH ENERGY SOURCES, THEN THE MAXIMUM AMOUNT OF SOLAR AND AEOLIAN POTENTIALS CAN BE REALIZED, PROVIDING BOTH SOURCES ARE PRESENT IN EXTRACTABLE LEVELS OF DIRECT BEAM SOLAR ENERGY AND MEAN WIND VELOCITIES.

1977-0639 PARKER C E, PAL D, VODRASKA K F, CIANI J B
IDENTIFICATION OF ALTERNATIVE POWER SOURCES FOR DREDGED MATERIAL PROCESSING OPERATIONS. FINAL REPORT.
NTIS, NOVEMBER 1977. 136 P.
AD-A048312, WES-TR-D-77-32

THIS REPORT PROVIDES A BASIS FOR SELECTING ALTERNATIVE, RENEWABLE POWER SOURCES SPECIFICALLY FOR OPERATING DREDGED MATERIAL PROCESSING SYSTEMS. OF ALL THE ALTERNATIVE POWER SOURCES STUDIED, WIND ELECTRIC GENERATION SEEMS TO BE THE MOST PRACTICAL AND VERSATILE TO APPLY AT THIS TIME.

1977-0640 PASSIVE SOLAR HOME FOR NORTHERN CLIMATE.
ALTERN. SOURCES ENERGY NO. 25: 5-11, APRIL 1977.

1977-0641 PATTERSON G N
THEORY OF WIND TURBINES WITH CONTRAROTATION.
TORONTO UNIV. INST. AEROSP. STUD. UTIAS REP. NO. 218, JULY 1977. 30 P. ALSO: NTIS, JULY 1977. 31 P.
N78-18556, UTIAS-218

THE BASIC AERODYNAMIC THEORY IS PRESENTED FOLLOWED BY A SUGGESTED DESIGN PROCEDURE FOR CONTRAROTATING WIND TURBINES (DUCTED WINDMILLS WITH CONTRAROTATION). THE POSSIBILITY OF HIGHLY EFFICIENT DESIGNS BASED ON THE PRINCIPLE OF CONTRAROTATION IS EMPHASIZED.

1977-0642 PELSER J
POSSIBLE USE OF WIND POWER FOR THE PRODUCTION OF ELECTRIC ENERGY.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 12 P.

ENERGY EXTRACTED FROM WIND HAS BEEN USED IN THE NETHERLANDS TO GENERATE MECHANICAL POWER FOR SEVERAL CENTURIES. IN THE PAST, POWER FROM THIS SOURCE HAS BEEN UNABLE TO COMPETE WITH THAT GENERATED BY BURNING FOSSIL FUELS. HOWEVER, IN 1973, WHEN FUEL PRICES BEGAN TO RISE, THERE WAS A RENEWED INTEREST IN THE USE OF WIND POWER WHICH HAS RESULTED IN THE SETTING UP OF A NATIONAL RESEARCH PROGRAMME ON WIND ENERGY. THE GOAL OF THE PROGRAMME IS TO INVESTIGATE THE FEASIBILITY, TECHNICALLY AS WELL AS ECONOMICALLY, OF WIND CONVERSION SYSTEMS OF MODERN DESIGN.

1977-0643 PHASES IN THE DEPLOYMENT OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS (WECS) CONFIGURATIONS TO LEGAL-INSTITUTIONAL IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS. APPENDIX A.
NTIS, MARCH 1977. 49 P.
PB-297687

THE BASIC SEQUENCE OF FUNCTIONS AND ACTIONS WHICH WILL BE OR MAY BE INVOLVED IN THE DEPLOYMENT OF AN OFFSHORE WIND ENERGY CONVERSION SYSTEM (WECS) INSTALLATION IS PRESENTED. CERTAIN PROJECT CONFIGURATIONS ARE POSITED IN ORDER TO EXAMINE ON A PROVISIONAL BASIS THE TYPES OF LEGAL-INSTITUTIONAL ISSUES WHICH MIGHT ARISE IN THE PROCESS OF INSTALLATION.

1977-0644 PHILLIPS F
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 58-60.
CONF-7705119, PB-282565

THE FEASIBILITY OF USING SMALL WIND TURBINES IN THE HAWAIIAN ISLANDS IS DISCUSSED.

1977-0645 PREUSS R D, MORINO L
COMPUTATIONAL ANALYSIS OF WINDMILL AERODYNAMICS.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1253-1258.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL EMBEDDED IN INCOMPRESSIBLE, INVISCID FLOW IS CONSIDERED. THE INCOMING VORTICITY FIELD IS ASSUMED TO BE UNPERTURBED BY THE PRESENCE OF THE WINDMILL, ENABLING THE USE OF A POTENTIAL FORMULATION. TWO INTEGRAL EQUATION METHODS (FOR LIFTING SURFACES AND COMPLEX CONFIGURATIONS) ARE PRESENTED. BOTH METHODS ARE FORMULATED IN A FRAME OF REFERENCE RIGIDLY ROTATING AT CONSTANT ANGULAR VELOCITY RELATIVE TO THE GROUND. SIMPLE OSCILLATORY UNSTEADY ANALYSIS MAY BE PERFORMED UNDER A SMALL PERTURBATION HYPOTHESIS WHILE A FULLY UNSTEADY TRANSIENT ANALYSIS REQUIRES NO SUCH HYPOTHESIS.

1977-0646 RAJAGOPALAN V, LESCARBEAU A, VEILLETTE D, SANKARA RAO K
CONTRIBUTION TO THE DEVELOPMENT OF WIND ENERGY CONVERSION SCHEMES.
INTERNATIONAL ELECTRICAL, ELECTRONICS CONFERENCE AND EXHIBITION, TORONTO, SEPTEMBER 26-28, 1977. NEW YORK, IEEE, 1977. P. 216-217.

THIS PAPER PRESENTS EXPERIMENTAL RESULTS OBTAINED FROM FOUR DIFFERENT METHODS OF GENERATING ELECTRIC POWER FROM A VARIABLE SPEED PRIME MOVER TO FEED INTO A CONSTANT FREQUENCY AND CONSTANT VOLTAGE ELECTRIC UTILITY SYSTEM. THE COMMON FEATURE OF ALL THESE SCHEMES SIMILAR TO A D.C. TRANSMISSION CONFIGURATION CONSISTING OF A THREE PHASE DIODE BRIDGE, A D.C. LINK AND A THREE PHASE LINE-COMMUTATED THYRISTOR INVERTER; THEIR DIVERSITY LIES IN THE USE OF EITHER AN ALTERNATOR OR A SLIP-RING INDUCTION MACHINE OR TWO SLIP-RING MACHINES CUMULATIVELY CASCADED OR DIFFERENTIALLY CASCADED FOR POWER GENERATION. THE PRIME MOVER IS SUPPOSEDLY A WIND MILL WHEREIN ENERGY INPUT IS ESSENTIALLY VARIABLE.

1977-0647 RAMAGE C
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 54-55.
CONF-7705119, PB-282565

METEOROLOGICAL SURVEYS FOR THE HAWAIIAN ISLANDS ARE SUMMARIZED. THE SURVEYS ARE BEING CONDUCTED TO ESTABLISH THE FEASIBILITY OF WIND POWERED SYSTEMS.

1977-0648 RAMAGE C S, DANIELS P A, SCHROEDER T A, THOMPSON N J

OAHU WIND POWER SURVEY, FIRST REPORT.
NTIS, MAY 1977. 44 P.
UHMET-77-01, PB-287361

A WIND POWER SURVEY HAS BEEN CONDUCTED ON OAHU SINCE SUMMER 1975. AT SEVENTEEN POTENTIALLY WINDY SITES, CALIBRATED ANEMOMETERS AND WIND VANES WERE INSTALLED AND RECORDINGS MADE ON COMPUTER-PROCESSABLE MAGNETIC TAPE CASSETTES.

1977-0649 RAMAGE C S, OSHIRO N E
KAUAI WIND POWER SURVEY. PART 1. MOBILE SAMPLING PROGRAM, 19 AUGUST TO 5 SEPTEMBER 1977.
NTIS, NOVEMBER 1977. 35 P.
UHMET-77-05, PB-287350

A WIND POWER SURVEY OF HAWAII WAS CONDUCTED. A VAN-MOUNTED ANEMOMETER WAS SET UP AT EACH OF 47 SITES FOR AT LEAST 24 HOURS. THE PROBABLE LONG-TERM AVERAGE WIND SPEED AT EACH SITE WAS ESTIMATED BY COMPARING THE MEASURED WIND SPEEDS TO SIMULTANEOUS OBSERVATIONS MADE AT LIHUE AIRPORT. THIS MOBILE FIELD SURVEY WAS DESIGNED TO FIND WHERE THE WINDS WERE STRONGEST, TO DESCRIBE THEIR DIURNAL VARIATION AND TO IDENTIFY SITES FOR FIXED STATIONS WHERE LONG PERIOD MONITORING SHOULD BE UNDERTAKEN.

1977-0650 RENAISSANCE OF WIND ENERGY. WIND POWER STATIONS CAN COVER PART OF THE DEMAND.
UMSCH. WISS. TECH. 77(21): 704-708, NOVEMBER 1977. (IN GERMAN)

1977-0651 RICHARDS H M
SESSION IV: WIND ENERGY.
SYMPOSIUM ON ENERGY, HILO, HAWAII, MAY 18, 1977. PROCEEDINGS. NTIS, 1977. P. 61-62.
CONF-7705119, PB-282565

THE AVAILABILITY OF WIND POWER ON THE KOHALA ISLAND OF HAWAIIAN ISLANDS IS DISCUSSED.

1977-0652 RINEER A E
WIND-DRIVEN ROTOR ASSEMBLY.
U.S. PATENT NO. 4,049,362, SEPTEMBER 20, 1977. 4 P.

A WIND-DRIVEN ROTOR FOR GENERATING POWER HAS A CENTRAL NORMALLY VERTICAL COLUMN MOUNTED IN A BASE STRUCTURE FOR ROTATION ABOUT THE COLUMN AXIS. IN THE PREFERRED FORM OF THE INVENTION, A PLATE IS SECURED TO THE TOP OF THE COLUMN PERPENDICULAR TO THE AXIS OF ROTATION, AND FUNCTIONS BOTH AS AN AERODYNAMIC END PLATE AND AS A BRACKET SUPPORTING A GROUP OF ARTICULATING AIRFOILS. THESE ARE ROTATABLE ABOUT A PIVOT CONNECTION TO THE END PLATE WITH FREEDOM OF MOVEMENT WITHIN A LIMITED SECTOR OF ARTICULATION PROVIDING DRIVING AND FEATHERING AIRFOIL POSITIONS.

1977-0653 ROGERS S E, CORNABY B W, RODMAN C W, STICKSEL P R, TOLLE D A
ENVIRONMENTAL STUDIES RELATED TO THE OPERATION OF WIND ENERGY CONVERSION SYSTEMS. FINAL REPORT.
NTIS, DECEMBER 1977. 158 P.
COO-0092-77/2

THIS BIOPHYSICAL IMPACT ASSESSMENT EXPLORES THE ENVIRONMENTAL CONSEQUENCES OF THE EMERGING WIND ENERGY CONVERSION TECHNOLOGY THROUGH FIELD STUDIES DONE AT THE DOE/NASA 100-KW EXPERIMENTAL WIND TURBINE LOCATED AT NASA LEWIS RESEARCH CENTER'S PLUM BROOK STATION NEAR SANDUSKY, OHIO.

1977-0654 ROGERS P
EFFICIENCY AND UTILIZATION OF COOLING TOWERS.
U.S. PATENT NO. 4,031,173, JUNE 21, 1977. 6 P.

THE INVENTION RELATES TO COOLING TOWERS OF THE TYPE CURRENTLY IN USE FOR COOLING WATER AND/OR CONDENSING EXHAUST STEAM AS FOR EXAMPLE IN ASSOCIATION WITH NUCLEAR OR FOSSIL FUEL TYPE POWER PLANTS. TYPICALLY TOWERS ARE VERY LARGE AND VERY HIGH. THE INVENTION EMBODIES AN ORIGINAL CONCEPT FOR UTILIZATION OF SUCH TOWERS, FOR EXAMPLE HYPERBOLIC TOWERS, FOR THE GENERATION OF ENERGY FROM WIND AND ALSO FOR IMPROVING THE EFFICIENCY OF THE COOLING TOWER. IN THE EXEMPLARY FORM OF THE INVENTION A LARGE WIND DRIVEN ROTOR IS PROVIDED TO BE CARRIED BY THE TOWER AND TO ROTATE AROUND ITS AXIS AT THE POSITION OF THE NARROWED THROAT OF THE TOWER. PRESSURE IS GENERATED BY THE ROTOR AND DISCHARGED THROUGH NOZZLES ARRAYED ON THE INSIDE OF THE WALLS OF THE TOWER TO AUGMENT AND ENHANCE THE DRAFT WITHIN THE TOWER.

1977-0655 ROGGE E
WIND POWER PLANT.
GERMAN (FRG) PATENT NO. 2,627,198/A/, DECEMBER 22, 1977. 6 P. (IN GERMAN)

THE APPLICATION RELATES TO A WIND POWER PLANT CONSISTING OF A ROTARY TOWER, TO THE BOTTOM END OF WHICH TWO OPPOSED BOOMS ARE HINGED WHICH CAN BE MOVED UPWARD AND DOWNWARD BY MEANS OF WINCHES ACTING THROUGH CABLES. THE BOOMS CARRY AT THEIR OUTER ENDS ONE PROPELLER EACH WHICH DRIVE GENERATORS BY MEANS OF CHAIN DRIVES OR CABLE DRIVES, WHICH GENERATORS ARE INSTALLED IN THE ROTARY TOWER. ROTATION OF THE TOWER MOVES THE PROPELLERS INTO OR OUT OF THE WIND.

1977-0656 ROHRBACH C, WAINAUSKI H, WOROBEL R
EXPERIMENTAL AND ANALYTICAL RESEARCH ON THE AERODYNAMICS OF WIND DRIVEN TURBINES. FINAL REPORT.
NTIS, DECEMBER 1977. 258 P.
COO-2615-T2, HSER 7505

THIS AERODYNAMIC RESEARCH PROGRAM WAS AIMED AT PROVIDING A RELIABLE, COMPREHENSIVE DATA BASE ON A SERIES OF WIND TURBINE MODELS COVERING A BROAD RANGE OF THE PRIME AERODYNAMIC AND GEOMETRIC VARIABLES. SUCH DATA OBTAINED UNDER CONTROLLED LABORATORY CONDITIONS ON TURBINES DESIGNED BY THE SAME METHOD, OF THE SAME SIZE, AND TESTED IN THE SAME WIND TUNNEL HAD NOT BEEN AVAILABLE IN THE LITERATURE.

1977-0657 ROSCHEL A
WIND DRIVEN GENERATOR.
GERMAN (FRG) PATENT NO. 2,620,236/A/, NOVEMBER 24, 1977. 9 P. (IN GERMAN)

IT IS THE PURPOSE OF THE INVENTION TO PRODUCE HEAT BY WIND-DRIVEN OR WATER-DRIVEN MACHINES, PARTICULARLY OVER THE WHOLE RANGE OF WIND STRENGTHS AND WATER QUANTITIES. FOR THIS PURPOSE, WATER- OR WIND-DRIVEN MACHINES OF ANY TYPE OF CONSTRUCTION HAVE THEIR DRIVING SHAFT CONNECTED TO A MACHINE, WHICH PRODUCES MECHANICAL FRICTION AND WHICH GIVES UP THE RESULTING HEAT USING A LIQUID OR GASEOUS MEDIUM, WITH INTERPOSITION OF A HEAT EXCHANGER.

THE HEAT CAN BE PRODUCED IN A TURBULENCE BRAKE FOR GASES, LIQUIDS OR PLASTIC MATERIAL OR IN A MAGNETIC EDDY CURRENT BRAKE. THE HEAT GENERATORS USING FRICTION, TURBULENCE OR MAGNETIC EDDY CURRENTS CAN BE EQUIPPED WITH PRESSURE AND TEMPERATURE CONTROLLERS AND CAN WORK WITH A THERMALLY INSULATED HEAT STORE. THE HEAT GENERATORS CAN BE USED IN COMBINATION WITH ELECTRIC GENERATORS OR PUMPS FOR SPEED CONTROL OF THE WIND OR WATER DRIVEN MACHINERY BY CONTROL OF THE HEAT PRODUCING FORCE.

1977-0658 RUMSEY R D
VERTICAL AXIS WIND TURBINE MOTOR.
U.S. PATENT NO. 4,052,134, OCTOBER 4, 1977. 14 P.

A WIND POWER CONVERSION TURBINE MOTOR HAS A BODY SUPPORTED TO ROTATE ABOUT A VERTICAL AXIS AND CARRYING A PLURALITY OF SUBSTANTIALLY UPRIGHT VANES SUBSTANTIALLY SPACED FROM THE VERTICAL AXIS AND CIRCUMFERENTIALLY SPACED FROM ONE ANOTHER SO THAT WIND THRUSTING PROPULSIVELY AGAINST OUTER SIDES OF THE VANES CAN MOVE ACROSS THE SPACE CIRCUMSCRIBED BY THE VANES AND THRUST PROPULSIVELY AGAINST INNER SIDES OF THE VANES ON LEAVING THE SPACE, THEREBY ATTAINING DUAL POWER ADVANTAGE FROM SUBSTANTIALLY ALL WIND THAT STRIKES THE TURBINE. EACH OF THE PLURALITY OF VANES IS PIVOTALLY CARRIED ON THE BODY, WITH A CONTROL MEANS TO MAINTAIN A SUBSTANTIALLY CONSTANT VANE ANGLE OF ATTACK TO A RELATIVE WIND VECTOR.

1977-0659 SABZEVARI A
POTENTIAL OF WIND AS AN ENERGY SOURCE IN IRAN.
IRAN. J. SCI. TECHNOL. 6(2): 51-62, 1977.

WIND ENERGY IS A CLEAN, ABUNDANT RESOURCE IN IRAN. IT CAN BE CAPTURED BY LARGE-GROUP WIND TURBINE GENERATORS TO SUPPLEMENT THE ELECTRICITY PROVIDED BY THERMAL POWER PLANTS. IT CAN ALSO BE CAPTURED BY MEDIUM-SCALE LOCAL WIND TURBOGENERATORS TO SUPPLY THE ENERGY NEEDS OF SO MANY THOUSANDS OF SCATTERED RURAL CENTERS IN THE WINDY REGIONS, IN PARTICULAR IN THE EASTERN PROVINCES OF THE COUNTRY.

1977-0660 SALIEVA R B
CLASSIFICATION OF WIND AND SOLAR POWER PLANT OUTPUT REGULATION MODES.
GELIOTEKHNIKA 13(5): 49-60, 1977. TRANSL.: APPL. SOL. ENERGY 13(5): 38-47, 1977.

THIS ARTICLE EXAMINES THE CLASSIFICATION OF WIND AND SOLAR PLANT OUTPUT REGULATION MODES BASED ON FUNCTION AND DURATION AND CONCLUDES THAT THE PRIMARY METHOD FOR CALCULATING THE PARAMETERS OF WIND AND SOLAR POWER PLANT STORAGE SYSTEMS IS THE CALENDAR METHOD, WHEN THE CALCULATION IS MADE USING CHRONOLOGICAL MULTI-YEAR SERIES OF ACTUAL PERIODIC OBSERVATIONS OF THE WIND AND SOLAR RADIATION REGIMES.

1977-0661 WIND-DRIVEN POWER; QUESTIONS AND ANSWERS.
ELECTR. CONSTR. MAINT. 76: 93, AUGUST 1977.

SUGGESTIONS TO SOLVE THE PROBLEM OF VARIATION IN WIND SPEED THAT EFFECTS THE ROTATING SPEED OF THE GENERATOR AND ITS OUTPUT ARE GIVEN,

1977-0662 SAVINO J M, WAGNER L H, SINCLAIR D
WAKE CHARACTERISTICS OF AN EIGHT-LEG TOWER FOR A MOD-0 TYPE WIND TURBINE.
NTIS, DECEMBER 1977. 70 P.
NASA-TM-73868, E-9463, N78-24615

LOW SPEED WIND TUNNEL TESTS WERE CONDUCTED TO DETERMINE THE FLOW CHARACTERISTICS OF THE WAKE DOWNWIND OF A 1/25TH SCALE, ALL TUBULAR EIGHT LEG TOWER CONCEPT SUITABLE FOR APPLICATION TO THE DOE-NASA MOD-0 WIND POWER TURBINE. MEASUREMENTS WERE MADE OF WIND SPEED PROFILES, AND FROM THESE WERE DETERMINED THE WAKE LOCAL MINIMUM VELOCITY, AVERAGE VELOCITY, AND WIDTH FOR SEVERAL WIND APPROACH ANGLES.

1977-0663 SCHMIDT E R
ALTERNATE SOURCES OF ENERGY AND THE LAW.
CONFERENCE ON TECHNOLOGY FOR ENERGY CONSERVATION, WASHINGTON, D.C., JUNE 8, 1977. TECHNOLOGY FOR ENERGY CONSERVATION. ROCKVILLE, MD., INFORMATION TRANSFER INC., 1977. P. 7-8.

ALTERNATIVE SOURCES OF ENERGY (ASE) INCLUDE SOLAR, WIND, SMALL HYDRO-POWER, HOME-MADE GAS, AND NON-INTERNAL COMBUSTION TRANSPORT. TO SOME, ASE MEANS BACK TO REAL HORSEPOWER AND CANDLE LIGHTING. UNDER LAW CLASSIFICATION ARE LAWS, BUILDING CODES, TRANSPORT RULES, OFFICIALDOM DIRECTIVE, ODD TAX TREATMENT, AND UNOFFICAL COMMUNITY STANDARDS. SINCE ASE HAS NEVER BEEN RECOGNIZED, THERE ARE NO ANTI-ASE LAWS BUT THE OLD LAWS, CODES, AND REGULATIONS ARE BEING INTERPRETED TO SUIT ANTI-ASE BIAS OF THE ENFORCERS. IN THIS PAPER, THE AUTHOR USES NON-INTERNAL COMBUSTION VEHICLES, HOME WIND/ELECTRICITY, AND NEW BUILDING REGULATIONS TO DISCUSS ASE AND THE LAW.

1977-0664 SEITZ H
TOTAL ENERGY SYSTEMS.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 459-470.

THE POSSIBILITY OF LOCAL, COMPLETE AND SELF SUFFICIENT ENERGY SUPPLY SYSTEMS FOR RESIDENCES IS INVESTIGATED USING THE EXAMPLE OF A FAMILY RESIDENCE IN THE OLDENBURG AREA, WHICH IS SUPPLIED WITH WIND AND SOLAR POWER. USING WIND DATA COLLECTED DURING A LONG PERIOD OF TIME WE DISCUSS THE SIZE OF WIND TURBINES AND STORAGE SYSTEMS. FROM THE SMALL FLUCTUATION OF THE ENERGY AVAILABLE YEARLY, WE CONCLUDE THAT THIS RENEWABLE SOURCE HAS HIGH RELIABILITY. VARIOUS SYSTEMS BUILT OUT OF SOLAR COLLECTORS, WIND TURBINES, ELECTRIC AND HEAT STORAGE SYSTEMS ARE CALCULATED. THE FREQUENCY OF CHARGE AND DISCHARGE OPERATIONS OF A STORAGE SYSTEM IS EXAMINED.

1977-0665 SFORZA P M
VORTEX AUGMENTED WIND ENERGY CONVERSION.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1233-1236.

A DISCUSSION OF RESEARCH, DESIGN AND DEVELOPMENT ON A NOVEL AERODYNAMIC DEVICE WHICH CAN CONCENTRATE AND AUGMENT NATURAL WIND IS PRESENTED.

1977-0666 SFORZA P M
VORTEX AUGMENTATION OF WIND ENERGY.
WIND ENG. 1(3): 186-197, 1977.

AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS ARE DISCUSSED. THE KEYNOTE ELEMENT IS THE

GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH POWER DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF RELATIVELY LOW POWER DENSITY. PROPERLY DESIGNED TURBINES ARE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED VORTEX FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC). THE BASIS FOR THE CONCEPT IS DESCRIBED AND EXPERIMENTAL STUDIES OF THE VORTEX FLOW FIELD ARE DISCUSSED. TURBINE ROTOR REQUIREMENTS AND ADVANTAGES ARE OUTLINED AND A TEST FACILITY FOR SUCH ROTORS IS ILLUSTRATED. A PROTOTYPE WIND ENERGY CONVERSION SYSTEM INCORPORATING THE VAC IS DESCRIBED. THE FIELD TEST PROGRAM FOR THE PROTOTYPE IS DISCUSSED.

1977-0667 SFORZA P M
FLUID FLOW ENERGY CONVERSION SYSTEMS.
U.S. PATENT NO. 4,047,832, SEPTEMBER 13, 1977. 22 P.

FLUID FLOW ENERGY CONVERSION SYSTEMS EMPLOYING AERODYNAMIC FLOW-SEPARATION VORTEX GENERATION FOR FOCUSING THE KINETIC ENERGY OF FLOW IN THE WORKING AREA OF THE TURBINE ARE DISCLOSED IN THE CONTEXT OF WIND POWER PLANTS. AS A CONSEQUENCE OF THIS AUGMENTATION, FLUID VELOCITY ACTING ON THE ROTOR IS INCREASED BY A SUBSTANTIAL AMOUNT OVER THE FREE STREAM VELOCITY, RESULTING IN SUBSTANTIAL INCREASES IN POWER OUTPUT FOR A GIVEN TURBINE CONFIGURATION. THE ILLUSTRATIVE EMBODIMENTS INCLUDE SIMPLE FLOW SEPARATION, VORTEX AUGMENTING SURFACES, SUCH AS THOSE FOUND IN DELTA PLANFORMS WHICH IN THIS CONTEXT GENERATE VORTICES AND THEREFORE FUNCTION AS AERODYNAMIC LENSES; THESE SURFACES ARE CRIENTED TO THE WIND TURBINE SO THAT GENERATED VORTICES ARE DIRECTED AT THE TURBINE BLADES.

1977-0668 SCHROEDER T A, TARLTON T G, DANIELS P A
MAUI COUNTY WIND POWER SURVEY. PART 2: MOLOKAI MOBILE SAMPLING PROGRAM 21 JUNE TO 31 JULY 1977. PART 3: MAUI FIXED STATION DATA SEPTEMBER 1976 TO JULY 1977.
HONOLULU, UNIVERSITY OF HAWAII, DEPARTMENT OF METEOROLOGY, OCTOBER 1977. 69 P.

A PRELIMINARY ATTEMPT WAS MADE TO IDENTIFY AREAS ON THE ISLAND OF MOLOKAI WHERE WINDS FAVOR ELECTRIC POWER GENERATION. BETWEEN 21 JUNE AND 31 JULY, 1977, FOUR MOBILE PLATFORMS WERE POSITIONED AT 58 LOCATIONS ON MOLOKAI. THE WINDS AT THESE SITES WERE COMPARED TO THOSE OBSERVED AT MOLOKAI AIRPORT. DIURNAL CYCLES ARE EVIDENT. THE VERTICAL STRUCTURE OF THE WIND WAS DETERMINED BY DAILY PILOT BALLOON ASCENTS FROM MOLOKAI AIRPORT. THE FIELD SURVEY HAS ALLOWED PLANNING THE ESTABLISHMENT OF PERMANENT MONITORING STATIONS ON MOLOKAI.

1977-0669 SIMKOVITS H R, KASSAKIAN J G
CONTROL AND DYNAMIC ANALYSIS OF A WIND ENERGY CONVERSION AND STORAGE SYSTEM OPERATING AT CONSTANT VELOCITY RATIO.
ENERGY DEVELOPMENT NO. 3. IEEE POWER ENGINEERING SOCIETY PAP. NEW YORK, IEEE, 77CH1215-3-PWR, 1977. P. 48-55.

LEAD-ACID BATTERIES ARE USED FOR ENERGY STORAGE AND CONSIDERATION IS GIVEN TO THE NUMBER OF BATTERY SECTIONS REQUIRED TO PRODUCE EFFICIENT OPERATION OF THE WINDMILL. A CHARGE CONTROL ALGORITHM IS DEVELOPED AND THE SYSTEM ENERGY EXTRACTION EFFICIENCY CALCULATED. SYSTEM DYNAMICS CAUSED BY BOTH WINDSPEED TRANSIENTS AND BATTERY SWITCHING ARE INVESTIGATED. OPTIMUM VALUES OF FIELD TIME CONSTANTS ARE DETERMINED.

1977-0670 SO R M C
ON VORTEX WIND POWER.
ASME PAPER 77-WA/FE-20, 1977. 5 P.

AN INFINITE VISCOUS LAMINAR VORTEX WITH NO REVERSE FLOW REGION IN THE EXIT PLANE, BUT WITH AXIAL INFLOW AT THE BASE, IS ANALYZED. THE AXIAL INFLOW IS ASSUMED TO BE FINITE EVERYWHERE. FROM THE ANALYSIS, THE MAXIMUM WIND POWER THAT CAN BE OBTAINED FROM SUCH A VORTEX IS CALCULATED. THE RESULTS SHOWS THAT THE POWER DEVELOPED DEPENDS ON THE CIRCULATION AT INFINITY AND ON THE VISCOUS RADIUS OF THE CORE OF THE VORTEX. THE SIGNIFICANCE OF THIS RESULT, AS IT RELATES TO THE RECENTLY PROPOSED VORTEX WIND ENERGY SYSTEM, IS DISCUSSED.

1977-0671 SO R M C
LIFT ON A ROTATING POROUS CYLINDER.
ASME TRANS. J. FLUIDS ENG. 99(4): 753-757, DECEMBER 1977.

TWO-DIMENSIONAL FLOW PAST A ROTATING CIRCULAR CYLINDER WITH UNIFORM SUCTION AT THE SURFACE IS CONSIDERED. THE METHOD OF SOLUTION FOLLOWS CLOSELY THAT USED BY GLAUERT AND THE PROBLEM IS SOLVED FOR THE CASE IN WHICH THERE IS NO VISCOUS FLOW SEPARATION FROM THE CYLINDER SURFACE. EXPRESSIONS IN TERMS OF THE RATIO OF THE CYLINDER PERIPHERAL VELOCITY AND A SUCTION PARAMETER ARE OBTAINED FOR THE LIFT AND TORQUE. THE RESULTS SHOW THAT UNIFORM SUCTION HAS A LIMITED EFFECT ON THE LIFT; HOWEVER, THE TORQUE INCREASES WITH SUCTION. POSSIBLE APPLICATION OF THESE RESULTS TO WIND POWER GENERATION IS BRIEFLY DISCUSSED.

1977-0672 SOLAR ENERGY.
MELVILLE, NEW YORK, OTTAVIANO TECHNICAL SERVICES, INC., 1977. 397 P.

THIS BOOK IS DIVIDED INTO THE FOLLOWING SEVEN SECTIONS: (1) NATIONAL ENERGY POLICY, (2) THE JUSTIFICATION OF USING SOLAR ENERGY, (3) DATA CONCERNING SOLAR ENERGY, (4) PRODUCTS AVAILABLE, (5) APPLICATIONS OF THESE PRODUCTS, (6) ECONOMICS, AND (7) FUTURE APPLICATIONS.

1977-0673 SOLAR--HYDROGEN ALTERNATIVE.
N.Z. ENERGY J. 50(3): 25, MARCH 25, 1977.

SOLAR ENERGY PROMISES MORE FOR ECOLOGY AND A PERMANENT ABUNDANT, CLEAN ENERGY SOURCE THAN DOES THE DEVELOPMENT OF ATOMIC ENERGY, WITH THE EXCEPTION OF FUSION. AND SOLAR METHODS OFFER A PATH FOR ABUNDANT, CLEAN ENERGY WHICH SEEMS FAR MORE EASILY ATTAINABLE THAN THAT OF FUSION. WIND ENERGY, PREVIOUSLY REGARDED AS A TRIVIAL SOURCE, COULD BE USED AS A MASSIVE SOURCE OF ENERGY IF AEROGENERATORS COULD BE LOCATED IN THE HIGH-INTENSITY WIND BELTS OF THE WORLD WHERE THE MEAN ANNUAL WIND IS MORE THAN 25 KM/H. HYDROGEN COULD BE MADE FROM THE ELECTRICITY GENERATED THERE AND BE TRANSPORTED TO DISTANT POINTS. THE AVAILABILITY OF MASSIVE QUANTITIES OF HYDROGEN WOULD GIVE A PERMANENTLY CLEAN METALLURGICAL AND CHEMICAL INDUSTRY.

1977-0674 SOUTH P, RANGI R S, TEMPLIN R J
APPLICATIONS OF WIND TURBINES IN CANADA.
WORLD ENERGY CONFERENCE, 10TH, ISTANBUL, SEPTEMBER 19-23, 1977. ANKARA, TURKEY, WORLD ENERGY CONFERENCE, 1977. DIV. 4, 22 P.

IN THIS PAPER AN EFFORT HAS BEEN MADE TO DETERMINE THE WIND POWER POTENTIAL AND THE AMOUNT THAT IS ECONOMICALLY USABLE IN CANADA. FROM EXISTING WIND DATA A MAP SHOWING THE DISTRIBUTION OF WIND POWER DENSITY HAS BEEN PREPARED. THIS MAP SHOWS THAT THE MARITIME PROVINCES AND THE WEST COAST OF HUDSON BAY HAVE HIGH WIND POWER

POTENTIAL. USING THE POWER DENSITY MAP THE POWER POTENTIAL FOR THE THREE CASES HAS BEEN CALCULATED. THE FIGURES SHOW THAT THE WIND POWER POTENTIAL IS OF THE SAME ORDER AS THE INSTALLED ELECTRICAL GENERATING CAPACITY IN CANADA (58 X 10**6KW IN 1974). HOWEVER, IN ORDER TO DETERMINE HOW MUCH OF THIS POWER IS USABLE THE ECONOMICS OF ADDING WIND ENERGY TO AN EXISTING SYSTEM MUST BE CONSIDERED. A COMPUTER PROGRAM HAS BEEN DEVELOPED TO ANALYZE THE COUPLING OF WIND TURBINES WITH MIXED POWER SYSTEMS.

1977-0675 SPERA D A
BRUSH WIND TURBINE GENERATOR AS DESCRIBED IN SCIENTIFIC AMERICAN OF DECEMBER 20, 1890.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, OHIO, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1977. P. 275-283.
CONF-771148

AN HISTORIC WIND TURBINE GENERATOR IS DESCRIBED WHICH OPERATED IN CLEVELAND, OHIO, FROM 1888 TO 1908. THE MACHINE HAD A 144-BLADE ROTOR 56 FEET IN DIAMETER, A PIVOTED TOWER 60 FEET HIGH, AND A MAXIMUM OUTPUT OF 12 KW DC. THE DESCRIPTION IS BASED ON AN 1890 ARTICLE IN SCIENTIFIC AMERICAN JOURNAL.

1977-0676 STUDY OF FEASIBILITY OF UTILIZING SOLAR, WIND AND GEOTHERMAL ENERGY IN HOBBS, NEW MEXICO.
NTIS, AUGUST 2, 1977. 183 P.
TID-28581

IT IS INDICATED THAT OF THE THREE TYPES OF RENEWABLE ENERGY SOURCES CONSIDERED: (1) GEOTHERMAL ENERGY IS NOT AVAILABLE CONVENIENTLY TO THE HOBBS AREA AND IS NOT CONSIDERED IN DEPTH; (2) WIND ENERGY, BASED ON TWENTY-FOUR HOUR AVERAGES OF WIND SPEED AND DENSITY, IS NOT A VIABLE SUPPLEMENTARY SOURCE BUT, WHEN CONSIDERING WINDS DURING THE HOURS BETWEEN 9:00 A.M. AND 5:00 P.M., IS ECONOMICALLY FEASIBLE; AND (3) SOLAR ENERGY CONTAINS MORE THAN SIX TIMES THE ENERGY PER SQUARE METER THAN WIND DOES AND THEREFORE IS MORE ATTRACTIVE ECONOMICALLY AND SHOULD BE PURSUED. GEOGRAPHIC CHARACTERISTICS PERTINENT TO THE SOUTHEASTERN PORTION OF NEW MEXICO ARE STUDIED WITH EMPHASIS ON LEA COUNTY. THE AREA DEMAND FOR ENERGY IS DISCUSSED. THE EVALUATION OF GEOTHERMAL ENERGY SOURCES, THE WIND, AND SOLAR ENERGY AS USABLE ENERGY SOURCES IS DISCUSSED. THE THREE MOST COMMON TYPES OF SOLAR ENERGY SYSTEMS ARE DISCUSSED. A NUMBER OF SPECIFIC SOLAR ENERGY SYSTEMS ARE DESCRIBED. THE SYSTEMS ARE EVALUATED ON THE BASIS OF AVAILABLE COST PROJECTIONS. THE RESULTS ARE SUMMARIZED AND RECOMMENDATIONS ARE PRESENTED.

1977-0677 SULLIVAN T F P
ENERGY REFERENCE HANDBOOK.
WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., 1977. 352 P.

IT HAD BEEN RECOGNIZED THAT A NEED EXISTED FOR A REFERENCE SOURCE INCORPORATING THE KEY WORDS AND TERMS FREQUENTLY USED IN THE VARIOUS SEGMENTS OF THE ENERGY FIELD. THE FIRST EDITION OF THE HANDBOOK WAS CREATED TO FILL THAT NEED. IN THIS SECOND EDITION, OUT-OF-DATE TERMS HAVE BEEN CULLED AND REPLACED WITH THE MOST CURRENT TERMS. SPECIAL ATTENTION HAS BEEN PAID TO THOSE TERMS PECULIAR TO EACH AREA WITHIN THE ENERGY TECHNOLOGY FIELD, NAMELY: COAL, NUCLEAR, OIL, GAS, SOLAR, WIND, OCEAN POWER, GEOTHERMAL, SHALE, AND THE ENVIRONMENT. IN ADDITION TO THE GLOSSARY, ALSO INCLUDED ARE FREQUENTLY USED CONVERSION TABLES, WITH PARTICULAR ATTENTION FOCUSED ON THOSE SPECIFIC TO ENERGY. CONVERSION TABLES ARE ESPECIALLY IMPORTANT AS THE U.S. ENTERS THE METRIC AGE. ALSO ADDED ARE CHARTS AND TABLES FORECASTING THE RESERVES OF VARIOUS FUEL RESOURCES. AN EFFORT WAS MADE TO COMPILE AND DEFINE THE MOST COMMON, MOST SPECIFIC TERMS TO RESULT IN A BETTER UNDERSTANDING OF THE TERMINOLOGY USED IN EACH ENERGY APPLICATION. IN MANY CASES IT IS SOMETIMES DIFFICULT TO SETTLE UPON A SINGLE DEFINITION ACCEPTABLE TO ALL CONCERNED.

1977-0678 SUMNER J
HEAT PUMPS SAVE FUEL COSTS.
ELECTR. REV. 201(21): 16-17, NOVEMBER 25, 1977.

THIS ARTICLE EXPLAINS THAT A HEAT PUMP COMBINED WITH A WATER OR WINDMILL MAY PROVE TO BE THE BEST SAVER OF DOMESTIC ENERGY COSTS. A HEAT PUMP DRIVEN BY THE PUBLIC SUPPLY IS ALSO A WORTHWHILE PROPOSITION.

1977-0679 SVENSSON T
CONSTRUCTION OF 1KVA INVERTER FOR WIND POWER PLANTS.
NTIS, MARCH 1977. 67 P. (IN SWEDISH)
STU-75-3324

A SINGLE PHASE INVERTER FOR 1 KVA HAS BEEN CONSTRUCTED. THE INVERTER CONSISTS OF A SINGLE PHASE THYRISTOR BRIDGE COUPLING WITH A DC VOLTAGE SOURCE AND A RIPPLE FILTER CHOKE ON THE DC SIDE AND A VARIABLE PARALLEL TURNED CIRCUIT ON THE AC SIDE. THE RELIABILITY OF THE INVERTER HAS BEEN TESTED. THE INFLUENCE OF LEAD AND SUPPLY VOLTAGE ON THE OUTPUT VOLTAGE AND FREQUENCY HAVE BEEN DETERMINED. THE INVERTER HAS ALSO BEEN TESTED UNDER TRANSIENT CONDITIONS SUCH AS STARTUP OF DIFFERENT LOADS. THE TESTS SHOW THAT THE INVERTER WORKS SATISFACTORILY. IN DECEMBER 1976 THE INVERTER WAS CONNECTED TO THE WIND POWER PLANT AT BOHUS MALMSEN, SWEDEN, AND HAS WORKED QUITE NORMALLY.

1977-0680 SYSTEMS DESCRIPTIONS AND ENGINEERING COST FOR SOLAR-RELATED TECHNOLOGIES. VOLUME I. SUMMARY.
NTIS, JUNE 1977. 157 P.
MTR-7485(VOL.1)

THE RESULTS OF THE METREK SOLAR ENERGY ENGINEERING COST STUDY, IN SUPPORT OF THE SYSTEM TO PROJECT UTILIZATION OF RENEWABLE RESOURCES (SPURR) MODEL, ARE PRESENTED. GENERIC SYSTEMS DESIGNS ARE FORMULATED AND THE ASSOCIATED ENGINEERING COSTS ARE EVALUATED AND ESTIMATED. AN AIM OF THIS STUDY IS TO PREDICT THE LIKELY COSTS AND PERFORMANCE OF SOLAR EQUIPMENT, ONCE MASS PRODUCED.

1977-0681 TENNYSON G P
FEDERAL WIND ENERGY PROGRAM.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2D, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 483-484.

1977-0682 TETZLAFF G
WIND POWER.
GERMAN SOLAR FORUM WITH EXHIBITION, 1ST, HAMBURG, SEPTEMBER 23-28, 1977. PROCEEDINGS. MUENCHEN, DGS, 1977. VOL. 2, P. 415-424.

THE ENERGY OUTPUT FROM WIND TURBINES DEPENDS ON THE LOCAL METEOROLOGICAL CONDITIONS. FIRST ESTIMATIONS SHOW DIFFICULTIES IN GETTING RELIABLE DATA OUT OF LONG TERM AVERAGES (ANNUAL) OF WIND SPEED VALUES. THE CORRELATION BETWEEN THE VALUES 10 M ABOVE THE GROUND AND AT 100 M HEIGHT IS NOT NECESSARILY GOOD. GUSTINESS INFORMATION IS

SPARSE AND MORE EXPERIMENTAL DATA IS NEEDED. THE SPATIAL EXTENSION OF THE WAKE IS ONLY KNOWN FOR SOME FEW CASES. THE GAPS IN THE WIND POWER AVAILABILITY MAY PROBABLY BE REDUCED BY SPREADING THE WIND TOWERS IN A LARGE AREA.

1977-0683 TEXAS ENERGY DEVELOPMENT FUND. VOLUME I. PERSPECTIVES FOR R AND D.
AUSTIN, TEXAS, TEXAS ENERGY ADVISORY COJNCIL, 1977. 57 P.
T-77-008

THE TEXAS ENERGY DEVELOPMENT ACT OF 1977 CREATED THE ENERGY DEVELOPMENT FUND TO SUPPORT RESEARCH IN AND DEVELOPMENT OF SOLAR, GEOTHERMAL, LIGNITE, BIOMASS, WIND, CONSERVATION, AND OTHER ALTERNATE ABUNDANT ENERGY RESOURCE TECHNOLOGIES. THE ACT REQUIRES THAT A PLAN BE PROMULGATED FOR PURPOSES OF ADMINISTERING THE FUND. THE PLAN DEVELOPED FOR PURPOSES OF THE ACT CONSISTS OF TWO VOLUMES. THE FIRST VOLUME PROVIDES AN OVERVIEW OF THE OUTLOOK TO THE YEAR 2000 FROM CONVENTIONAL SOURCES OF ENERGY IN TEXAS, PRIMARILY OIL AND GAS, AND FURTHER, DESCRIBES THE PROSPECTS FROM DEVELOPING ENERGY TECHNOLOGIES. LEGAL, TECHNOLOGICAL, ECONOMIC, AND INSTITUTIONAL PROBLEMS IMPEDING THE DEVELOPMENT OF EACH OF THE DEVELOPING TECHNOLOGIES ARE IDENTIFIED, AND THE RATIONALE FOR PROJECT SOLICITATION IMPLIED FROM THIS OVERVIEW IS DESCRIBED. VOLUME II DESCRIBES THE PROCEDURES FOR ADMINISTERING THE FUND: SUBMISSION AND SOLICITATION OF PROPOSALS, EVALUATION AND SELECTION OF PROPOSALS BY AN IMPARTIAL GROUP OF TECHNICAL EXPERTS, THE DISBURSEMENT OF CONTRACTED FUNDS, PROJECT COSTS ACCOUNTING, PROJECT REPORTING REQUIREMENTS, AND DISSEMINATION OF RESULTS.

1977-0684 THALHEIM K
ELECTRIC POWER GENERATOR USING SUN AND WIND.
GERMAN (FRG) PATENT NO. 2,604,175/A/, AUGUST 11, 1977. 2 P. (IN GERMAN)

THE PATENT CLAIMS AN ELECTRIC WIND POWER GENERATOR WHOSE WIND BLADES ARE EQUIPPED WITH SOLAR CELLS. ALSO OTHER PARTS OF THE WIND POWER GENERATOR MAY BE EQUIPPED WITH SOLAR CELLS. THE POWER GENERATED MAY BE SUPPLIED DIRECTLY TO THE USER.

1977-0685 THOMANN G C, JONG M, SNYDER M H
SMALL HORIZONTAL-AXIS WIND TURBINE FEEDING POWER INTO THE UTILITY GRID.
ANNUAL UMR-DNR CONFERENCE ON ENERGY, 4TH, ROLLA, MISSOURI, OCTOBER 11, 1977. PROCEEDINGS. NTIS, 1977. P. 588-602.
CONF-7710136

A SMALL HORIZONTAL AXIS WIND TURBINE, WITH ABOUT A 2 KW POWER OUTPUT, WAS CONTRUCTED TO CONVERT WIND ENERGY INTO AC POWER TO BE FED INTO THE UTILITY GRID. THE MACHINE IS INTENDED TO MODEL OPERATION OF THE LARGER WIND GENERATORS NOW BEING BUILT. THE VARIABLE PITCH ROTOR IS 18 FT IN DIAMETER AND HAS A GA(W)-1 BLADE AIRFOIL. THE ROTOR IS FABRICATED FROM SITKA SPRUCE MOUNTED ON A COMMERCIAL PROPELLER/HUB SYSTEM. ROTOR SPEEDS OF FROM 75 TO 150 RPM ARE USED IN OPERATION. A CHAIN DRIVE AND HELICAL GEAR DRIVE SYSTEM STEPS UP ROTOR SPEED TO 1800-3600 RPM TO DRIVE A GENERATOR CONNECTED TO THE UTILITY GRID. THE GENERATOR CAN BE OPERATED IN EITHER AN INDUCTION OR SYNCHRONOUS MODE; ONLY THE INDUCTION MODE HAS BEEN USED AT THE PRESENT TIME. ROTOR SPEED, ROTOR PITCH, TURBINE AZIMUTH, WIND SPEED AND DIRECTION, AND POWER OUTPUT ARE MONITORED DURING OPERATION. TOWER AZIMUTH AND ROTOR PITCH ARE CONTROLLED DURING EXPERIMENTS. AN AUTOMATIC DATA RECORDING SYSTEM IS PRESENTLY BEING INSTALLED. A MICROPROCESSOR AUTOMATIC CONTROL SYSTEM FOR ADJUSTING AZIMUTH DIRECTION AND ROTOR PITCH WILL BE INSTALLED SHORTLY. A COMPLETE SET OF EXPERIMENTS IS PLANNED FOR THE SPRING OF 1978.

1977-0686 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRICAL POWER GENERATION FROM THE WIND.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY. ANNUAL MEETING 1977. PROCEEDINGS. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 19, SESS. B.2. 5 P.

WIND ENERGY CONVERSION SYSTEMS (WECS) NOW BEING DEVELOPED ARE EXPECTED TO BE ABLE TO PROVIDE LARGE AMOUNTS OF ELECTRICAL ENERGY AT SELECTED WINDY SITES AT COSTS COMPETITIVE WITH ENERGY FROM NEW COAL AND NUCLEAR POWER PLANTS. WECS AND HYDROELECTRIC FACILITIES FOR STORAGE CONNECTED TO THE SAME LARGE-SCALE TRANSMISSION GRIDS ARE EXPECTED TO PUT LARGE ENERGY RESOURCES WITHIN REACH OF LOAD CENTERS UP TO 2000 KM FROM THE WIND SITES. DIVERSITY OF WIND SITES REDUCES THE COST OF STORAGE REQUIRED TO SMOOTH FLUCTUATIONS IN WIND ENERGY. TRANSMISSION FROM THE BEST SITES TO LOAD CENTERS IS EXPECTED TO BE PREFERABLE TO LOCAL GENERATION FROM THE WIND AND SUN AT INFERIOR SITES. ALL ELEMENTS OF THE INTEGRASYSTEM ARE WITHIN THE PRESENT STATE OF THE ART.

1977-0687 TODD J
TOMORROW IS OUR PERMANENT ADDRESS.
J. NEW ALCHEM.: 85-106, 1977.

THE ARK ON PRINCE EDWARD ISLAND IN CANADA IS DESCRIBED. IT IS CONSIDERED AS A BIOSHELTER SINCE IT PROVIDES ITS OWN ENERGY AND CLIMATE FOR ITS RESIDENTS. IT INCLUDES ITS OWN WIND POWERED GENERATION FACILITIES AND WASTE TREATMENT PLANT. SOLAR PONDS PROVIDE THE FOOD FOR THE INHABITANTS. THE ARK HAS DOMESTIC HOT WATER SYSTEMS INCLUDING A 700 SQ. FT. COLLECTOR FOR SPACE HEATING AND A PASSIVE WARM WATER AQUACULTURE FACILITY FOR HEATING. ENERGY CONSERVATION TECHNIQUES HELP TO MINIMIZE THE ENERGY NEEDS. SUGGESTIONS ARE MADE FOR THE ADOPTION OF THE BIOLOGICAL DESIGN MODELS. OVER THIRTY SENSORS MONITOR THE ARK FOR PERFORMANCE OF ENERGY, CLIMATOLOGICAL AND BIOLOGICAL PROCESSES. A MINI-COMPUTER WILL BE INSTALLED IN THE PROJECT FOR SIMULATION AND OBSERVATION.

1977-0688 TRAVIS S
NATURAL HOUSE FOR NORTHERN MAINE.
ALTERN. SOURCES ENERGY NO. 26: 15-19, JUNE 1977.

DETAILED DESIGN FEATURES OF A MAINE HOUSE WHICH COMBINES PASSIVE SOLAR HEATING, SOLAR COOKING, WIND POWER, SNOW REFRIGERATION, AND SOLAR SEWAGE COMPOSTING FOR COMPLETE SELF-SUFFICIENCY ARE DESCRIBED. ARCHITECTURAL DRAWINGS SHOW ALL VIEWS OF THE STRUCTURE. THE HOUSE IS BUILT OVER A WATER POND, WHERE SOLAR ENERGY IS STORED. A WOOD BURNING FURNACE PROVIDES BACK-UP HEATING. INFORMATION IS INCLUDED ON PROCUREMENT SOURCES FOR KEY COMPONENTS. CONTACT INFORMATION IS GIVEN FOR OBTAINING A FULL SET OF DETAILED BUILDING PLANS AT NOMINAL COST.

1977-0689 TRENDS.
UMSCH. WISS. TECH. 77(21): 704-708, NOVEMBER 1, 1977. (IN GERMAN)

A 3 MW WIND POWER PLANT CALLED GROWIAN IS DESCRIBED. A TOTAL OF 20 MILLION DM IS ESTIMATED FOR THE FOUR YEAR WIND ENERGY PROSPECTING PROGRAM ENDING 1980.

1977-0690 URBANEK A
WIND POWER.

ENERGIE 29(9): 296-299, SEPTEMBER 1977. (IN GERMAN)

THE TECHNICAL FEATURES OF WIND-POWER UTILISATION AND PRIME MOVER/GENERATING PLANT ARE DISCUSSED, EXPERIMENTAL PLANT AND WIND POWER PROGRAMMES IN VARIOUS COUNTRIES ARE DISCUSSED AND REFERENCE IS MADE TO ENERGY STORAGE, SOLAR/WIND POWER INTERCONNECTION AND PROSPECTS IN THE THIRD WORLD. IN THE GERMAN FEDERAL REPUBLIC IT IS HOPED TO HAVE A 3 MW PROTOTYPE UNIT READY FOR TECHNICAL EVALUATION BY THE END OF 1980 UNDER THE GROWIAN RESEARCH PROGRAMME. DESPITE RENEWED INTEREST IN WIND POWER GENERATION AND ITS ATTRACTIVE FEATURES AND TECHNICAL FEASIBILITY, IT IS CONCLUDED THAT DOUBTS STILL EXIST ON ECONOMICAL GROUNDS FOR LARGE SCALE UTILIZATION.

1977-0691 USE OF BRACKISH GROUND WATER RESOURCES FOR REGIONAL ENERGY CENTER DEVELOPMENT. TULAROSA BASIN, NEW MEXICO: PRELIMINARY EVALUATION.
NTIS, MARCH 1977. 517 P.
FEA/G-77/101, PB-269898

THE PURPOSE OF THIS STUDY IS TO CONTRIBUTE TO THE GROWING KNOWLEDGE ABOUT THE FEASIBILITY OF ENERGY CENTERS, PARTICULARLY IN RELATION TO UTILIZATION OF HITHERTO UNALLOCATED AND MAINLY UNUSABLE GROUNDWATER IN THE WESTERN STATES. SPECIFICALLY THE SUITABILITY OF THE TULAROSA BASIN IN SOUTH-CENTRAL NEW MEXICO AS THE SITE FOR A REGIONAL ENERGY CENTER IS STUDIED. THE CENTER IS ASSUMED TO BE PRIMARILY NUCLEAR WITH VARYING POTENTIALS FOR FOSSIL, SOLAR, GEOTHERMAL, AND WIND ENERGY-GENERATING FACILITIES. THE ANALYSIS ALSO CONSIDERS ANTICIPATED SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACT ON THE REGION.

1977-0692 WARNE D F, CALNAN P G
GENERATION OF ELECTRICITY FROM THE WIND.
INST. ELECTR. ENG. PROC. 124(11R): 963-985, NOVEMBER 1977.

A REVIEW IS PRESENTED WHICH TRACES THE HISTORY OF WIND-DRIVEN PLANT FROM A POINT WHEN IT WAS FIRST CONSIDERED FOR ELECTRICITY GENERATION IN ABOUT 1890. THE BUILD UP OF A SIGNIFICANT LEVEL OF AVAILABLE TECHNOLOGY FOR LARGE-SCALE EXPLOITATION IS DEMONSTRATED, BASED ON RESEARCH AND DEVELOPMENT THAT HAS SINCE TAKEN PLACE, TOGETHER WITH SOME OF THE CONCURRENT COMMERCIAL ACHIEVEMENTS. PLANT SUBSYSTEM DESIGN OPTIONS INTERACT WITH EACH OTHER AND AFFECT PERFORMANCE AND COSTS. THESE OPTIONS ARE DISCUSSED, AND THE COSTS, COSTING METHODS AND COMPETITIVENESS OF LARGE WIND GENERATORS NOW AT, OR SOON TO REACH, THE STAGE OF CONCEPTION OR DESIGN, ARE EXAMINED. AN ACCOUNT IS INCLUDED OF THE SCOPE OF CURRENT ACTIVITIES OF ANY SIZE OR SPECIAL INTEREST IN SEVERAL COUNTRIES. A FUTURE WORLDWIDE ROLE FOR WIND GENERATION LINKED TO NEEDS, WINDS AND TECHNICAL INNOVATIONS IS PROJECTED.

1977-0693 WEINLICH K
ENERGY CHARACTERISTIC QUANTITIES.
BRENNST.-WAERME-KRAFT 29(12): 481-488, DECEMBER 1977.

FOR COMPARING VARIOUS ENERGY FORMS, SPECIFIC ENERGY, ENERGY DENSITY AND ENERGY SLOW DENSITY CAN BE USED AS ENERGY CHARACTERISTIC QUANTITIES WHICH ENABLE DEDUCTIONS IN RESPECT OF THE DEMAND ON MATERIALS, VOLUME AND AREA FOR A CERTAIN ENERGY CONVERSION TO BE MADE. ASSUMING A LOSS-FREE CONVERSION, THESE THREE ENERGY CHARACTERISTIC QUANTITIES ARE DETERMINED FOR POTENTIAL ENERGY, PRESSURE ENERGY, KINETIC ENERGY, THERMAL ENERGY, COMBUSTION ENERGY, COMPLETE TRANSFORMATION OF MASS INTO ENERGY (ANNIHILATION), NUCLEAR FISSION ENERGY, NUCLEAR FUSION ENERGY, AS WELL AS SOLAR AND WIND ENERGY. A COMPARISON IS MADE BETWEEN THEM.

1977-0694 WEISBRICH A L
FEATURE REVIEW OF SOME ADVANCED AND INNOVATIVE DESIGN CONCEPTS IN WIND ENERGY CONVERSION SYSTEMS.
NESEA '77: BETTER THERMAL UTILIZATION. CONFERENCE OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 2D, HARTFORD, CONNECTICUT, SEPTEMBER 8, 1977. BRATTLEBORO, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1977. P. 445-458.

IN RESPONSE TO THE IMPENDING ENERGY SITUATION, NUMEROUS ALTERNATIVE ENERGY GENERATION SCHEMES ARE BEING PROPOSED AND PURSUED. SPECIFICALLY, IN THE AREA OF WIND ENERGY MUCH EFFORT IS BEING EXPENDED TO DEVELOP A SUPERIOR ENERGY CONVERSION SYSTEM. SOME ADVANCED WIND ENERGY CONVERSION SYSTEM (WECS) CONCEPTS ARE PRESENTED AND THEIR FEATURES HIGHLIGHTED. ALTHOUGH OTHERS MAY BE PURSUING SIMILAR OR OTHER CONCEPTS, ONLY CERTAIN INDIVIDUALS AND ORGANIZATIONS ASSOCIATED WITH THESE CONCEPTS ARE SPECIFIED.

1977-0695 WENDNER W
PENDULUMIMPELLER--WIND- AND HYDROELECTRIC POWER PLANT WITH VERTICAL ROTATION AXIS AND FLY WHEEL CENTRIFUGAL ENERGY STORAGE.
GERMAN (FRG) PATENT NO. 2,612,200/A/, OCTOBER 16, 1977. 16 P. (IN GERMAN)

THE INVENTION DEALS WITH A WIND- OR WATER WHEEL WITH VERTICAL AXIS. ON THE CIRCUMFERENCE OF THE WHEEL, ARRANGED ARE THE PENDULUM IMPELLERS WHICH--EQUIPPED WITH COUNTERWEIGHTS--CAN SWIVEL AROUND A VERTICAL AXIS AND THROUGH SPRING POWER ARE PUSHED BACK INTO MID-POSITION, IN A WAY THAT THE WHEEL IS DRIVEN FROM THE SIDES TURNED TOWARDS AND AWAY FROM THE STREAM AND MADE TO ROTATE.

1977-0696 WHITFORD D H, MINARDI J E, STARNER F L, WEST B S
MADARAS ROTOR POWER PLANT.
RECENT ADVANCES IN ENGINEERING SCIENCES. SOCIETY OF ENGINEERING SCIENCES, PROCEEDINGS, 14TH ANNUAL MEETING, BETHLEHEM, PA., NOVEMBER 14-16, 1977. BETHLEHEM, PA., LEHIGH UNIVERSITY, 1977. P. 1281-1290.

ANALYTICAL STUDIES, WIND TUNNEL EXPERIMENTS, AND FULL-SCALE TESTS OF THE NOVEL, WIND-POWERED, MADARAS ROTOR POWER PLANT WERE CONDUCTED IN THE 1930 TO 1934 TIME PERIOD. THIS SYSTEM, INVENTED BY JULIUS D. MADARAS, USED 90-FT HIGH BY 22.2-FT DIAMETER ROTATING, VERTICALLY-MOUNTED CYLINDERS TO CONVERT WIND POWER TO MAGNUS EFFECT FORCES WHICH PROPELLED AN ENDLESS TRAIN OF CARS AROUND A CLOSED TRACK. GENERATORS GEARED TO THE CAR AXLES PRODUCED ELECTRIC POWER. FORCE MEASUREMENTS ON A FULL-SIZE CYLINDER PROVED THAT THE CONCEPT WAS TECHNICALLY FEASIBILE, BUT THE PROJECT WAS DISCONTINUED PRIOR TO PILOT PLANT DEMONSTRATION BECAUSE OF THE DEPRESSION. THE UNIVERSITY OF DAYTON RESEARCH INSTITUTE HAS CONDUCTED STUDIES OF THE MADARAS SYSTEM TO VERIFY THE INITIAL COMPUTATIONS MADE BY MADARAS AND HIS CO-WORKERS. THESE STUDIES HAVE INCLUDED A THOROUGH REVIEW OF THE LITERATURE OF THE MADARAS PROGRAM CONTAINED IN A SET OF 14 UNPUBLISHED TECHNICAL REPORTS AND DISCUSSIONS WITH TWO KEY MEN WHO WORKED WITH THE ORIGINAL MADARAS PROJECT. THE STUDIES ALSO HAVE INCLUDED A REVIEW OF THE MAJOR WIND TUNNEL TESTS ON ROTATING CYLINDERS CONDUCTED SINCE THE MID 1920'S AND COMPUTER SIMULATION STUDIES OF THE SYSTEM PERFORMANCE.

1977-0697 WIEDEMANN H
DEVICE FOR MAKING NATURAL ENERGY AVAILABLE.
GERMAN (FRG) PATENT NO. 2,617,023/A/, OCTOBER 20, 1977. 28 P. (IN GERMAN)

THE CLAIMS CHIEFLY CONCERN A WATER VEHICLE OF THE CATAMARAN TYPE AND A PLATFORM COVERING THE HULL OF THE SHIP

WITH DEVICES FOR CONVERTING SOLAR ENERGY AND/OR WAVE ENERGY AND/OR WIND ENERGY AND/OR THE HEAT OF THE SEAWATER INTO ELECTRICAL ENERGY. THE ELECTRICAL ENERGY IS STORED IN THE FORM OF KINETIC ENERGY OF TWO FLYWHEELS ROTATING IN OPPOSITE DIRECTIONS.

1977-0698 WILSON D E
AEROELASTIC PUMP.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 571-573.

1977-0699 WIND ENERGY SOON NECESSARY FOR ELECTRIC POWER GENERATION.
ALTES HAUS-MOD. NO. 14: 4, 1977. (IN GERMAN)

1976-0562 1976 ENERGY RESEARCH AND DEVELOPMENT INVENTORY FOR THE STATE OF MISSOURI.
JEFFERSON CITY, MISSOURI, MISSOURI ENERGY AGENCY, 1976. 25 P.

THE MISSOURI ENERGY AGENCY HAS COMPILED AN INVENTORY OF 150 STATEWIDE R AND D PROJECTS INVOLVED WITH ENERGY AS A FIRST STEP IN OPENING COMMUNICATIONS CHANNELS BETWEEN GROUPS INVOLVED. THE PROJECTS WILL BE KEPT INFORMED OF RESEARCH ACTIVITIES AND FUNDING OPPORTUNITIES. MOST FUNDS ORIGINATE WITH ERDA AND THE NATIONAL SCIENCE FOUNDATION, WITH CONTRIBUTIONS FROM THE ELECTRIC POWER RESEARCH INSTITUTE, GAS RESEARCH INSTITUTE, ET AL. PROJECTS ARE LISTED IN BROAD CATEGORIES OF AGRICULTURE, ELECTRIC ENERGY ANALYSIS AND UTILIZATION STUDIES, FOSSIL FUEL, NUCLEAR ENERGY, SOLAR, WIND, MISCELLANEOUS, AND PENDING. LISTINGS INCLUDE THE ORGANIZATION, NAMES OF PRINCIPAL INVESTIGATORS, TITLE OF PROJECT, FUNDING SOURCE, DOLLAR AMOUNTS, AND DURATION OF PROJECT.

1976-0563 BAKER R H
ENERGY SUPPLY, DEMAND/NEED, AND THE GAPS BETWEEN. VOL. III. MONOGRAPHS AND WORKING PAPERS: WIND ENERGY.
EPA ENVIRONMENTAL PROTECTION TECHNOLOGY SERIES, MARCH 1976. P. 2-1--2-8.
EPA-600/2-76-044B

1976-0564 BALACHANDRAN S
ENERGY STATISTICS: A GUIDE TO SOURCES.
CHAMPAIGN, ILLINOIS, COUNCIL OF PLANNING LIBRARIANS, 1976. 51 P.

THIS PUBLICATION COMPILES A SELECTED AND ANNOTATED GUIDE TO 162 NATIONAL AND INTERNATIONAL SOURCES OF STATISTICS COVERING ALL FORMS OF ENERGY SUCH AS COAL, ELECTRICITY, NATURAL GAS, NUCLEAR POWER, PETROLEUM, SOLAR, AND OTHER MISCELLANEOUS TYPES. EACH FORM IS DEALT WITH SEPARATELY, THE FIRST LISTING COVERING COMPOSITE SOURCES--SOURCES WHOSE COVERAGE EXTENDS TO ALL FORMS OF ENERGY. A SUBJECT INDEX AND A DIRECTORY OF PUBLISHERS ARE ALSO INCLUDED.

1976-0565 BEATSON C
RESEARCH TODAY FOR TOMORROW'S POWER.
ENGINEER 242(6275): 54-55, 57, JUNE 24, 1976.

MUCH R AND D WILL BE REQUIRED FOR SOLAR, TIDAL, WAVE, WIND, AND GEOTHERMAL ENERGY TO BE EXPLOITED ON A LARGE SCALE IN THE UK. WIND ENERGY IS WIDELY AVAILABLE BUT IRREGULAR AND VARIABLE, THE BASIC PROBLEM BEING STORAGE. TIDAL AND WAVE POWER ARE OF PRACTICAL INTEREST ONLY TO LARGE ELECTRICITY SUPPLY ORGANIZATIONS; WAVE POWER IS MORE OF A CONVENTIONAL BASE-LOAD ENERGY SOURCE FOR WHICH STORAGE IS NEEDED IF THE FULL POTENTIAL IS TO BE REALIZED; AN EXPANDED TIDAL SCHEME COULD PROVIDE THIS STORAGE BECAUSE IT IS COMPLEMENTARY TO ANY PRIMARY SOURCE.

1976-0566 BEHRMAN D
SOLAR ENERGY: THE AWAKENING SCIENCE.
BOSTON, MASSACHUSETTS, LITTLE, BROWN AND COMPANY, 1976. 408 P.

THE BOOK CONCERNS ANSWERS TO THE QUESTIONS: (1) IS SOLAR ENERGY THE KEY TO THE FUTURE OF OUR ENERGY NEEDS; AND (2) WHAT ARE THE FACTS AND TRUE POTENTIAL OF THIS ENORMOUS, STILL LARGELY UNEXPLORED SOURCE OF RENEWABLE POWER. IT REVIEWS THE KNOWLEDGE OF SOLAR ENERGY FROM THE MIRRORS THAT ARCHIMEDES USED TO SET A ROMAN FLEET AFLAME IN 215 B.C., TO TODAY'S PLANS FOR DESIGNING ATTRACTIVE, AFFORDABLE DOMESTIC SOLAR HOUSING, TO TOMORROW'S DREAMS OF BUILDING SOLAR SKYSCRAPERS. MANY OF THE SITES AND THE TECHNOLOGY APPLIED TO HARNESS THE SUN'S POWER ARE DESCRIBED.

1976-0567 BLIAMPTIS E E
MUSES: A MULTIPURPOSE UTILIZATION OF SOLAR ENERGY SYSTEM.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY. 1ST CONFERENCE AND EXHIBITON OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 512-524.

THE MULTIPURPOSE UTILIZATION OF SOLAR ENERGY SYSTEM (MUSES) IS A SYSTEM FOR LARGE SCALE UTILIZATION OF SOLAR ENERGY. IT CONSISTS OF THE FOLLOWING BASIC COMPONENTS: (A) A DISTILLATION POND; (B) A DUCT FOR THE FLOW OF THE HEATED AIR/VAPOR MIXTURE; (C) A HIGH ELEVATION WIND TURBINE/ELECTRIC GENERATOR; (D) A COOLING TOWER FACILITY; (E) A HIGH ELEVATION RESERVOIR FOR STORAGE OF WATER CONDENSED FROM THE AIR/VAPOR MIXTURE; (F) A SERIES OF HYDRAULIC TURBINES PRODUCING ADDITIONAL ELECTRIC POWER; AND FINALLY (G) A LOW ELEVATION RESERVOIR FOR STORING THE SPENT WATER BEFORE IT IS USED FOR IRRIGATION OR DRINKING PURPOSES. THE OPERATION, ADVANTAGES, AND DISADVANTAGES OF SUCH A SYSTEM ARE DISCUSSED.

1976-0568 BLOK C
LEVEN VAN DE WIND. (LIVING ON WIND).
ORGANORAMA 13(1): 1976. (IN DUTCH)

1976-0569 CHAMIS C C, SULLIVAN T L
FREE VIBRATIONS OF THE ERDA-NASA 100 KW WIND TURBINE.
NTIS, 1976. 16 P.
DOE/NASA/1028-77/7, NASA-TM-X-71879, CONF-760307-4

THE ERDA-NASA WIND TURBINE (WINDMILL), WHICH CONSISTS OF A 93-FOOT TRUSS TOWER, A BED PLATE THAT SUPPORTS MECHANICAL AND ELECTRICAL EQUIPMENT, AND TWO 62.5-FOOT LONG BLADES, WAS ANALYZED TO DETERMINE ITS FREE VIBRATIONS USING NASTRAN. THE FINITE ELEMENT REPRESENTATION OF THE SYSTEM CONSISTED OF BEAM AND PLATE ELEMENTS. THE FREE VIBRATIONS OF THE TOWER ALONE, THE BLADES ALONE, AND THE COMPLETE SYSTEM WERE DETERMINED EXPERIMENTALLY IN THE FIELD.

1976-0570 CHARACTERISTICS OF WINDMILLS.
NTIS, 1976. 6 P. TRANSLATION OF P-2062/G.
RFP-TRANS-192

THE SPECIFICATIONS AND PRICES OF ENAG WIND POWERED ELECTRIC GENERATORS WITH CAPACITIES OF 400 WATTS, 1200 WATTS, AND 2500 WATTS ARE LISTED.

1976-0571 CHILCOTT R E
A REVIEW OF RENEWABLE ENERGY IN NEW ZEALAND WITH EMPHASIS ON WIND POWER UTILIZATION.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 117-121.

1976-0572 CLARKE R
BUILDING FOR SELF-SUFFICIENCY.
NEW YORK, UNIVERSE BOOKS, 1976. 296 P.

THE BIOTECHNIC RESEARCH AND DEVELOPMENT (BRAD) EXPERIMENT, SET UP IN 1973, HAS FAILED, BUT THE AUTHOR REVIEWS THE EXPERIENCES OF CONVERTING THE 43-ACRE HILL-FARM AND NEAR-DERELICT COTTAGE INTO A COMMUNE. IT WAS TO DEVISE A LIFESTYLE OF SELF-SUFFICIENCY IN FOOD, ENERGY, WATER, AND MATERIALS. CLARKE DESCRIBES HOW AND TO WHAT EXTENT THE COMMUNE SUCCEEDED. HE DESCRIBES HOW HE AND THE OTHER INEXPERIENCED PEOPLE BUILT A LARGE, WATERTIGHT, HABITABLE HOUSE WITH SOLAR-HEATED WATER. FURTHER, HE SHOWS HOW THE ARTS OF HOUSEBUILDING, PLASTERING, AND CARPENTRY MAY BE MASTERED. HE WRITES ABOUT HEAT, INSULATION, SOLAR ENERGY, WIND POWER, WATER AND PLUMBING, WASTE AND COMPOST, TRANSPORT, AND FOOD. CLARKE DOES NOT NECESSARILY THINK ALL SHOULD STRIVE FOR SELF-SUFFICIENCY, BUT BE AWARE THAT IT IS POSSIBLE.

1976-0573 CLARK P, LANDFIELD J
NATURAL ENERGY. WORKBOOK NO. 2.
BERKELEY, CALIFORNIA, BOOKPEOPLE, SEPTEMBER 1976. 128 P.

NATURAL ENERGY WORKBOOK NUMBER 2 IS A COMPREHENSIVE TEXT ON THE APPLICATION OF LOCALLY REGENERATIVE RESOURCES (SUN, WIND, WATER, AND PHOTOSYNTHETIC FUELS) TO LOCAL ENERGY NEEDS. ENERGY CONSERVATION AND USE ARE PLACED INTO PERSPECTIVE. SIMPLE EXPERIMENTS ARE GIVEN WHICH DEMONSTRATE THE CONCEPTS OF REGENERATIVE CONVERSION IN LAY TERMS. BASIC PRINCIPLES OF SCIENCE AND ENGINEERING ARE OUTLINED AS THEY APPLY TO SPECIFIC CONVERSION TECHNIQUES AND CONSTRUCTION APPROACHES. ECONOMICAL APPLICATION IS SHOWN TO BE DEPENDENT ON SIMPLIFICATION OF SYSTEMS AND LOCALLY BASED DEVELOPMENT. CAPITAL AND LABOR INVESTMENT ARE REDUCED THROUGH THE USE OF ALREADY MASS-PRODUCED AND LOCALLY AVAILABLE ITEMS.

1976-0574 COONLEY D R
REGIONAL WIND, INDIVIDUAL WIND: TWO STUDIES ASSESS WAYS IN WHICH WE CAN USE THE WIND. II. GATHER UP THE WIND FOR A HOUSE OR A FAVORITE SKYSCRAPER.
SOL. AGE 1(3): 28-29, MARCH 1976.

THE USE OF TALL BUILDINGS AS WIND ENERGY COLLECTORS IS DISCUSSED.

1976-0575 COSTELLO D
CHOOSING ALTERNATIVE ENERGY SYSTEMS UNDER CONDITIONS OF UNCERTAINTY.
ANNUAL CONFERENCE ON ENERGY, 2D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1975. PROCEEDINGS. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS CO., 1976. P. 268-275.

A METHODOLOGY FOR SIMULATING THE DECISION PROCESS OF AN INVESTOR DECIDING BETWEEN ALTERNATIVE ENERGY SYSTEMS IS PRESENTED. THE APPROACH ASSUMES THE INVESTOR BASES HIS DECISION ON COST (OR RATE OF RETURN) AND RISK. RISK IS TREATED DIRECTLY IN THE MODEL AND NOT REDUCED TO A CERTAINTY EQUIVALENT. THE RATE OF RETURN--RISK CHARACTERISTICS OF MANY SYSTEM COMBINATIONS ALLOWS THEM TO BE ELIMINATED AS VIABLE CHOICES TO THE INVESTOR WITHOUT REFERENCE TO HIS PERSONAL ATTITUDE TOWARD RISK.

1976-0576 DATTA R L, SHERMAN M M
AN INTRODUCTION TO INTEGRATED SOLAR-WIND SYSTEMS.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 139-143.

1976-0577 DAVARAJAN S, MOHAPATRA P K
ENERGY ENVIRONMENT--1.
CHEM. ENG. WORLD 11(8): 49-53, AUGUST 1976.

A CHEMICAL ENGINEERING WORLD RESEARCH BUREAU SURVEY COVERS THE WORLD'S RESERVES OF OIL, COAL, NATURAL GAS, SHALE OIL AND TAR SANDS; INDIA'S SUPPLY, DEMAND AND CONSUMPTION OF COAL, OIL, NATURAL GAS, HYDROELECTRIC POWER, NUCLEAR ENERGY, FIREWOOD, COWDUNG, AND AGRICULTURAL WASTES; AND THE PROSPECTS OF USING SOLAR ENERGY, GEOTHERMAL ENERGY, WIND POWER AND TIDAL POWER TO HELP MEET INDIA'S ENERGY REQUIREMENTS.

1976-0578 DEAN T
SOLAR ASSISTED HEAT PUMP AIR CONDITIONING SYSTEM.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 3. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 373-377.

THE DESIGN OF A SOLAR ASSIST TO HEAT PUMPS IN A YEAR ROUND AIR CONDITIONING SYSTEM IS PRESENTED. THE RESIDENCE IN WHICH THE SYSTEM IS INSTALLED CONTAINS 1850 SQUARE FEET OVER A 720 SQUARE FOOT BASEMENT, ATTACHED 126 X 206 PIT GREENHOUSE, TWO CAR GARAGE, AND ASSOCIATED PORCHES AND STORAGE AREAS. SOLAR HEATED WATER IS USED FOR DOMESTIC HOT WATER PREHEAT AND FOR SPACE HEATING WHEN TANK TEMPERATURE EXCEEDS 95".

1976-0579 DESFRESNES J P
SOLUTIONS ACTUELLES ET PERSPECTIVES D'AVENIR POUR L'ALIMENTATION DES STATIONS AUTONOMES DE TELECOMMUNICATIONS. (PRESENT SOLUTIONS AND FUTURE PROSPECTS FOR THE POWER SUPPLY OF SELF-CONTAINED TELECOMMUNICATION STATIONS).
REV. GEN. ELECTR. 85(6): 510-520, JUNE 1976.

THE DATA CONCERNING THE DELICATE PROBLEM RAISED BY ISOLATED OR REMOTE PLANTS ON POWER DISTRIBUTION NETWORKS ARE RECALLED AND THE PRESENT CONVENTIONAL SOLUTIONS, I.E.: CELLS, TURBO-GENERATORS AND GENERATING SETS ARE FIRST CONSIDERED. NEW SOLUTIONS ARE THEN DISCUSSED.

1976-0580 DJOJODIHARDJO H
RESEARCH AND PROSPECTS OF UTILIZATION OF WIND ENERGY IN INDONESIA.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 125-129.

1976-0581 DUMON R
PROFITABILITY AND PROSPECTS FOR DEVELOPMENT OF NEW ENERGY SOURCES.
IND. PET. MONDE, GAZ-CHIM. NO. 481: 15-20, APRIL 1977. (IN FRENCH)

A SURVEY WHICH EMPHASIZES FRENCH AND AMERICAN ACTIVITIES COVERS SOLAR ENERGY AND ITS APPLICATIONS, INCLUDING SOLAR PANELS, THE SOLAR ENGINE, SOLAR PHOTOELECTRIC CELLS, AND THE ODEILLO SOLAR FURNACE; WIND ENERGY RECOVERY

EQUIPMENT; GEOTHERMAL ENERGY EQUIPMENT AND CURRENT INSTALLATIONS; CURRENT STUDIES, ON MARINE THERMAL ENERGY; TIDAL ENERGY RECOVERY; ENERGY FROM INDUSTRIAL WASTES, INCLUDING LOW-PRESSURE STEAM, HOT WATER, WOOD WASTES, AND DOMESTIC REFUSE; AND THE PROBABLE ROLE OF THESE SUPPLEMENTARY ENERGY SOURCES IN THE FUTURE ENERGY ECONOMIES OF THE U.S. AND FRANCE.

1976-0582 EATON W W
SOLAR ENERGY.
WASHINGTON, D.C., ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, 1976. 51 P.

THE FOLLOWING TOPICS ARE INCLUDED: SOLAR ENERGY USED AS HEAT; CONVERTING SOLAR ENERGY TO ELECTRICITY: WIND, SOLAR THERMAL, PHOTOVOLTAIC CONVERSION, AND OCEAN THERMAL; CONVERTING SOLAR ENERGY TO PLANTS AND FOSSIL FUELS; AND ENERGY PLANNING FOR THE FUTURE. THE FOLLOWING ARE CONTAINED IN APPENDICES: BASIC UNITS RELATED TO ENERGY; MANAGEMENT OF SOLAR ENERGY ACTIVITIES; AND PUBLIC PARTICIPATION IN THE RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.

1976-0583 ENERGIEQUELLEN FUER MORGEN. NICHTNUKLEARE--NICHTFOSSILE PRIMAERENERGIEQUELLEN. (TOMORROW'S ENERGY SOURCES. NON NUCLEAR--NON FOSSIL PRIMARY ENERGY SOURCES).
FRANKFURT AM MAIN, GERMANY, F.R., UMSCHAU, 1976. 165 P. (IN GERMAN)

THIS SHORTENED VERSION OF THE PROGRAM (STUDY IN SIX PARTS WITH THE SAME TITL) DEALS IN AN EASILY COMPREHENSIBLE WAY WITH UTILIZATION POSSIBILITIES OF SOLAR, WIND, TIDAL, GEOTHERMAL, AND HYDRO ENERGY. IN A COMPARISON OF THE RENEWABLE ENERGY SOURCES, POSSIBILITIES OF UTILIZATION WITHIN AND BEYOND THE FRG ARE ALSO INVESTIGATED.

1976-0584 ENERGY: THE U.S AT THE CROSSROADS.
ENVIRON. SCI. TECHNCL. 10: 854-859, SEPTEMBER 1976.

ENERGY POLICY IS DISCUSSED IN RELATION TO THE DEVELOPMENT OF RENEWABLE ENERGY SOURCES. EMPHASIS IS ON SOLAR ENERGY TECHNOLOGY, WITH DISCUSSIONS ALSO OF OCEAN THERMAL, TIDE AND WIND POWER. ECONOMIC FACTORS ASSOCIATED WITH THE DEVELOPMENT OF RENEWABLE SOURCES ARE EXAMINED.

1976-0585 ERIKSSON B, HELGESEN H
USE OF SYNCHRONOUS MACHINES AS GENERATORS AT WIND POWER PLANTS. (PART I)
NTIS, MAY 1976. 65 P. (IN SWEDISH)
LUTMDN/TMVK-76-05-03(PT.1)

THE THEORY FOR THE SYNCHRONOUS MACHINE UNDER DYNAMICAL CONDITIONS IS APPLIED IN ORDER TO FORECAST ITS BEHAVIOUR WHEN USED AS A GENERATOR AT A WIND POWER PLANT. THE AIM OF THIS REPORT IS TO DESCRIBE HOW THE DIFFERENT CONSTRUCTIVE PARAMETERS OF THE MACHINE WILL AFFECT ITS PROPERTIES AS A WIND GENERATOR. THE ANALYTICAL BASIS NECESSARY FOR THE DETERMINATION OF THESE PROPERTIES AS WELL AS OF ITS SUITABILITY FOR BEING A WIND GENERATOR IS ALSO PRESENTED.

1976-0586 ERIKSSON B, HELGESEN H
USE OF SYNCHRONOUS MACHINES AS GENERATORS AT WIND POWER PLANTS. (PART II)
NTIS, MAY 1976. 38 P. (IN SWEDISH)
LUTMDN/TMVK-76-05-03(PT.2)

IN AN EARLIER REPORT (PART I) THE ANALYTICAL BASIS NECESSARY FOR THE DETERMINATION OF THE SUITABILITY OF THE SYNCHRONOUS MACHINE FOR BEING A WIND GENERATOR HAS BEEN PRESENTED. THIS REPORT CONTAINS THE RESULTS FROM COMPUTER CALCULATIONS APPLYING THE METHODS DESCRIBED IN THE EARLIER REPORT. THE RESULTS ARE PRESENTED IN GRAPHS.

1976-0587 FARMSTEAD HEATED WITH SOLAR ENERGY.
SONNENENERGIE-TECH 2(7): 8-9, DECEMBER 1976. (IN GERMAN)

1976-0588 FERENCZ D
VERTICAL AXIS WIND MOTOR.
U.S. PATENT NO. 3,986,785, OCTOBER 19, 1976. 4 P.

A VERTICAL-AXIS WIND MOTOR COMPRISES AN ANNULAR WIND DEFLECTOR ASSEMBLY SURROUNDING THE ROTOR ASSEMBLY AND INCLUDING A PLURALITY OF DEFLECTORS ORIENTED TO DEFLECT THE WIND SO THAT, FROM ALL WIND DIRECTIONS, A GREATER WIND FORCE IS APPLIED TO THE ROTOR VANES ON ONE SIDE OF THE VERTICAL AXIS THAN ON THE OTHER SIDE. SUCH A WIND MOTOR MAY BE CONSTRUCTED OF VERY LARGE DIMENSIONS BOTH IN HEIGHT AND DIAMETER SO AS TO MORE EFFICIENTLY EXPLOIT THE WIND ENERGY.

1976-0589 FREEDMAN A
ENERGY FACILITY SITING SELECTED ABSTRACTS.
NTIS, AUGUST 1976. 310 P.
MTR-7159, PB-284152

THIS REPORT CONTAINS A BIBLIOGRAPHIC SURVEY OF RESEARCH ON ALL ISSUES THAT AFFECT TIME, COSTS, OR ACCEPTABILITY OF BRINGING NEW ENERGY FACILITIES ON LINE. EACH LISTING INCLUDES TITLE, PERFORMING AND SPONSORING ORGANIZATIONS, PRINCIPAL INVESTIGATOR, AND AN ABSTRACT.

1976-0590 FREEMAN B E
NEW WIND ENERGY SITE SELECTION METHODOLOGY. QUARTERLY REPORT NO. 3, SEPTEMBER 17 - DECEMBER 16, 1975.
NTIS, JANUARY 1976. 74 P.
SAI-76-510-LJ, PB-287750

MAJOR EMPHASIS WAS PLACED ON THE TESTING AND APPLICATION OF A 3-D MESOSCALE COMPUTER CODE SIGMET ON WIND ENERGY SITE SELECTION. IDEALIZED PROBLEM CALCULATIONS WERE CARRIED OUT. THESE INCLUDED SEVERAL 3-D CALCULATIONS REPRESENTING FLOW OVER REAL TERRAIN TO HELP DETERMINE VALUES OF INPUT PARAMETERS FOR SATISFACTORY SOLUTIONS AND CODE IMPROVEMENTS. INVESTIGATIONS WERE CONTINUED INTO THE DEVELOPMENT OF MORE ACCURATE AND ECONOMICAL METHODS FOR MESOSCALE SIMULATION. THEY INVOLVED THE PARTIAL IMPLICATION OF GRAVITY WAVES, TURBULENCE FORMATION, AND MORE ACCURATE ADVECTION CALCULATIONS. AN ANALYTICAL STUDY OF STABILITY CONDITIONS WAS PERFORMED TO PROVIDE GUIDANCE IN CODE DESIGN AND USE. FIELD DATA FOR VALIDATION COMPARISONS WERE ALSO OBTAINED. THE REPORT INCLUDES A SUMMARY OF FIELD DATA GATHERING, WORK AND CALCULATIONS ON THE 3-D SIGMET CODE, AND A REVIEW OF NEW TECHNIQUES AND ANALYSES.

1976-0591 FRICKE J
WINDMILLS.

PHYS. UNSERER ZEIT 7(5): 129-130, SEPTEMBER 1976. (IN GERMAN)

A NEW PLAN OF A WIND ENERGY CONVERTER IS INTRODUCED. THE PRINCIPLE IS THE PRODUCTION OF TORNADO-LIKE WHIRLWINDS USING WIND POWER. THE PRESSURE DIFFERENCE BETWEEN THE INNER SIDE OF THE "TORNADO" AND ITS ENVIRONS IS TO BE USED TO DRIVE A TURBINE. ACCORDING TO THE CALCULATIONS THE NEW CONSTRUCTION PROVIDES FOR A BETTER ENERGY YIELD THAN WAS POSSIBLE WITH CONVENTIONAL WIND MILLS OF THE SAME SIZE. FURTHERMORE, THIS SYSTEM IS LESS SENSITIVE TO STORMS. THE TURBINE RUNS WITH HIGHER R.P.M., THUS MAKING A POWER TRANSMISSION UNNECESSARY; IT IS NEAR TO THE GROUND AND THIS MAKES SERVICING EASY. THE PRODUCTION OF 1 MW SHOULD BE POSSIBLE USING A TURBINE WITH A DIAMETER OF 2 M IN A 60 M HIGH TOWER WITH A DIAMETER OF 20 M.

1976-0592 FRIEDMANN P P
AEROELASTIC MODELING OF LARGE WIND TURBINES.
AM. HELICOPTER SOC. J. 21(4): 17-27, OCTOBER 1976.

A SET OF COUPLED FLAG-LAG-TORSIONAL EQUATIONS OF MOTION FOR A SINGLE WIND TURBINE BLADE ARE DERIVED IN A GENERAL, NONLINEAR, PARTIAL DIFFERENTIAL FORM. THESE EQUATIONS ARE SUITABLE FOR DETERMINING THE AEROELASTIC STABILITY OR RESPONSE OF LARGE WIND TURBINE BLADES. METHODS FOR SOLVING THE EQUATIONS, TOGETHER WITH SOME POSSIBLE SIMPLIFICATION OF THE EQUATIONS, ARE DISCUSSED. FINALLY, THE FORMULATION OF THE COMPLETE ROTOR-TOWER AEROELASTIC PROBLEM IS CONSIDERED IN GENERAL TERMS.

1976-0593 FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 9TH ANNUAL, PROCEEDINGS, 1976.
STILLWATER, OKLAHOMA STATE UNIVERSITY, UNIVERSITY EXTENSION PROGRAM, 1976.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 9TH, STILLWATER, OKLAHOMA, OCTOBER 27-28, 1976.

THE PROCEEDINGS INCLUDES TEXTS OF 16 PAPERS GIVEN AT THE CONFERENCE, MANY OF WHICH ARE ON WIND ENERGY.

1976-0594 GARLAND J, PAVELIC V
WINDGENERATOR MECHANISM.
OKLAHOMA STATE UNIVERSITY APPLIED MECHANISMS CONFERENCE, 4TH, CHICAGO, ILLINOIS, NOVEMBER 3, 1975.
PROCEEDINGS. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1976. P. 21.1 - 21.9.

THE MECHANISM DESCRIBED IS A WINDMILL CONSISTING OF THREE SMOOTHLY FINISHED BLADES WHICH ARE DRIVEN BY THE WIND AT FLUCTUATING SPEEDS. A CENTRIFUGAL FEATHERING MECHANISM IS INCLUDED TO STABILIZE THE ROTATION FOR HIGH VELOCITY WINDS AND POSSIBLE ERRATIC WIND GUSTS. THE ROTATING BLADES PROVIDE DRIVING TORQUE TO A HORIZONTAL SHAFT WHICH LEADS TO A SPEED INCREASING ASSEMBLY. THIS ASSEMBLY IN TURN DRIVES A GENERATOR WHICH PROVIDES THE ELECTRICAL POWER. A SPEED INCREASER IS DESIGNED SO THAT IT ROTATES THE GENERATOR AT ITS MAXIMUM EFFICIENCY POINT. THE ENTIRE WINDGENERATOR MECHANISM IS MOUNTED ON A TOWER AND PIVOTS FREELY ON A VERTICAL SHAFT.

1976-0595 GOOL W VAN
FLOURING TYPES OF ENERGY: POTENTIAL AND RESEARCH.
ATOOMENERG. HAAR TOEPASS. 18(2): 33-36, FEBRUARY 1976.

1976-0596 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, OCTOBER 1976. 130 P.

1976-0597 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (CITATIONS FROM THE NTIS DATA BASE).
NTIS, OCTOBER 1976. 119 P.

1976-0598 HAMER J
SOLAR ENERGY.
ED. RES. REP. 11(18): 825-842, NOVEMBER 12, 1976.

1976-0599 HAUSER L G
NEW POWER GENERATION SYSTEMS.
COAL AGE 81(7): 41, JULY 1976.

ONLY 12 NEW POWER GENERATION SYSTEMS ARE FEASIBLE USING EXISTING TECHNOLOGY AND CAPABLE OF COMPETING IN COST WITH SYSTEMS NOW IN USE. SINCE INTENSIVE DEVELOPMENT IS NEEDED TO MAKE ANY OF THE 12 SUCCESSFUL, EFFORTS SHOULD CONCENTRATE ON THE FIVE THAT WILL "MOST BENEFIT SOCIETY OVER THE NEXT 25 YEARS." THESE ARE (1) COAL GASIFICATION WITH GAS- AND STEAM-TURBINE GENERATORS IN COMBINED CYCLES, (2) THE BREEDER REACTOR, (3) MUNICIPAL WASTES WITH STEAM-TURBINE GENERATORS, (4) WIND POWER WITH WIND-TURBINE GENERATORS, AND (5) ELECTROLYTES WITH STORAGE BATTERIES.

1976-0600 HAWAII'S NATURAL ENERGY RESOURCES, 1976.
NTIS, JUNE 1, 1976. 65 P.
PB-298278

THE ALTERNATIVE ENERGY SOURCES AVAILABLE IN HAWAII ARE DISCUSSED: SOLAR ENERGY, OCEANIC WATERS SUITABLE FOR OCEAN THERMAL ENERGY CONVERSION, WIND POWER, BIOMASS, AND GEOTHERMAL ENERGY.

1976-0601 HERBERG G M
ENERGY STORAGE SYSTEM.
U.S. PATENT NO. 3,996,741, DECEMBER 14, 1976. 4 P.

A SYSTEM AND APPARATUS FOR THE STORAGE OF ENERGY GENERATED BY NATURAL ELEMENTS ARE DESCRIBED. ENERGY FROM NATURAL ELEMENTS SUCH AS FROM THE SUN, WIND, TIDE, WAVES, AND THE LIKE, IS CONVERTED INTO POTENTIAL ENERGY IN THE FORM OF AIR UNDER PRESSURE WHICH IS STORED IN A LARGE, SUBTERRANEAN CELL. MACHINES OF KNOWN TYPES SUCH AS WINDMILLS ARE DRIVEN BY NATURAL ELEMENTS TO OPERATE AIR COMPRESSORS. AIR COMPRESSORS PUMP THE AIR UNDER PRESSURE TO THE STORAGE CELL. AIR ENTERING THE STORAGE CELL DISPLACES WATER FROM THE CELL WHICH RETURNS TO A WATER RESERVOIR AS AN OCEAN OR A LAKE. WATER LOCKS THE AIR IN THE STORAGE CELL. THE STORED COMPRESSED AIR IS AVAILABLE UPON DEMAND TO PERFORM A WORK FUNCTION AS DRIVING AN AIR TURBINE TO OPERATE AN ELECTRIC GENERATOR.

1976-0602 HIGGIN R M R
SUN, WIND, AND WASTE HAVE A ROLE TO PLAY. RENEWABLE ENERGY SOURCES MERIT CONTINUING STUDY.
NORTH. MINER : C6-C8, SEPTEMBER 23, 1976.

THE POTENTIAL OF RENEWABLE ENERGY SOURCES IN CANADA IS DISCUSSED.

1976-0603 HIX J
DESCRIPTION OF PROVIDENT HOUSE, KING CITY, ONTARIO.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 9. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 229-235.

A DWELLING UNIT POWERED BY SOLAR AND WIND ENERGY FOR SPACE AND WATER HEATING IS DESCRIBED. ARCHITECTURAL, INSULATION, AND SOUND PROTECTION ASPECTS OF THE BUILDING ARE ANALYZED.

1976-0604 HOPPE H
WAVE AND WIND STORAGE STATION.
GERMAN (FRG) PATENT NO. 2,514,447/A/, OCTOBER 14, 1976. 9 P. (IN GERMAN)

THE SPECIFICATION CONCERNS AN ARRANGEMENT WHICH IS TO USE THE ENERGY OF SEA WAVES. IT IS TO BE SITUATED OUTSIDE THE BREAKERS IN WATERS OF GREAT DEPTH. PISTONS ARE MOVED TO AND FRO BY THE SEA WAVES IN CYLINDERS WHICH ARE OPEN BELOW AND WHICH REACH INTO THE WATER. IN THE UPPER AIR FILLED PART OF SUCH A CYLINDER, THERE IS ALTERNATE HIGH AND LOW PRESSURE DUE TO THE PISTON MOVEMENT, AND A SO-CALLED EXCESS PRESSURE STORE IS FILLED VIA NON-RETURN VALVES, WHILE A LOW-PRESSURE STORE IS EMPTIED. USING THESE TWO STORES, WATER IS PUMPED PNEUMATICALLY FROM A LOWER FRESH WATER CONTAINER INTO AN UPPER CONTAINER FLOATING ON IT. THE WATER DRIVES A TURBINE, WHEN FLOWING BACK FROM THE UPPER TO THE LOWER CONTAINER, WHICH IS COUPLED TO A GENERATOR FOR POWER GENERATION.

1976-0605 HOWELL Y
AFRICAN RURAL ENERGY CENTER.
SUNWORLD NO. 2: 2-5, NOVEMBER 1976.

A PLAN FOR A REMOTE AREA RURAL ENERGY CENTER IN SENEGAL, INCORPORATING SOLAR, WIND, BIOGAS AND BIOMASS SYSTEMS IS DESCRIBED. PROCESSING OF AGRICULTURAL WASTES, FRESH WATER AND ELECTRICITY PRODUCTION, IRRIGATION, AND HOT WATER HEATING, ALONG WITH HEAT FOR COOKING AND HOME SPACE HEATING ARE INCLUDED. SMOKELESS WOOD STOVES, SOLAR STEAM COOKERS, AND SOLAR FOOD WARMERS ARE PROPOSED.

1976-0606 HUQ R, LOTH J L
VORTEX KINETIC ENERGY CONCENTRATOR.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 11TH. PROCEEDINGS. NEW YORK, AICHE, 1976. VOL. 2, P. 1773-1778, PAPER 769305.

THE AERODYNAMIC PERFORMANCE OF A NON-ROTATING VERTICAL HIGH LIFT FINITE WING WHICH IS ORIENTED INTO THE WIND IS DESCRIBED. AS THE WING DEVELOPS LIFT, THE TRAILING VORTEX SHEET ROLLS UP TO FORM A SINGLE VORTEX OF SIGNIFICANT STRENGTH. THE CORE OF THE VORTEX IS SUBJECT TO LOW STATIC PRESSURE DUE TO THE CENTRIFUGAL EFFECTS. THE ASIMUTHAL MOTION IN THIS VORTEX PROVIDES THE CORE WITH CONCENTRATED ROTATIONAL KINETIC ENERGY WHICH CAN BE HARNESSED BY AN APPROPRIATE ROTOR PLACED COAXIALLY WITH THE VORTEX CORE. AS A RESULT OF THIS AUGMENTATION THE POWER HARNESSED PER UNIT ROTOR AREA CAN BE INCREASED UP TO FIVE FOLD, THEREBY PERMITTING A CORRESPONDING REDUCTION IN ROTOR SIZE. THE THEORETICAL ASPECTS OF CONCENTRATING KINETIC ENERGY IN THE TRAILING WING TIP VORTEX BEHIND A HIGH LIFT WING IS REPORTED. SPECIFIC DESIGN CRITERIA FOR THE REQUIRED WIND TURBINES ARE DEVELOPED. THE ENERGY CONCENTRATION RATIO OF VARIOUS ROTOR SIZES AND WING LOADING CHARACTERISTICS IS COMPUTED. SIGNIFICANT CONCENTRATION RATIOS ARE OBTAINABLE WITH THIS TECHNIQUE.

1976-0607 JAYADEV T S
INDUCTION GENERATORS FOR WIND ENERGY CONVERSION SYSTEMS. PROGRESS REPORT FOR THE PERIOD JULY-DECEMBER 1975.
NTIS, FEBRUARY 1976. 54 P.
AER-75-00653

THIS IS A REPORT ON THE APPLICATION OF INDUCTION GENERATORS IN WIND ENERGY CONVERSION SYSTEMS (WECS). THE CONVENTIONAL INDUCTION GENERATOR, WHICH IS AN INDUCTION MACHINE WITH A SQUIRREL CAGE ROTOR, HAD BEEN USED IN LARGE WIND POWER PLANTS IN EUROPE, BUT HAS NOT CAUGHT MUCH ATTENTION UNTIL NOW BY DESIGNERS OF LARGE SYSTEMS IN THIS COUNTRY. EVEN FOR SMALL SYSTEMS OPERATING ON UTILITY POWER LINES, THE SIMPLEST AND CHEAPEST GENERATING SCHEME IS THE CONVENTIONAL INDUCTION GENERATOR. SOMEHOW, THIS POINT HAS NOT CAUGHT THE ATTENTION OF SMALL SYSTEM DEVELOPERS AS WELL. PART I OF THIS REPORT BRIEFLY REVIEWS THE INDUCTION GENERATOR WITH A SQUIRREL CAGE ROTOR AND DEVELOPS USEFUL DESIGN TECHNIQUES TO BUILD INDUCTION GENERATORS FOR WIND ENERGY APPLICATION. PART II DESCRIBES THE DOUBLE OUTPUT INDUCTION GENERATOR (DOIG)--SO-CALLED BECAUSE POWER IS FED INTO THE GRID FROM THE STATOR, AS WELL AS THE ROTOR. IT IS A WOUND ROTOR INDUCTION MACHINE WITH POWER ELECTRONICS TO CONVERT ROTOR SLIP FREQUENCY POWER TO THAT OF LINE FREQUENCY. IT IS SHOWN THAT BY VARYING THE FIRING ANGLE OF SCR'S THE OUTPUT CHARACTERISTICS OF THE GENERATOR COULD BE PERFECTLY MATCHED WITH THE CHARACTERISTICS OF WIND TURBINE. FURTHER, THE SPEED COULD VARY FROM SYNCHRONOUS SPEED TO ANY VALUE, SAY, DOUBLE THE SYNCHRONOUS, MAKING THE SYSTEM A VARIABLE SPEED ONE AND RESULTING IN INCREASED ENERGY OUTPUT. THUS, AN IDEAL GENERATION SCHEME IS REALIZED WITH DOIG, WHICH IS SIMPLE, ECONOMICAL, AND EFFICIENT OPERATING AS A VARIABLE SPEED SYSTEM.

1976-0608 JAYADEV T S
NOVEL ELECTRIC GENERATION SCHEMES FOR WIND POWER PLANTS. ACCG AND DOIG, PART I: EXECUTIVE SUMMARY.
NTIS, JULY 30, 1976. 26 P.
PB80-190838

TWO NOVEL ELECTRIC GENERATION SCHEMES FOR WIND POWER PLANTS ARE EVALUATED: AN A.C. COMMUTATOR GENERATOR (ACCG) AND THE ROTOR FED INDUCTION GENERATOR. THE REPORT PRESENTS EXPERIMENTAL AND ANALYTICAL RESULTS AND CONCLUSIONS WHICH INCLUDE TECHNICAL INFORMATION AND COST DATA. ACCG IS A MACHINE SIMILAR TO THE D.C. MACHINE AND HAS SIMILAR PERFORMANCE CHARACTERISTICS. ALTHOUGH THERE ARE NO LIMITATIONS ON THE USE OF THIS MACHINE FOR WIND POWER GENERATION, THE COST COUPLED WITH LACK OF A U.S. MANUFACTURER SEVERELY LIMITS ITS POTENTIAL FOR USE IN VARIABLE SPEED CONTACT FREQUENCY GENERATION. RESEARCH ON THE ROTOR FED INDUCTION GENERATOR LED TO A POWER ELECTRONIC CIRCUIT CONNECTED TO THE ROTOR CIRCUIT WHICH OPERATES AS A GENERATOR WITH BROAD POWER VS. SPEED CHARACTERISTICS. THIS IS APPLICABLE TO WIND ENERGY SYSTEMS IN WHICH SPEED VARIATION IS ABOUT 30-40 PERCENT. THIS SYSTEM CAN ALSO REGENERATE POWER THAT WOULD BE DISSIPATED. BY THIS MEANS, POWER OUTPUT IS OBTAINED FROM BOTH REACTOR AND ROTOR. THE MACHINE THUS DEVISED IS CALLED A DOUBLE OUTPUT INDUCTION GENERATOR (DOIG). DOIG IS THE BEST CHOICE FOR WIND ENERGY SYSTEMS. A CHART COMPARES VARIABLE SPEED CONSTANT FREQUENCY GENERATORS.

1976-0609 JOHNSON C A
RECYCLING ENERGY BY BUILDING HEAT EXCHANGE SYSTEMS.
ASAE, ANNUAL MEETING, LINCOLN, NEBRASKA, JUNE 27-30, 1976. PAPER 76-4035, 24 P.

ECONOMIC FEASIBILITY OF THE USE OF SOLAR OR WIND ENERGY FOR RESIDENTIAL HEATING SYSTEMS IS DEPENDENT UPON MINIMIZING EQUIPMENT SIZE (AND COST) OF COLLECTORS--WHICH CAN BE ACCOMPLISHED BY AVAILABLE TECHNIQUES OF

INSULATION, AUGMENTED BY SUGGESTED DESIGNS FOR WINDOW, WALL AND ROOF HEAT EXCHANGERS--SYSTEMS DESIGNED FOR ENERGY CONSERVATION.

1976-0610 JOHNSTON P
PLANNING FOR SMALL-SCALE USE OF RENEWABLE ENERGY SOURCES IN FIJI.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 144-146.

1976-0611 JORGENSEN G L, LOTKER M, MEIER R C, BRIERLEY D
DESIGN, ECONOMIC AND SYSTEM CONSIDERATIONS OF LARGE WIND-DRIVEN GENERATORS.
IEEE TRANS. POWER APPAR. SYST. PAS-95(3): 870-878, MAY-JUNE 1976.

RESULTS AND CONSIDERATIONS OF AN INVESTIGATION OF LARGE WIND-DRIVEN GENERATORS ARE PRESENTED. THIS PAPER EMPHASIZES THE CONCEPT SELECTION OF WIND-DRIVEN GENERATORS, SYSTEM OPTIMIZATION, CONTROL SYSTEM DESIGN, SAFETY ASPECTS, ECONOMIC VIABILITY ON ELECTRIC UTILITY SYSTEMS AND POTENTIAL ELECTRIC SYSTEM INTERFACING PROBLEMS.

1976-0612 KOEHLER H W
ELECTRIC POWER FROM WIND POWER.
BILD WISS. 13(7): 56-61, JULY 1976. (IN GERMAN)

IN SEARCH OF NEW ENERGY SOURCES, THE INTEREST IN WIND TURBINES WAS ALSO REVIVED. FOR THE PAST FEW YEARS THERE HAVE BEEN EXPERIMENTS WITH VARIOUS TYPES. THE DIAMETERS OF THE ROTORS COME UP TO 53 M. CURRENT PROTOTYPES HAVE CAPACITIES OF UP TO 100 KW. WITHIN THE FRAMEWORK OF AN AMERICAN RESEARCH PROGRAMME, TURBINES WITH A CAPACITY OF 1,000 KW AND A ROTOR DIAMETER OF UP TO 90 M ARE TO BE BUILT BY 1980.

1976-0613 LEE C-O
WINDPOWER STUDIES IN KOREA.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 121-125.

1976-0614 LEE S M
INSOLATION AND WIND: A NATURAL COMBINATION FOR SELF-SUFFICIENT POWER SYSTEMS.
IEEE PHOTOVOLTAIC SPECIALISTS CONFERENCE, 12TH, BATON ROUGE, LOUISIANA, NOVEMBER 15, 1976. NEW YORK, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC., 1976. P. 721-724.

AT REMOTE AND ISOLATED LOCATIONS WHERE THE INSOLATION LEVEL IS HIGH, FREQUENTLY THERE ALSO EXISTS A GOOD WIND POTENTIAL. IN MANY CASES, THERE IS A NEGATIVE SEASONAL CORRELATION BETWEEN WIND AND SOLAR ENERGY. THIS PROVIDES THE POSSIBILITY FOR AN ATTRACTIVE COMBINATION OF THESE SOURCES, WHICH CAN LEAD TO AN EFFECTIVE, SELF-SUFFICIENT ENERGY SYSTEM AT THESE REMOTE INSTALLATIONS.

1976-0615 LITTLER J G F
IS SOLAR HEATING COST EFFECTIVE IN ENGLAND?
NESEA 75: DECISION MAKING IN SOLAR TECHNOLOGY. 1ST CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, AMHERST, MASSACHUSETTS, JUNE 24, 1976. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 111-113.

TOTAL INSTALLED COSTS ON NEW OR OLD BUILDINGS OF AEROGENERATORS, OF SOLAR COLLECTORS FOR WATER HEATING, OR WATER AND SPACE HEATING WITH LIMITED STORAGE, OR WITH INTERSEASONAL STORAGE AND OF MANY CONSERVATION MEASURES SUCH AS HEAT RECOVERY FROM HOT WATER OR VENTED AIR ARE CALCULATED.

1976-0616 MCVEIGH J C
BRIGHTON POLYTECHNIC INTEGRATED SOLAR DWELLING (ISD).
SOLAR COOLING AND HEATING: A NATIONAL FORUM. SOLAR COOLING AND HEATING FORUM, MIAMI BEACH, FLORIDA, DECEMBER 13, 1976. NTIS, 1976. P. 129-133.
CONF-761220

THE BRIGHTON ISD PROJECT IS A SELF-SUFFICIENT DWELLING BASED ON A COMBINATION OF PRACTICAL EXPERIENCE OF THE VARIOUS SYSTEMS--SOLAR, WIND, WATER, FOOD, AND SANITATION--AND THEORETICAL MODELING STUDIES. THERE ARE 12 SQ. M. OF SOLAR COLLECTORS. THE EXPERIMENTAL PROGRAM FOR 1976-1978 AND A FLOOR PLAN ARE GIVEN.

1976-0617 MAGOVENY G S, FORGO E J
HORIZONTAL MULTIDIRECTIONAL TURBINE WINDMILL.
U.S. PATENT NO. 3,938,907, FEBRUARY 17, 1976.

A HORIZONTAL MULTIDIRECTIONAL WINDMILL IS DESCRIBED WHICH COMPRISES A FIXED HOUSING AND A ROTOR, THE HOUSING BEING CONSTITUTED BY UPPER AND LOWER HORIZONTALLY DISPOSED MEMBERS AND A PLURALITY OF VERTICALLY DISPOSED VANES EXTENDING BETWEEN THE MEMBERS. A VERTICAL AXLE IS SECURED TO THE ROTOR MEMBERS. BUCKETS ARE MOUNTED BETWEEN THE ROTOR MEMBERS AND EXTEND INWARDLY FROM THE PERIPHERY THEREOF. EACH BUCKET HAS A FLEXIBLE VERTICALLY DISPOSED SURFACE PORTION AND SUPPORTS FOR THE INNER AND OUTER EDGES OF THE PORTIONS. THE DISTANCE BETWEEN THE SUPPORTS IS VARIED AUTOMATICALLY AS A FUNCTION OF ROTATIONAL SPEED OF THE ROTOR.

1976-0618 MAYER-SCHWINNING W
USEFUL ENERGY FROM WIND ENERGY.
ENVIRONMENTAL POLICIES MEETING ON UNMASTERED GROWTH., BAD BOLL, GERMANY, F.R., APRIL 29, 1976. (IN GERMAN)

THE WORK GROUP REGARDS THE USE OF WIND ENERGY AS THE THIRD LEG OF ENERGY TECHNOLOGY. IT CALCULATES THE WIND UTILIZATION IN VOGELSBERG OVER AN AREA OF 1500 SQ. KILOMETERS WITH 5 PLANTS EACH 100 M BIG ON 1 SQ. KILOMETER AS EXAMPLE. PRODUCTION OF 14,000 MW ELECTRICITY THROUGH 7500 WIND WHEELS CAN BE GENERATED WITH AN INVESTMENT SUM OF UP TO 28 THOUSAND MILLION D-MARK WITHOUT MAINTENANCE COSTS.

1976-0619 MERONEY R N
WIND POWER APPLICATIONS IN RURAL AND REMOTE AREAS.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, DEPARTMENT OF CIVIL ENGINEERING, CEP76-77-RNM-1, 1976.

IT IS REASONABLE TO EXPECT THAT AGRICULTURE, RURAL AND REMOTE AREAS APPLICATIONS CAN AGAIN PLAY AN IMPORTANT ROLE IN THE DEVELOPMENT OF A FUTURE VIABLE WIND ENERGY INDUSTRY IN THE UNITED STATES AS FOSSIL FUELS BECOME MORE SCARCE AND EXPENSIVE. AN EXAMINATION OF THE RURAL AREA ENERGY BUDGET IDENTIFIES NUMEROUS AREAS WHERE WIND MACHINES MAY CONTRIBUTE. EXAMPLES OF SUCH APPLICATIONS ARE (1) PRODUCTION OF HOT WATER FOR RURAL SANITATION

USES; (2) HEATING OF RURAL STRUCTURES AND PRODUCTS; (3) REFRIGERATION OF RURAL STRUCTURES AND PRODUCTS; (4) DRYING OF AGRICULTURAL PRODUCTS; AND (5) IRRIGATION OR AQUACULTURE. A GREAT DEAL OF DEVELOPMENT NEEDS TO BE DONE ON THE DESIGN OF SMALL TO MEDIUM SCALE MACHINES FOR RURAL USE; THE DESIGN OF SIMPLE YET RELIABLE TOWERS; AND THE MATCHING OF WIND MACHINE PERFORMANCE TO THE REQUIREMENTS OF SPECIFIC APPLICATIONS.

1976-0620 MEYER H
GEMINI SYNCHRONOUS INVERTER.
SOL. AGE 1(3): 11-14, MARCH 1976.

THE GEMINI SYNCHRONOUS INVERTER IS A SOLID STATE DEVICE THAT, WHEN INTERPOSED BETWEEN A VARIABLE-VOLTAGE DC POWER SOURCE AND AN AC POWER GRID, CONVERTS THE DC TO AC AT STANDARD LINE VOLTAGES AND FREQUENCIES. IF MORE POWER IS AVAILABLE FROM THE DC SOURCE THAN IS REQUIRED BY THE LOAD, THE EXCESS FLOWS INTO THE POWER GRID. IF LESS POWER IS AVAILABLE THAN IS REQUIRED BY THE LOAD THE DIFFERENCE IS PROVIDED BY THE POWER GRID IN THE NORMAL FASHION.

1976-0621 MILLER R H, MARTINEZ-SANCHEZ M, DUGUNDJI J, LARRABEE E, HUMES T
WIND ENERGY CONVERSION.
NTIS, FEBRUARY 15, 1976. 183 P.
ASRL-TR-184-2, PB-256198

TESTING OF THE WIND TUNNEL MODEL AND AEROELASTIC ANALYSES INDICATE THE SCOPE OF THE PROBLEM INVOLVED IN SELECTING A SUITABLE SPEED FOR A WIND TURBINE. THIS REPORT DISCUSSES THE PROBABILITY THAT AT LEAST FOR CONVENTIONAL ROTOR TYPE WIND TURBINES, A CONSTANT TIP SPEED RATHER THAN A CONSTANT RATIO OF TIP SPEED TO WIND SPEED IS A MORE SATISFACTORY DESIGN SOLUTION. THE PENALTY INVOLVED IN MAINTAINING CONSTANT TIP SPEED IS INVESTIGATED AS PART OF THE CONTROL STRATEGY RESEARCH (TASK I) IN ORDER TO DETERMINE WHETHER CONTROL SHOULD BE CONSIDERED FOR A CONSTANT SPEED OR FOR VARIABLE SPEED (CONSTANT TIP SPEED RATIO) WIND TURBINE. AS A RESULT OF EXPERIENCE WITH THE AEROELASTIC ANALYSES (TASK 3), IT WAS DECIDED TO CONCENTRATE ON THE CONSTANT SPEED CONFIGURATION. TASK 2 IS CONCERNED WITH THE EXPERIMENTAL AND THEORETICAL INVESTIGATION OF AIRLOADS IN THE PRESENCE OF WIND SHEAR AND GUST.

1976-0622 MUKHERJEE T
NATIONAL SCIENCE FOUNDATION (U.S.A.) SOLAR ENERGY PROGRAM.
HELIOTECHNIQUE AND DEVELOPMENT. INTERNATIONAL CONFERENCE ON HELIOTECHNIQUE AND DEVELOPMENT, DHAHRAN, SAUDI ARABIA, NOVEMBER 2-6, 1975. CAMBRIDGE, MASSACHUSETTS, DEVELOPMENT ANALYSIS ASSOCIATES, INC., 1976. VOL. 2, P. 696-701.

THE MAIN OBJECTIVES AND MAJOR ACCOMPLISHMENTS OF THE UNITED STATES' SOLAR ENERGY PROGRAM INITIATED UNDER THE FEDERAL LEADERSHIP OF THE NATIONAL SCIENCE FOUNDATION ARE REVIEWED. WIND ENERGY CONVERSION IS ONE OF THE SIX APPLICATIONS CONSIDERED.

1976-0623 OOSTHUIZEN P H, RUSH C K
PROSPECTS FOR ENERGY FROM ALTERNATE SOURCES IN CANADA.
CANADIAN NUCLEAR ASSOCIATION ANNUAL INTERNATIONAL CONFERENCE, 16TH, TORONTO, ONTARIO, JUNE 13-16, 1976. VOL. 3: NUCLEAR ENERGY AND THE PUBLIC. TORONTO, CANADIAN NUCLEAR ASSOCIATION, 1976. P. 3-30.

THIS PAPER REVIEWS THE MAJOR ALTERNATE ENERGY SOURCES WHICH WILL BECOME AVAILABLE TO CANADA IN THE FUTURE. THESE SOURCES INCLUDE: SOLAR ENERGY; WIND ENERGY; TIDAL ENERGY; GEOTHERMAL ENERGY; OCEAN TEMPERATURE GRADIENT ENERGY; WAVE ENERGY; AND BIOMASS ENERGY.

1976-0624 PAVLECKA V H
METHOD AND DEVICE FOR POWER GENERATION USING WIND ENERGY.
GERMAN (FRG) PATENT NO. 2,535,297/A/, FEBRUARY 19, 1976. 33 P. (IN GERMAN)

THE PATENT DESCRIBES A SO-CALLED "WIND ENGINE" DRAWING PRIMARY ENERGY FROM WIND. THE DEVICE IS CHARACTERIZED BY A STATOR WHICH INCREASES THE VELOCITY OF THE AIR FLOW. THIS RELATIVELY VERY FAST AIR CURRENT DRIVES A TURBINE. THE SHAPE AND THE MODE OF ACTION OF THE STATOR--WHICH CONSISTS OF GUIDE BLADES--AND OF THE MOVING BLADES AND THE ROTOR ARE DESCRIBED. RECOMMENDED STRUCTURAL TYPES OF THE WIND ENGINE ARE ILLUSTRATED BY DRAWINGS.

1976-0625 POLAR ENERGY RESOURCES POTENTIAL. REPORT PREPARED FOR THE COMMITTEE ON SCIENCE AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, NINETY-FOURTH CONGRESS, SECOND SESSION BY THE CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1976. 187 P.

THE STUDY COVERS BOTH ANTARCTIC AND ARCTIC ENERGY RESOURCES INCLUDING OIL, COAL, NATURAL GAS, HYDROELECTRIC POWER, GEOTHERMAL ENERGY, OIL SHALE, URANIUM, SOLAR ENERGY, AND WIND POWER. THE ENVIRONMENT, GEOLOGY, TOPOGRAPHY, CLIMATE, AND WEATHER ARE ALSO TREATED. CONSIDERATION IS GIVEN TO THE INTERNATIONAL RELATIONS INVOLVED IN ENERGY RESOURCE EXPLOITATION IN BOTH POLAR REGIONS, AND THE TECHNOLOGIES NECESSARY TO DEVELOP POLAR RESOURCES ARE DISCUSSED. THE POTENTIAL RESOURCES IN EACH AREA ARE DESCRIBED. RESOURCE POTENTIALS SOUTH OF 60 DEGREES IN ANTARCTICA AND NORTH OF 60 DEGREES IN THE ARCTIC ARE SUMMARIZED.

1976-0626 PORTER W H
ELECTRICAL GENERATING SYSTEM.
U.S. PATENT NO. 3,988,592, OCTOBER 26, 1976. 6 P.

AN ELECTRICAL GENERATING SYSTEM IS DESCRIBED IN WHICH A HERMETICALLY SEALED FLOTATION SPHERE, PREFERABLY CONSTRUCTED OF PLASTIC, IS ANCHORED TO A SEA BED. THE SPHERE CARRIES A CIRCUMFERENTIAL FENDER ON THE OUTSIDE THEREOF IN WHICH IS LOCATED A PLURALITY OF SCREWS OPEN TO SEAWATER WHICH GENERATE ELECTRICITY FROM THE ACTION OF GROUND SWELLS. A WIND TURBINE IS MOUNTED ON TOP OF THE SPHERE FOR GENERATING ELECTRICITY FROM WIND ACTION AND A SOLAR GENERATOR IS DISPOSED DIRECTLY BENEATH THE WIND TURBINE AND ON THE UPPER SURFACE OF THE SPHERE FOR GENERATING ENERGY FROM SOLAR HEAT. AN AIR COMPRESSOR IS DISPOSED BENEATH THE SPHERE FOR GENERATING ELECTRICITY FROM TIDAL ACTION.

1976-0627 PREUSS R, MORINO L
WECS INCOMPRESSIBLE COMPLEX CONFIGURATION AERODYNAMICS (WICCA).
NTIS, MAY 1976. 53 P.
PB-288474

A FINITE-ELEMENT METHOD FOR DETERMINING THE AERODYNAMIC LOADING ON ROTORS IS PRESENTED. THE REPORT DESCRIBES THE DEVELOPMENT OF THE FORMULATION FOR THE STEADY STATE AND NUMERICAL RESULTS FOR HORIZONTAL AXIS WINDMILLS. IT

IS BASED ON A GENERAL THEORY FOR INCOMPRESSIBLE POTENTIAL AERODYNAMICS FOR COMPLEX CONFIGURATIONS IN A ROTATING FRAME OF REFERENCE. IF A ROTOR IS ROTATING AT CONSTANT ANGULAR VELOCITY AND IS DIRECTED ALONG A UNIFORM WIND DISTRIBUTION, THE PROBLEM MAY BE SOLVED IN THE STEADY STATE FOR A FRAME OF REFERENCE ROTATING WITH THE ROTOR. A COMPUTER PROGRAM (WICCA) HAS BEEN DESIGNED TO INCORPORATE THE METHOD, AND RESULTS COMPARE FAVORABLY WITH AN EXISTING LIFTING SURFACE FORMATION. THE PROGRAM HAS BEEN MODIFIED TO INCLUDE THE HUB FOR ANALYSIS. FURTHER MODIFICATIONS ARE PLANNED TO STUDY THE EFFECT OF THE CONING ANGLE, CHORD LENGTH DISTRIBUTION, BLADE PITCH ANGLE DISTRIBUTION, AND AIRFOIL SECTION. THE METHOD MAY ALSO BE APPLIED TO UNSTEADY FLOW PROBLEMS SUCH AS NON-UNIFORM WIND DISTRIBUTIONS (WINDMILLS IN SHEAR WINDS). THE APPENDICES CONTAIN GRAPHS, THE VERIFICATION OF EXPRESSIONS FOR THE INDEFINITE DOUBLET AND SOURCE INTEGRALS, PROOF OF FAR WAKE, AND HUB GEOMETRY.

1976-0628 RAMAKUMAR R
TECHNICAL AND SOCIO-ECONOMIC ASPECTS OF SOLAR ENERGY AND RURAL DEVELOPMENT IN DEVELOPING COUNTRIES.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 9. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 162-176.

A STEP-BY-STEP APPROACH IS PRESENTED FOR THE ADOPTION OF TECHNOLOGIES DESIGNED TO EXPLOIT RENEWABLE (SOLAR) ENERGY SOURCES AT THE RURAL LEVEL. IT IS CENTERED AROUND THE ESTABLISHMENT OF RURAL ENERGY CENTERS TO IMPROVE THE BASIC LIVING ENVIRONMENT. IN DUE COURSE, THE ROLE OF THESE CENTERS IS TO BE EXPANDED TO ENCOMPASS AGRICULTURAL AND SMALL-SCALE INDUSTRIAL ACTIVITIES. THE TECHNICAL AND SOCIO-ECONOMIC ASPECTS OF THE STEP-BY-STEP INTRODUCTION OF SOLAR ENERGY SYSTEMS IN RURAL AREAS IN DEVELOPING COUNTRIES ARE DISCUSSED.

1976-0629 REDFIELD D
SOLAR ENERGY: ITS STATUS AND PROSPECTS.
RCA ENG. 22: 71-75, JUNE 1976.

THE DIFFERENT SUBPROGRAMS ENCOMPASSED BY THE NATIONAL PLAN FOR SOLAR RESEARCH AND DEVELOPMENT RECENTLY ISSUED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) ARE DESCRIBED BRIEFLY. OF THE SOLAR ELECTRIC APPLICATIONS CURRENTLY UNDER DEVELOPMENT, WIND ENERGY CONVERSION SYSTEMS AND SOLAR PHOTOVOLTAIC CONVERSION SYSTEMS ARE THE MOST ADVANCED.

1976-0630 REGIONAL WIND, INDIVIDUAL WIND: TWO STUDIES ASSESS WAYS IN WHICH WE CAN USE THE WIND. I. FILL THE POWER NEEDS FOR THE WHOLE OF LONG ISLAND.
SOL. AGE 1(3): 26-28, 1976.

THE USE OF WIND POWER PLANTS TO REPLACE EXISTING POWER PLANTS ON LONG ISLAND, NEW YORK, IS DISCUSSED. GENERATOR SCHEMES AND ECONOMIC CONSIDERATIONS ARE ANALYZED.

1976-0631 REPORT OF THE STATE ENERGY COMMITTEE OF SOUTH AUSTRALIA.
NTIS, MAY 1976. 185 P.
NP-23032

THIS REPORT ON SOUTH AUSTRALIAN ENERGY DISCUSSES THE PRINCIPAL ENERGY RESOURCES ALREADY IN USE, AND ENERGY SOURCES POTENTIALLY AVAILABLE TO SOUTH AUSTRALIA WHETHER OR NOT THE REQUIRED TECHNOLOGIES ARE FULLY DEVELOPED. IT CONSIDERS NATURALLY OCCURRING FORMS SUCH AS SOLAR ENERGY, WIND ENERGY, GEOTHERMAL ENERGY, AND HYDROLOGICAL SOURCES. ITS ALSO CONSIDERS SEVERAL DERIVED ENERGY TECHNOLOGIES SUCH AS HYDROGEN GAS, THE RECYLING OF WASTE MATERIAL, FUEL CELLS, AND THE RELATIVELY NOVEL MAGNETOHYDRODYNAMIC METHOD OF GENERATING ELECTRICITY.

1976-0632 RESEARCH, DEVELOPMENT AND USE OF WIND ENERGY IN THAILAND.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 108-114.

1976-0633 RI Z
PROCESS FOR STORING ELECTRICITY FOR A FAST ADVANCING CONVEYANCE AND DEVICE FOR STORING SUCH ELECTRICITY.
U.S. PATENT NO. 3,942,025, MARCH 2, 1976. 1 P.

A DEVICE FOR STORING ELECTRICITY FOR A FAST MOVING CONVEYANCE IS DESCRIBED AND CONSISTS OF A WINDMILL HAVING A ROTATING SHAFT WITH RADIALLY AND LINEARLY EXTENDING ARMS, THE LATTER HAVING ENDS DEFINING SUBSTANTIALLY CIRCULAR OPENINGS, THE SHAFT BEING DISPOSED ON A FAST MOVING CONVEYANCE; AND GENERATOR MEANS CONNECTED TO THE ROTATING SHAFTS OF THE WINDMILL FOR CAUSING ELECTRICITY TO BE GENERATED. THE WINDMILL INCLUDES A PLURALITY OF SUBSTANTIALLY BOWL-LIKE WINGS DISPOSED IN CIRCULAR OPENINGS, RESPECTIVELY, AND INCLUDING A BOTTOM PLATE PROVIDED AT A BOTTOM EDGE PORTION OF EACH OF THE WINGS.

1976-0634 SELLMAN D L
WIND MOTORS.
U.S. PATENT NO. 3,986,786, OCTOBER 19, 1976. 4 P.

WIND MOTORS ARE DESCRIBED WHICH ARE PROPELLED BY THE IMPACT OF THE WIND AGAINST THE VANES OF AN IMPELLER WHEEL. WIND CHANNELING DEVICES GATHER THE WIND FROM A LARGE AREA AND FUNNEL IT AT INCREASED DENSITY AND PRESSURE TO APPLY MULTIPLIED IMPACT AGAINST THE IMPELLER VANES.

1976-0635 SHEIBLY D W, GAHN R F
GELS AS BATTERY SEPARATORS FOR SOLUBLE ELECTRODE CELLS.
NTIS, JULY 20, 1976. 18 P.
PAT-APPL-707 124, NASA-CASE-LEW-12364-1, N76-28643

GELS ARE FORMED FROM SILICA POWDERS AND HYDROCHLORIC ACID. THE GELS CAN THEN BE IMPREGNATED INTO A POLYMERIC FOAM, AND THE RESULTANT SHEET MATERIAL CAN THEN BE USED IN APPLICATIONS WHERE THE TRANSPORT OF CHLORIDE IONS IS DESIRED. SPECIFICALLY DISCLOSED IS THE UTILIZATION OF THE SHEET IN ELECTRICALLY RECHARGEABLE REDOX FLOW CELLS WHICH FIND APPLICATION IN BULK POWER STORAGE SYSTEMS.

1976-0636 SHERMAN M M
THE DESIGN AND CONSTRUCTION OF LOW-COST WINDPOWERED WATER PUMPING SYSTEMS.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 76-104.

1976-0637 SHERMAN M M
DEVELOPMENT OF WIND ENERGY UTILIZATION IN ASIA AND THE PACIFIC.

UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 61-75.

1976-0638 SHORE J, PULLING F
INTEGRATED SOLAR DWELLING.
ALTERN. SOURCES ENERGY NO. 22: 8-9, SEPTEMBER 1976.

THE INTEGRATED SOLAR DWELLING IS AN INDEPENDENTLY SERVICED DWELLING BASED ON PRACTICAL EXPERIENCE OF THE VARIOUS SYSTEMS: SOLAR, WIND, WATER, FOOD AND SANITATION. IT IS LOCATED IN BRIGHTON, ENGLAND. THE FLOOR PLAN OF THE 36 SQ. M. LIVING UNIT LINKED TO A SOUTH FACING 38 SQ. M. CONSERVATORY IS SHOWN. THERE ARE 12 SQ. M. OF SOLAR HEATING PANELS. A WIND GENERATOR IS PROPOSED FOR LIGHTING. THE THERMAL PERFORMANCE AND INSULATION ARE DISCUSSED.

1976-0639 SUCIU E, MORINO L
WECS INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS (WILSA).
NTIS, MAY 1976. 44 P.
ENGR-COMP-TN-76-01, PB80-191620

A METHOD IS DESCRIBED FOR COMPUTING THE DISTRIBUTION FOR A ZERO-THICKNESS HORIZONTAL AXIS WINDMILL, AS WELL AS FOR OBTAINING THE POWER COEFFICIENT. THE PROBLEM IS FORMULATED IN TERMS OF VELOCITY POTENTIAL, AND THE STUDY DEALS WITH A NONLINEAR FINITE-ELEMENT LIFTING-SURFACE ANALYSIS OF HORIZONTAL-AXIS WINDMILLS IN A STEADY INCOMPRESSIBLE, INVISCID, IRROTATIONAL FLOW, WITH A PRESCRIBED HELICOIDAL WAKE. A ZERO-ORDER-FINITE-ELEMENT ANALYSIS IS USED WITH A STRAIGHT-VORTEX LINE WAKE. THE CORRECT WAKE GEOMETRY IS OBTAINED AND THE PRESSURE COEFFICIENT CALCULATED USING BOTH LINEARIZED AND NONLINEAR FORMS OF THE BERNOULLI THEOREM. THE NUMERICAL RESULTS COMPARE WELL WITH THOSE OBTAINED WITH WINDMILL INCOMPRESSIBLE COMPLEX CONFIGURATION AERODYNAMICS (WICCA), A COMPUTER PROGRAM FOR SOLVING THE SAME PROBLEM WHICH USES A COMPLETELY DIFFERENT INTEGRAL EQUATION. A NUMBER OF SUGGESTIONS ARE OFFERED TO IMPROVE THE MODEL PRESENTED.

1976-0640 TECHNOLOGY ASSESSMENT AND FORECAST. SIXTH REPORT.
NTIS, JUNE 1976. 190 P.
PAT-036.3-7606, PB-254 88

THE DOCUMENT REVIEWS 15 TECHNOLOGIES WHICH ARE THE SUBJECT OF HEAVY PATENTING BY FOREIGN RESIDENT INVENTORS, AND 22 TECHNOLOGIES WITH HIGH PATENT ACTIVITY. PATENT ACTIVITY IS REVIEWED IN SOLAR ENERGY TECHNOLOGY, THE PRODUCTION OF ENERGY FROM WASTE MATERIAL, AND WIND GENERATION OF ELECTRICITY.

1976-0641 TEWARI S K
A REVIEW OF EFFORTS MADE IN INDIA FOR WIND POWER UTILIZATION.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 105-107.

1976-0642 TROLL J H
DEVICE FOR THE UTILIZATION OF WIND ENERGY.
GERMAN (FRG) PATENT NO. 2,535,138/A/, FEBRUARY 19, 1976. 13 P. (IN GERMAN)

A DEVICE FOR THE UTILIZATION OF WIND ENERGY IS CLAIMED WHICH CAN BE OPERATED IN A WIDE RANGE OF WIND VELOCITIES AND ENABLES THE CONVERSION OF WIND ENERGY INTO MECHANICAL AND/OR ELECTRICAL POWER. THE OUTPUT OF THIS DEVICE WILL BE UNIFORM AT DIFFERENT WIND VELOCITIES.

1976-0643 THE UTILIZATION OF WIND ENERGY IN AUSTRALIA.
UNITED NATIONS. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC. PROCEEDINGS OF THE MEETING OF THE EXPERT WORKING GROUP ON THE USE OF SOLAR AND WIND ENERGY, BANGKOK, MARCH 2-9, 1976. ENERGY RES. DEV. SER. NO. 16. NEW YORK, UNITED NATIONS, 1976. P. 115-116.

1976-0644 WIND ENERGY MISSION ANALYSIS. APPENDIX.
NTIS, APRIL 1976. 268 P.
SAN/1075-1/2

THESE APPENDICES INCLUDE INFORMATION ON THE AVERAGE POWER DENSITY OF THE WIND FOR THE U.S. AND ITS TERRITORIES, CHARACTERISTICS OF THE VERTICAL AXIS MACHINE, STRUCTURAL ANALYSIS DETAILS, AERODYNAMIC ANALYSIS, COST FACTORS FOR WTG COST MODEL, EVALUATION OF UTILITY APPLICATIONS, INDUSTRIAL COST OF ELECTRICITY, NATIONAL IMPACT OF WECS, PUBLIC ACCEPTANCE, AND ENVIRONMENTAL ISSUES.

1976-0645 WIND ENERGY + WATER + AIR = FOOD.
MACH. DES. 48(27): 4, NOVEMBER 25, 1976.

HARNESSING THE WIND TO PRODUCE ELECTRICITY AND USING THE ELECTRICITY TO GET CHEMICALS FROM WATER AND AIR MAY PROVE TO BE AN IMPORTANT NEW METHOD OF PRODUCING FERTILIZER. LOCKHEED-CALIFORNIA IS INVESTIGATING THE TECHNICAL FEASIBILITY AND ECONOMICS OF THE PROCESS.

1976-0646 WIND POWER PROBLEMS.
SCI. DIG. 80: 20, OCTOBER 1976.

NASA'S EXPERIENCE WITH A 100 KW TURBINE IN SANDUSKY, OHIO, IS DESCRIBED. IN THE FIRST 9 MOS. OF OPERATION THE TURBINE LOGGED LESS THAN 30 HOURS OF OPERATION, DUE TO STRESSES ON THE BLADES.

1976-0647 WRIGHT J H, ROFFMAN H K
ENERGY SHORTAGE AND POTENTIAL ENVIRONMENTAL IMPACTS OF NONCONVENTIONAL ENERGY SOURCES.
AM. NUCL. SOC. TRANS. SUPPL. 23(1): 7-8, 1976.

1976-0648 YING S J
MULTIPLE CONTROL CIRCUIT FOR ELECTRICAL UNIT AND AUTOMATIC CONTROL CIRCUIT FOR WINDMILL GENERATOR.
ASME PAPER 76-DET-100, 1976. 3 P.

TWO CIRCUITS ARE INTRODUCED IN THIS PAPER. ONE IS DESIGNED FOR CONTROLLING AN ELECTRICAL UNIT AT MANY DIFFERENT LOCATIONS. THE PARTS REQUIRED FOR ONE CONTROL SET ARE JUST ONE NO (NORMAL OPEN) SWITCH AND ONE NC (NORMAL CLOSED) SWITCH. THE OTHER CIRCUIT IS DESIGNED FOR CONTROLLING THE OUTPUT OF UNSTEADY POWER SUPPLY, SUCH AS A WINDMILL-OPERATED GENERATOR. THE CONTROL CAN AUTOMATICALLY TURN ON THE CIRCUIT TO THE LOAD WHEN THE

VOLTAGE IS HIGH ENOUGH. THE CIRCUIT TO EACH LOAD IS CONTROLLED BY A SILICON-CONTROLLED RECTIFIER AND A ZENER DIODE. A VOLTAGE REGULATOR AND BATTERIES ARE USED TO STABILIZE THE VOLTAGE SUPPLYING TO THE ELECTRICAL UNITS.

1976-0649 ZIMMERMANN G
TRANSFORMER OF ENERGY DIRECTION FOR USE IN AERODYNAMIC AND HYDRODYNAMIC FLOW.
GERMAN (FRG) PATENT NO. 2,507,295/A/, JANUARY 25, 1977. 11 P. (IN GERMAN)

THE INVENTION REFERS TO A FLOW POWER ENGINE WHERE THE POWER WINGS, PICKING UP THE THRUST AND BEING ARRANGED AROUND THE AXIS OF THE ENGINE BY MEANS OF WING CARRIES, ARE BROUGHT INTO THE POSITION REQUIRED FOR POWER PICK-UP BY THE FLOW ITSELF. UNTIL THE NEXT POWER PICK-UP PHASE THE FLOW PUTS THEM INTO A POSITION IN WHICH THEY DO NOT PUT UP ANY RESISTANCE TO THE FLOW. IF THE FLOW DIRECTION IS CHANGED, E.G., ON TRANSITION FROM HIGH TIDE TO LOW TIDE, THE SENSE OF ROTATION DOES NOT CHANGE. THE MASS OF THE POWER WINGS IS EQUAL TO THAT OF THE AMOUNT OF WATER DISPLACED, E.G., BY MEANS OF AIR-FILLED CAVITIES, IN ORDER THAT THEY DO NOT CHANGE THEIR POSITION BY BUOYANCY OR GRAVITY. THE POWER WINGS FOLD ON THE CARRIERS TURNING AROUND THE WIND AXIS UNTIL A PROLONGATED STRAIGHT LINE IS FORMED. BY MEANS OF THE BRAKE ARM OR BRAKE ROD THEY ARE PREVENTED FROM FOLDING ANY FURTHER.

1976-0650 GARWOLI W N
INDIRECT USE OF SOLAR ENERGY.
AUST. PHYS. 13(11): 187, 1976.

THE RESEARCH IS CONSIDERED ON WIND ENERGY, ANAEROBIC DIGESTION OF ORGANIC WASTES, COLLECTION OF WIND ENERGY AT SEA, AND CONVERSION OF THE ENERGY TO H FOR STORAGE.

1975-0553 ADAMS A
YOUR ENERGY-EFFICIENT HOUSE: BUILDING AND REMODELING IDEAS.
CHARLOTTE, VERMONT, GARDEN WAY PUBL. CO., 1975. 118 P.

1975-0554 BADE P
FLAPPING-VANE WIND MACHINE AND ROD PISTON PUMP, AN INTEGRATED DELIVERY SYSTEM FOR LARGE WELL DEPTHS AND SMALL FLOW RATES.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 71-82.

1975-0555 BADE P
FLAPPING-VANE WIND MACHINE.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 83-88.

1975-0556 BOCKRIS J O
TIME AVAILABLE FOR THE RESEARCH, DEVELOPMENT, AND BUILDING OF A NEW ENERGY BASE.
ENERGY: THE SOLAR-HYDROGEN ALTERNATIVE. NEW YORK, JOHN WILEY AND SONS, INC., 1975. P. 21-43.

THE FOLLOWING TOPICS ARE COVERED: EXHAUSTION OF FOSSIL FUELS; ENERGY AND LIVING STANDARDS; AVAILABILITY OF VARIOUS ENERGY RESOURCES; FOSSIL FUELS; WATER POWER; TIDAL POWER; GEOTHERMAL POWER; WIND POWER; THE TIME EXHAUSTION OF THE WORLD'S FOSSIL FUELS; MATHEMATICAL MODELS FOR PREDICTING RESOURCE EXHAUSTION TIME; ESTIMATION OF THE EXHAUSTION OF FUEL SUPPLY; TIME NEEDED TO REALIZE A MAJOR TECHNOLOGICAL CHANGE; LIMITS TO GROWTH; LIMITS FOR THE SUPPLY OF ATOMIC ENERGY; AND THE NEGATIVE SIDE OF THE SHORT-TERM (UP TO 2000 A.D.) SITUATION.

1975-0557 BOCKRIS J O
SOURCES OF ABUNDANT, CLEAN ENERGY.
ENERGY: THE SOLAR-HYDROGEN ALTERNATIVE. NEW YORK, JOHN WILEY AND SONS, INC., 1975. P. 57-83.

THE FOLLOWING SOURCES OF ENERGY ARE DISCUSSED: SOLAR, GRAVITATIONAL (HYDROELECTRIC AND TIDES), WIND POWER, GEOTHERMAL, CONTROLLED FISSION, AND CONTROLLED FUSION.

1975-0558 BRUCKNER A, GHEORGHE A
SYSTEMATIC CONSIDERATIONS ABOUT A POWER GENERATION SCHEME. CONCEPT OF AIR-GENERATOR--STORAGE POND.
ENERGETICA 23(9-10): 233-238, SEPTEMBER-OCTOBER 1975. (IN RUMANIAN)

AN ANALYSIS OF A MODEL FOR POWER GENERATION USING WIND ENERGY, WITH A STORAGE POND, IS PRESENTED.

1975-0559 COMM R
REPORT TO THE SECRETARY OF THE INTERIOR OF THE ADVISORY COMMITTEE.
ENERGY COMMUN. 1(1) 57-103, 1975.

THE REPORT IS THE PRODUCT OF A FULL-YEAR EFFORT, EMPLOYING AN INTERDISCIPLINARY APPROACH, TO STUDY THE SITUATION AND PROBLEMS OF THE NATION'S ENERGY ECONOMY. SUBJECTS INCLUDE ELEMENTAL AND NEW TECHNOLOGY ENERGY SOURCES, SUCH AS WIND, SUN AND TIDES; PETROLEUM LIQUID FUELS; NATURAL GAS; COAL; WATER; NUCLEAR ENERGY; SYNTHETIC OILS; SYNTHETIC GAS. RECOMMENDATIONS ARE GIVEN FOR EACH.

1975-0560 CURL H
WINONA: TOWARDS AN ENERGY CONSERVING COMMUNITY.
MINNEAPOLIS, MINNESOTA, UNIVERSITY OF MINNESOTA, 1975.

THE UTILIZATION OF SOLAR ENERGY, WIND ENERGY, BIO-FUELS, AND AQUA/AGRICULTURE IS DISCUSSED. BIBLIOGRAPHIES ARE PRESENTED AND OTHER PERTINENT INFORMATION IS INCLUDED ON THESE SUBJECTS PRECEEDING THE PRESENTATION ON WINONA, MINNESOTA. THE APPLICATION OF ENERGY-CONSERVING TECHNOLOGY TO A TOTAL EXISTING COMMUNITY IS THEN EXAMINED IN DEPTH USING WINONA AS THE SAMPLE CITY. ITS POPULATION IS 27,000 PERSONS WITH THREE INSTITUTIONS OF HIGHER LEARNING.

1975-0561 DELPHIANS PLAN ENERGY-EFFICIENT AGRICULTURAL FACILITY.
SHERIDAN, OREGON, DELPHIAN FOUNDATION, 1975. 6 P.

A PRODUCTIVE RESEARCH AND EDUCATIONAL DEMONSTRATION PLAN OF EXPERIMENTAL TECHNOLOGIES SUCH AS SOLAR AND WIND ENERGY, AQUACULTURE, METHANE PRODUCTION, RECYCLED BY-PRODUCTS, BIOLOGICAL FILTRATION, AND POLYCULTURE ON ONE SITE IS PRESENTED. THE 1300-ACRE SITE IN OREGON WILL PRODUCE FOOD, FUEL, FIBER, AND PRESERVE THE ENVIRONMENT. THE LOW-ENTROPY (HENCE, THE NAME, LOW ENTROPY AGRICULTURAL FACILITY (LEAF I)) SYSTEMS ARE INTEGRATED INTO A COMPATIBLE NETWORK THAT MAINTAINS HIGH PRODUCTION AND ENSURES THE PRESERVATION OF THE ENVIRONMENT.

1975-0562 DOERING E
OVERVIEW OF THE ERDA SOLAR PROGRAM: A SYNOPSIS.
SELECTED AND EDITED PROCEEDINGS OF SOLAR ENERGY FOR VIRGINIA. SOLAR ENERGY FOR VIRGINIA CONFERENCE, RICHMOND, VIRGINIA, AUGUST 19, 1975. NTIS, 1975. P. 7-13.
CONF-7508105

1975-0563 DORNER H
EFFICIENCY AND ECONOMIC COMPARISON OF DIFFERENT WEC--(WIND ENERGY CONVERTER) ROTOR SYSTEMS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 43-70.

1975-0564 DUBACH P
SIMPLE ANEMOMETRIC EQUIPMENT.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 119-129.

1975-0565 ECCLI E
LOW-COST, ENERGY-EFFICIENT SHELTER FOR THE OWNER AND BUILDER.
EMMAUS, PENNSYLVANIA, RODALE PRESS, 1976. 408 P.

1975-0566 ENERGY HISTORY OF THE UNITED STATES 1776 TO 1976.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1975. 24 P.

A BICENTENNIAL ENERGY WALL CHART AND ACCOMPANYING MANUAL DEPICT THE HISTORY OF U.S. ENERGY USE SINCE 1776.

COLOR BARS FOR WOOD, COAL, ANIMAL ENERGY, WIND AND WATER POWER, GASEOUS AND LIQUID FUELS, ELECTRICITY, SOLAR ENERGY, GEOTHERMAL ENERGY, AND NUCLEAR FUELS HELP TIE SPECIFIC HISTORICAL EVENTS WITH ENERGY SOURCES. THE COLOR BARS ARE ARRANGED VERTICALLY IN A YEAR-BY-YEAR CHRONOLOGY AND HORIZONTALLY BY DECADES. PROJECTIONS TO THE YEAR 2001 PREDICT THE USES AND TECHNOLOGIES OF EACH ENERGY SOURCE AND THE POSSIBILITY OF NEW DISCOVERIES.

1975-0567 ENERGY: TRANSPORT, STORAGE AND CONVERSION.
THERMOFLUIDS CONFERENCE, PREPRINTS OF PAPERS. SYDNEY, AUSTRALIA, INSTITUTE OF ENGINEERING, NATIONAL CONFERENCE PUBLICATION NO. 75/9, 1975. 142 P.
THERMOFLUIDS CONFERENCE, BRISBANE, AUSTRALIA, DECEMBER 3-5, 1975.

THE VOLUME CONTAINS 19 PAPERS DEALING WITH POWER GENERATION BY UNCONVENTIONAL MEANS SUCH AS SOLAR, MHD, COAL GAS ENGINES, GEOTHERMAL, AND WIND. SEVERAL PAPERS DISCUSS THE METHODS OF POWER TRANSMISSION.

1975-0568 FAUEL P L
COMPARATIVE WIND TUNNEL INVESTIGATION OF SAIL PROFILES FOR WINDMILLS.
NTIS, FEBRUARY 1975. 20 P.
N77-13012

LOW SPEED WIND TUNNEL TESTS WERE CARRIED OUT TO DETERMINE SAIL PROFILES FOR IMPROVING THE PERFORMANCE OF CLASSICAL DUTCH WINDMILLS. RESULTS ARE PRESENTED IN GRAPHS, IN WHICH THE COEFFICIENT OF FORCE-IN-PLANE RELATED TO THE WIND VELOCITY IS DEPICTED AS FUNCTION OF THE RATIO BETWEEN CIRCUMFERENTIAL SPEED AND EFFECTIVE WIND VELOCITY. IT APPEARS THAT IMPROVEMENTS IN PERFORMANCE MAY BE OBTAINED BY CHANGING THE SHAPE OF THE SAILS.

1975-0569 FEDERAL WIND ENERGY PROGRAM. SUMMARY REPORT.
NTIS, OCTOBER 1975. 81 P.
ERDA-84

THIS PAPER PRESENTS A BRIEF OVERVIEW OF THE FEDERAL RESEARCH AND DEVELOPMENT ACTIVITIES IN THE FIELD OF WIND ENERGY AND INCLUDES ABSTRACTS OF THE INDIVIDUAL PROJECTS WHICH COMPRISE THE PROGRAM.

1975-0570 FRAENKEL P L
FOOD FROM WINDMILLS.
NTIS, NOVEMBER 1975. 83 P.
PB-297559

THIS REPORT DESCRIBES WORK DONE TO IMPROVE AND EVALUATE A SERIES OF WIND-MILLS DEVELOPED FOR IRRIGATING SMALL PLOTS OF LAND ON THE BANKS OF THE OMO RIVER IN ETHIOPIA, USING RIVER WATER. THE SYSTEMS WERE DEVELOPED BY THE AMERICAN MISSION FOR USE BY THE LOCAL PEOPLE IN ORDER TO PERMIT ALL YEAR ROUND CULTIVATION WHICH IS NOT OTHERWISE POSSIBLE. STATISTICAL INFORMATION IS INCLUDED IN THE FIVE APPENDICES.

1975-0571 FREEMAN B E
NEW WIND ENERGY SITE SELECTION METHODOLOGY. QUARTERLY REPORT NO. 1, MARCH 17-JUNE 16, 1975.
NTIS, JULY 1975. 63 P.
PB-282832

THIS REPORT DISCUSSES NEW WIND ENERGY SITE SELECTION METHODOLOGY; SPECIFICALLY, FIELD DATA ACQUISITION, AND MATHEMATICAL MODEL DESIGN, DEVELOPMENT, AND DOCUMENTATION. THE MAJOR TASK WAS TO FORMULATE AND DEVELOP METEOROLOGICAL SIMULATION MODELS. THE SIGMET COMPUTER CODE WAS MODIFIED AND REORGANIZED FOR USE AS A MESOSCALE SIMULATION TOOL FOR THE WIND ENERGY SITING PROGRAM.

1975-0572 HAEUSSER W
WIND ENGINE.
GERMAN (FRG) PATENT NO. 2,401,214/A/, JULY 24, 1975. 5 P. (IN GERMAN)

THE INVENTION APPLIES TO A WIND ENGINE WITH A VERTICAL AXIS AND WORKING SURFACES FOR WIND WHICH MAY BE SWUNG AROUND RADIAL HORIZONTAL AXES. WHEN FACING THE WIND IN THEIR ROTATION, THEY ARE HELD IN PLACE BY A STOP. AT ALL OTHER POINTS OF THEIR ROTATION, THEY ARE AUTOMATICALLY SWUNG OUT OF THE WIND. AT HIGH WIND SPEEDS, AND THUS ALSO AT HIGH ROTATIONAL SPEEDS, A CENTRIFUGAL GOVERNOR MOVES THE STOP OUTWARD SO THAT THE WORKING SURFACE IS NO LONGER HELD IN THE WIND, THUS MAKING SURE THAT A GIVEN ROTATIONAL SPEED IS NOT EXCEEDED.

1975-0573 HARRIS F W, JOHNSON G L, HARMS W A, GOOLEY W E
ECONOMIC ANALYSIS OF A PROPOSED HYDROGEN FUEL SYSTEM FOR FARM APPLICATIONS.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 8TH ANNUAL, STILLWATER, OKLAHOMA, OCTOBER 1-2, 1975. STILLWATER, OKLAHOMA STATE UNIVERSITY, ENGINEERING EXTENSION, 1975. PAPER 4, 21 P.

THE PAPER IS CONCERNED WITH ESTIMATING THE COST TO THE FARMER OF EACH UNIT OF FUEL PRODUCED BY A CONCEPTUAL FARM HYDROGEN FUEL SYSTEM WHEREIN THE HYDROGEN IS PRODUCED ELECTROLYTICALLY AT THE FARM SITE USING ELECTRICITY DERIVED ENTIRELY FROM A WIND ENERGY COLLECTION SYSTEM. A DIGITAL COMPUTER PROGRAM THAT SIMULATED THE PROPOSED FARM FUEL SYSTEM IS DESCRIBED. ITS PURPOSE WAS TO ANSWER THE QUESTION OF WHAT MUST BE THE CAPACITY OF THE BULK HYDROGEN STORAGE FACILITY IN ORDER TO MATCH THE VARIABLE ENERGY SOURCE (WIND) TO THE VARIABLE DEMAND (FARM FUEL REQUIREMENTS). THE RESULTS OF THIS STUDY SHOW THAT THE PROPOSED FARM HYDROGEN FUEL SYSTEM CAN BE MADE ECONOMICALLY VIABLE IN THE FUTURE. IN ORDER FOR THIS TO OCCUR, THE SO-CALLED "PROJECTED TECHNOLOGY" OF THE ELECTROLYTIC PROCESS MUST BE REALIZED. OTHERWISE, THE HYDROGEN STORAGE REQUIREMENTS WILL BE SO GREAT THAT IT WILL BE DIFFICULT FOR THE SYSTEM TO COMPETE WITH OTHER NON-PETROLEUM MOBILE FUELS.

1975-0574 HERWIG L O
FEDERAL SOLAR RESEARCH PLANS.
ENERGY TECHNOLOGY CONFERENCE, 2D, WASHINGTON, D.C., MAY 12-14, 1975. PROCEEDINGS. P. 315-332. WASHINGTON, GOVERNMENT INSTITUTES, INC., 1975.

THE UTILIZATION OF SOLAR RADIATION THROUGH DIRECT AND INDIRECT CONVERSION INTO THERMAL ENERGY, ELECTRICITY, AND CLEAN FUELS IS DISCUSSED. SOLAR ENERGY FOR HEATING AND COOLING, WIND ENERGY CONVERSION, AND BIOCONVERSION TO FUELS, SOLAR THERMAL CONVERSION, PHOTOVOLTAIC CONVERSION, AND OCEAN THERMAL CONVERSION ARE ANALYZED. DATA IN TABULAR FORM ARE APPENDED.

1975-0575 HIGH COST OF FUEL REVIVES INTEREST IN COMMERCIAL SAILING VESSELS.
TRAFFIC WORLD 163(11): 105-106, SEPTEMBER 15, 1975.

A BRIEF EXAMINATION IS MADE OF THE TECHNICAL AND ECONOMIC ASPECTS OF THE USE OF SAIL SHIPS. MODERN DEVELOPMENTS IN ELECTRONIC NAVIGATION AIDS AND WEATHER DATA FROM RADAR MAY MAKE COMMERCIAL SAILING SHIPS

ECONOMICALLY FEASIBLE.

1975-0576 HOGAN I, FORD B, BOYLE G
WIND POWER!
UNDERCURRENTS NO. 11: 25-30, MAY/JUNE 1975.

1975-0577 HOVEY R W
WIND DRIVEN FANS: SIMPLIFIED ANALYSIS, DESIGN, AND CONSTRUCTION.
PHOENIX, CENTERLINE CORPORATION, 1975. 35 P.

A SIMPLIFIED ANALYSIS OF THE WINDMILL, ITS DESIGN AND APPLICATIONS ARE PRESENTED IN A MANNER EASY TO FOLLOW AND UNDERSTAND. DIAGRAMS, GRAPHS, AND SIMPLE MATHEMATICAL EQUATIONS ARE USED FOR DETAILED EXPLANATIONS OF THE CONSTRUCTION AND FORCES WHICH AFFECT THE OPERATION OF THE WINDMILL.

1975-0578 HURLEBAUS W
SUBGROUP 4: WIND ENERGY SYSTEMS.
MAGNITUDE AND DEPLOYMENT SCHEDULES OF ENERGY RESOURCES, CONFERENCE, PORTLAND, OREGON, JULY 21-23, 1975. PROCEEDINGS. CORVALLIS, OREGON STATE UNIVERSITY, 1975. P. 43-46.

AN ESTIMATE, ON THE BASIS OF PRESENTLY AVAILABLE INFORMATION, ON THE LIKELY DEPLOYMENT OF WIND ENERGY IS PRESENTED.

1975-0579 HYDROGEN AS ENERGY CARRIER. FUTURE POSSIBILITIES IN THE NETHERLANDS.
NTIS, SEPTEMBER 1975. 281 P.
N76-24723

THE APPLICATION OF HYDROGEN AS CARRIER FOR THERMAL ENERGY, PRODUCED BY NEW ENERGY SOURCES SUCH AS NUCLEAR REACTORS AND WIND AND SOLAR ENERGY GENERATORS, IS DISCUSSED. TOPICS DEALT WITH INCLUDE PRODUCTION, STORAGE, TRANSPORT AND DISTRIBUTION OF HYDROGEN, ASPECTS OF LOCATION BOUND USE, APPLICATION IN TRANSPORT VEHICLES, ENVIRONMENTAL AND SAFETY ASPECTS, AND PROBLEMS IN INTRODUCING HYDROGEN. CONCLUSIONS AND RECOMMENDATIONS FOR EACH OF THESE TOPICS ARE GIVEN AND, AS A GENERAL CONCLUSION, THERE ARE THOUGHT TO BE WIDE PERSPECTIVES FOR THE USE OF HYDROGEN AS CARRIER IN THE ENERGY SUPPLY IN THE NETHERLANDS. THE TECHNOLOGICAL PROBLEMS ARE CONSIDERED SURMOUNTABLE.

1975-0580 JAYADEV T S, SMITH R T
WIND-POWERED ELECTRIC UTILITY PLANTS.
ASME PAPER 75-WA/PET-1, 1975. 4 P.

THIS PAPER DESCRIBES THE GENERAL OPERATING MODES OF WIND-POWERED ELECTRIC UTILITY PLANTS UNDER CONSTANT-SPEED OR VARIABLE-SPEED CLASSIFICATIONS. IT IS SHOWN THAT FOR A PARTICULAR SET OF WIND FREQUENCY-VELOCITY SPECTRA THERE ARE A NUMBER OF ATTRACTIVE SYSTEM CONFIGURATIONS, SO FAR AS TOTAL YEARLY ENERGY PRODUCTION IS CONCERNED. THUS, DETAILED COST EFFECTIVENESS STUDIES AND ADDITIONAL RESEARCH WILL BE REQUIRED TO DEVELOP PRACTICAL WIND ELECTRIC CONVERSION SYSTEMS (WECS).

1975-0581 JOHNSON A L
BIOMASS ENERGY.
ASTRONAUT. AERONAUT. 13(11): 64-70, NOVEMBER 1975.

SOLAR ENERGY CONVERTERS SUCH AS SOLAR THERMAL ABSORBERS, PHOTOVOLTAIC CELLS, AND WINDMILLS REQUIRE ENERGY STORAGE AND, IN GENERAL, HIGH CAPITAL INVESTMENT. BOTH OF THESE DIFFICULTIES CAN BE CIRCUMVENTED BY UTILIZING THE STORED CHEMICAL ENERGY CREATED BY PHOTOSYNTHESES IN VEGETATION. BY USING APPROPRIATE PROCESSES AND ECONOMIC PROCEDURES, BIOMASS FUELS CAN BE PRODUCED AT COSTS WHICH ARE COMPETITIVE WITH THOSE OF COAL PRODUCTS.

1975-0582 KILLIAN H J, DUGGER G L, GREY J
SOLAR ENERGY FOR EARTH: AN AIAA ASSESSMENT.
NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, INC., 1975. 118 P.

DIRECT AND INDIRECT SOLAR ENERGY AND ITS POTENTIAL FOR REPLACEMENT OF FOSSIL FUELS ARE INVESTIGATED. TERRESTRIAL INSOLATION, SOLAR HEATING AND COOLING, SOLAR-THERMAL ELECTRIC POWER, PHOTOVOLTAIC POWER, GEOSYNCHRONOUS SATELLITE SOLAR POWER, WIND POWER, OCEAN THERMAL ENERGY CONVERSION, AND FUEL PRODUCTION (BIOMASS ENERGY) ARE THE PRINCIPAL TOPICS COVERED.

1975-0583 LEE H K, WIE S K
AEROELASTIC CHARACTERISTICS OF A ROTOR AND A WIND MILL.
J. KOREAN SOC. AERONAUT. SPACE SCI. 3(1): 7-15, 1975. (IN KOREAN)

IN THIS INVESTIGATION, HOVERING CHARACTERISTICS OF HINGELESS RIGID ROTOR OF HELICOPTER AND AERODYNAMIC CHARACTERISTICS OF WIND MILL ARE STUDIED. BASIC EQUATIONS OF MOTION OF BENDING-TORSION FLUTTER ARE FORMULATED UNDER THE ASSUMPTION THAT HINGELESS RIGID ROTOR AND WIND MILLS CAN BE CONSIDERED AS A SLENDER ROTATING BEAM AND OSCILLATING AERODYNAMIC FORCE WHICH ARE INDUCED BY THE HELICAL WAKE VORTEX SHEET IN THE CASE OF LOW PITCH ROTOR ARE INTRODUCED TO THIS EQUATION BY THE USE OF MODIFIED THEODOSEN FUNCTION.

1975-0584 MCCARTHY G
ENVIRONMENTAL CONSIDERATIONS FOR SOLAR ENERGY.
SELECTED AND EDITED PROCEEDINGS OF SOLAR ENERGY FOR VIRGINIA. SOLAR ENERGY FOR VIRGINIA CONFERENCE, RICHMOND, VIRGINIA, AUGUST 19, 1975. NTIS, 1975. P. 56-61.
CONF-7508105

THE ENVIRONMENTAL IMPACTS OF SOLAR POWER PLANTS, WIND TURBINES, AND BIOMASS PLANTATIONS ARE DISCUSSED AND CONTRASTED WITH THOSE FOR FOSSIL AND NUCLEAR FUELS.

1975-0585 MAGAI B S
PLANNING FOR ENERGY RESOURCE DEVELOPMENT.
ELECTR. INDIA 15(13): 27-32, 1975.

A GENERAL REVIEW IS PROVIDED OF THE NATIONAL ENERGY RESOURCES OF INDIA. THEY INCLUDE WIND POWER, ITDAL POWER, GEOTHERMAL ENERGY, AND NUCLEAR FISSION AND FUSION. THEIR PRESENT (1975) CONTRIBUTION TO INDIA'S TOTAL ENERGY REQUIREMENTS AND THE POSSIBILITY OF THEIR ACCELERATED DEVELOPMENT AND IMPACT ON THE NATIONAL ECONOMY ARE DISCUSSED.

1975-0586 MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR WIND. SEMI-ANNUAL REPORT.
NTIS, 1975. 62 P.
PB80-188675

A THEORETICAL FORMULATION IS COMPLETED AND EXTENDED TO UNSTEADY FLOWS FOR ANALYSIS OF LIFTING-SURFACE WIND ENERGY CONVERSION SYSTEMS (WECS) AERODYNAMICS. ITS FORMULATION IS UNDERWAY. A NUMERICAL FORMULATION OF WINDMILL INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS (WILSA) IS COMPLETED. THIS PROGRAM IS A MODIFICATION OF THE PROGRAM FOR INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS. WILSA IS COMPLETED, DEBUGGED, AND EXERCISED, AND THE RESULTS ARE DETAILED IN AN ATTACHMENT.

1975-0587 MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR WIND. QUARTERLY REPORT NO. 2.
NTIS, 1975. 25 P.
PB80-188667

SEVERAL PROJECT GOALS ARE INCLUDED IN THIS REPORT: (1)DEVELOPMENT OF A FORMULATION AND COMPUTER PROGRAM FOR A COMPLEX-CONFIGURATION AERODYNAMIC ANALYSIS OF WIND ENERGY CONVERSION SYSTEMS (WECS); (2)DEVELOPMENT OF A FORMULATION AND COMPUTER PROGRAM FOR A COMPLEX-CONFIGURATION AERODYNAMIC ANALYSIS OF WECS; (3)INCLUSION OF THE HUB; AND (4)PRELIMINARY ANALYSIS OF THE VISCOUS EFFECTS. THE THEORETICAL FORMULATION FOR THE LIFTING-SURFACE AERODYNAMIC ANALYSIS OF WECS IS COMPLETED TOGETHER WITH NUMERICAL FORMULATION FOR WINDMILL LIFTING SURFACE AERODYNAMICS (WILSA).

1975-0588 MORINO L
NONPOTENTIAL AERODYNAMICS FOR WINDMILLS IN SHEAR WIND. QUARTERLY REPORT NO. 3.
NTIS, 1975. 43 P.
PB80-188659

THE THEORETICAL FORMULATION OF THE LIFTING-SURFACE AERODYNAMIC ANALYSIS OF WIND ENERGY CONVERSION SYSTEMS (WECS) IS EXTENDED TO UNSTEADY FLOW AND THE FORMULATION IS INCLUDED. THE COMPLETED CORRESPONDING NUMERICAL FORMULATION FOR THE WINDMILL INCOMPRESSIBLE LIFTING SURFACE AERODYNAMICS (WILSA) PROGRAM IS LISTED IN AN ATTACHMENT. THE POWER COEFFICIENT IS PRESENTED AS A FUNCTION OF ANGULAR SPEED. THE IMPROVED THEORETICAL FORMULATION FOR THE COMPLEX-CONFIGURATION AERODYNAMIC ANALYSIS OF WECS IS BEING WRITTEN.

1975-0589 MORRELL W H
ENERGY MISER'S MANUAL.
ELIOT, MAINE, GRIST MILL, 1975. 68 P.

1975-0590 PARK J
AN AIR-OPERATED DEEP-WELL PUMP WITH TWO TYPES OF WINDMILLS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 113-117.

1975-0591 PETZRICK P A
ENERGY STORAGE TECHNOLOGY--A USER'S ANALYSIS.
ENERGY TECHNOLOGY CONFERENCE, 2D, WASHINGTON, D.C., MAY 12-14, 1975. PROCEEDINGS. P. 160-168. WASHINGTON, GOVERNMENT INSTITUTES, INC., 1975.

THE IMPORTANCE OF ENERGY STORAGE RESEARCH AND DEVELOPMENT IS BEING RECOGNIZED AS EVIDENCED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S DECISION TO FUND PROGRAMS IN COMPRESSED AIR STORAGE, LOW TEMPERATURE THERMAL ENERGY STORAGE AND FLYWHEEL ENERGY STORAGE. AN ANALYSIS OF NAVY ENERGY DEMAND SHOWS THAT POTENTIAL NAVY APPLICATIONS FOR ENERGY STORAGE SYSTEMS INCLUDE: THE MATCHING OF ENERGY DEMAND AND SOURCES AT REMOTE BASES WHICH MAY BE SUPPLIED BY SOLAR, OCEANIC OR WIND POWER; THE LEVELING OF ENERGY DEMAND AND CONSERVATION OF ENERGY ONBOARD SHIPS, AIRCRAFT AND AT NAVY FACILITIES; AND, THE USE OF STORAGE DEVICES AS POWER SOURCES FOR VEHICLES AND WEAPONS SYSTEMS. DATA ARE SHOWN GRAPHICALLY AND TABULARLY.

1975-0592 PIKE A
CAMBRIDGE AUTONOMOUS HOUSE.
SOLAR ENERGY ARCHITECTURE AND PLANNING. CONFERENCE ON SOLAR ENERGY ARCHITECTURE AND PLANNING, LONDON, UK, APRIL 1975. P. 1-8.

A PROPOSED HOUSE HAS A BASIC MINIMUM LIVING AREA OF APPROXIMATELY 65 SQ. METERS ON TWO FLOORS. FOR MUCH OF THE YEAR AN OVERALL FLOOR AREA OF 111 SQ. METERS COULD BE USED FOR LIVING PURPOSES. THE DESIGN INCLUDES AN AEROGENERATOR, SOLAR STILL AND COLLECTOR, SOLAR COLLECTOR, AND INSULATING SHUTTERS ON THE GREENHOUSE PORTION AND WINDOWS. A COMPARISON OF AVERAGE EFFICIENCIES OF DIFFERENT ABSORBERS IS INCLUDED.

1975-0593 REVIEW AND SUMMARY OF SOLAR THERMAL CONVERSION PROGRAM PLANNING ASSISTANCE.
NTIS, JUNE 1975. 209 P.
ATR-75(7523-01)-1

THE SOLAR THERMAL CONVERSION PROGRAM PLAN IS DESCRIBED IN DETAIL. SECTIONS 2.0 THROUGH 5.0 COVER THE DISCUSSION AND DETAIL PLANNING COVERING THE OBJECTIVES, JUSTIFICATION, BASIC AND ALTERNATIVE PLANS, BUDGETS, AND SCHEDULES FOR THE SOLAR THERMAL SUB-UNIT PORTION OF THE SOLAR ELECTRIC APPLICATIONS EFFORT.

1975-0594 YOUNG R B, TIEDEMANN A F, MARIANOWSKI L G, CAMARA E H
PRODUCTION OF METHANE USING OFFSHORE WIND ENERGY. QUARTERLY PROGRESS REPORT, 1 APR - 30 JUN 1975.
NTIS, JULY 1975. 63 P.
AAI-ER-8374, PB80-129158

THE FEASIBILITY OF CONVERTING WIND ENERGY TO METHANE GAS WAS INVESTIGATED. THE BASIC APPROACH CONSISTS OF USING OFF-SHORE WINDS TO DRIVE GENERATORS WHICH SUPPLY ELECTRICITY TO ELECTROLYSIS CELLS. ELECTROLYSIS OF DISTILLED SEA WATER PRODUCES HYDROGEN. CARBON DIOXIDE IS DERIVED FROM UNDERWATER CARBONATE DEPOSITS. THESE GASES ARE COMBINED TO FORM METHANE. IN THIS REPORT PERIOD, IN-DEPTH THERMOCHEMICAL ANALYSES WERE MADE OF TWO CANDIDATE PROCESSES. THEIR EFFICIENCIES, MASS FLOWS, AND THERMODYNAMIC BALANCES WERE ESTABLISHED.

1975-0595 SAKR I A, SALEH M A
COMBINED SOLAR-WIND POWER PLANT FOR ARID ZONES IN EGYPT.
SOLAR USE NOW--A RESOURCE FOR PEOPLE: EXTENDED ABSTRACTS, 1975. INTERNATIONAL SOLAR ENERGY CONGRESS AND EXPOSITION, LOS ANGELES, JULY 28-AUGUST 1, 1975. ROCKVILLE, MARYLAND, INTERNATIONAL SOLAR ENERGY SOCIETY, 1975. P. 55-56.

1975-0596 SAN MARTIN R L
ENERGY RESEARCH AND DEVELOPMENT AT NEW MEXICO STATE UNIVERSITY, 1975.
NEW MEXICO WATER CONFERENCE, 20TH. ANNUAL, LAS CRUCES, NEW MEXICO, APRIL 3, 1975. LAS CRUCES, NEW MEXICO, NEW MEXICO STATE UNIVERSITY, OCTOBER 1975. P. 137-146.

CURRENT PROGRAMS AT THE UNIVERSITY INVOLVE RESEARCH IN THE FOLLOWING AREAS: ELECTRIC POWER, WATER FOR ENERGY, ENVIRONMENTAL IMPACT OF ENERGY DEVELOPMENT, ENERGY IN AGRICULTURE, THE USE OF SEWAGE AND REFUSE AS ENERGY SOURCES, GEOTHERMAL ENERGY, COAL ENERGY, WIND ENERGY, AND SOLAR ENERGY. SPECIFIC FACETS OF THESE PROGRAMS BEING RESEARCHED ARE SUMMARIZED.

1975-0597 SHARMAN H
WIND AND WATER SOURCES OF ENERGY IN THE UK.
ENERGY OPTIONS IN THE UK, SYMPOSIUM, LONDON, MARCH 1, 1975. PROCEEDINGS. LONDON, LATIMER NEW DIMENSIONS LTD., 1975. P. 51-64.

A SURVEY OF THE DEVELOPMENT OF TIDAL WATER SOURCES AND WIND POWER GENERATING PLANTS IS PRESENTED.

1975-0598 SHEFTER Y I
ISOPL'ZOVANIE ENERG I VETRA. (USE OF WIND ENERGY.)
MOSCOW, ENERGII, 1975. 177 P.

THIS BOOK CONSIDERS THE TECHNICAL AND ECONOMIC PREREQUISITES IN USING WIND ENERGY, AND THE EFFICIENCY OF ENERGY CONVERSION IN WIND UNITS. THE CONSTRUCTION OF NEW WIND UNITS IS DESCRIBED, AND THEIR TECHNICAL CHARACTERISTICS ARE GIVEN. GENERAL DATA ARE PRESENTED ON THE MODES OF OPERATION AND WIND RESOURCES IN THE TERRITORIES OF THE USSR. METHODS OF INCREASING THE RELIABILITY OF THE ENERGY SUPPLY BY INCREASING THE POWER AND BY USING VARIOUS MEANS OF STORAGE ARE PRESENTED. RECOMMENDATIONS ARE GIVEN ON THE USE OF WINDMILLS IN VARIOUS AREAS OF THE USSR.

1975-0599 SHERMAN M M
6,000 HAND-CRAFTED SAILWING WINDMILLS OF LASSITHIOU, GREECE, AND THEIR RELEVANCE TO WINDMILL DEVELOPMENT IN RURAL INDIA.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 89-93.

1975-0600 SHERMAN M M
AN INTERIM REPORT: THE DESIGN AND CONSTRUCTION OF AN APPROPRIATE WATER PUMPING WINDMILL FOR INDIAN AGRICULTURE.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 95-111.

1975-0601 SHUPE J W
ALTERNATE ENERGY SOURCES FOR HAWAII. PROCEEDINGS.
NTIS, MAY 1975. 52 P.
WORKSHOP ON ALTERNATIVE ENERGY SOURCES FOR HAWAII, HONOLULU, MAY 8-9, 1975.
PB80-191125

THIS WORKSHOP WAS DESIGNED TO INCORPORATE THE BEST CURRENT THINKING OF ENERGY EXPERTS IN DEVELOPING THE OPTIMUM PLAN FOR HAWAII'S ENERGY FUTURE AND TO PROVIDE NATIONAL VISIBILITY TO THE VARIETY AND ABUNDANCE OF NATURAL ENERGY RESOURCES IN THE STATE. FOCUS WAS ON AREAS OF ENERGY RESEARCH AND DEVELOPMENT CURRENTLY OF MAJOR INTEREST TO HAWAII. THESE INCLUDE GEOTHERMAL, WIND, SOLID WASTE, AND SOLAR ENERGY.

1975-0602 SITING ENERGY FACILITIES AT CAMP GRUBER, OKLAHOMA. EXECUTIVE SUMMARY.
NTIS, 1975. 27 P.
PB-246639

PRELIMINARY EVALUATION OF CAMP GRUBER MILITARY RESERVATION IN OKLAHOMA SHOWS IT TO BE A FEASIBLE SITE FOR MANY TYPES OF LARGE COMPLEX ENERGY FACILITIES. APPLYING STANDARD SITING CRITERIA (SUFFICIENT LAND, WATER SUPPLY, ATMOSPHERIC DISPERSION, MARKET POTENTIAL, LOW SOCIO-ECONOMIC AND ENVIRONMENTAL DAMAGE, LOW LABOR AND MATERIAL COSTS, TRANSPORTATION FACILITIES, AND UTILITIES), 24 APPROPRIATE USES ARE LISTED. THESE INCLUDE POWER PLANTS FIRED BY OIL, COAL, AND NUCLEAR FUELS AND POWER PLANTS USING WIND AND SOLAR ENERGY.

1975-0603 SMULDERS P T
WIND ENERGY IN DEVELOPING COUNTRIES: A RESEARCH PROGRAMME IN THE NETHERLANDS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 305-308.

1975-0604 SOLAR ENERGY. FROM PROTOTYPES TO WORKING UNITS BUT ALWAYS THE SAME OBSTACLE: THE COST.
ELECTR. IND. 88(2173): 181-182, 1975. (IN FRENCH)

THE FRACTION OF RADIATED ENERGY FROM THE SUN INTERCEPTED BY THE EARTH IS 20,000 TIMES GREATER THAN WORLD CONSUMPTION IN 1975. A HOUSE HEATED BY SOLAR ENERGY AND DISPLAYED AT THE 1975 PARIS FAIR HAD 45 SQ. MI. OF COLLECTOR PANELS, A WATER THERMAL STORAGE SYSTEM OF 3000 LITRES, 3 SQ. MI. OF PHOTOPILES, AND A WIND GENERATOR. A 400 W SOLAR GENERATOR USING SILICON PHOTOVOLTAIC CELLS HAS BEEN EMPLOYED TO DRIVE AN ELECTRIC PUMP TO DRAW 2700 LITRES/HOUR OF WATER FROM A DEPTH OF 20 M.

1975-0605 SQUIRE D R, WOOD B D
COLLECTOR DESIGN ANALYSIS FOR A SOLAR-AIR TURBINE POWER SYSTEM.
INTERNATIONAL SOLAR ENERGY CONGRESS AND EXPOSITION, LOS ANGELES, JULY 28-AUGUST 1, 1975. SOLAR USE NOW--A RESOURCE FOR PEOPLE. ROCKVILLE, MD., INTERNATIONAL SOLAR ENERGY SOCIETY, SMITHSONIAN RAD. BIOL. LAB., 1975. P. 73-74.

THE SOLAIR TURBINE POWER GENERATION CONCEPT DESCRIBED USES THE BUOYANCY OF SOLAR-HEATED AIR TO DRIVE A WINDMILL-TYPE TURBINE. A BLACK PLATE UNDER A GLASS COVER SHEET ABSORBS SOLAR RADIATION AND HEATS THE ADJACENT AIR. THE OBJECT OF THIS STUDY WAS TO DETERMINE THE ABSORBER SHAPE AND ORIENTATION WHICH WOULD OPTIMIZE THE SOLAR ENERGY COLLECTION AND AIR BUOYANCY THROUGHOUT THE YEAR.

1975-0606 STEFAN H, FORD D E
TEMPERATURE DYNAMICS IN DIMICTIC LAKES.
ASCE HYDRAUL. DIV. J. 101(1): 97-114, JANUARY 1975.

DAILY WATER TEMPERATURE PROFILES IN TEMPERATURE LAKES ARE PREDICTED FROM TIME-VARIABLE METEOROLOGICAL CONDITIONS AND LAKE MORPHOLOGY. A TOTAL ENERGY CONCEPT WHICH INCLUDES WIND ENERGY IS USED. THE METHOD OF ANALYSIS IS DERIVED AND ILLUSTRATED THROUGH CASE STUDIES. AGREEMENT OF PREDICTED AND MEASURED WATER TEMPERATURES IN TWO LAKES THROUGHOUT THE SUMMER SEASON IS GOOD.

1975-0607 SUN, WIND, AND WATER POWER: REVIVIFIES RECYCLED BUILDING.
BUILD. SYST. DES. 72(5): 7-9, 1975.

1975-0608 SUNG C S, EVEN J C
THE SELF-SUFFICIENT ENERGY SUPPLY TO RURAL IOWA AREAS.
OPER. RES. SOC. AM. BULL. 23(SUPPL.1): B-149, PAPER FP3.5, 1975. (ABSTRACT)

1975-0609 TABOR H
SOME REMARKS ON THE USE OF WIND AND SOLAR ENERGY IN SEMIARID AREAS.
INTERNATIONAL CONFERENCE APPROPRIATE TECHNOLOGIES FOR SEMIARID AREAS: WIND AND SOLAR ENERGY FOR WATER SUPPLY, BERLIN, SEPTEMBER 15-20, 1975. BERLIN, GERMAN FOUNDATION FOR INTERNATIONAL DEVELOPMENT, 1975. P. 5-7.

1975-0610 TEWARI S K
IT'S TIME TO TALK ABOUT WIND POWER.
SCI. TODAY, P. 15-22, NOVEMBER 1975.

DISCUSSED BRIEFLY ARE THE POSSIBILITIES AND ECONOMICS OF THE USE OF WIND POWER, ESPECIALLY IN INDIA. FOUR REASONS ARE MENTIONED WHY AT THIS TIME WIND ENERGY DOES NOT APPEAR ECONOMICALLY FAVORABLE.

1975-0611 THOMAS R, PUTHOFF R, SAVINO J, JOHNSON W
PLANS AND STATUS OF THE NASA-LEWIS RESEARCH CENTER WIND ENERGY PROJECT.
ENERGY TECHNOLOGY CONFERENCE, 2D, WASHINGTON, D.C., MAY 12, 1975. WASHINGTON, D.C., GOVERNMENT INSTITUTES, INC., 1975. P. 290-314.

1975-0612 TINKER J
NUCLEAR TECHNOCRAT TILTS AT WINDMILLS.
NEW SCI. 68(974): 340-342, NOVEMBER 6, 1975.

DR. ISHRAT USMANI, FORMER HEAD OF PAKISTAN'S ATOMIC ENERGY COMMISSION AND NOW THE ENERGY ADVISER TO THE UN ENVIRONMENT PROGRAM, BELIEVES THAT NUCLEAR POWER HAS NO FUTURE IN THE DEVELOPING WORLD. DR. USMANI PREPARED A PAPER ON ENERGY'S IMPACT ON THE ENVIRONMENT FOR THE THIRD MEETING OF UNEP'S GOVERNING COUNCIL, APRIL 1975. THE REPORT WAS CONDENSED WHEN PRESENTED AT THE MEETING. THE ENVIRONMENTAL IMPACT OF OTHER ENERGY SOURCES WAS REVIEWED AND THEN THE IMPACT OF NUCLEAR FISSION ENERGY WAS RELATED.

1975-0613 TOLLESON S
WINDMILLS: ENERGY BLOWING IN THE WIND.
ELEMENTS 3(1): 32-41, 1975.

THE HISTORY OF WIND POWER IS REVIEWED WITH ITS UNCERTAIN BEGINNING, BUT BELIEVED TO DATE AS FAR BACK AS 2000 B.C. THE OPERATION OF THE SMITH-PUTNAM GENERATOR IN VERMONT FROM OCTOBER 1941 TO MARCH 1945 MARKED THE FIRST SYNCHRONOUS GENERATION OF POWER FROM THE WIND. IN 1951, CONGRESS REFUSED TO APPROPRIATE FUNDS FOR A PROTOTYPE PROJECT. A WINDMILL CHARGES THE BATTERIES OF A SMALL EXPERIMENTAL "URBAN CAR" WITH A RANGE OF 25 MILES AT THE UNIVERSITY OF OKLAHOMA. IN 1972, IT WAS PREDICTED THAT BY THE YEAR 2000, ABOUT 19 PERCENT OF THE U.S. ENERGY REQUIREMENTS COULD BE SUPPLIED BY WINDPOWER UTILIZED IN WINDY AREAS. A WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS IN 1973 SOUGHT TO ASSESS THE PRESENT STATE OF THE ART OF WIND ENERGY SYSTEMS TECHNOLOGY AND RECOMMENDED CONCRETE DIRECTIONS.

1975-0614 VARGO D J
WIND ENERGY DEVELOPMENTS IN THE 20TH CENTURY. REVISED.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., 1975. 20 P.

THE AUTHOR REVIEWS VARIOUS WIND ENERGY PROJECTS UNDERTAKEN IN THE 20TH CENTURY, INCLUDING THOSE IN DENMARK, RUSSIA, U.S., GREAT BRITAIN, FRANCE, AND GERMANY. FINALLY CURRENT PROJECTS OF NASA AND ERDA ARE DESCRIBED.

1975-0615 WALTERS R E, FANUCCI J B, LOTH J L, NESS N, PALMER G M
INNOVATIVE WIND MACHINES.
NTIS, SEPTEMBER 1975. 160 P.
TR-47, PB-252617

THIS REPORT DESCRIBES THEORETICAL AND EXPERIMENTAL RESEARCH CONCERNING THE EVALUATION OF TWO CONCEPTS FOR WIND ENERGY CONVERSION MACHINES. THE FIRST CONCEPT DESCRIBED IS THAT OF A VERTICAL AXIS PANEMONE DEVICE WITH CIRCULATION CONTROLLED AIRFOILS FOR THE BLADES. ALSO CONTAINED IS AN OUTLINE FOR A MORE EXACT FLOW THEORY, WHICH PROPERLY TAKES INTO ACCOUNT THE UNSTEADY AERODYNAMICS INVOLVED.

1975-0616 WIND ENERGY POTENTIAL IN NEW MEXICO.
SANTA FE, NEW MEXICO, ENERGY RESOURCES ADMINISTRATION, 1975. 190 P.

THE HISTORY AND STATE OF THE ART OF WIND TURBINES ARE BRIEFLY DISCUSSED. ESTIMATES OF WIND ENERGY AVAILABLE IN THE UNITED STATES ARE NOTED. ALTHOUGH A PRELIMINARY ESTIMATE OF THE WIND ENERGY POTENTIAL FOR NEW MEXICO SHOWS THAT IT IS MORE THAN ADEQUATE TO SERVE LOCAL NEEDS WITHOUT SEVERE ENVIRONMENTAL IMPACT, SEVERAL WINDIER REGIONS APPEAR MORE ATTRACTIVE FOR WIND TURBINE FIELDS DESIGNED TO GENERATE ENERGY FOR EXPORT.

1975-0617 WIND POWER.
A.S.E.'S SPECTRUM. ALTERNATIVE SOURCES ENERGY, P. 28-35, 1975.

1975-0618 WOODWARD J B, BECK R F, SCHER R, CARY C M
FEASIBILITY OF SAILING SHIPS FOR THE AMERICAN MERCHANT MARINE.
NTIS, FEBRUARY 1975. 103 P.
COM-75-10519

THE UNIVERSITY OF MICHIGAN HAS STUDIED THE POSSIBLE USE OF SAILING CARGO SHIPS IN THE CONTEMPORARY AMERICAN MERCHANT MARINE. THE STUDY WAS PROMOTED BY RECENT WORLD DEVELOPMENTS IN ENERGY SUPPLY AND ENVIRONMENTAL CONCERN, THE MOST SIGNIFICANT BEING THE SHARP RISE IN COST OF ENERGY REQUIRED TO DRIVE A POWERED SHIP. SECOND IS A COMPLEX SET OF CHANGES THAT CAN BE GENERALLY CLASSIFIED AS TECHNOLOGICAL ADVANCES, SUCH AS THE

IMPROVEMENTS IN MATERIALS THAT CAN BE USED FOR SAILS AND RIGGING, AND THE IMMENSE ADVANCES IN COMMUNICATION AND CONTROL TECHNOLOGY. A THIRD DEVELOPMENT IS THE CHANGE IN STANDARDS FOR SEAGOING, WHICH INCLUDES IMPROVEMENTS IN SAFETY STANDARDS, HABITABILITY STANDARDS AND MAJOR CHANGES IN WAGE STRUCTURES.

1974-0343 ARCHIBALD F
ELECTRONICS FOR HOMEBUILT WINDMILLS.
J. NEW ALCHEM. NO. 2: 1974.

1974-0344 ARCHIBALD F
WIND POWER WINDMILL ELECTRONICS.
J. NEW ALCHEM., 1974. 5 P.

1974-0345 ELLIOT I F
SOVIET ENERGY BALANCE: NATURAL GAS, OTHER FOSSIL FUELS, AND ALTERNATIVE POWER SOURCES.
NEW YORK, PRAEGER PUBLISHERS, 1974. 285 P.

1974-0346 FUTURE MEANS OF THERMAL POWER GENERATION IN NORWAY.
NTIS, JANUARY 1974. 249 P. (IN NORWEGIAN)
INIS-MF-1550

1974-0347 GALANIS N
INTRODUCTORY REMARKS (TO SESSION III: INTEGRATED SYSTEMS).
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974.
SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 188-198.

1974-0348 GALLAGHER J
ELECTRIC POWER GENERATION ON NOMAD BUOYS.
MACARTHUR WORKSHOP ON THE FEASIBILITY OF EXTRACTING USABLE ENERGY FROM THE FLORIDA CURRENT, PALM BEACH SHORE, FLORIDA, FEBRUARY 27, 1974. PROCEEDINGS. MIAMI, FLORIDA, 1974. P. 278-305.

WIND-DRIVEN, SOLAR, NUCLEAR AND MECHANICAL ELECTRICAL POWER GENERATING TECHNIQUES HAVE BEEN EXPLORED SINCE 1958 FOR USE ON THE DEEP OCEAN NOMAD BUOYS. THESE DEVICES HAVE DEMONSTRATED THAT THEY CAN RELIABLY SUPPLY LOW LEVEL, TRICKLE-CHARGE RATES OF ELECTRICAL ENERGY TO LEAD-ACID AND NI-CAD BATTERIES TO COMPENSATE FOR THE INTERMITTENT DEMAND OF THE ELECTRONICS SYSTEMS AND NAVIGATIONAL AIDS ON THE BUOYS. THE WIND AND SOLAR CELL COLLECTOR-GENERATOR SYSTEMS WERE SUCCESSFULLY TESTED AT SEA DURING THE PERIOD 1959-1967, AND WERE ESSENTIALLY OPERATIONAL SINCE 1967. THE SOLAR CELL GENERATOR APPEARS TO BE A MORE RELIABLE GENERATOR SYSTEM THAN THE WIND GENERATOR. NUCLEAR GENERATORS WERE ALSO TESTED IN NOMAD BUOYS IN THE GULF OF MEXICO SINCE 1964 AND PERFORMED SUCCESSFULLY. A RESONANT PENDULUM GENERATOR DESIGN WHICH UTILIZES WAVE MOTION AND IS HOUSED INSIDE THE BUOY HULL WAS SUCCESSFULLY TESTED IN THE LABORATORY. BUT HAS NOT BEEN TESTED AT SEA. THE HIGH ENERGY TIDAL CURRENT REGIME IN EASTERN LONG ISLAND SOUND IS VIEWED AS A POSSIBLE AREA FOR TESTING WATER-DRIVEN ELECTRICAL ENERGY COLLECTOR-GENERATORS IN CONCERT WITH WIND AND SOLAR SOURCES OF ENERGY.

1974-0349 HARNESSING THE WAYWARD WIND.
INT. OPER. ENG. 117(10): 8-10, OCTOBER 1974.

1974-0350 HERONEMUS W E, MCGOWAN J G
OCEAN THERMAL POWER AND WINDPOWER SYSTEMS--NATURAL SOLAR ENERGY CONVERSION FOR NEAR-TERM IMPACT ON WORLD ENERGY MARKETS.
AM. ASTRONAUT. SOC. SCI. TECHNOL. SER. 35, 1975. ENERGY SYMPOSIUM: ENERGY DELTA/SUPPLY VS. DEMAND, 140TH ANNUAL MEETING OF A.A.A.S., SAN FRANCISCO, FEBRUARY 25-27, 1974. PAPER AAS74-031, P. 491-506.

THE POTENTIAL OF TWO ENERGY CONVERSION SYSTEMS WHICH USE THE NATURAL SOLAR COLLECTION OF THE EARTH AND ITS ATMOSPHERE OVER LAND AND SEA AS THEIR POWER INPUT IS DISCUSSED. THE FIRST CONCEPT, FOR LARGE SCALE POWER GENERATION, IS BASED ON A RANKINE CYCLE HEAT ENGINE DRIVEN BY THE THERMAL DIFFERENCE (15 TO 22 DEGREES CELSIUS) WHICH EXISTS BETWEEN THE WARM TROPICAL SURFACE WATERS OF THE OCEAN AND THE GREAT MASS OF COLD WATER BELOW. WINDPOWER, THE SECOND CONCEPT, IS DISCUSSED IN THE CONTEXT OF SMALL TO LARGE SCALE SYSTEMS COMPRISING A NUMBER OF METHODS FOR EXTRACTING A PORTION OF THE KINETIC ENERGY OF THE EARTH'S ATMOSPHERE. A BRIEF HISTORY AND A CURRENT STATUS REPORT ON RESEARCH ON THESE TWO CONCEPTS ARE PRESENTED. SUGGESTED CONFIGURATIONS FOR ENERGY DISTRIBUTION SYSTEMS UTILIZING THESE NATURAL ENERGY RESOURCES COMPLETE WITH ENERGY STORAGE AND TRANSMISSION SYSTEMS ARE GIVEN. IN ADDITION TO THE POTENTIAL IMPACT OF THESE SYSTEMS, THE RECOGNIZED TECHNOLOGICAL AND INSTITUTIONAL PROBLEMS STANDING IN THE WAY OF THEIR POTENTIAL IMPLEMENTATION ARE ENUMERATED.

1974-0351 KAYSER H
ENERGY GENERATION FROM SEA WAVES.
IEEE INTERNATIONAL CONFERENCE ON ENGINEERING IN THE OCEAN ENVIRONMENT, HALIFAX, AUGUST 21-23, 1974.
PROCEEDINGS RECORD. VOL. 1, P. 240-243. NEW YORK, IEEE, 74CHO873-0 OCC, 1974.

WIND ENERGY WHICH IS INTERCHANGED THROUGH WIDE SURFACE AREAS OF THE OCEANS IS STORED IN SEA WAVES AS A MECHANICAL OSCILLATION. A SIMPLE SYSTEM IS DESCRIBED WHICH ENABLES THE CONVERSION OF THIS ENERGY OF OSCILLATION INTO HIGH PRESSURE WATER AND ELECTRIC POWER. IT IS POSSIBLE TO USE THIS WAVE-DRIVEN GENERATOR FOR POWER SUPPLY OF BUOYS FOR 1 KW OR MORE AS WELL AS FOR BIG STATIONARY POWER PLANTS OF SEVERAL HUNDRED KILOWATTS OF ELECTRIC POWER.

1974-0352 LJUNGSTROM O, SOEDERGAARD B
WIND POWER IN SWEDEN. A PRELIMINARY FEASIBILITY STUDY.
SWEDISH BOARD FOR TECHNICAL DEVELOPMENT, MAY 1974.

1974-0353 POWE R E, TOWNES H W, BLACKKETTER D O, BISHOP E H
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.
ANNUAL PROGRESS REPORT 1 SEPTEMBER - 31 DECEMBER 1973.
NTIS, JANUARY 31, 1974. 93 P.
PB80-169899

INITIAL STAGES OF A DETAILED TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT ARE DESCRIBED. IT IS ANTICIPATED THAT THE SYSTEM WILL CONSIST OF AIRFOILS MOUNTED VERTICALLY ON CARRIAGES WHICH WILL MOVE AROUND A HORIZONTAL, CLOSED TRACK SYSTEM. THE ORIENTATION OF THE AIRFOILS, RELATIVE TO THE WINDS WILL BE AUTOMATICALLY CONTROLLED TO ENABLE A MAXIMUM POWER EXTRACTION FROM THE WIND. DURING THIS FIRST STAGE OF THE STUDY, THE PERFORMANCE SPECIFICATIONS FOR THE MAJOR SYSTEM COMPONENTS REQUIRED FOR CONVERTING WIND ENERGY TO MECHANICAL ENERGY HAVE BEEN ESTABLISHED, AND THE INTERFACE REQUIREMENTS BETWEEN THESE COMPONENTS HAVE BEEN IDENTIFIED. SEVERAL POSSIBLE ALTERNATIVES FOR MEETING THESE COMPONENTS AND INTERFACE CRITERIA HAVE BEEN SELECTED, AND A DETAILED STUDY OF A NUMBER OF THESE ALTERNATIVES IS REPORTED.

1974-0354 POWE R E, TOWNES H W
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.

QUARTERLY PROGRESS REPORT NO. 1, 1 JANUARY - 31 MARCH 1974.
NTIS, SEPTEMBER 30, 1974. 57 P.
PB80-170962

A THEORETICAL STUDY OF THE EXPECTED OUTPUT OF VARIOUS WIND ENERGY CONVERSION DEVICES HAS BEEN MADE. IT IS DEMONSTRATED ANALYTICALLY THAT THE MAXIMUM POSSIBLE WIND ENERGY EXTRACTION RATE WITH THE TRACKED VEHICLE-AIRFOIL DEVICE MAY BE AS MUCH AS 26 PERCENT GREATER THAN THAT FOR CONVENTIONAL WINDMILLS. ALSO, THE ALTERNATIVES AVAILABLE FOR THE FOUR MAJOR SUBSYSTEMS WERE EXAMINED AND A SPECIFIC OVERALL SYSTEM WAS SELECTED FOR MORE DETAILED STUDY. A COMPREHENSIVE MATHEMATICAL MODEL OF THIS SYSTEM WAS DEVELOPED IN ORDER TO PREDICT ITS PERFORMANCE. THIS MODEL INCORPORATES A SEARCH TECHNIQUE TO DETERMINE OPTIMUM CARRIAGE SPEED AND AIRFOIL ANGLE OF ATTACK FOR MAXIMUM SYSTEM POWER EXTRACTION. ACTUAL WIND SPECTRUM INFORMATION FOR A SPECIFIC GEOGRAPHIC LOCATION CAN BE USED IN CONJUNCTION WITH THE MODEL TO PREDICT ENERGY OUTPUT FROM THE SYSTEM OVER ANY DESIRED TIME PERIOD.

1974-0355 POWE R E, TOWNES H W, BISHOP E H, MARTINELL J
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.
SEMI-ANNUAL PROGRESS REPORT. 1 JANUARY - JUNE 1974.
NTIS, JULY 31, 1974. 55 P.
PB80-170681

RESULTS OF A TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT ARE DESCRIBED. SPECIFIC ALTERNATIVES FOR THE MAJOR SYSTEM COMPONENTS WERE SELECTED FOR DETAILED ANALYSIS, AND A COMPREHENSIVE MATHEMATICAL MODEL OF THE RESULTING SYSTEM WAS DEVELOPED. THIS MODEL WAS PROGRAMMED FOR SOLUTION ON A DIGITAL COMPUTER, AND THE SYSTEM OPERATION WAS SIMULATED UNDER CONDITIONS SELECTED TO DEMONSTRATE THE EFFECTS OF CHANGES IN VARIOUS DESIGN PARAMETERS. IT IS SHOWN THAT A GREATER POWER OUTPUT MAY BE EXPECTED FROM THIS SYSTEM THAN FROM CONVENTIONAL WINDMILLS UNDER SIMILAR OPERATING CONDITIONS.

1974-0356 POWE R E, TOWNES H W
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT.
PROGRESS REPORT. (FINAL) 1 SEPTEMBER 1973 - 31 AUGUST 1974.
NTIS, SEPTEMBER 30, 1974. 85 P.
PB80-170962

THE TECHNICAL FEASIBILITY OF A UNIQUE MOMENTUM INTERCHANGE DEVICE FOR EXTRACTION OF ENERGY FROM THE WIND IS STUDIED. IT IS SHOWN THAT THE MAXIMUM POSSIBLE ENERGY EXTRACTION WITH THIS TRACKED VEHICLE-AIRFOIL DEVICE IS GREATER THAN THAT FOR A CONVENTIONAL WINDMILL. A COMPREHENSIVE MATHEMATICAL MODEL IS DEVELOPED FOR THE DEVICE AND THIS MODEL IS PROGRAMMED FOR SOLUTION ON A DIGITAL COMPUTER. THE PROGRAM IS WRITTEN SO THAT WIND SPECTRUM DATA FOR ANY GEOGRAPHIC LOCATION CAN BE USED TO DETERMINE MONTHLY ENERGY OUTPUT FOR THAT LOCATION. INDICATIONS ARE THAT THIS DEVICE COULD MAKE SIGNIFICANT CONTRIBUTIONS TO ELECTRICAL POWER REQUIREMENTS. FOR EXAMPLE, A SYSTEM 8 KM LONG AND CONSISTING OF AIRFOILS 12 METERS IN LENGTH WITH A 3 METER CHORD COULD SUPPLY THE ELECTRICAL ENERGY NEEDS OF ABOUT 17,000 PEOPLE. RESULTS ARE PRESENTED IN A FORM WHICH INDICATES THE EFFECT OF CHANGING VARIOUS DESIGN PARAMETERS. IN ADDITION, COMPARISONS OF THE ENERGY OUTPUT OF THE TRACKED VEHICLE-AIRFOIL SYSTEM WITH TYPICAL WINDMILLS ARE MADE. IT IS FOUND THAT THE MONTHLY ENERGY OUTPUT PER UNIT OF SWEPT AREA FOR THE TRACKED VEHICLE-AIRFOIL SYSTEM MAY BE AS MUCH AS 54 PERCENT GREATER THAN THAT FOR AN EFFICIENT WINDMILL OPERATING IN THE SAME LOCATION.

1974-0357 PUTNAM P C
POWER FROM THE WIND.
NEW YORK, VAN NOSTRAND REINHOLD COMPANY, 1974. 236 P.

1974-0358 RAMAKUMAR R, ALLISON H J, HUGHES W L
ECONOMICS OF SOLAR AND WIND ENERGY SYSTEMS FOR LARGE SCALE POWER GENERATION.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, 7TH ANNUAL, STILLWATER, OKLAHOMA, OCTOBER 9-10, 1974. STILLWATER, OKLAHOMA STATE UNIVERSITY. COLLEGE OF ENGINEERING, 1974. PAPER 11, 19 P.

A CASE IS MADE FOR THE CONTINUED DEVELOPMENT OF SOLAR AND WIND ENERGY SYSTEMS TO PROVIDE VIABLE ALTERNATIVES TO FOSSIL FUELS IN THE YEARS TO COME. A SIMPLIFIED ECONOMIC ANALYSIS OF SOLAR AND WIND ENERGY SYSTEMS OF THE TYPE BEING DEVELOPED AT OKLAHOMA STATE UNIVERSITY IS PRESENTED AND THE CALCULATED GENERATION COSTS IN MILLS PER KWH ARE COMPARED WITH THOSE OF CONVENTIONAL FUEL-BURNING SYSTEMS FOR DIFFERENT FUEL COSTS, LOAD FACTORS, AND INTEREST RATES. THE RESULTS SHOW THAT CERTAIN ASPECTS OF SOLAR AND WIND ENERGY CONVERSION CAN, AT PRESENT, GENERATE ENERGY AT COSTS COMPETITIVE WITH CONVENTIONAL SYSTEMS AND THAT MORE FAVORABLE CONDITIONS CAN BE EXPECTED IN THE FUTURE AS FOSSIL FUELS BECOME SCARCE AND FUEL COSTS FURTHER GO UP AS PREDICTED.

1974-0359 SEMINAR WINDENERGIE. (SEMINAR ON WIND POWER).
JUELICH, GERMANY, KERNFORSCHUNGSANLAGE, OCTOBER 1974.
SEMINAR ON WIND POWER, JUELICH, GERMANY, SEPTEMBER 12, 1974.

1974-0360 THALLER L H
ELECTRICALLY RECHARGEABLE REDOX FLOW CELLS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 9TH. PROCEEDINGS. NEW YORK, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 1974. PAPER 749142, P. 924-928.

AN ELECTROCHEMICAL BULK POWER STORAGE CONCEPT, WHICH THE AUTHORS HAVE NAMED A RECHARGEABLE REDOX FLOW CELL IS DESCRIBED. THIS SCHEME, BASED ON PUMPING A REDOX COUPLE THROUGH A POWER CONVERSION SECTION, APPEARS TO OFFER HIGH OVERALL EFFICIENCY, NO CYCLE LIFE LIMITATIONS FOR THE ELECTRODES, AND DEEP DISCHARGE CAPABILITY.

1974-0361 VILLECCO M
ENERGY CONSERVATION IN BUILDING DESIGN.
WASHINGTON, D.C., AMERICAN INSTITUTE OF ARCHITECTS, 1974. 156 P.

1974-0362 WADE N
WINDMILLS: THE RESURRECTION OF AN ANCIENT ENERGY TECHNOLOGY.
ENERGY: USE, CONSERVATION, AND SUPPLY. EDITED BY PHILIP H. ABELSON. WASHINGTON, D.C., AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1974. P. 128-130.

1973-0158 ALWARD R, ACHESON A, LAWAND T A
INTEGRATION OF SOLAR STILLS INTO MINIMUM COST DWELLINGS FOR ARID AREAS.
SUN IN THE SERVICE OF MANKIND. INTERNATIONAL CONGRESS ON THE SUN IN THE SERVICE OF MANKIND, PARIS, JULY 2, 1973. PAPER E16, 12 P.
CONF-730747--(E)

A STUDY HAS BEEN MADE OF THE INTEGRATION OF SOLAR DISTILLATION UNITS, FOR FRESH WATER PROVISION, INTO THE STRUCTURE OF MINIMUM COST HOUSING FOR ARID AREAS. THE STILLS ARE INCORPORATED INTO THE ROOF SERVING AS A COVERING ELEMENT IN ADDITION TO THEIR NORMAL DISTILLATION FUNCTION. A STANDARDIZED WATER RECYCLE UNIT HAS BEEN DEVELOPED WHICH MAKES USE OF SOLAR AND WIND ENERGIES AS THE ONLY POWER INPUTS TO THE SYSTEM, THUS REDUCING BOTH POLLUTION EFFECTS AND OPERATING COSTS. CONTAINED WITHIN THIS WATER RECYCLE UNIT ARE WATER COLLECTION, STORAGE AND PURIFICATION SYSTEMS INTEGRATED WITH WASTE WATER AND SEWAGE STORAGE AND TREATMENT FACILITIES PERMITTING MINIMUM CONSUMPTION AND MAXIMUM RE-USE OF THE WATER. THE SOLAR STILLS ACT AS WATER PURIFICATION UNITS, RENDERING SHOWER WASTE AND SALINE WATER POTABLE. DETAILS OF CONSTRUCTION AND SYSTEM OPERATION ARE OUTLINED AND EXPERIMENTAL RESULTS OBTAINED THROUGH ACTUAL USAGE BY A FAMILY ARE PROVIDED.

1973-0159 GIBBONS B
REBUILT WINDCHARGERS.
ALTERN. SOURCES ENERGY NO. 8: JANUARY 1973.

1973-0160 JACOBS M L
EXPERIENCE WITH JACOBS WIND-DRIVEN ELECTRIC GENERATING PLANT, 1931-1957.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 155-158.
PB-231341

ENGINEERING, CONSTRUCTION, PERFORMANCE, ELECTRIC OUTPUT, AND DIFFERENT USES OF THE WIND ELECTRIC 2500- TO 3000 WATT PLANT ARE OUTLINED. AFTER SEVERAL YEARS OF TESTING DIFFERENT TYPES OF WINDMILLS, THE THREE BLADE AEROPLANE TYPE OF PROPELLER WAS FOUND TO BE FAR SUPERIOR IN POWER OUTPUT. BY MEANS OF A FLYBALL GOVERNOR OPERATED, VARIABLE PITCH SPEED CONTROL, THE MAXIMUM SPEED OF THE PROPELLER WAS ACCURATELY AND EASILY CONTROLLED, TO PREVENT EXCESSIVE SPEEDS IN HIGH WINDS AND STORMS. THE THREE BLADE PROPELLER WAS FOUND TO BE NECESSARY TO PREVENT EXCESSIVE VIBRATION WHENEVER THE SHIFT OF THE WIND DIRECTION REQUIRED THE PLANT TO CHANGE ITS FACING DIRECTION ON THE TOWER.

1973-0161 MORSE F H
NSF PRESENTATION.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 244-253.
PB-231341

WIND ENERGY CONVERSION RESEARCH IS CONSIDERED IN THE FRAMEWORK OF THE NATIONAL ENERGY PROBLEM. RESEARCH AND DEVELOPMENT EFFORTS FOR THE PRACTICAL APPLICATION OF SOLAR ENERGY--INCLUDING WIND ENERGY--AS ALTERNATIVE ENERGY SUPPLIES ARE ASSESSED FOR HEATING AND COOLING OF BUILDINGS, PHOTOVOLTAICS, SOLAR THERMAL ENERGY CONVERSION, WIND ENERGY CONVERSION, OCEAN THERMAL ENERGY CONVERSION, PHOTOSYNTHETIC PRODUCTION OF ORGANIC MATTER AND CONVERSION OF ORGANIC MATTER INTO FUELS.

1973-0162 POWE R E, TOWNES H W, BLACKKETTER D O
TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT. QUARTERLY PROGRESS REPORT NO. 3.
NTIS, OCTOBER 31, 1973. 150 P.
PB80-170665

FIRST PHASE RESULTS OF A DETAILED TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT ARE DESCRIBED.

1973-0163 STAFF REPORT ON WIND POWER. (FEDERAL POWER COMMISSION).
NTIS, SEPTEMBER 1973. 13 P.
PB-231955

THE TEN-PAGE PAMPHLET STATES THAT WHILE THERE IS A GENUINE INTEREST ON THE PART OF ALL ELECTRIC UTILITIES TODAY IN ECONOMICAL AND NON-POLLUTING SOURCES OF ELECTRIC POWER, THE PRACTICAL POTENTIAL FOR WIND-POWER DEVICES IS AT PRESENT LIMITED, AND REASONABLE SOLUTIONS FOR SPACE REQUIREMENTS AND LAND USE PROBLEMS HAVE NOT YET BEEN DEVELOPED.

1972-0061 GORLAND S H, KEMPKE E E
ROTOR WINDAGE LOSSES FOR LUNDELL ALTERNATORS. FINAL REPORT.
NTIS, 1972. 10 P.
N72-20452, NASA-TM-X-68079

1972-0062 NOTE ON THE UTILIZATION OF WIND POWER FOR PROVIDING INDUSTRY ELECTRIC POWER.
PARIS, FRANCE, REPORT AEROWATT T.AW 10472, 1972. 17 P.

DESIGN CRITERIA ARE GIVEN FOR 4 KVA UP TO 100 KVA WIND GENERATORS TO BE BUILT BY AEROWATT, BASED ON EXPERIENCES WITH THE 800 KVA BEST WIND TURBINE AND THE VARIABLE PITCH PROPELLER BUILT BY AEROWATT.

1972-0063 SCHAEPER H R A
TECHNOLOGICAL ADAPTATIONS TO AEOLIAN ENERGY UTILIZATION IN THE ANTILLEAN CARIBBEAN.
IEEE REGION 3 CONVENTION, 10TH ANNUAL, KNOXVILLE, TENNESSEE, APRIL 10-12, 1972. PROCEEDINGS. PAPER. NEW YORK, IEEE, 72CHO591-8 REG III, 1972.

1971-0044 BERNSTEIN T, STICHMAN J H, MILLER J G
SHIELDED ROTATING CUP VELOMETER FOR MOUNTAIN SITES.
IEEE FALL ELECTRONICS CONFERENCE, CHICAGO, OCTOBER 18-20, 1971. PROCEEDINGS, P. 304-309.

THIS UNIT WAS DEVELOPED FOR USE AT MOUNTAIN PEAK SITES IN A SEVERE ENVIRONMENT WHERE THE ROTATING CUPS ARE ENCLOSED IN A HOUSING WHICH LIFTS ON RADIO COMMAND FOR 5 MINUTES EACH HOUR TO OBTAIN A READING. THE WIND INFORMATION IS TRANSMITTED BY RADIO TELEMETRY.

1970-0033 KHARITONOV V P
EXPERIMENTAL CHARACTERISTICS OF A SUBMERGED CENTRIFUGAL ELECTRIC PUMP COMBINED WITH A WIND ENGINE.
TR. VNITEMA 34: 1970.

1970-0034 URUSOV I D, RYZHKOV V S, ZIL'GERSHTEIN L, VOLCHKOV V K
A SERIES OF CONTACTLESS SYNCHRONOUS GENERATORS UP TO 100 KV FOR WIND POWER PLANTS.
ELEKTROTECHNIKA NO. 1: 56-58, JANUARY 1970. (IN RUSSIAN)

1970-0035 WENK F
DIE ANALYTISCHE FORMULIERUNG DER WIND-STARKEN-HAUFIGHEITSKURVEN. (ANALYTICAL FORMULATION OF WIND VELOCITY DURATION CURVES.)
WINDKRAFTMITTEILUNGEN NO. 5, 1970.

1969-0022 HAMMITT A G
OPTIMUM WIND PROPULSION.
ANCIENT INTERFACE, PROCEEDINGS OF THE 1ST AIAA SYMPOSIUM ON THE AER/HYDRONAUTICS OF SAILING, MARINA DEL REY, CALIFORNIA, APRIL 26, 1969. AIAA LECTURE SERIES, LOS ANGELES SECTION MONOGRAPH VOL. 8. NO. HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS COMPANY, 1969. P. 133-150.

1969-0023 KHARITONOV V P
AUTOMATIC WIND ELECTRIC PUMPING INSTALLATION.
BYULL. IZOBRET NO. 15: 1969.

1969-0024 SULLIVAN A F
SAILBOAT STEERING COMMAND INSTRUMENT.
ANCIENT INTERFACE, PROCEEDINGS OF THE 1ST AIAA SYMPOSIUM ON THE AER/HYDRONAUTICS OF SAILING, MARINA DEL REY, CALIFORNIA, APRIL 26, 1969. AIAA LECTURE SERIES, LOS ANGELES SECTION MONOGRAPH VOL. 8. NO. HOLLYWOOD, CALIFORNIA, WESTERN PERIODICALS COMPANY, 1969. P. 235-240.

1969-0025 TOROCHKOV V Y, SURAZHSKII D Y
MEASURING AVERAGE WIND SPEED.
NTIS, SEPTEMBER 2, 1969. 8 P. EDITED TRANSLATION OF ARTICLE BY M. OLAECHEA IN NAUCHNOIZSLED. INST. GIDROMETEOROL. PRIBOROSTR. TR. (USSR) NO. 17: 15-18, 1967. SEE 1967-0021.
FTD-HT-23-341-69, AD-696229

AN INVESTIGATION WAS MADE OF THE TRANSIENT RESPONSE OF ROTATING WINDMILL AND CUP ANEMOMETERS. IN GENERAL, THE EXPERIMENTS CONFIRMED THE CONTENTION THAT ROTATING ANEMOMETERS INDICATE THE AVERAGE WIND VELOCITY AS BEING HIGHER OR LOWER THAN THE ACTUAL VALUE, DEPENDING ON THE CIRCUMSTANCES. THE CAUSE FOR THIS DISCREPANCY IS THE DIFFERENCE IN THE EFFECTIVE AERODYNAMIC MOMENTS DURING THE ACCELERATION AND THE DECELERATION OF THE ROTOR. THE COMPARISON OF THE TRANSIENT RESPONSE OF CUP AND WINDMILL ANEMOMETERS SHOWED THAT FOR THE LATTER DEVICE THE TIME CONSTANT OF THE TRANSIENT PROCESS APPROXIMATING THE DECELERATION WAS FOUR TIMES GREATER THAN THE TIME CONSTANT DURING THE ACCELERATION. FOR THE CUP ANEMOMETER THIS RATIO WAS ONE TO SIX. A COMPARATIVE EVALUATION OF THE AVERAGE WIND VELOCITY INDICATION BY A ROTATING ANEMOMETER USING A RESTRAINED ANEMOMETER AS A REFERENCE WAS ALSO MADE. IT WAS FOUND THAT THE ROTATING ANEMOMETER INDICATED HIGHER AVERAGE WIND VELOCITY FOR VELOCITIES UP TO 10-11 M/SEC., AND LOWER AVERAGE WIND VELOCITY FOR HIGHER VALUES. THE RESULTS OF THE INVESTIGATION INDICATE THAT TRUE RESULTS CAN BE OBTAINED ONLY FROM A SIMULTANEOUS STUDY OF THE WIND STRUCTURE AND THE DYNAMIC PROPERTIES OF THE WIND GAGES.

1968-0026 HARRIS R I
MEASUREMENTS OF WIND STRUCTURE AT HEIGHTS UP TO 598 FEET ABOVE GROUND LEVEL.
SYMPOSIUM ON WIND EFFECTS ON BUILDINGS AND STRUCTURES, LOUGHBOROUGH, UNIVERSITY OF TECHNOLOGY, ENGLAND, APRIL 2-4, 1968. PROCEEDINGS. VOL. 1, PAPER 1. 35 P.

WIND MEASUREMENTS MADE SIMULTANEOUSLY AT 12 HEIGHTS BETWEEN 54 FT. AND 598 FT. ABOVE GROUND LEVEL DURING A WINTER GALE ARE REPORTED, TOTAL DURATION OF THE RECORD BEING 30 MINUTES. COMPUTER RESULTS INCLUDE INCREASE OF MEAN WIND DIRECTION WITH HEIGHT, CHANGE OF RMS GUST SPEED AND INTENSITY OF TURBULENCE WITH HEIGHT. AUTO AND CROSS-CORRELATIONS TOGETHER WITH POWER SPECTRA ARE ALSO PRESENTED, AND SIMPLE COMPARISONS MADE WITH RESULTS OBTAINED BY OTHER WORKERS.

1968-0027 WILSON A
COMMENTS ON BRACE RESEARCH INSTITUTE WINDMILL.
BRACE RES. INST. PUBL NO. 176, FEBRUARY 1968.

1968-0028 WIND SUPPLIES ALTERNATIVE ENERGY TO HEAT HOUSE FOR VERENDRYE MEMBER.
N.D. REC. MAG. 24(1): 3¢, JULY 1968.

A HOMEMADE WIND ELECTRIC GENERATOR SYSTEM IS DESCRIBED. THE TOWER-MOUNTED FOUR-BLADED AIRCRAFT PROPELLER TYPE 20 FOOT DIAMETER HORIZONTAL AXIS WIND TURBINE DRIVES A GROUND-LEVEL AC GENERATOR WHICH FEEDS POWER DIRECTLY TO RESISTANCE HEATERS.

1967-0021 OLAECHEA M
MEASURING AVERAGE WIND SPEED.
NAUCHNOIZSLED. INST. GIDROMETEOROL. PRIBOROSTR. TR. (USSR) NO. 17: 15-18, 1967. (IN RUSSIAN. SEE 1969-0025 FOR TRANSLATION)

1966-0020 LAGENDIJK N W
ELECTRICITEITSOPWEKKING DUOR WINDMOLENS. (GENERATION OF ELECTRICTY BY WINDMILLS.)
ELECTRA, 1966. (IN DUTCH)

1964-0079 RAMAMOORTHY M

WIND POWER POTENTIAL IN SOUTH INDIA.

INST. ENG. INDIA J. 44 (6PT.EL3): 211, 1964.

THIS IS A STUDY OF WIND FLOW AND AVAILABLE WIND POWER POTENTIAL AT SEVERAL PLACES IN SOUTH INDIA BASED ON THE RECORDS OF THE REGIONAL METEOROLOGICAL CENTRE, MADRAS, FOR THE YEAR 1961. THE DATA AND THE CALCULATIONS ARE EXPECTED TO BE OF HELP TO THOSE ENGAGED IN THE ASPECTS OF WINDMILL CONSTRUCTION.

1961-0022 WHEELER N

SURVEY OF POWER SOURCES.

ITHACA, NEW YORK, ADVANCED ELECTRONICS CENTER, 1961. 57 P.

PRESENTED IS A SURVEY OF AVAILABLE "BATTERY" POWER SOURCES FOR SELECTION OF OPTIMUM POWER SOURCE FOR SONOBUOYS, MISSILES, OR OTHER SIMILAR DEVICES; POWER SOURCES DESCRIBED INCLUDE WIND-DRIVEN IMPELLERS, WAVE-BOOSTED BATTERY, WEIGHT-DRIVEN SYSTEMS, ELECTROCHEMICAL CELLS, SOLAR CELLS, THERMOELECTRIC POWER GENERATION, THERMIONIC CELLS, NUCLEAR CELLS, PRIMARY AND SECONDARY CELLS, RESERVE OR DELAYED-ACTION BATTERIES, FUEL CELLS, ETC.

1959-0025 ARGAND A
L'UTILISATION DU VENT COMME SOURCE D'ENERGIE. (UTILIZATION OF WIND AS A SOURCE OF ENERGY.)
GENEVE, L'ERE ATOMIQUE, TOME X, EDITION RENE KISTER, 1959. (IN FRENCH)

1957-0028 FRANKFURT M O
DETERMINING CALCULATED AERODYNAMIC LOADS OF HIGH-SPEED WINDMILLS.
PROM. AERODIN. NO. 8: 1957. (IN RUSSIAN)

1957-0029 TROMP C
INVESTIGATION OF A GENERATOR SYSTEM FOR GENERATING ELECTRICAL POWER, TO SUPPLY DIRECTLY TO THE PUBLIC NETWORK, USING A WINDMILL.
DELFT, NETHERLANDS, DELFT UNIVERSITY OF TECHNOLOGY, POWER ELECTRONICS LABORATORY, MAY 1957. 122 P. TRANSL.: NTIS, AUGUST 1979. 159 P.
N79-31779, NASA-TM-75497

A WINDPOWERED GENERATOR SYSTEM IS DESCRIBED WHICH USES A WINDMILL TO CONVERT MECHANICAL ENERGY TO ELECTRICAL ENERGY FOR A THREE PHASE (NETWORK) VOLTAGE OF CONSTANT AMPLITUDE AND FREQUENCY. THE GENERATOR SYSTEM CONTROLS THE WINDMILL BY THE NUMBER OF REVOLUTIONS SO THAT THE POWER DRAWN FROM THE WIND FOR A GIVEN WIND VELOCITY IS MAXIMUM. A GENERATOR REVOLUTION WHICH IS PROPORTIONAL TO WIND VELOCITY IS ACHIEVED. THE STATOR OF THE GENERATOR IS LINKED DIRECTLY TO THE NETWORK AND A FEED CONVERTER AT THE ROTOR TAKES CARE OF CONSTANT VOLTAGE AND FREQUENCY AT THE STATOR.

1955-0039 WIND-GENERATED ELECTRICITY, PROTOTYPE 100 KW PLANT.
ENGINEERING 179: 371-374, MARCH 25, 1955.

THIS ARTICLE IS ON THE WIND DRIVEN ALTERNATOR INSTALLED NEAR ST. ALBANS, ENGLAND, AND COVERS "DEPRESSION" PRINCIPLE FOR FLEXIBILITY, MECHANICAL DESIGN, ALTERNATOR CONTROLS, SELECTION OF SITES AND STORING ELECTRICAL ENERGY. IT INCLUDES PHOTOGRAPHS AND DIAGRAMS.

1953-0049 LEMEUNIER
ENERGY RESEARCH: WINDMILLS.
MONIT. PROF. ELECT., FEBRUARY 1953. (IN FRENCH)

1952-0042 ANTENNA TOWERS AS WIND TOWER GENERATION PLANTS. FINAL REPORT.
ELEKTROTECH. Z. 73(4): 95-96, 1952. ALSO NTIS, FEBRUARY 1974. 10 P.
N74-15763, NASA-TT-F-15304

1949-0036 POWER FROM THE WIND.
ELECTR. REV., APRIL 8, 1949.

1949-0037 VERMEULEN H
THE ECONOMICS OF USING WINDPOWER FOR ELECTRICITY SUPPLY IN THE NETHERLANDS AND FOR WATER SUPPLY ON CURACAO.
ROYAL DUTCH AIRLINES KLM, REPORTS TW-555 AND GOV-R-128, JANUARY 5, 1949. TRANSL.: NTIS, OCTOBER 1974. 64 P.
N75-10587

IT IS SHOWN TO BE ECONOMICALLY FEASIBLE TO HARNESS THE WIND FOR ELECTRICITY SUPPLY IN THE NETHERLANDS IN TERMS OF POWER AND PRODUCTION COSTS. DIFFERENT WIND POWER PLANTS ARE DISCUSSED IN DETAIL. AN ABRIDGED ACCOUNT OF A DANISH PROPOSAL TO HARNESS WIND POWER, AND CALCULATION OF THE EFFICIENCY OF THE DANISH AEROMOTOR ARE INCLUDED. COMPARISONS ARE MADE WITH THE POWER NEED SITUATION IN CURACAO, AND IT IS DETERMINED THAT A SIMILAR WIND POWER CONVERSION CAPABILITY RECOMMENDED FOR THE NETHERLANDS IS FEASIBLE FOR THE WEST INDIES AS WELL.

1949-0038 WINDMILL POWER PLANTS.
NACHR. AUBENHANDEL 4(73): 1949.

1943-0025 SHOLL W S
WIND POWER GENERATORS.
ELECTRICIAN 131: 602-603, DECEMBER 17, 1943.

THIS PRESENTS A BRIEF REVIEW OF SOME WINDMILLS FOR POWER GENERATION.

1942-0033 KILOWATTS FROM THE WIND.
POWER PLANT 46: 60, 78-79, OCTOBER 1942.

THE 1000-KW SMITH-PUTNAM WIND-POWER GENERATING PLANT ON GRANDPA'S KNOB NEAR RUTLAND, VERMONT, IS DESCRIBED.

1942-0034 WIND POWER.
DTSCH. TECH., OCTOBER 1942. (IN GERMAN)

1941-0030 PFLUEGER
CALCULATION OF LARGE WIND WHEELS.
TECHNICAL UNIVERSITY HANNOVER, INAUGURATORY REPORT, 1941.

1935-0012 HEYS J W VAN
WIND POWER PLANTS.
ELEKTROTECH. Z. 56(18): 1935. (IN GERMAN)

1926-0021 BETZ A
WINDENERGIE UND IHRE AUSNUTZUNG DURCH WINDMUHLEN. (WIND ENERGY AND EXPLOITATION BY WINDMILLS.)
GOTTINGEN, GERMANY, VANDENHOECK AND RUPPRECHT, 1926. 64 P.

1926-0022 DONATH
NEW REGULATORS FOR WIND POWER PLANTS.
ELEKTROTECH. ANZEIGER 43: 363-365, APRIL 17, 1926. (IN GERMAN)

THIS ARTICLE REVIEWS RECENT PATENTS BY HULLEN, KUMME, SANDHURST, BOSSELMANN AND KOSTER, THEIR DESIGN AND OPERATION.

1926-0023 FOERSTER
ELECTRIC WIND POWER STATIONS.
ELEKTROTECH. ANZEIGER 43: 299-302, 304, MARCH 27, 1926. (IN GERMAN)

A NUMBER OF GERMAN INSTALLATIONS ARE DESCRIBED, INCLUDING AVAILABLE WIND POWER PER YEAR, TYPES OF WINDMILLS FOR DRIVING GENERATORS, STORAGE BATTERIES, AND POWER-PLANT ARRANGEMENT FOR CENTRAL STATIONS OR ISOLATED ESTATES.

1920-0011 HOLMGREN, AAGREN E M

THE UTILIZATION OF W ND POWER IN LARGE INDUSTRIAL PLANTS IN ITS PRESENT STAGE OF TECHNICAL DEVELOPMENT FROM AN ECONOMIC STANDPOINT.

Z. GES. TURBWES. 17: 376-379, 388-393, 1920. (IN GERMAN)

THIS INCLUDES THEORETICAL DISCUSSIONS ON THE POSSIBLE USE OF WIND POWER ENERGY FOR INDUSTRY.

INDEXES

The following indexes (author, subject, report number, and conference proceedings) are for the Third Supplement only. If the Third Supplement is merged with the earlier three volumes the indexes provided with those must be retained, or the new Cumulative Indexes for all four volumes must be acquired. The Cumulative Indexes include more in-depth indexing of the Basic Volume and First Supplement than in the indexes originally provided with those volumes. That, plus the fact that use of the Cumulative Indexes means searching one index instead of four, makes this a very useful tool for anyone having all four volumes of ENERGY FROM THE WIND. The Cumulative Indexes are available separately. For information contact Publications, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523.

AUTHOR INDEX

AAGREN E N
19200011
ABARIKWU O I
19800056
ABDEL HAFIEZ M S
19800444
ACHESON A
19730158
ADAMS A
19750553
ADAMS G B
19790433
ADAMS J A
19790263
ADAMS J Y
19800538
ADKINS D W
19790230
ADLER F
19780305, 19790264
ADLER F M
19800107, 19800108
ADOLFSON W F
19780630, 19780631, 19790500
AFANASJEVS J
19780806, 19790231
AGNELLO M
19790363
AGOPIAN K G
19780306, 19780307
AGRAWAL D P
19780721
AHMADI G
19780285, 19780308, 19790265, 19800110
AI D K
19790266
AICHER W
19790827
AIKEN R
19790826
AKINS R E
19790130, 19790267, 19800058, 19810001
AKUTA T
19790447
AL-SHEHRI A
19790467
ALBARRAN J F
19800111
ALBRIGHT S
19800112
ALDER G M
19790665
ALDRED J
19790268
ALEXANDER A J
19790666
ALEXANDER J H
19800113
ALEXANDERSSON H
19790234
ALFORD C
19800255
ALFREDSSON P H
19790269, 19800114
ALIAKBARKHANAFJEH A
19810053
ALLISON H J
19740358, 19780286, 19790270
ALLISON J M
19790516
ALLISON W D
19800059
ALTSEIMER J H
19790131
ALVES R
19780791
ALWARD R
19730158, 19780311
ALY A
19780422
ANAPOL'SKAYA L E
19780312
ANCONA D F
19790273, 19790274
ANDERSEN P S
19790132
ANDERSEN T S
19800098, 19800458
ANDERSON B
19790517
ANDERSON L A
19790156, 19800137
ANDERSON M
19790275
ANDERSON N B
19800115
ANDERSON W D
19770602
ANDERSSON R
19780313
ANDREW J F
19800479
ANDREWS J
19780314
ANDREWS M B
19780315
ANGELINI A M
19780316
ANGELOFF L G
19800107, 19800108
ANKRUM G T
19800060
ANKRUM T
19800116
ARCHIBALD F
19740343, 19740344
ARE E
19800117
ARGAND A
19590025
ARGO W H
19800118
ARGYRIS J H
19790276-19790281, 19790827
ARMENCOIU R D
19790236
ARMSTRONG J E
19790238
ARMSTRONG J R C
19790237
ARMSTRONG M D
19790238
ARMSTRONG P R
19790321
ARNOLD J E
19770496
ARONSON E A
19810002
ARONSON R B
19780322, 19780323
ARRILLAGA J
19790790
ASHLEY H
19780324
ASHMOLE P H
19800218
ASIN J
19790283
ASKEGAARD V
19790506, 19790686
ASMUSSEN J
19780325-19780327, 19780600, 19790585, 19800490
ASPLIDEN C
19770553, 19790675
AUER F
19780328, 19800101

AUER P
19780329
AWALT T Y
19770497
AXELL R A
19800120
BABB S M
19790239
BADE P
19750554, 19750555
BAE H M
19780330
BAER C A
19790485
BAER M
19790526
BAHADORI M N
19790286
BAHRAMI K
19800061
BAILEY D Z
19780331
BAIN D
19790135, 19790287, 19800121,
19800201
BAINVILLE D
19800482
BAIRD W F
19780332
BAKER R H
19760563
BAKER R W
19780333-19780335, 19780523,
19780838, 19790136, 19790198,
19790200, 19790240, 19790262,
19790393, 19790422, 19790555
BAKER T L
19800122
BAKER W J
19780336
BALACHANDRAN S
19760564
BALCERAK J C
19800123
BALDWIN D H
19800438, 19810088
BALDWIN J D
19780841
BALDWIN J D C
19790288
BALMA M
19790531
BALMER T
19810003
BALOMBIN J R
19800062
BANKAITIS H
19810004
BANKWITZ H
19770498
BARBER D A
19780522, 19780838
BARCHET R J
19780337
BARCHET W R
19790356, 19790828, 19790829,
19800124, 19800125, 19800148,
19800210, 19800395, 19800400,
19800469, 19800550, 19810034,
19810080, 19810094, 19810127
BARDSLEY W E
19800126
BARIEAU R E
19770499, 19790835
BARK F H
19800114
BARKER H
19790627
BARLOW T M
19800127
BARNA P S
19810005
BARNETT K
19800452
BARNETT K M
19780338, 19790289, 19800434
BARRETT C I
19800063
BARRON J
19790241
BARROWS R E
19790290
BARTON J
19790292
BARTON R S
19790242
BARTOS K P
19780339
BASE T E
19790243, 19810006
BASS A
19810080
BASS L
19800128
BASTIANON R A
19800129
BATES A P
19810010
BAUER P H
19780438
BAUMAN B
19800130
BAWN W E
19800131
BEANS E W
19810007
BEATSON C
19760565
BEAULIEU G
19810008
BECK R F
19750618
BECKER M
19800309
BECKER R
19800244
BEHRMAN D
19760566
BELEW W W
19810009
BELIVEAU K D
19790212
BELL D J
19800246
BELLAIRE M I
19790368
BEN-DOV E
19780342, 19780343
BENDICK P
19780340
BENESCH W
19780341, 19780344
BERENY J A
19770500
BERGER G J
19800132
BERGESON L
19810010
BERGEY K H
19790293
BERGEY M
19780345, 19780346
BERKOVITCH I
19790137
BERLINER D
19780347
BERNA M
19790454
BERNARDI R P
19780630, 19780631, 19790500

BERNSTEIN T
19710044
BERRIE T
19800064
BERRY E X
19800133
BEST G
19790420
BEST R W B
19790244
BETZ A
19260021
BEURSKENS H J M
19800134
BEUSSE H
19770501, 19780348
BEYER G
19780349
BEYER R
19790742
BHUMRALKAR C M
19780350, 19780351, 19780830,
19800135, 19810027
BIELAWA R L
19800406
BILGEN E
19780287, 19780705
BILTOFT C A
19780352
BINDER G
19780353, 19790245
BINGHAM C
19790210
BIRCHENOUGH A G
19780485, 19780486
BIRD M
19790138, 19790139
BISHOP C J
19790246
BISHOP E H
19740353, 19740355
BISHOP W S
19790156, 19800137
BJERGBAEK B
19800247
BJERREGAARD E
19790506, 19790686
BJERREGAARD E T D
19800292
BJUSTROM R C
19800187
BLACK T
19800136
BLACK T W
19790140
BLACKKETTER D O
19730162, 19740353
BLACKLER J
19800439
BLAKE S
19780354
BLANTON J C
19780841
BLAUNSTEIN R
19790342
BLAUNSTEIN R P
19790131
BLIAMPTIS E E
19760567
BLOEDORN J
19800128
BLOK C
19760568
BLUHM R
19790861
BOARDMAN R W
19810011
BOCKRIS J O
19750556, 19750557
BODENSCHATZ C A
19800098, 19800458
BOEHMAN L I
19800137
BOESTAD G K W
19780355
BOGERS A J
19770503
BOGLE A W
19790247
BOHN J
19800185
BOLAND J F
19790664, 19800138
BOLLE T G
19790294
BOLLMEIER W S
19800139
BOLT J B D H
19780834
BOLTON H R
19790248
BONDI H
19800065
BONGAARTS A L M
19790699
BONNET J A
19780356
BONTIUS G H
19790667, 19800140
BOODA L
19780358
BOOTH D
19780359
BOOTHROYD P
19770504
BORTZ S A
19790295
BOSSANYI E A
19800141, 19800333, 19800555
BOTTRELL G
19800142
BOTTRELL G W
19800143, 19810012
BOUWMEESTER R J B
19780360, 19780361, 19780663
BOWEN A J
19780661, 19780662
BOWES M A
19790296, 19790830, 19810047,
19810048
BOWLER C E J
19790242
BOWMAN D
19790615
BOYLE G
19750576
BRAASCH R H
19780362, 19780363, 19790159,
19800066
BRACETTI F P
19780356
BRAGG G M
19790249, 19790250
BRANDELS L
19800067
BRANDVOLD G E
19780364
BRAUN H R
19790779, 19800068
BRAUN K A
19790276, 19790277, 19790279-
19790281
BRAY R E
19780365, 19790143, 19800144
BRENNAN P J
19780450
BRENNECKE P
19800145
BRIDSEN D W
19800146

BRIERLEY D
19760611
BRIGGS W R
19800147
BRISTOW D J
19790779, 19800068
BROCK B C
19790144
BRODE R
19800148
BRONDYKE K J
19790297
BROOKS B M
19810013
BROTSKY V K
19790424
BROWN F
19780366
BROWN R H
19780367, 19790298
BROWNING J A
19810014
BRUCKNER A
19750558
BRULLE R V
19770505, 19780368
BUCH A
19800149
BUCHANAN D L
19780463
BUDENHOLZER R A
19790295
BUEHRING I K
19800150
BUEHRING W A
19790251, 19790252, 19800523
BUILTJES P J H
19780370, 19790668, 19800151
BULLO P
19790253, 19800069, 19800070,
19800152-19800156
BUNDGAARD R
19770506
BURLEY R R
19790145
BURROUGHS J D
19790788
BUSCHULTE W
19780371
BUTLER D A
19780372
BUTLER N G
19780335, 19790831
BUTTERFIELD C P
19800139, 19800157, 19800170,
19800270, 19810124
BUTTERFIELD S
19790299
BUZENBERG R J
19790158, 19790832
BYGGETH N G
19800158
BYRD G
19800344
CADWALLADER E A
19790254, 19790300
CAHILL T P
19780373
CALDERA E
19790260
CALHOUN J T
19800552, 19800553, 19810120
CALLAHAN H L
19770507
CALNAN P G
19770692
CALVERT N G
19790147
CAMARA E H
19750594
CAMPBELL J S
19780376, 19780377, 19790301
CANEGHEM A E VON
19780378
CANFIELD M
19770508
CARLIN P
19770509
CARLISLE J W
19780379
CARLSON A
19780504
CARLSON R D
19790295
CARLSSON I
19790355
CARNE T G
19810015-19810019
CARPENTER R D
19800161
CARR M J
19790424, 19790427, 19790780,
19800162
CARROLL D P
19790302, 19800163
CARROLL T O
19780380
CARTER G M
19790833
CARTER J
19780381-19780383, 19790223
CARY C M
19750618
CASE C W
19800071
CASHMAN T
19790303
CASKEY B C
19790304, 19800164, 19810002
CASKEY D L
19810002
CASTELLANOS A
19790260
CATANIA P J
19770510, 19780384
CERMINARA J
19790306
CHAMIS C C
19760569, 19780386
CHAN M L
19790872
CHANDRA S K
19780497
CHANG G C
19780387, 19780440
CHANGERY M J
19780388
CHARI R T
19800447
CHARLIER M
19800003
CHASE V D
19780389
CHATEL B
19790307
CHATTOPADHYAY S N
19780390
CHAVEZ C
19800111
CHEN H C
19790148
CHEN J
19790308
CHEN J M
19790148
CHEN J-M
19790149
CHENEY M C
19770513, 19780392, 19780795,
19780796, 19790151, 19790309,
19800165

CHENG E D H
19780391
CHERDAK A S
19800187
CHEREMISINOFF P N
19780393
CHERRY N J
19790834, 19800072
CHEUNG A
19770634, 19770635, 19780693,
19780694, 19790576, 19790577
CHIAO T T
19800127
CHIEH C F
19800166
CHIEN H C
19780663, 19800167
CHILCOTT R E
19760571, 19790310-19790312
CHILDS J
19790526
CHILOCOTE W W
19780522
CHIN S W
19780617
CHIU A N L
19780394
CHOPRA I
19780395, 19780396, 19780673,
19790152
CHOWANIEC C R
19790219
CHRISTENSEN C J
19790507, 19800226, 19800345
CHRISTENSEN D L
19790314
CHRISTIANSON M M
19800168
CHRISTMAS S
19780347, 19780463
CHUNG S
19780671, 19780672
CHUNG S Y
19780397
CIANI J B
19770639
CINGO R P
19800139, 19800169-19800171
CLARK E F
19790315
CLARK H R
19800071
CLARK J A
19800490
CLARK P
19760573
CLARK R N
19780398, 19780399, 19790646,
19790835
CLARKE R
19760572
CLAUSS D B
19810017-19810019
CLAYTON C A
19780845
CLEARLY L D
19780400
CLEGG B R
19790884
CLEGG P
19790824
CLEGG R J
19780401, 19780402
CLEMMER G L
19810010
CLEWS H
19790349, 19800102, 19800103
CLIFF W C
19780403, 19780404
CLIFTON W W
19790316
CLOUTIER G G
19770514
COJOCARU D
19790236
COLE W J
19790241
COLEMAN C
19790317
COLIN R
19770515
COLLINS J L
19800035
COLUZZI M E
19800187
COMISKEY A L
19800244
COMM R
19750559
CONNELL J R
19780854, 19790318, 19790836,
19800174, 19800175, 19800405,
19800550
CONSIDINE D M
19770516
COOK C
19790849
COON H L
19780488
COON M D
19800437
COONLEY D R
19760574, 19790319
COOPER H
19780788
COOPER N
19800177
CORCORAN W
19790320
CORDES J
19800102, 19800103
CORNABY B W
19770653
COROTIS R B
19770517, 19780406-19780408,
19790155, 19790484, 19790657,
19790837, 19800178-19800180
CORREN D
19800370
CORRIGAN R D
19810037, 19810038
COSTELLO D
19760575, 19780347
COTY U
19770518, 19780409, 19800201
COUCH J P
19780410
COX K E
19770519
COX M
19790321
COXON L
19790322
COXON L K
19780411
CRAFOORD C
19790323
CRAIG A G
19790324
CRAIG R L
19800081
CRAMER G
19800181
CRESPO A
19800088
CRIMI P
19800182
CRISP J N
19790156, 19800137

CROMACK D
19780288
CROMACK D E
19770520, 19780289, 19780293,
19790255, 19790325, 19800183
CROMIE W J
19800184
CROOKS G
19790531
CROSSLAND R T
19800294
CROTHERS W T
19800127
CROW S C
19780306, 19780307
CROWDER R
19790703
CUBITT L J
19790326
CUNNINGHAM A B
19800087
CUNTZE R
19790327
CURL H
19750560
CURRIN H
19810020
CURTICE D
19780326, 19800185, 19810021,
19810022
CURTICE D H
19780600, 19790872, 19810011
CURTIS E H
19800186
CURTIS G B
19780412
CURTO P
19770521
CURTO P A
19800187
DA MATHA SANT'ANNA F
19780705
DA-JUN Y
19790328
DAHLBERG J A
19790269, 19800114
DALE B
19790676
DALL-WINTHER D P
19800188
DAMBOLENA I G
19770522
DANIELS P A
19770648, 19770668, 19780413
DARKAZALLI G
19780290
DAS S C
19790329, 19790330
DASH P K
19790157
DATTA R L
19760576
DAUVILLIER A
19780414, 19780415
DAVARAJAN S
19760577
DAVID M L
19790158, 19790832
DAVIDOFF P H
19780630, 19780631
DAVIDSON M
19770523
DAVIS J C
19780416
DAVISON G N
19790331
DAVITIAN H
19780417
DAWBER K R
19800080
DAY J T
19780418
DE CAMARA TORRES C
19780419
DE CARVALHO H G
19790333
DE HOLANDA P R H
19780384
DE KEUSTER C
19780835
DE LAGARDE J M
19790669, 19800192
DE MAY G
19800190
DE MEYER F
19800522
DE RENZO D J
19790160
DE WINTER F
19790315
DE ZEEUW W J
19790469, 19800140
DEAN T
19760578
DEBONTRIDDER J
19780835, 19790332, 19800189
DECARLO J
19790353
DEIBERT D D
19800191
DEKITSCH A
19780353, 19790245, 19790334
DELIONBACK L N
19800193
DEMEO E
19780421
DEMEO E A
19770524, 19790335, 19790528,
19800074-19800076
DENNETT J T
19810057
DENSEM T
19790790
DES CHENES C
19810102
DESFRESNES J P
19760579
DESHMUKH R G
19790161, 19790337, 19790338,
19790613
DESIKAN V
19780727
DESSERT R
19800195
DEVINE D
19800314, 19800315
DEVINE M
19780422
DEVINE M D
19780330
DEWINKEL C C
19780423, 19790339
DHOTARAD M S
19780424
DICKINSON R
19800201
DIEDRICH J H
19790145
DIESENDORF M
19790340, 19790869, 19800354
DINELEY J L
19780425
DIVONE L
19780428, 19780429
DIVONE L V
19780426, 19790341, 19790342,
19790670, 19800197
DIXIT D K
19780430
DJOJODIHARDJO H
19760580

DO AMARANTE O A C
19790333
DODD C W
19780431, 19790785
DODGE D
19800077
DODGE D M
19790343, 19790345, 19800139
DOERING E
19750562
DOERNER H
19770498, 19770525
DOMAN G S
19780432, 19790346
DOMINIC R J
19780700, 19780707
DONATH
19260022
DONHAM R
19800201
DONHAM R E
19770602, 19790347
DONOHUE K
19800198
DONOVON R M
19780818
DORAN J C
19790839, 19800199
DORNER H
19750563
DORSEY J
19790643, 19790644, 19800451,
19810093
DORY B
19770526
DOUGLAS J H
19770527
DOUGLAS R R
19790348
DOWNEY W T
19790761, 19810076, 19810077
DRAKE R L
19770528, 19770529, 19780433,
19800200, 19800541
DRAKE W
19790349, 19800102, 19800103
DREES H M
19770530, 19780295, 19780435,
19790282, 19790350, 19790671
DREIER M E
19790227, 19810024
DREIFUERST G R
19770623
DREWS P
19800181
DRIGGS C L
19780297
DUBACH P
19750564
DUBEY M
19770531, 19780409, 19780437,
19800201
DUBEY M B
19780436
DUENSING G
19780341, 19780344, 19800202
DUFFY M
19780590
DUFFY R E
19800203, 19800477, 19800544
DUGGER G L
19750582
DUGUNDJI J
19760621, 19780395, 19780438,
19780670-19780673, 19790152,
19790440, 19810025
DULIKRAVICH D S
19800078, 19800204
DUMON R
19760581
DUNCAN C N
19770532
DUNHAM B
19800008
DUNHAM D C
19770533
DUNN P D
19790237, 19800141, 19800333,
19800555
DUSKIN A
19780439
DUTT G R
19790482
DUTTON J A
19790351, 19790840
DUWE W D
19790352
DYBBS A
19790716
DYER G
19800079
EATON W W
19760582
ECCLI E
19750565
ECKHART M T
19780630, 19780631
EDBLOM G
19800442, 19800443
EDDS M
19780288, 19780293
EDDY R L
19770686, 19780822
EDESESS M
19790170, 19800206
EDRIS A-A
19790354, 19800207
EDSINGER A W
19790787
EDSINGER R W
19780440, 19790788
EDWARDS P J
19800080
EGGERS A G
19800098, 19800458
EGGLESTON D M
19780441
EGGWERTZ S
19790355, 19800208
EGOLF T A
19810026
EGUCHI N
19800209
ELDERKIN C E
19770534, 19780632, 19780842,
19790704
ELDRIDGE F
19790171
ELDRIDGE F R
19800187
ELFIQI A
19810043
ELFORD W G
19800081
ELLIOT I F
19740345
ELLIOTT D L
19770535, 19780741, 19790356,
19790625, 19790829, 19790841,
19800124, 19800148, 19800210,
19800244, 19800395, 19800400,
19800469, 19810034, 19810080,
19810094, 19810127
EMERSON G
19800211
ENDLICH R M
19810027
ENGELKE C E
19780445

ENGLE W W
19790502, 19790503
ENGSTROM S
19770544, 19780446, 19790843
ERIKSSON B
19760585, 19760586, 19780447,
19780448
ERIKSSON J
19790256
ESBENSEN T V
19770545, 19780449
ESCHER W J D
19800212, 19800225
ESCOBEDO M
19790260
ESKINAZI S
19780450, 19790176
ESSENWANGER O M
19780797
ESTOQUE M A
19810027
ETHELFELD J
19800213, 19800214
ETZLER C
19780451
EULER K-J
19800082
EUSER B
19790648
EVANS M
19760452
EVEN J C
19750608
EVERITT K W
19800433
EVERS J L
19780431, 19790785
EVERSOLE R A
19790177
EWE H
19800145
FABIAN O
19790359
FADDOUL J R
19810029
FALICOFF W
19790360, 19790361
FALLEN M
19810030
FANSTEN M
19800217
FANTOM I D
19790672
FANUCCI J B
19750615, 19770618, 19780850,
19790783, 19790784, 19800029
FARLEY R C
19800132
FARMER E D
19800218
FARRINGTON R B
19800250
FAUEL P L
19750568
FAXEN T
19780455, 19790673, 19790844
FEGAN G R
19800083, 19800084, 19800219
FEJER A A
19780457, 19800446, 19810089
FELIX A
19790260
FELLHAUER C
19780347
FELLHAUER C A
19790362
FELTZ L V
19800038
FERBER R
19780458
FERENCZ D
19760588
FERRELL G C
19790363
FERTIS D G
19780611, 19790364, 19790365
FEUERSTEIN R J
19790224, 19790366
FEUSTEL J
19780459, 19780460
FEUSTEL J E
19800220, 19800221
FICHTL G H
19790435
FIELD J
19800026
FIELDHOUSE I
19790295
FIERENS E
19780835
FIESTER K
19770547
FIGARD R L
19800009
FIMREITE D
19800130
FINCH T
19790367
FINLAYSON A N
19810031
FINNEGAN P M
19800085, 19800086
FISHER E D
19790368
FLAIM S J
19780463
FLATT R
19770548
FLAVIN C
19810032
FLETCHER C A J
19790182
FLUDE E
19790458
FOERSTER
19260023
FORD B
19750576
FORD D E
19750606
FORDHAM J W
19800087
FOREMAN K M
19780464, 19780465, 19780481,
19780482, 19780696, 19790183,
19790184, 19790186, 19790370,
19790372, 19800407
FORGO E J
19760617, 19770611
FOSTER R W
19800212, 19800225
FOUAD A A
19780704
FRAENKEL P
19790846
FRAENKEL P L
19750570, 19790373, 19790374,
19790674
FRAGA E
19800088
FRANCIS B
19800011
FRANDSEN S
19790682, 19800226, 19800345
FRANK A
19770549
FRANK A L
19810033
FRANK D N
19800127

FRANKFURT M C
19570028
FRANKLIN R
19780468, 19790847
FREDERICK W A
19790375
FREEBAIRN-SMITH R
19790861
FREEDMAN A
19760589
FREEMAN B E
19750571, 19760590, 19780825
FREEMAN D L
19810034
FREEMAN P A
19800227
FREER R
19800228
FREIDRICH F J
19780592
FRENCH R E
19800310
FRENZEN P
19780779
FRERIS L L
19800150
FRERKING M
19790376
FRICKE J
19760591
FRIEDMAN P A
19800230
FRIEDMANN P
19800539
FRIEDMANN P P
19760592, 19780469, 19780598,
19780750, 19780853, 19790471,
19790684, 19800229
FRIES S
19790593
FRIESEMA H P
19810074
FRISK B
19800257
FRITZSCHE A
19770498, 19780353, 19780451,
19790245, 19790334
FROST W
19780470-19780473, 19790377,
19800166, 19800231, 19800232,
19810035
FRY C M
19790378
FULFORD G
19790340
FULLER D
19780504
FULLER G A
19770510, 19770550
FUNG T K
19800233, 19810036
FUNKHOUSER D
19790379
FURLONG D B
19780474, 19790227
FURNESS R
19790380
FURRY R B
19790852
FURUYA O
19800408
GADSBY G N
19770551
GAHN R F
19760635
GAIA M
19780475, 19780476
GALANIS N
19740347, 19770552
GALLAGHER J
19740348
GALLUP R B
19790381
GANDIN L S
19780312
GANESAN N
19780424
GARATE J A
19780477
GARFINKEL P
19790382
GARG H P
19800234
GARLAND J
19760594
GARSTANG M
19770553, 19780479, 19780788,
19790675, 19800235
GARTON J E
19800236
GARWOLI W N
19760650
GATZKE A E
19800517
GAYLORD D R
19790527
GELLER E W
19800437
GEORGE R L
19800148, 19800400, 19800469,
19810034, 19810094
GEORGI H
19790384
GERHARDT K
19800237
GEWEHR H W
19780480, 19790185, 19790385,
19800238
GEYSEN W
19780835, 19790332, 19800189
GHEORGHE A
19750558
GHERMAZIEN T
19800236
GIBBONS B
19730159
GIES P
19780857
GIGLIOLI G
19780475
GILBERT B
19780465
GILBERT B L
19780464, 19780481, 19780482,
19780696, 19790183, 19790184,
19790186, 19790370, 19790372
GILBERT L J
19770567-19770570, 19780541,
19790386, 19790387
GILBY D
19800371
GILHAUS A
19790388, 19800239
GILHAUSEN D B
19790833
GILKEY K B
19790532
GILLI P V
19800240
GILLOIS J
19790389
GILMORE E
19780483, 19790141, 19790835
GINOSAR M
19780484, 19790849, 19800241
GIPE P
19790187-19790189, 19800012-
19800015, 19800242, 19800243
GLASGOW J
19770602

GLASGOW J C
19780485, 19780486, 19790390, 19790850, 19800018, 19810037, 19810038
GLASSEY C R
19780487
GLENN B
19790558
GLODOWSKI C W
19780332
GLOWER D D
19780488
GLYNN E F
19790158, 19790832
GNECCO A J
19780489
GOEDKOOP J A
19800245
GOELA J S
19790191
GOETHALS R
19790176, 19800089
GOH T N
19790391, 19790392, 19810070
GOHARD J
19780671, 19780672
GOHARD J C
19780490
GOHIL H M
19790412
GOKHMAN A
19780491
GOLDBERG T
19800247
GOLDENBLATT M
19790851
GOLDENBLATT M K
19780564, 19780565, 19790449, 19790683
GOLDFARB J
19780419
GOODALE B A
19790394
GOODMAN F R
19800090
GOODRICH R W
19770554
GOOL W VAN
19760595
GOOLEY W E
19750573
GORDON J J
19790887
GORDON L H
19780440, 19810057
GORLAND S H
19720061
GOSLICH H D
19770555, 19780492, 19800248
GOTTLIEB R
19770556
GOUGEON M
19790395
GOVINDA RAJU S P
19780493, 19790396-19790398
GOVINDAN K P
19790412
GRANNEMANN W W
19790399, 19800249
GRASTRUP H
19800091
GREAVER V W
19800250
GREEB F J
19810102
GREEN T J
19800403
GREENE G C
19800092, 19810039
GREENWALD M L
19770557
GREET R J
19800251
GREGORY S E
19790400
GRETHER D
19770523
GREY J
19750582
GRIFFIN T
19810052
GRIFFITHS R T
19780494
GRIMMER D
19790192
GROS J
19790342
GROS J G
19790251, 19790252
GROSS G
19800253
GROSS G E
19800252
GROSSMAN W C
19770558, 19790401
GROSVELD F
19810104
GROTZKY V K
19790780, 19800162
GROVER O P
19780292
GROVER R D
19790193
GROVES W N
19770634, 19770635, 19780693, 19780694, 19790576, 19790577
GRUBER C L
19770634, 19770635, 19780693, 19780694, 19790577
GRUBER E L
19790576
GRUENBAUM R
19780495
GRYLLS W
19790676
GUERRERO J V
19800131, 19800255, 19810056
GUILD D H
19790403
GUNKEL W W
19790852
GUNNESKOV O
19800346
GUNWALDSEN D S
19780630, 19780631
GUO T
19770571, 19780542
GUPTA R P
19780497
GUPTA Y
19800256
GUSDORF J
19800235
GUSTAFSSON A
19790355
GUSTAFSSON A L
19800257
GUSTAVSON M R
19780501
GUSTAVSSON B
19780446, 19780499, 19780500, 19790677
HAACK B N
19800258
HABERCOM G E
19760596, 19760597, 19770559, 19770560, 19780502, 19780503, 19790194-19790196, 19800259
HABOECK A
19790404

HACKLEMAN M
19800260, 19800261
HADLEY D L
19810034
HAEUSSER W
19750572
HAGEDORN N H
19800262
HAGEMAN A J F K
19800134
HAGEN H
19770561
HAGEN L J
19790168, 19790169, 19790197
HAHN M
19800263
HALACY D S
19800264
HALEY D
19770562
HALL D C
19780504
HALL F F
19780505
HALL O P
19790405
HALLSTEN K-E
19800158
HAM N D
19800387, 19800412, 19810040
HAMER J
19760598
HAMILTON L D
19800265
HAMMITT A G
19690022
HAMMOND G
19780506
HANES D G
19790406
HANKS D J
19790407
HANLEY J
19790408
HANSEN A C
19790409, 19790853, 19800139,
19800170, 19800266-19800270
HANSON J A
19800212, 19800225
HARDELL R
19790410, 19790411, 19790678
HARDY D
19780508
HARDY D M
19780509, 19780510
HARDY W E
19780511
HARGRAVES W R
19780574
HARKARE W P
19790412
HARMS W A
19750573
HARNER K I
19790413
HARPER J
19810081-19810083
HARPER M R
19790205
HARRIS F W
19750573
HARRIS R I
19680026
HARRIS W L
19810064
HASBROUCK T M
19790414
HASLETT J
19790415
HASSAN U
19780511, 19800332
HASSEL W F
19780512
HAUSER L G
19760599
HAUSMANN H
19780513
HAUSMANN K H
19780513
HAWKINS T J
19780496
HAWORTH W L
19790854
HAYES D
19790416
HEAD W
19790417
HEALD R C
19780523, 19790521, 19790855,
19800222
HEALY J V
19780514-19780516
HEALY T J
19780517, 19790206
HEGAZY A S
19800444
HEIER S
19800181
HEIN L A
19800377
HEINZELMANN P J
19780592
HELGESEN H
19760585, 19760586, 19780447,
19780448
HELLHAKE G P
19790418
HELLICKSON M A
19790770, 19790772
HELM S
19800220
HELMS P W
19800120
HENDERSON J
19790210
HENNESSEY J P
19780518
HENRY G E
19780519
HENSING P C
19780520
HENTON P
19800107, 19800108
HERBERG G M
19760601
HERBERT F P
19790419
HERNANDEZ E
19790420
HERONEMUS W E
19740350, 19780289, 19800183
HERTER E
19780521, 19790421
HERWIG L O
19750574, 19770564
HERZOG F
19800128
HEWSON E
19780334
HEWSON E W
19780333, 19780335, 19780522-
19780524, 19780838, 19780846,
19790198, 19790200, 19790240,
19790262, 19790393, 19790422,
19790555, 19790776
HEYS J W VAN
19350012
HIBBS B
19790493, 19790496, 19800410
HIBBS B H
19810128

HICKS B B
19780778, 19790886
HIESTER T R
19790423, 19790856, 19790857,
19800104, 19800124, 19800395,
19810041
HIGASHI K K
19790424-19790428, 19800271
HIGGIN R M R
19760602
HIGHTOWER S J
19780525, 19780526
HILL K L
19790884
HILL P W
19780850, 19790783, 19790784
HIMMELMAN W A
19800272
HINERMAN J M
19790572
HINRICHSEN E N
19800273, 19810042
HINSLEY A J A
19780527
HINTON B
19780806
HINTON B B
19790231
HIRATE M H
19790522
HIRSCHBEIN M S
19800274
HIRSCHFELD F
19780387
HISE H W
19790378
HIX J
19760603
HOA S V
19790429
HOBBS R B
19790604
HODGSON F
19800128
HOEGSTROM U
19780455, 19780785
HOESON M J
19780297
HOFFER T
19810043
HOFFERT M
19800370
HOFFERT M I
19790207
HOFFMAN J A
19790201, 19810024
HOFFMANN I
19790430
HOGAN I
19750576
HOHENEMSER K H
19790431, 19790432, 19800275,
19810044
HOJSTRUP J
19790840
HOLDREN J P
19780529, 19800276
HOLLAND M B
19780530
HOLLANDSWORTH R P
19790433
HOLLEY W E
19810045, 19810112
HOLME O
19790679
HOLMES B A
19790536
HOLMGREN
19200011
HOLTER O E
19790858
HOLUB G
19800277
HOOKE W H
19810046
HOOVER L J
19800278
HOPPE H
19760604
HORI A M
19810094
HORVATH E
19800436
HOSPERS G D
19800134
HOULT C P
19770565
HOUSTON S
19800420, 19800421
HOVEY R W
19750577
HOWE R R
19790434
HOWELL D G
19790859
HOWELL W E
19770686, 19780532, 19780822
HOWELL Y
19760605
HOWES H E
19790296, 19810047, 19810048
HSU C T
19780533
HUANG C H
19790435, 19800200
HUANG I
19780851
HUB K A
19790251, 19790252, 19800523
HUBBARD H H
19800092
HUBBARTT J E
19790202
HUBER C C
19790251, 19790252, 19800523
HUEBNER R
19790437
HUGHES P S
19800098, 19800458
HUGHES W L
19740358, 19780534
HUGOSSON S
19780536, 19790438, 19790680,
19800093, 19800279, 19800280
HULTGREN L S
19790439, 19790440
HUMES T
19760621, 19780672
HUNDEMANN A S
19770566, 19800094-19800096,
19800281, 19800282
HUNNICUTT C L
19780537
HUNNICUTT W
19790317
HUNT D J
19780384
HUNT V D
19800283
HUQ R
19760606
HURLEBAUS W
19750578
HURST J
19790473, 19800319
HURWOOD D L
19790441
HUSAIN S A
19780538, 19800284

HUSS G
19800285
HUTTER U
19780539, 19780540, 19790442, 19790860
HWANG H H
19770567-19770571, 19780541, 19780542
ICERMAN L
19790443
IGRA O
19790681, 19800286, 19810049
ILLIES K
19770572
IMAIZUMI S
19800097
INALL E K
19800287
INGBERMAN A K
19790342
INGEBRETSEN F
19790858
INGLIS D R
19770574, 19780544, 19780545, 19790204
INHABER H
19780546-19780548, 19790444, 19790445
ISAACS N
19780549
ISSHIKI N
19790447
IVANOVIC V
19770575
JACKSON P S
19790862
JACOB A
19780550, 19780551, 19800288
JACOBS E W
19800485
JACOBS M L
19730160, 19770576
JACOBS P R
19770576
JACOBSEN W E
19800187
JAFAREY N
19810112
JAGADISH B S
19800289
JAIN B C
19800290
JAJU S P G
19790656
JAMES R C
19770686, 19780822
JANCZEWSKI J
19800291
JANETZKE D C
19790217, 19800301, 19810050
JANNA W S
19780420
JARAN C
19800203
JARASS A
19780556
JARASS L
19780552-19780556, 19810051
JAYADEV T S
19750580, 19760607, 19760608, 19780557, 19790210
JENG D R
19810053
JENNINGS D M
19790222, 19800316, 19800317
JENSEN F
19800213
JENSEN N O
19790682
JENSEN S A
19800292
JESCH L F
19780559, 19790448, 19800293-19800295
JI B
19790258
JIRLOW K
19780560
JOHANSON E E
19770577, 19780562-19780565, 19790449, 19790683, 19800099
JOHANSSON B C A
19800296, 19800297
JOHANSSON M
19780566
JOHANSSON T B
19780567, 19780568, 19790450, 19800298
JOHN V I
19780569, 19790451
JOHNS M D
19780401, 19780402
JOHNSON A L
19750581
JOHNSON A W
19770578
JOHNSON B
19800102, 19800103
JOHNSON C A
19760609
JOHNSON G L
19750573, 19770579-19770581, 19780570, 19790158, 19790180, 19790239, 19790832, 19790863
JOHNSON R
19770582
JOHNSON W
19750611
JOHNSTON P
19760610
JONES B W
19770583
JONES R
19810084
JONES W J
19770584
JONG M
19770685, 19780816
JOOS R
19780353, 19790245
JOPP M
19790213
JORDAN G A
19780571
JORDAN P F
19780572
JORGENSEN G L
19760611
JOYCE C
19790648
JUEMMERLE W
19790827
JURKSCH G
19780341, 19780344
JUSTI E
19800145
JUSTUS C G
19780573-19780578, 19790452, 19790541, 19790542
JUUL N H
19780579
KADLEC E G
19780580, 19790193, 19790864
KAHN E
19790453
KAIMAL J C
19790865
KAINE M
19780287
KALS W S
19770585

KALSER H W
19780581
KAMINSKY F C
19770522
KAMOSHIDA J
19790447
KANAKI M T
19790215
KANE W
19770586
KANT M
19790454
KARL F
19790827
KASSAKIAN J G
19770669
KATZENBERG R
19780820, 19790455
KAUFMAN J W
19800232, 19800299
KAUFMAN V
19770587
KAWAMOTO H
19790456, 19790457
KAY J
19800071
KAYSER H
19740351
KAZA K R V
19790216, 19790217, 19800300,
19800301, 19810050
KEABLE J
19770588
KEAR E B
19790866
KEAST D N
19780582, 19800302
KEITH T G
19800303, 19810053
KELLEDY E
19790415
KELLEY N D
19810054
KELLN K
19790458
KELLY D A
19780583, 19800304
KEMPKE E E
19720061
KENDALL H W
19800305
KENNELL E
19790459
KENTFIELD J A C
19780584, 19790460, 19800306
KERRIGAN T C
19780585, 19780586
KESSLER D L
19800307
KETLEY G R
19790703
KHAN M H
19780587
KHARITONOV V P
19690023, 19700033
KIDDER T
19770589
KIEBLING F
19790461
KILAR L A
19780588, 19790218, 19790219,
19790462-19790464
KILICKAYA M S
19800308
KILKIS B
19780291
KILLIAN H J
19750582
KING D M
19800127
KING P W
19800107, 19800108
KING R J
19780589
KING S M
19780590
KINLOCH D H
19800309
KIPHUT A
19790595, 19790596
KIRCHGAESSNER B
19790278-19790281
KIRCHHOFF R H
19780591, 19780833, 19790465,
19790867
KIRSCHBAUM H S
19770590
KISS A L
19770591
KITTLAUS E R
19780302
KJOLLER J
19800213
KLATTE R J
19810067
KLEIN H
19780592
KLEIN J
19780407
KLEIN J W
19790618, 19800426
KLEIN W E
19790466, 19800100
KLEINKAUF W
19800181
KLEMS J H
19770592
KLIMAS P C
19790220, 19790221, 19800038,
19800310, 19800448, 19810055,
19810091, 19810096
KLUETER H
19800311
KLUETER H H
19790211, 19790868, 19800312
KNOWLES R
19800256
KNOX J B
19800313, 19800537
KOBYLARZ T
19790467
KOEHLER H W
19760612
KOENRAADS A J T M
19790469, 19800140
KOERBER F
19800220
KOHLOSS F H
19780593
KOIDE G
19790360, 19790361
KOIDE G T
19770593, 19780594
KOIKE B M
19790333
KOLM K E
19770594
KOPRIVICA O
19770575
KORBER F
19790468
KORNFELD J
19790295
KORNREICH T R
19780595, 19780596, 19790222,
19790470, 19800314-19800317
KORZENIEWSKI E C
19780681
KOS J M
19780597, 19790413

KOTTAPALLI S B R
19780598, 19790471, 19790684
KOTTLER R J
19790222, 19790470, 19800316-
19800318
KOVACS I
19790472
KOVARIK T
19800319
KOVARIK T J
19790473
KRABBE U
19790132
KRAGTEN A
19800134
KRAUSE P C
19790302, 19790474, 19800163
KRAUSS O
19780325, 19780326, 19780600,
19790585
KRAWIEC S
19800020, 19800320
KRISHNA S S
19790759
KRISTOFERSON L
19800321
KRONER W M
19790475
KUECKEN J A
19790476
KUHLKE K D
19770618
KULKARNI S V
19800127
KULLGREN T E
19790259
KUMAR K L
19780292, 19800466
KUMIN H
19780422
KUNSTMANN W H
19800248
KUNZ G E
19790405
KUSSMANN A
19790477
KVATERNIK R G
19790216
LABUSZEWSKI T
19780652
LACEY D R
19790852
LACOSTE J
19800322
LAGENDIJK N W
19660020
LAITNER S
19790478, 19800323
LAITOS J
19790224
LAITOS J G
19790648
LAKOUTSIS D
19780425
LAMB C S J
19790479
LAMPE R F
19800098, 19800458
LANDA D C
19770596
LANDA H C
19770595, 19770596
LANDA J M
19770596
LANDA M C
19770596
LANDAHL M T
19790480
LANDFIELD J
19760573
LANDGREBE A J
19810026
LANE D
19800442, 19800443
LANGHAM R
19790481
LAPIN E E
19770597
LARKO D
19790351
LARKO D E
19790878
LARRABEE E
19760621
LARRABEE E E
19780438
LARSON D L
19790482
LARSSON L
19780602
LAUER H
19790483
LAWAND T A
19730158
LAWLER J
19780600, 19790585
LAWLESS-BUTTERFIELD C
19810056
LAWRENCE K
19800324, 19800493
LAWRENCE K A
19780603, 19790225, 19800325
LAWS K L
19780604
LAWSON M O
19780605, 19780674, 19780675,
19790546, 19790547, 19800411
LE K D
19780418
LEBOEUF C M
19800250
LEBOST B A
19770598
LECHNER M
19800112
LEE C-O
19760613
LEE H K
19750583
LEE S M
19760614
LEE S T
19800326
LEE T R
19790870
LEGOURIERES D
19800327
LEICESTER R J
19780606
LEIGH G G
19800409
LEIGHTON L H
19770599
LEMASOV B I
19780607
LEMEUNIER
19530049
LEONARD T M
19790226, 19800494
LERNER J
19780608, 19780609
LESCARBEAU A
19770646
LEVY G W
19800026
LEWIN L
19790485
LEWIS D C
19780293

LEWIS J O
19780610
LEZAMA J A
19800111
LIEBLEIN S
19780611, 19790227, 19790486
LIEBST B S
19800328
LILJEDAHL L A
19780612, 19790871, 19800329, 19800330
LILLEY G M
19780613
LIN J T
19790769, 19800530
LIN J-T
19800531
LIN M-C
19810035
LIN S-R
19810045
LINACRE J K
19770600
LINDGREN M
19780614
LINDLEY C A
19780615, 19780616, 19790229, 19790487, 19790489
LINDLEY D
19780617, 19780661, 19780662, 19800331, 19800332
LINDQUIST O H
19780618
LINDSEY C
19800235
LINKE S
19770601, 19780619
LINSCOTT B
19780537
LINSCOTT B S
19770602, 19790330, 19790490, 19810057
LINVILL D E
19780325, 19780326, 19780600
LIPMAN N H
19790237, 19800333, 19800555
LIPNER M H
19800458
LIPPERT J
19790491
LIPPERT S
19800334
LIPSCHUTZ R C
19790878
LISSAMAN P B S
19780620-19780622, 19790492-19790496, 19800335, 19800410, 19810128
LITTLER J G F
19760615, 19770603, 19780623, 19780819, 19790497
LIU H
19810058
LIU M K
19800027
LIVESAY J C
19790757
LJUNG L
19790411
LJUNGSTROM O
19740352, 19780310, 19790410, 19790678, 19800337
LOBITZ D W
19800339, 19800340, 19810059, 19810060
LODGE M
19780625, 19790660, 19790685
LOEB A
19780626
LOEFFLER A L
19810061
LOIS L
19790498
LONDAHL D S
19790227
LONG B H
19780472
LONG W F
19770623
LOOIJESTEIJN C J
19810062
LORMAN W R
19780627
LOTFALLIAN M
19790643, 19790644, 19800451, 19810093
LOTH J L
19750615, 19760606, 19770604, 19770605, 19780628, 19790499
LOTKER M
19760611, 19780629-19780631, 19790500, 19810074
LOWE J E
19790501-19790503
LOWE R
19800341
LOWY S H
19780633
LOYD M L
19800057
LUCARELLI F B
19800071
LUCAS T
19770606
LUDDE P F
19800342
LUDWIG D
19790504, 19800343
LUDWIG F L
19780350, 19800135, 19800344, 19810027
LUMSDAINE E
19790505
LUNDE P
19800028
LUNDEMO C
19790355
LUNDGREN S
19800257
LUNDSAGER P
19790132, 19790506-19790508, 19790686, 19800345, 19800346
LYLES L
19790169, 19790197
LYNETTE R
19790509
LYSEN E A
19800134
LYSEN L H
19780635
LYSTRUP A
19800213
LYTLE W F
19790770
MA F S
19790518, 19790872
MACCHI E
19780476
MACCREADY P B
19770610, 19780637
MACHENS U
19790483, 19790519
MACKLIS S L
19780642, 19780643, 19790520, 19790607
MACLEAN C
19800141, 19800333, 19800555
MADIO F R
19790761
MAEGEY M
19800482

MAEKAWA S
19800408
MAGAI B S
19750585
MAGOVENY G S
19760617, 19770611
MAHRT L
19790521, 19800222
MAJEETHIA K M
19790412
MAKOFSKE W
19770612
MALET L M
19780645, 19800522
MALLNER C
19780504
MALVER F S
19780618
MANCUSO R L
19780350, 19800135
MANDERS A H E
19790667
MANDUJANO M
19790260
MANI K
19780575
MANLEY R N
19800187
MANNER D
19780327, 19780600
MANSOUR W M
19790522
MANSURE A J
19790523
MANWELL J F
19790515, 19790524
MARCELIS R
19780835
MARCH F
19790761
MARIANOWSKI L G
19750594
MARIE T L
19810009
MARIER A
19800353
MARIER D
19790873, 19810063
MARKS A M
19780646, 19790525
MARLATT W E
19790526
MARRS R W
19780379, 19780647, 19780648,
19790527
MARSH W D
19770613, 19780571, 19780649,
19780650, 19790528-19790530
MARSTON C H
19780651
MARTIN B
19800354
MARTIN P
19790531
MARTINELL J
19740355
MARTINEZ A M
19790260
MARTINEZ R
19810064
MARTINEZ-SANCHEZ M
19760621, 19780652, 19780670-
19780672
MARTINSSON J
19800355
MARWITZ J
19780648
MARWITZ J D
19790532
MASSMAN W
19780806
MASSMAN W J
19790231
MATHUR R M
19790539, 19800362
MATSON R
19780600
MATTILA J M
19790854
MATZEN R
19780654, 19790687
MAULE P
19800356
MAULE P A
19790883
MAUMUS J P
19790533
MAUREL A
19790534
MAYCOCK P
19800490
MAYER D
19780655
MAYER D J
19790535
MAYER-SCHWINNING W
19760618, 19780656
MAYO L H
19780657
MAYS I D
19790536, 19790688
MAYS J H
19810010
MCCARTHY G
19750584
MCCONNELL R D
19790170, 19790512, 19790701,
19790739, 19800021
MCCORMICK M E
19780636
MCCREARY S T
19800517
MCCUTCHEON S
19800347
MCDERMOTT J
19800348
MCEVILY A J
19790513
MCEWEN L B
19790514, 19800349
MCGEORGE J
19800022
MCGOWAN J G
19740350, 19780290, 19780293,
19780638, 19790515, 19790524,
19790639, 19790640, 19800183
MCGREW P O
19780639
MCKEE J S C
19780640
MCKENZIE B A
19790874
MCKIE W R
19790705
MCLAUGHLIN T
19770607
MCLENDON B D
19790516
MCMULLAN J T
19790247
MCMULLEN R
19800087
MCNERNEY G M
19800024, 19800350, 19810065,
19810066
MCPHERSON W E
19800351
MCPHILLIPS M
19790517, 19790875

MCVEIGH J C
19760616, 19770608, 19770609, 19780641
MEEKER L D
19800357
MEIER R C
19760611
MEIER R W
19790538
MEIJER S
19800417
MEILKE P
19790526
MELISS M
19770614, 19770615, 19780658, 19800361
MELLOR G L
19780533
MELTON W C
19780616, 19780659, 19790229, 19790487
MENZIES R W
19790539, 19800362
MERCADIER Y
19780660
MERONEY R N
19760619, 19780360, 19780361, 19780661-19780664, 19790876, 19800056, 19800167, 19800363
MERRIAM M F
19780665, 19780666, 19800364
MERRILL O
19800256
MERSON T J
19790538
METTAM P J
19780630, 19780631
METZGER B
19810003
METZGER F B
19810067
MEYER H
19760620
MEYERER W
19790540
MEYERS C E
19800365
MICHAUD L M
19770616
MIFFLIN R
19770617
MIGLIORE P G
19770618, 19780849, 19780850, 19790782-19790784, 19800029, 19800366, 19800536
MIKHAIL A
19780575
MIKHAIL A S
19780576, 19780578, 19790452, 19790541, 19790542
MILBORROW D
19800332
MILBORROW D J
19780667, 19800151, 19800367
MILLER A H
19800368, 19800550
MILLER C A
19780668
MILLER D E
19800369
MILLER D L
19790543
MILLER D R
19770620, 19800018, 19810037, 19810038
MILLER D W
19780669
MILLER G
19770521, 19770621, 19790207, 19800370
MILLER J A
19790375
MILLER J G
19710044
MILLER K J
19770619
MILLER R
19780673
MILLER R H
19760621, 19780670-19780672, 19790545
MILLNER A R
19790544
MINARDI J E
19770622, 19770696, 19780674, 19780675, 19780700, 19780707, 19780752, 19790546, 19790547, 19790812, 19800411
MINDER R
19800371
MINTZER I
19800276
MISKELL J T
19800372
MITCHELL R L
19800529
MOBERG E
19790548
MODARRESI K
19780591
MODARRESS D
19790554
MODIR H
19790643, 19790644, 19800451
MOELLER F
19780654
MOHAN N
19770623, 19770624, 19780676
MOHAPATRA P K
19760577
MOHN J
19790593
MOHR E
19780677
MOLLY J
19790477
MOLLY J P
19770498, 19770625, 19780678
MOMENT R L
19780679, 19790133, 19790556, 19790557, 19800374, 19810068
MONTES J S
19780680
MONTGOMERIE B
19790355
MOORING M
19800383
MORAN E
19770626
MORAN K E
19780681
MORETTI P M
19770583, 19810069
MORGAN G H
19790648
MORGAN R
19790247, 19790595
MORINO L
19750586-19750588, 19760627, 19760639, 19770645, 19780717, 19800415
MORRELL W H
19750589
MORRIS D
19800030
MORRIS G
19780529, 19800276
MORRISON B A
19780682
MORSE F H
19730161

MOSES H L
19780840, 19780841
MOSES R
19770627
MOSS J
19780683
MOURNING P
19790558
MOYER G F
19780487
MOZEICO H V
19770571, 19780542
MUEHLOECKER H
19800375
MUELLER M
19790827
MUELLER W
19790334
MUKHERJEE T
19760622
MUKHOPADHYAY V
19780294, 19800105
MULAS P
19790260
MULLER A
19790593
MURPHY P
19780591, 19800102, 19800103
MURPHY R D
19780684
MURRAY R B
19790247
MUSER D
19790477
MUSGROVE P
19770629, 19780687, 19780688
MUSGROVE P J
19780685, 19790688, 19800333,
19800376, 19800555
MYERS K
19790443
MYERS W N
19800377
MYSELS K J
19790559
NADIS S J
19800305
NAGY G D
19790257
NAOT Y
19780342, 19780343
NARASIMHA R
19780493, 19790396, 19790397,
19790656
NARAYANAN M A B
19790560
NARAYANAN P
19780630, 19780631
NATHAN G K
19790391, 19790392, 19810070
NEAL D
19790561
NEBERAY Y I
19770630
NELLUMS R O
19790179, 19790562, 19790723,
19800381
NELSON V
19780689, 19790141, 19790835,
19800382, 19800383
NESBIT W
19800384
NESS N
19750615
NEUMANN R
19780690, 19800570
NEUSTADTER H E
19780744, 19790713, 19790877,
19800385, 19800486, 19810071
NEWMAN B G
19780691, 19790630
NEWMAN V G
19780606, 19800218
NEYELOFF S
19790852
NGAGO T M
19780691
NGUYEN D V
19790564
NGUYEN T
19800042
NICHOLS L
19780295
NICODEMOU V C
19790248
NIGHTENGALE M E
19790566
NIKAI I
19790447
NILBERG R H
19790567
NILSSON K
19780692
NINGAIAH
19790743
NITTEBERG J
19800386
NNAJI S
19800235
NOEL J M
19800482
NOISEUX D
19810008
NOLA F J
19810072
NOLAN P J
19800273, 19810042
NOLL R B
19780295, 19790282, 19800387,
19800412
NORD A R
19800369
NORMAN G T
19800469
NORTON J H
19790568
NOUN R J
19790569, 19790570, 19800388,
19810073, 19810074
NOWAK D
19780470
NOWAK D K
19790377
NOWAK E S
19810006
O'BRIEN W F
19780840, 19790173, 19790572
O'DONNELL D
19800324, 19800493
O'LONE R G
19810075
OBERMEIER J L
19790571
ODDO S
19770633
ODLAND R
19790627
OEHLKERS R A
19790231
OFFRINGA J J
19790469
OFFRINGA L J J
19800140
OGASAWARA N
19800209
OGUCHI K
19790574
OLAECHEA M
19670021

OLGAARD P L
19790575
OLIVER T K
19770634, 19770635, 19780693,
19780694, 19790576, 19790577
OLSSON C
19790411
OLSSON L E
19770636
OMAN R A
19770637, 19780465, 19780482,
19780695, 19780696
OOSTHUIZEN P H
19760623
OPLINGER J L
19780571, 19790520, 19790528,
19790578
OPPENGARD M
19780697
ORGILL M M
19800541
OSBORN W C
19800389, 19810076, 19810077
OSHIRO N E
19770649, 19790612
OSSENBRUGGEN P
19780698
OSSENBRUGGEN P J
19800357
OTAWA T
19790579, 19800390
OTIS D R
19800391
OTNES K
19790580
OTTENHEIMER J
19790419
OTTENS H H
19780699, 19790689
OTTOSEN G O
19790581
OUCHI N
19790574
OWEN J A
19770638
OZBOYA N
19780491
PAL D
19770639, 19780701, 19780702
PALMA F N
19780703, 19790582
PALMER G M
19750615
PALMGREN D
19800391
PANOFSKY H A
19790351, 19790878
PANTALONE D K
19780704
PAPROCKI S
19790540
PARASCHIVOIU I
19780287, 19780705, 19810078
PARK G L
19780325-19780327, 19780600,
19790584, 19790585, 19790643,
19790644, 19800451, 19810093
PARK J
19750590, 19780706, 19810079
PARK R T
19780709
PARKER C E
19770639, 19780702
PARKINSON B W
19790485
PARMELEE J M
19800309
PARR H
19790858
PARTHE A C
19790586
PATNAIK P C
19780824, 19780825, 19790587,
19800514
PATON D L
19810080
PATRICK J P
19790413, 19790588
PATTEMORE S W
19780401, 19780402
PATTERSON G N
19770641
PATTON J
19800185, 19810021, 19810022
PATTON R
19810011
PAUL J
19770614
PAVELIC V
19760594, 19800445
PAVLECKA V H
19760624
PAYNE P E
19790589
PAYNE P R
19800413
PAZIENZA J
19780771
PEARSE J R
19780661, 19780662
PEARSON E
19780708
PECK M K
19800087
PEDERSEN B M
19800393
PEDERSON B M
19790590
PEERY D J
19790227
PELKA D G
19780709
PELSER J
19770642
PENNELL W T
19780854, 19790154, 19790591,
19790798, 19790856, 19790857,
19790879, 19800124, 19800394,
19800395, 19800550, 19810041
PERCIVAL C D
19800083, 19800084, 19800219
PERCIVAL D
19780557, 19810081-19810083
PERKINS F
19780557
PERKINS F W
19810084
PERLEY R
19790296, 19790830, 19810047,
19810048, 19810085
PERNPEITNER R
19800285
PETERS D A
19790431
PETERSEN D
19790592
PETERSEN G
19790593
PETERSEN H
19790132, 19790594, 19800396-
19800398
PETERSON B
19780838
PETERSON H A
19770623
PETERSON J N
19780710
PETZRICK P A
19750591
PEXTON A F
19800399

PFLUEGER
19410030
PFLUGER J E
19790375
PHILBRICK D
19790595, 19790596
PHILLIPS F
19770644
PHILLIPS G T
19780824, 19780825, 19790597,
19790754, 19790755, 19800514
PHILLIPS P
19810006
PHILLIPS P D
19790598
PICKERING K E
19800400
PIELKE R
19770553, 19780788, 19790575
PIELKE R A
19800235
PIEPER W M
19790599
PIEPERS G G
19780712, 19790600, 19790601,
19790690, 19790699, 19800401
PIKE A
19750592
PINSON J D
19790156, 19800137
PIPHER C
19790473, 19800319
PIWKO R J
19790242
PLACE T W
19780713, 19790602, 19790603,
19810086
PLANTES W J
19780714
PLEN A
19780715
PLUCHARD A
19780296
PLUNKETT J
19780716
PONTIN G W W
19770608, 19780641
POOR R H
19790604
POORE R
19790509
PORCH W M
19800402, 19800403
PORTER T G
19790852
PORTER W H
19760626
POTTER R C
19800302
POWE R E
19730162, 19740353-19740356
POWELL D C
19790880, 19790881, 19800199,
19800405
POWELL W R
19800404, 19810087
POWER H M
19790605, 19800414
PRATT M
19790606
PREGENT G
19780698, 19800357
PREUSS R
19760627
PREUSS R D
19770645, 19780717, 19800415
PRICE W W
19790607
PROBERT S D
19790215
PRYOR D V
19790485
PUGA N
19790260
PULLING F
19760638
PURPER G
19780718
PUTHOFF R
19750611
PUTHOFF R L
19800035
PUTNAM P C
19740357
PYKKONEN K
19790609, 19810056
PYKKONEN K R
19800157
PYTLINSKI J T
19780719
QAZI A Q
19780720
QUAKERNAAT J
19770503
QURAESHI S
19790793
RAAB A
19790610, 19800418
RAGHAVA A K
19780721
RAHMAN M A
19790157
RAJAGOPALAN V
19770646, 19780550, 19780551,
19780722, 19780723, 19800288
RAJVANASHI A K
19800419
RAMAGE C
19770647
RAMAGE C S
19770648, 19770649, 19790611,
19790612
RAMAKUMAR R
19740358, 19760628, 19780720,
19780724, 19790161, 19790337,
19790613
RAMAMOORTHY M
19640079
RAMAMURTI V
19800447
RAMBO F
19790614
RAMSDELL J V
19770534, 19780725, 19780726,
19800420, 19800421, 19800541
RAMSHAW R S
19790615
RANGARAJAN S
19780727
RANGI R S
19770674, 19780728, 19790696
RANI U
19800234
RAO B V A
19780424
RASMUSSEN F
19800422-19800424
RAU N S
19800450
RAYNOR G S
19800460
REALE T
19810043
REDDOCH T W
19790616-19790618, 19800426,
19800427
REDFIELD D
19760629
REED J W
19780729-19780731, 19790619,

19790620
REGAR K N
19780732
REGINO T C
19780393
REICHEL R
19780298
REICHEL R S
19790691
REID M A
19800428
REINHARDT C L
19810009
RENNE D S
19780741, 19780854, 19790624,
19790625, 19800430
REPPERT M H
19790626
RESTREPO I
19790260
REUTER R C
19780742, 19780743, 19800431,
19800432
REVELL P S
19800433
REYER R
19780504
REYNOLDS R D
19800434
RI Z
19760633
RIAZ M
19770624, 19780676
RICE C E
19790516
RICE W L R
19790342
RICHARDS H M
19770651
RICHARDS T R
19780744, 19780817, 19790712,
19790713, 19800486
RIDER M
19780663
RIDER M A
19780361
RIEDLER W
19800436
RIEDLINGER T
19800435
RIEGLER G
19800436
RIKKERS R F
19770522
RILEY J D
19790627
RILEY J J
19800437
RINDE J A
19800127
RINEER A E
19770652
RIZER S
19800071
ROAN V P
19790628
ROBBINS W H
19780745, 19790390, 19790629,
19790850, 19800438, 19800509,
19800510, 19810088
ROBERT J
19790630
ROBERTS B W
19790182, 19800439
ROBERTS F
19800440
ROBERTSON G
19810006
ROBINSON J W
19780746
ROBINSON K
19800236
ROCK K C
19790754, 19790755
RODMAN C W
19770653
RODRIGUEZ D J
19790633
ROFFMAN H K
19760647
ROGERS P
19770654, 19780747
ROGERS S E
19770653, 19780748
ROGGE E
19770655
ROHRBACH C
19770656
ROOT D H
19780749
ROSCHEL A
19770657
ROSE M
19790634
ROSEN A
19780598, 19780750, 19790471,
19790684
ROSENFELD C L
19790883
ROSS F
19800441
ROSS R S
19780611, 19790364, 19790365
ROTH S D
19810111
ROTHMAN E A
19780753, 19790692
ROWE D W
19800351
ROWLEY L P
19790793
ROYCE R
19800132
RUANE M
19770584
RUBIN S A
19790558
RUDMAN P S
19780342, 19780343
RUGG B
19800370
RUHLMANN T E
19780754
RUMSEY R D
19770658
RUP R
19780755
RUSH C K
19760623
RUSSELL L J
19790243
RUTLEDGE G
19800442, 19800443
RYZHKOV V S
19700034
SABZEVARI A
19770659, 19790693
SACHDEVA R C
19780292
SACKS T
19790636
SAH P L
19800466
SAHU B
19790157
SAIFUL M R
19780757
SAKR I A
19750595, 19800444

SALEH M A
19750595
SALES A T
19780577
SALIEVA R B
19770660, 19780758
SALTER E L
19780759
SAMAGA B S
19790759
SAMBAR H
19800445
SAMMELLS A F
19800446, 19810089
SAMPSON A R
19780760
SAMRAJ A C
19790743
SAN MARTIN R L
19750596
SANCHEZ S
19790260
SANDBORN V A
19780360, 19780361, 19780663, 19780664, 19800167
SANDS C D
19790482
SANDUSKY W F
19800430, 19810090
SANESI N L
19790638
SANKARA RAO K
19770646, 19780722
SANTANDER F
19790260
SANTINI D J
19800278
SARKISIAN P H
19780638, 19790639, 19790640
SARRE P E
19790676
SATHIKH S
19800447
SAVCHENKO I G
19780607
SAVINO J
19750611
SAVINO J M
19770662, 19790145
SCHAEPER H R A
19720063
SCHAKENBACH J T
19800400, 19810127
SCHATZLE P R
19800448, 19810091
SCHEDVIN J C
19800437
SCHEFFLER R L
19790641, 19790642, 19800233, 19810036
SCHELLENS F J C
19790469, 19800449
SCHENK K F
19800450
SCHENZLE P
19780761
SCHER R
19750618
SCHETZ J A
19790173, 19800009
SCHIBBYE B
19780692
SCHIENBEIN L A
19810092
SCHILDKNECHT H E
19800164
SCHIMKE G R
19790761
SCHLOSSER A
19800477
SCHLUETER R A
19790643, 19790644, 19800451, 19810093
SCHMALZL F
19790404
SCHMIDT E R
19770663
SCHMIDT W L
19790250
SCHMITZ K
19790645
SCHNEIDER A D
19780399, 19790646, 19790835
SCHOENMACKERS R
19800452
SCHOLZ H J
19800453
SCHONBALL W
19790647
SCHORNHORST J R
19800458
SCHROEDER T A
19770648, 19770668, 19780413, 19810094
SCHUETTE K W
19800454
SCHULGASSER K
19790681
SCHURIG A K
19790400
SCHWIND D
19780706
SCOTT D
19780762, 19810095
SECHAN N
19800185
SEDEFIAN L
19800455
SEELEY D
19790648
SEGER G
19800482
SEIDEL M
19780764
SEIDEL R C
19780763
SEIFERT J
19780857, 19810118
SEITZ H
19770664
SELLBERG C
19780692
SELLMAN D L
19760634
SELZER H
19800456, 19800457
SENGUPTA D L
19780767-19780769, 19790649-19790651, 19800359
SENIOR T B A
19780767-19780769, 19790649-19790651, 19800359
SENS P F
19780712, 19790690
SENTER R
19800112
SEO P H
19800249
SETHURAMAN S
19800460
SEXTON J
19790299
SEXTON J H
19790164, 19800157, 19800162, 19800461, 19800462, 19810124
SFORZA P M
19770665-19770667, 19780528, 19780770-19780772, 19790652, 19800463
SHANKAR P N
19790653

SHARIF M
19790168, 19790169
SHARMAN H
19750597
SHAW E
19780773
SHAW R H
19790733
SHAW R W
19780630, 19780631, 19790500
SHAYANFAR H
19810093
SHEEHAN J L
19790589
SHEFTER Y I
19750598
SHEIBLY D W
19760635
SHEIH C M
19780774
SHELDAHL R E
19800038, 19800464, 19810096,
19810097
SHEPERDSON W
19800039, 19810098
SHEPHERD D C
19790655, 19800139
SHEPHERD D G
19790654
SHEPHERD K P
19810104
SHERMAN C A
19790884, 19800537
SHERMAN D J
19800465
SHERMAN M M
19750599, 19750600, 19760576,
19760636, 19760637
SHEU D
19780673
SHEU D L
19780775
SHINN J H
19790884
SHIRER H N
19790351, 19790878
SHISHODIA K A
19800234
SHISHODIA K S
19800466
SHOEMAKER F F
19790558
SHOLES J E
19780745
SHOLL W S
19430025
SHORE J
19760638
SHRINIVASA U
19790656
SHULTIS J K
19790158, 19790832
SHUPE J W
19750601
SHURTLEFF W W
19780776
SIGL A B
19780407, 19790657
SILLIN J O
19780630, 19780631
SIM S R
19790885
SIMHAN K
19800453
SIMKOVITS H R
19770669
SIMMS D
19800467
SIMON R L
19800468, 19800469
SIMONIN J
19790658
SIMPSON J
19780777
SIMPSON P B
19800332
SINCLAIR D
19770662
SINCLAIR J H
19780386
SINGH R
19780709
SIROCKY J R
19790728
SISTERSON D L
19780778, 19780779, 19790886
SIVASEGARAM S
19790659, 19790773, 19800472
SIVIER K R
19800473
SIZEMORE R L
19790313
SKAERBAECK E
19780692
SKIDMORE E L
19790169, 19790197
SLAGER W
19780780
SLATER K
19790660
SLOOP J L
19790887
SMEALLIE P H
19800040
SMEDMAN-HOEGSTROM A S
19780446, 19780455, 19780785,
19790694
SMELTZER K K
19800278
SMIRNOVA A N
19780607
SMITH D
19790363
SMITH D A D
19780527
SMITH D G
19810080
SMITH D R
19790661
SMITH J
19780370
SMITH M C
19780787
SMITH M F
19810102
SMITH O J M
19780786, 19800474
SMITH P L
19800517
SMITH P R
19800475
SMITH R J
19800476
SMITH R T
19750580
SMITH T
19810106, 19810107
SMOLKA S A
19780717
SMORTO M
19780771
SMULDERS P T
19750603, 19790718
SNECK H J
19800477
SNOW J W
19780788, 19790675, 19800235
SNYDER M H
19770685, 19780789, 19780816,
19800552, 19800553, 19810099

SO R M C
19770670, 19770671
SODERHOLM L H
19780299, 19780300, 19790142,
19800478, 19800479
SOEDERGAARD B
19740352
SOLBERG J
19790708
SOMERS E V
19770590
SONES J
19780569
SOREL J
19800482
SORENSEN B
19780790, 19790695, 19800483,
19800484
SOTO R
19790558
SOUTH P
19770674, 19780728, 19790696,
19790709, 19800485, 19800526
SPAHR H R
19800448, 19810091
SPANOS E
19800112
SPAULDING A P
19790710
SPENCER R H
19810100
SPERA D A
19770675, 19780793, 19790711-
19790715, 19800486, 19810071,
19810101
SPERO E
19790716
SPIERINGS P A M
19770513, 19780392, 19780794-
19780796
SQUIRE D R
19750605
SQUIRE W
19780850
SRINATH L S
19780301
STAFFORD J V
19790343, 19790345
STAFFORD R W
19810102
STALLKAMP J A
19800061
STAPLETON C A
19800488, 19800489
STARNER F L
19770696
STARR P J
19800487
STASI W
19780771, 19780772
STASI W J
19790652
STATES L
19810056
STEEN P
19780567, 19780568, 19800298
STEFAN H
19750606
STEIMLE F
19770614
STENEHJEM E J
19800278
STEPHENS H S
19800488, 19800489
STEVENS B
19800573
STEVENS D G
19810104
STEVENS M J M
19790718
STEWART D A
19780797
STEWART H J
19780798
STEWART T D
19790261
STEWART W D
19770510
STICHMAN J H
19710044
STICKSEL P R
19770653
STIEFELD B
19780799
STODDARD F S
19780800
STODDARD W
19790720
STOECKER R R
19810105
STOLPE J
19800233, 19810036
STONE G
19790351
STONER R
19800148
STOOP T
19790667
STOTZ K C
19780801
STOUT B A
19800490
STOY B
19800221
STRABO F
19770545, 19780449
STRICKLAND J H
19800042, 19810106, 19810107
STROCK O J
19800491
STROJAN C
19800324
STROJAN C L
19800325, 19800492, 19800493
SUAGEE D B
19780803
SUBRAMANYAM D V V
19790743
SUCIU E
19760639
SUCIU E O
19780717, 19800415
SULLIVAN A F
19690024
SULLIVAN J P
19810109
SULLIVAN L J
19800142
SULLIVAN T F P
19770677
SULLIVAN T L
19760569, 19790217, 19790313,
19790728, 19810108
SULLIVAN W N
19780804, 19780805, 19790721-
19790727, 19800339, 19800340,
19800494
SULZBERGER V T
19770590
SUMNER J
19770678
SUN K
19810106, 19810107
SUNDAR R M
19810109
SUNDARAM P
19790398
SUNG C S
19750608

SUOMI V E
19780806, 19790231
SURAZHSKII D Y
19690025
SUTZ R
19800497
SVENSSON T
19770679
SWAIN J W
19790514, 19800349
SWAMY M N S
19780722
SWIFT A
19790443
SWIFT A H P
19790431, 19800275, 19810044
SWIFT-HOOK D T
19790729, 19800502
SWISS M
19790730
SYRETT J J
19770599
SZOSTAK J
19800043, 19800044
TABOR H
19750609
TAG I
19790505
TAKAHASHI P
19790360, 19790361
TAKAHASHI P K
19770593, 19780594
TAKEUCHI M
19790447
TAKLE E S
19790733
TAMMELIN B
19780810
TANENBAUM G
19780529
TANGLER J L
19800139
TARLTON T G
19770668
TARNIZHEVSKII B V
19780607
TATE M
19810052
TAYLOR D
19810110
TAYLOR P A
19800499-19800501
TAYLOR R H
19780811, 19790734, 19800502
TAYLOR T B
19790735
TEGTH U
19800504
TELFORD J W
19790738
TELLER E
19800505
TEMPLIN R J
19770674, 19780728, 19780812, 19790696, 19790739, 19790740, 19800506
TENENBOM B
19770556
TENNYSON G
19800507
TENNYSON G P
19770534, 19770681, 19780813, 19790153, 19790741
TER BRUGGE R
19790699
TERHORST W
19790645
TESHOME A
19770601, 19780619
TETZLAFF G
19770682, 19790742
TEWARI S K
19750610, 19760641, 19780301, 19780814, 19780815, 19790743
THALHEIM K
19770684
THALLER L H
19740360, 19790744, 19800262, 19800428
THARPE B J
19790745
THEYSE F H
19790746
THIELE H A
19790468
THOMANN G C
19770685, 19780816
THOMAS J
19790751
THOMAS R
19750611
THOMAS R B
19770603, 19780623, 19780819
THOMAS R L
19780817, 19780818, 19790629, 19800378, 19800438, 19800508-19800510, 19810088
THOMPSON J E
19800511
THOMPSON N J
19770648
THOMSON D W
19810111
THOR S E
19790747
THORESON L
19800158
THORN W R
19790363
THORNBLAD P
19790697
THRESHER R W
19790494, 19790495, 19790749, 19790750, 19810045, 19810069, 19810112, 19810124
THUMANN A
19790752
TIEDEMANN A F
19750594
TIELEMAN H W
19800512
TIERNEY P
19790526
TINKER J
19750612
TINSLEY J T
19790259
TISON R R
19800212, 19800225
TODD C J
19770686, 19780822
TODD J
19770687
TODD R W
19780821, 19790753
TOLLE D A
19770653
TOLLER B
19800044
TOLLESON S
19750613
TOMLINSON R N
19780799
TOMPKINS D
19800360
TOMPKINS D N
19780595
TONKS P E
19800106
TORDA T P
19780823

TORNKVIST G
19790677, 19800513
TOROCHKOV V Y
19690025
TOWNES H W
19730162, 19740353-19740356,
19790571
TRACI R M
19780824, 19780825, 19790754,
19790755, 19800514
TRAN V-V
19780826
TRAVIS S
19770688
TRENKA A
19780828, 19790756
TRENKA A R
19780827, 19790757, 19800374,
19800379, 19800515
TRIEZENBERG D M
19790386, 19790387
TROLL J H
19760642
TROMMERSHAUSEN W E
19790381
TROMP C
19570029
TROYER J
19810113
TSAO I S
19810058
TUMA J
19800516
TURNER R E
19780472
TWIDDELL J
19790758
TWISS R H
19800517
TYNDALL D H
19790703
UKO P
19800450
UNGERMANN C
19800203
UPENDRA S S
19790759
UPMALIS A
19800518
URBANEK A
19770690, 19780829, 19790760
URUSOV I D
19700034
USHIYAMA I
19790698
USMANI I H
19780831
VACHON W A
19790761, 19800520, 19800521
VAIDYA V H
19790412
VALDEZ M E
19780302
VALETT J
19800248
VALTER G P
19790762, 19800140, 19810062
VALVERDE S
19790260
VAN BRONKHORST J
19790763
VAN DEN BERG J M
19790699
VAN DER AUWERA L
19800522
VAN DUSEN E S
19780833
VAN ESSEN A A
19790699
VAN HOLTEN T
19780836, 19780837, 19790700
VAN LEERSUM J
19800524
VAN WYK J D
19790766
VANDENPUT A
19780835, 19790332, 19800189
VANDERELST W J
19790764, 19790765
VANKUIKEN J C
19790251, 19790252, 19800523
VANSANT J H
19790701
VARGO D J
19750614
VAS I E
19780839, 19790767, 19790768,
19800049, 19800380, 19800525-
19800529
VAUGHAN D H
19780840, 19780841, 19790173
VAUGHN L
19770518, 19800201
VEENHUIZEN S D
19790769, 19800530, 19800531
VEERS P
19810115
VEILLETTE D
19770646, 19780550, 19780551,
19780723, 19800288
VERMA L R
19790770, 19790772
VERMA S D
19790771
VERMEULEN H
19490037
VERMUELEN P E J
19800532
VIDONI E
19790454
VILARDO J M
19790878, 19800400, 19810127
VILARDO M
19790351
VILLECCO M
19740361
VINAYAGALINGAM T
19790773, 19790774, 19800050
VITERNA L A
19790713, 19790728, 19800486,
19810116
VITHAYATHIL J J
19770623
VODRASKA K F
19770639
VOLCHKOV V K
19700034
VOLLAN A
19780353, 19790245
VOLLAN A J
19790702
VON KOENING F
19780843, 19780844
VRIES O DE
19790775
VUKOVICH F M
19780845
WACKERLE P
19800263
WACO D
19790849
WADE J E
19780523, 19780846, 19790198,
19790200, 19790422, 19790776
WADE J H
19780524
WADE N
19740362
WAGNER H F
19780592

WAGNER H J
19790645
WAGNER J
19790863
WAGNER J P
19790158, 19790832
WAGNER L H
19770662, 19790145
WAGNER N K
19800365
WAHRENBROCK H E
19790777
WAINAUSKI H
19770656, 19790778
WAKE N S
19780847
WAKE S J
19790779, 19800068
WALDON C A
19790780, 19800533, 19810117
WALKER C
19780416
WALKER H S
19770581
WALKER S N
19780620, 19780622, 19790493-
19790496, 19790781, 19800335,
19810122
WALLACE V
19800534
WALLENSTEIN A R
19780848, 19800535
WALTERS R E
19750615, 19780849, 19780850,
19790782-19790784, 19800536
WALTHER R
19790281
WALTON A
19800061
WALTON D
19780559, 19790448, 19800295
WALTON J J
19780784, 19790884, 19800537
WAN Y H
19790785
WANG P N
19780851
WARCHOL E J
19780335
WARDMAN J C
19800538
WARMBRODT W
19780852, 19780853, 19800539
WARNE D F
19770692, 19780309, 19780855,
19780856, 19790703
WARNER R J
19800445
WARREN A W
19780440, 19790786-19790789
WATSON D B
19790790
WATSON G
19790791
WATSON R A
19800051
WATT M H
19790887
WATTENDORF F L
19790546
WATTS A
19790701, 19790709, 19790793
WATTS A W
19780525, 19780526, 19790792
WEAVER N L
19810102
WEBER R C
19780857, 19810118
WEBER W
19800540
WEBSTER B T
19800042
WEBSTER G W
19790796
WEED G D
19790795
WEGLEY H L
19780854, 19790154, 19790591,
19790797-19790799, 19800394,
19800420, 19800421, 19800541
WEIGEL W D
19790809, 19790810
WEINGART O
19790801, 19790802
WEINLICH K
19770693
WEIS P
19800542
WEISBRICH A L
19770694, 19780739, 19800543,
19800544
WELLMAN C
19790800
WELLS R J
19810119
WELTE D
19770498, 19780792, 19790334
WENDELL J
19780673, 19790806
WENDELL J H
19810025
WENDELL L
19780809
WENDELL L L
19780632, 19780842, 19780854,
19790704, 19790803-19790805,
19800124, 19800395, 19800545-
19800550
WENDNER W
19770695
WENK F
19700035
WENTINK T
19780303, 19790808, 19800244
WENTWORTH M C
19800551
WENTZ W H
19800552, 19800553, 19810099,
19810120
WEST B S
19770696, 19780700, 19780707,
19780752
WESTBERG J E
19790254, 19790300
WETTLAUFER R
19800181
WHEELER N
19610022
WHISLER D
19790884
WHITE H O
19780756
WHITE M L
19790809, 19790810
WHITE P W
19790811
WHITEHEAD G T
19780489
WHITEWAY D
19800044
WHITFORD D H
19770696, 19780700, 19780707,
19780752, 19790812
WHITNEY R L
19790240
WHITTLE G E
19800141, 19800333, 19800555
WHOLEY J
19800053

WICKS F E
19800309
WIDNALL S E
19810064
WIE S K
19750583
WIEBE B C
19780304, 19790813
WIEDEMANN H
19770697
WIEDEMANN H O
19790814
WIEDEMEIER D W
19790259
WIESNER W
19790815
WILHOLD G A
19800193
WILLEM R A
19780686
WILLIAM F L
19790481
WILLIAMS R A
19800556
WILSON A
19680027
WILSON D E
19770698, 19780634
WILSON R E
19780599, 19780624, 19780653,
19790494, 19790495, 19790705,
19800557, 19810121, 19810122
WINDHEIM R
19780690, 19800570
WINEMILLER J R
19790313
WINN C B
19790485
WISE J L
19800244
WITWER J G
19790150
WOLF R A
19780537, 19800035
WOLFE R
19790824
WOLFE W P
19770618, 19790782, 19800029,
19800366, 19800536
WOLFF B
19780543, 19800040
WON D J
19790657
WONG A
19790260
WOOD A
19780535
WOOD B D
19750605
WOOD B L
19810009
WOOD R R
19770502
WOODBRIDGE D D
19790228
WOODWARD J B
19750618
WOOLDRIDGE G L
19790825
WOOLLARD M G
19780494
WOROBEL R
19770656
WORSTELL M H
19780743, 19790562, 19800571,
19800572
WORTHINGTON P J
19800146
WORTMANN F X
19780498
WRIGHT A D
19810124
WRIGHT J H
19760647
WRIGHT J K
19770599, 19780606
WRIGHT P
19800573
WURTZ F R
19780496
WYATT D C
19800514
WYLDE A F
19780478
WYNHOLDS H
19800128
YAMAGIWA A T
19800531
YAMAYEE Z A
19800326
YANG C E
19800249
YEE S T
19790313
YEHSAKUL P D
19770601, 19780619
YEN J T
19770637, 19780453, 19780454,
19780466, 19780533, 19790353,
19800574
YEOMAN J C
19780434
YERAZUNIS S
19800309
YING S J
19760648
YOCKE M A
19800027
YOKOGAWA S T
19790612
YORK J E
19810010
YORK W L
19790488
YOUNG B J
19810125
YOUNG M I
19790230, 19800274
YOUNG R B
19750594
YOUNG S
19800256
YOUSEF H L
19780427
YPERLAAN G J
19790344
YU Y-Y
19810126
ZABRANSKY J
19810127
ZAININGER H W
19800246
ZALAY A D
19800410, 19810128
ZAMBRANO T
19790493
ZAMBRANO T G
19790496, 19790781, 19800023,
19800335
ZATARAIN A M
19780420
ZAUN J
19790327
ZIEGLER J
19810030
ZIL'GERSHTEIN L
19700034
ZIMMERMANN G
19760649
ZOELLNER R
19780341, 19780344

ZULIANI G
19780357, 19780369
ZUTECK M
19790395
ZVARA J
19790282, 19800387
ZWAAN R J
19780699, 19790689
ZYWAN W
19790353

A.C. COMMUTATOR GENERATOR
19760608, 19790451
ACOUSTIC DOPPLER TECHNIQUE
19770610
ACTIVE FILTERS
19770623
AERATION
19790417, 19790888, 19800227
AERODYNAMIC HEATER
19780605
AERODYNAMICS
19550039, 19570028, 19670021, 19690025, 19710044, 19730162, 19740353-19740356, 19750555, 19750577, 19750583, 19750586-19750588, 19750615, 19760585, 19760592, 19760594, 19760606, 19760621, 19760624, 19760627, 19760639, 19760644, 19770548, 19770555, 19770567-19770569, 19770571, 19770597, 19770602, 19770605, 19770611, 19770618, 19770620, 19770637, 19770641, 19770643, 19770656, 19770661, 19770662, 19770665, 19770666, 19770670, 19770671, 19770698, 19780285, 19780308, 19780324, 19780345, 19780353, 19780357, 19780361, 19780363, 19780392, 19780395-19780397, 19780403, 19780432, 19780438, 19780454, 19780472, 19780490, 19780494, 19780496, 19780498, 19780505, 19780514-19780516, 19780528, 19780533, 19780541, 19780542, 19780559, 19780572, 19780579, 19780580, 19780587, 19780591, 19780597-19780599, 19780605, 19780613, 19780622, 19780624, 19780626, 19780634, 19780653, 19780660, 19780670-19780673, 19780678, 19780684, 19780691, 19780693, 19780696, 19780699, 19780704, 19780705, 19780717, 19780721, 19780750, 19780752, 19780763, 19780771, 19780772, 19780774, 19780789, 19780794-19780796, 19780800, 19780816, 19780833, 19780834, 19780836, 19780849, 19780850, 19780853, 19790132, 19790148, 19790151, 19790152, 19790157, 19790159, 19790182-19790184, 19790201, 19790203-19790205, 19790216, 19790217, 19790220, 19790226, 19790230, 19790242, 19790245, 19790299, 19790302, 19790328, 19790389, 19790431, 19790439, 19790442, 19790448, 19790461, 19790474, 19790493-19790496, 19790504, 19790507, 19790522, 19790560, 19790567, 19790581, 19790592, 19790599, 19790605, 19790630, 19790654, 19790655, 19790665, 19790681, 19790684, 19790688, 19790696, 19790705, 19790713, 19790724, 19790725, 19790729, 19790764, 19790765, 19790775, 19790782-19790784, 19790806, 19790827, 19790864, 19800009, 19800018, 19800029, 19800038, 19800042, 19800050, 19800051, 19800057, 19800066, 19800078, 19800092, 19800109, 19800134, 19800161, 19800163, 19800175, 19800182, 19800203, 19800204, 19800207, 19800257, 19800274, 19800275, 19800285, 19800295, 19800300, 19800302, 19800308, 19800310, 19800316, 19800317, 19800339, 19800340, 19800343, 19800350, 19800351, 19800366, 19800377, 19800391, 19800406, 19800409, 19800415, 19800431, 19800432, 19800439, 19800445, 19800448, 19800464, 19800473, 19800477, 19800486, 19800494, 19800557, 19800571, 19810006, 19810013, 19810026, 19810037, 19810038, 19810044, 19810053, 19810055, 19810059, 19810065, 19810078, 19810091, 19810096, 19810106, 19810109, 19810120-19810122, 19810125, 19810128
AEROELASTIC ANALYSIS
19750583, 19760621, 19780750, 19790151, 19790216, 19790309, 19790359, 19790592, 19800300, 19800539, 19810084
AEROELASTIC STABILITY
19760592, 19780324, 19780469, 19780598, 19780670, 19780699, 19780852, 19780853, 19790461, 19790471, 19790684, 19790689, 19790702, 19790806, 19800229
AEROELASTIC WIND ENERGY CONVERSION
19780308, 19790265
AEROSOLEC ELECTRIC POWER PLANT
19770515, 19780296, 19790533
AEROSOLS
19780646, 19790525
AEROWATT
19720062
AESTHETICS
19780458, 19780692, 19800153, 19800171, 19800493
AFRICA
19760605, 19790275, 19790887
AGRICULTURAL APPLICATIONS
19750570, 19750573, 19760619, 19780367, 19780398, 19780425, 19780430, 19780477, 19780538, 19780610, 19780612, 19780682, 19780686, 19780781, 19790138, 19790141, 19790142, 19790158, 19790209, 19790211, 19790298, 19790303, 19790319, 19790478, 19790482, 19790606, 19790624, 19790639, 19790640, 19790646, 19790685, 19790770, 19790772, 19790832, 19790843, 19790863, 19790868, 19790871, 19790874, 19800004, 19800236, 19800311, 19800312, 19800318, 19800320, 19800329, 19800330, 19800559, 19810102
AGWAY
19800001
AILERON CONTROL SYSTEMS
19800552, 19800553
AIR DENSITY
19800266
AIRFOILS
19730162, 19740353-19740356, 19780384, 19780581, 19780685, 19780789, 19780649, 19790494, 19790630, 19810055, 19810096, 19810120
ALABAMA
19810127
ALASKA
19760625, 19780303, 19780382, 19790156, 19790233, 19790808, 19800104, 19800125, 19800137, 19800244, 19800442, 19800443, 19810090
ALBERTA
19790212, 19790859

ALCOA
19780708, 19790146, 19790189, 19790261, 19790266, 19790297, 19790637, 19800001, 19800012, 19800055, 19800435
ALLISON W
19800573
ALTERNATORS
19720061, 19790399, 19790539, 19800249, 19800362
ALTOS
19790426, 19790427
ALUMINUM
19790266, 19790297, 19790324, 19790490, 19790540, 19800038, 19800435, 19800464
AMERICAN WIND ENERGY ASSOCIATION
19780435, 19780452, 19780689, 19790455, 19800383, 19800566
AMMONIA
19770531, 19780436, 19780437
ANAEROBIC DIGESTION
19760650, 19800247
ANEMOMETERS
19750564, 19770565, 19790130, 19790240, 19790595, 19790596, 19800242, 19800356, 19800403
ANEMONITOR
19770565
ANTARCTIC
19760625
ANTILLES
19720063
APPLE STORAGE
19780840, 19780841, 19790173, 19790288, 19790606
APPROPRIATE TECHNOLOGY
19750564, 19750600, 19760636, 19770498, 19770533, 19770537, 19780777, 19790137, 19790275, 19790396, 19790397, 19790743, 19790846, 19800071, 19800172
AQUACULTURE
19750560, 19750561, 19770556, 19770612, 19770687, 19770688, 19790382, 19790417
AQUIFERS
19790523
ARCTIC
19760625, 19790257
ARGENTINA
19800129
ARGONNE NATIONAL LABORATORY
19790663
ARID LANDS
19730158, 19750595, 19780826
ARIZONA
19770630, 19790167, 19800071
ARK
19770687
ARRAYS
19780359, 19780370, 19780526, 19780532, 19780574, 19780576, 19780578, 19780636, 19780675, 19790244, 19790323, 19790381, 19790452, 19790484, 19790492, 19790673, 19790816, 19790856, 19800042, 19800141, 19800151, 19800246, 19800367, 19800376, 19800437, 19800451, 19800501, 19800565, 19800567, 19810093
ASIA
19760576, 19760637
ASSOCIATIONS
19770573, 19780435
ASYNCHRONOUS GENERATORS
19770581, 19770624, 19780551, 19780835, 19790132, 19790519, 19800140, 19800375
ATMOSPHERE
19790749
ATTIC INSTALLATION
19790626
AUGMENTOR SYSTEMS
19790496
AUSTRALIA
19760631, 19760643, 19780314, 19790182, 19790340, 19790870, 19800081
AUSTRIA
19800240
AUTARKIC HOUSE
19770603, 19780623, 19780819, 19790497
AUTOMOBILES
19790434
AXIAL-FLOW AIR TURBINE
19790764, 19810049
BALANCED-PITCH ROTOR
19810012
BALTIC SEA
19790411
BATTERIES
19610022, 19740348, 19770515, 19770566, 19770669, 19780296, 19780623, 19780754, 19790156, 19790157, 19790257, 19790369, 19790433, 19790563, 19790600, 19790661, 19790735, 19790779, 19800068, 19800195, 19800281, 19800282, 19800352, 19800446, 19810089
BATTERIES - RECHARGING
19800106
BAYESIAN DECISION THEORY
19800178
BELGIUM
19780645, 19800518
BENDIX
19800034
BETZ LIMIT
19790293
BETZ TYPE LIMIT
19770605, 19780628
BIBLIOGRAPHIES
19760564, 19760589, 19760596, 19760597, 19770559, 19770560, 19770566, 19780311, 19780502, 19780503, 19790194-19790196, 19790579, 19790648, 19800073, 19800094-19800096, 19800205, 19800259, 19800281, 19800282, 19800559
BICYCLE WHEEL TURBINE
19790522
BIOCONVERSION
19750574, 19760622, 19770500, 19770562, 19770563, 19780351, 19790663
BIOGAS
19760610, 19780444, 19790236, 19790794, 19800234
BIOLOGICAL WIND PROSPECTING
19780522, 19780524, 19780846, 19790198, 19790200, 19790422, 19790776, 19800531
BIOMASS
19750560, 19750562, 19750581, 19750582, 19750584, 19760566, 19760600, 19760605, 19760623, 19770502, 19770504, 19770516, 19770519, 19770521, 19770523, 19970537, 19770541, 19770543, 19770551, 19770584, 19770609, 19770683, 19780286, 19780329, 19780358, 19780393, 19780463, 19780529, 19780567, 19780568, 19780740, 19780831, 19780832, 19790260, 19790270, 19790271, 19790286, 19790292, 19790298, 19790320, 19790379, 19790383,

BIOMASS
19790416, 19790446, 19790450, 19790488, 19790516, 19790558, 19790648, 19790730, 19790758, 19790854, 19800173, 19800176, 19800217, 19800264, 19800276, 19800290, 19800298, 19800322, 19800323, 19800490, 19800516
BIOSPHERE
19800264
BIRD SCARERS
19780538
BLADE CAMBER
19780515
BLADE FEATHERING
19790460
BLADE THICKNESS
19780514
BLADES
19750563, 19750583, 19760569, 19760588, 19760592, 19760646, 19770555, 19770598, 19770618, 19770620, 19770641, 19780313, 19780315, 19780355, 19780357, 19780363, 19780381, 19780384, 19780386, 19780395, 19780396, 19780432, 19780447, 19780469, 19780474, 19780480, 19780490, 19780492, 19780494, 19780497, 19780514-19780516, 19780520, 19780521, 19780537, 19780559, 19780572, 19780579-19780581, 19780587, 19780598, 19780611, 19780672, 19780673, 19780685, 19780750, 19780753, 19780756, 19780774, 19780779, 19780789, 19780794, 19780796, 19780800, 19780834, 19780837, 19780843, 19780850, 19780853, 19790132, 19790144, 19790152, 19790159, 19790160, 19790185, 19790192, 19790216, 19790217, 19790220, 19790227, 19790230, 19790235, 19790245, 19790266, 19790276, 19790278-19790280, 19790290, 19790297, 19790317, 19790324, 19790347, 19790359, 19790364, 19790365, 19790384, 19790385, 19790390, 19790395, 19790424, 19790429, 19790432, 19790439, 19790440, 19790448, 19790461, 19790471, 19790477, 19790486, 19790490, 19790494, 19790504, 19790506, 19790513, 19790540, 19790592, 19790594, 19790599, 19790610, 19790628, 19790635, 19790637, 19790669, 19790684, 19790696, 19790700, 19790714, 19790715, 19790720, 19790726-19790728, 19790738, 19790747, 19790763, 19790765, 19790780, 19790782-19790784, 19790801, 19790802, 19790806, 19790809, 19790810, 19790827, 19790865, 19800010, 19800029, 19800035, 19800038, 19800041, 19800051, 19800078, 19800146, 19800165, 19800174, 19800175, 19800188, 19800192, 19800199, 19800204, 19800213, 19800220, 19800231, 19800238, 19800257, 19800263, 19800275, 19800285, 19800293, 19800294, 19800300, 19800301, 19800303, 19800328, 19800343, 19800366, 19800369, 19800409, 19800418, 19800435, 19800445, 19800464, 19800466, 19800482, 19800494, 19800519, 19800536, 19800539, 19800573, 19810008, 19810025, 19810026, 19810029, 19810037, 19810038, 19810040, 19810050, 19810055, 19810078, 19810095, 19810096, 19810105, 19810115, 19810120, 19810125
BOEING
19790815
BONNEVILLE POWER ADMINISTRATION
19790134, 19790136
BOOKS
19260021, 19410030, 19740345, 19740357, 19740361, 19750553, 19750565, 19750589, 19750598, 19750614, 19760566, 19760572, 19760573, 19760583, 19770516, 19770538, 19770585, 19770595, 19770596, 19770606, 19770607, 19770609, 19770632, 19770672, 19770677, 19780329, 19780393, 19780416, 19780544, 19780573, 19780678, 19780733-19780738, 19780791, 19780844, 19790147, 19790160, 19790171, 19790430, 19790473, 19790476, 19790517, 19790824, 19790846, 19790858, 19800260, 19800283, 19800305, 19800319, 19810051, 19810063, 19810079
BOTSWANA
19790275
BOUNDARY LAYER
19780680, 19790177, 19790521, 19790855, 19800222
BRACE RESEARCH INSTITUTE
19680027
BRACKISH WATER
19770691, 19790254
BRAKE SYSTEM
19790491, 19790687, 19800214
BRAZIL
19780730, 19790283, 19790333
BRISTOL AEROSPACE
19800043
BRUSH WIND TURBINE GENERATOR
19770675
BUILDING CODES
19770663, 19780563, 19790627, 19790648
BUILDINGS
19740361, 19780791, 19780821, 19780856, 19790314
BUOYS
19740348, 19740351, 19800071
BW 150
19790519
CABLE TV
19790800
CABLES
19780634, 19800413, 19810015, 19810016
CALCULATORS
19790187
CALIFORNIA
19770592, 19780339, 19780375, 19780484, 19780529, 19780609, 19790287, 19790446, 19790621, 19790641, 19790642, 19790706, 19790707, 19790781, 19790845, 19790849, 19790861, 19800071, 19800133, 19800173, 19800201, 19800223, 19800233, 19800241, 19800335, 19800468, 19800469, 19810033, 19810036, 19810090, 19810114
CALIFORNIA AQUEDUCT
19780615
CALIFORNIA DEPARTMENT OF WATER RESOURCES
19790146
CANADA
19760602, 19760623, 19760625, 19770511, 19770674, 19770687,

CANADA
19780451, 19780625, 19780640, 19780644, 19780728, 19780812, 19790212, 19790458, 19790660, 19790813, 19790859, 19800028, 19800347
CANADA. NATIONAL RESEARCH COUNCIL
19780728, 19800044, 19800506
CAPACITY CREDIT
19790745, 19800354
CAPITAL
19800040
CARDAA - COMPUTER CODE
19810078
CARIBBEAN
19720063, 19800371
CARTER J
19790209
CENTRALIZED SYSTEMS
19800278
CERTIFICATION
19790627
CHARGED WATER DROPLETS
19800411
CHINA
19790258
CHINESE WINDMILLS
19780376, 19780377, 19790301, 19800002
CHROMALLOY FARM SYSTEMS
19800004
CLARKSON COLLEGE
19780708
CLIMATE
19770523, 19780351, 19790858
COAL
19750567, 19760589, 19760625, 19770507, 19770516, 19770543, 19770677, 19780529, 19780547, 19780549, 19780749, 19790444, 19800184, 19800240
COAL GASIFICATION
19760599
COASTAL ZONE
19770553, 19780479, 19780788, 19800235
CODING SYSTEMS
19790319
COLD CLIMATES
19780288, 19790255
COLOMBIA
19780385
COLORADO
19790865
COLORADO STATE UNIVERSITY. DAIRY FARM
19780412, 19800056
COMMERCIAL MACHINES
19430025, 19720062, 19760570, 19770530, 19770573, 19770607, 19780305, 19780340, 19780461, 19780462, 19780549, 19780655, 19780708, 19790264, 19790424, 19790430, 19790631, 19790632, 19790664, 19790737, 19790780, 19790846, 19790875, 19800272, 19800319, 19800396, 19800564
COMMERCIALIZATION
19770546, 19780428, 19780439, 19780601, 19780630, 19780631, 19780782, 19780848, 19790206, 19790220, 19790221, 19790224, 19790268, 19790294, 19790320, 19790342, 19790348, 19790362, 19790366, 19790500, 19790558, 19790566, 19790586, 19790527, 19800060, 19800066, 19800177, 19800205, 19800212, 19800225, 19800270, 19800318, 19800509, 19800515, 19800556, 19800570, 19810036, 19810069, 19810101, 19810123
COMMUNICATION SYSTEMS
19790457
COMMUNITIES
19780445, 19800172
COMPLEX MODEL
19780830, 19790358, 19800135
COMPOSITE BEARINGLESS ROTOR
19770513, 19780392, 19780794, 19780795, 19790309, 19800165
COMPOSITE MATERIALS
19780386, 19790185, 19790384, 19790385, 19790477, 19790540, 19790635, 19790801, 19790802, 19790809, 19790810, 19800127
COMPOST
19780558
COMPRESSED AIR
19760601, 19770558, 19770578, 19780291, 19790401, 19790514, 19800349
COMPRESSED AIR STORAGE POWER PLANTS
19780297
COMPUTER CODES
19780717, 19780793
COMPUTERS
19800491
CONCENTRATION DIFFERENCE ENERGY ENGINE
19790447
CONCENTRATORS
19780584, 19790659, 19790693
CONCRETE
19780474, 19790227
CONFIDENCE INTERVALS
19800179
CONNECTICUT
19780382, 19780848
CONSTANT SPEED SYSTEMS
19760621, 19800302
CONSTRUCTION PLANS
19770607
CONSUMER PROTECTION
19790854
CONTRA-ROTATING AXIAL FLOW TURBINES
19790765
CONTRAROTATION
19770641
CONTROL SYSTEMS
19260022, 19750572, 19760611, 19760648, 19760649, 19770501, 19770513, 19770570, 19770576, 19770582, 19770669, 19780313, 19780348, 19780355, 19780448, 19780485, 19780486, 19780489, 19780498, 19780550, 19780551, 19780569, 19780597, 19780681, 19780776, 19780817, 19790242, 19790282, 19790288, 19790309, 19790317, 19790399, 19790413, 19790451, 19790454, 19790474, 19790483, 19790491, 19790499, 19790568, 19790588, 19790605, 19790634, 19790643, 19790647, 19790692, 19790773, 19790785, 19800024, 19800139, 19800143, 19800150, 19800156, 19800165, 19800181, 19800237, 19800246, 19800288, 19800328, 19800368, 19800387, 19800445, 19800453, 19800479, 19800552, 19800553, 19810017-19810020, 19810042, 19810044, 19810066, 19810085, 19810089, 19810093
CONTROLLED VELOCITY TESTING
19800123
CONVERTERS
19780451, 19790762
COOK A
19800001

COOLING
19780323, 19790420
COOLING SYSTEMS
19760578, 19770497, 19770581,
19770588, 19780412, 19780468,
19780840, 19790173, 19790376,
19790606, 19800056, 19800284
COOLING TOWERS
19770654, 19800477
CORNELL UNIVERSITY
19780619
CORROSION
19790583
CRETAN WINDMILLS
19780814, 19790215
CROSSWIND AXIS TURBINES
19800110
CROSSWIND KITES
19800057
CUPANEMOMETERS
19670021, 19690025, 19790694
CYCLOTURBINE
19770530, 19780295, 19790282,
19790671, 19800008
CZECHOSLOVAKIA
19800516
DAF INDAL
19800043, 19810092
DAIRY FARM
19780412, 19790420, 19790852,
19790866, 19810102
DAMPERS
19780424, 19800447
DAMPING
19790384, 19810015, 19810016
DARRIEUS
19750590, 19760580, 19760602,
19760641, 19760644, 19770506,
19770550, 19770618, 19770694,
19780345, 19780346, 19780353,
19780363, 19780364, 19780370,
19780384, 19780412, 19780419,
19780457, 19780475, 19780476,
19780478, 19780497, 19780559,
19780580, 19780625, 19780644,
19780653, 19780711, 19780742,
19780743, 19780799, 19780804,
19780805, 19780843, 19790159,
19790162, 19790163, 19790179,
19790189, 19790192, 19790193,
19790216, 19790220, 19790221,
19790226, 19790245, 19790259,
19790261, 19790266, 19790297,
19790324, 19790328, 19790332,
19790456, 19790457, 19790494,
19790562, 19790580, 19790606,
19790615, 19790653, 19790668,
19790702, 19790705, 19790709,
19790721-19790726, 19790739,
19790740, 19790782, 19790791,
19790817, 19790864, 19800001,
19800004, 19800007, 19800010-
19800012, 19800015, 19800029,
19800039, 19800041-19800044,
19800048, 19800056, 19800066,
19800192, 19800209, 19800295,
19800310, 19800342, 19800347,
19800350, 19800366, 19800369,
19800381, 19800409, 19800431-
19800433, 19800448, 19800494,
19800557, 19800571, 19800572,
19810006, 19810030, 19810033,
19810040, 19810055, 19810059,
19810060, 19810065, 19810078,
19810096, 19810097, 19810106,
19810115, 19810121, 19810122
DART WIND TURBINE MODEL
19810030
DARTER - COMPUTER CODE
19800310
DATA ACQUISITION
19780402, 19780776, 19780799,
19790465, 19800385, 19800491
DATA ANALYSIS
19790853
DELAWARE
19800148
DELPHIAN FOUNDATION
19750561
DELTA-3 HINGE
19810084
DEMONSTRATION
19780821, 19790305
DENMARK
19490037, 19770545, 19780449,
19780553, 19780554, 19780566,
19780665, 19780677, 19780790,
19790506, 19790507, 19790565,
19790575, 19790580, 19790590,
19790869, 19800085, 19800091,
19800247, 19800292, 19800345,
19800393, 19800396-19800398,
19800457, 19800483, 19800484
DESALINATION
19780475, 19780495, 19780519,
19790412, 19790505, 19790534,
19790593, 19800149, 19800419
DESIGN
19260022, 19750555, 19750572,
19760588, 19760594, 19760601,
19760604, 19760617, 19760624,
19760626, 19760633-19760635,
19760640, 19760642, 19760649,
19770497, 19770498, 19770501,
19770536, 19770558, 19770576,
19770580, 19770598, 19770604,
19770611, 19770620, 19770632,
19770652, 19770654, 19770655,
19770657, 19770658, 19770667,
19770684, 19770695, 19770697,
19780313, 19780315, 19780348,
19780349, 19780355, 19780363,
19780364, 19780373, 19780378,
19780427, 19780450, 19780472,
19780496, 19780498, 19780521,
19780528, 19780535, 19780540,
19780581, 19780583, 19780596,
19780622, 19780626, 19780632,
19780669, 19780671, 19780678,
19780681, 19780684, 19780685,
19780703, 19780711, 19780715,
19780732, 19780751, 19780756,
19780759, 19780760, 19780766,
19780789, 19780792, 19780795,
19780837, 19780843, 19790159,
19790179, 19790220, 19790249,
19790316, 19790318, 19790319,
19790326, 19790346, 19790350,
19790378, 19790389, 19790400,
19790401, 19790408, 19790413,
19790419, 19790421, 19790434,
19790435, 19790442, 19790456,
19790462, 19790481, 19790491,
19790513, 19790522, 19790535,
19790544, 19790559, 19790567,
19790581, 19790582, 19790588,
19790647, 19790671, 19790682,
19790704, 19790727, 19790738,
19790746, 19790795, 19790796,
19790814, 19790836, 19790864,
19800059, 19800066, 19800069,
19800117, 19800118, 19800143,
19800161, 19800188, 19800191,
19800193, 19800195, 19800231,
19800237, 19800257, 19800289,
19800299, 19800304, 19800346,
19800351, 19800364, 19800377,
19800387, 19800392, 19800395,
19800441, 19800466, 19800475,
19800479, 19800489, 19800495,

DESIGN

19800497, 19800511, 19800534,
19800538, 19810072, 19810079

DESIGN - LARGE SCALE

19200011, 19410030, 19420033,
19740351, 19740358, 19740362,
19750611, 19750614, 19760591,
19760592, 19760607, 19760611,
19760618, 19760646, 19770505,
19770511, 19770522, 19770525,
19770534, 19770544, 19770570,
19770597, 19770601, 19770621,
19770627, 19770631, 19770637,
19770686, 19770689, 19770690,
19770692, 19780309, 19780310,
19780328, 19780337, 19780346,
19780362, 19780389, 19780410,
19780422, 19780431, 19780432,
19780434, 19780451, 19780469,
19780478, 19780480, 19780483-
19780485, 19780495, 19780511,
19780525, 19780526, 19780532,
19780536, 19780537, 19780539,
19780544, 19780562, 19780564,
19780574, 19780578, 19780588,
19780596, 19780597, 19780601,
19780602, 19780619, 19780643,
19780668, 19780683, 19780690,
19780699, 19780700, 19780704,
19780707, 19780712, 19780714,
19780728, 19780742, 19780744,
19780745, 19780748, 19780752,
19780790, 19780798, 19780804,
19780817, 19780818, 19780822,
19780829, 19780844, 19780853,
19780855, 19790162, 19790163,
19790166, 19790172, 19790178,
19790189, 19790193, 19790203,
19790214, 19790218, 19790221,
19790232, 19790235, 19790237,
19790242, 19790253, 19790274,
19790290, 19790313, 19790315,
19790329, 19790331, 19790342,
19790347, 19790348, 19790355,
19790357, 19790365, 19790371,
19790381, 19790385-19790387,
19790390, 19790395, 19790402,
19790410, 19790414, 19790437,
19790438, 19790463, 19790466,
19790468, 19790477, 19790486,
19790490, 19790498, 19790501-
19790503, 19790506, 19790507,
19790511, 19790531, 19790537,
19790538, 19790549-19790553,
19790565, 19790585, 19790590,
19790604, 19790608, 19790617,
19790618, 19790629, 19790634,
19790637, 19790638, 19790641,
19790642, 19790650, 19790651,
19790667, 19790670, 19790672,
19790680, 19790685, 19790686,
19790689, 19790696, 19790697,
19790699, 19790701, 19790703,
19790709-19790711, 19790713-
19790715, 19790728, 19790739,
19790740, 19790742, 19790761,
19790763, 19790778, 19790792,
19790793, 19790802, 19790812,
19790816, 19790817, 19790844,
19790848, 19790850, 19790856,
19790857, 19790869, 19790886,
19800005, 19800012, 19800019,
19800034, 19800035, 19800043,
19800044, 19800054, 19800055,
19800057, 19800062, 19800063,
19800067, 19800074, 19800076,
19800085, 19800086, 19800088-
19800093, 19800098, 19800100,
19800120, 19800141, 19800146,
19800151, 19800154, 19800156,
19800158, 19800174, 19800186,
19800208, 19800215, 19800220,
19800238, 19800241, 19800263,
19800273, 19800274, 19800277,
19800279, 19800285, 19800292,
19800302, 19800303, 19800318,
19800332, 19800337, 19800345,
19800347, 19800368, 19800373,
19800375, 19800378, 19800384,
19800385, 19800393, 19800401,
19800412, 19800413, 19800416,
19800426, 19800430, 19800438,
19800451, 19800456-19800458,
19800476, 19800486, 19800498,
19800502, 19800506, 19800508-
19800510, 19800520, 19800521,
19800539, 19800540, 19800552-
19800554, 19800560, 19800565,
19800567, 19800571, 19800572,
19810013, 19810028, 19810033,
19810037, 19810038, 19810041,
19810050, 19810057, 19810062,
19810065, 19810071, 19810075,
19810088, 19810095, 19810098,
19810101, 19810108, 19810114

DESIGN - SMALL SCALE

19260023, 19430025, 19680028,
19720062, 19730159, 19730160,
19740343, 19740344, 19740348,
19750553, 19750565, 19750576,
19750592, 19750604, 19750607,
19760563, 19760570, 19760572,
19760587, 19760603, 19760610,
19760616, 19760636, 19760638,
19770509, 19770528, 19770534,
19770545, 19770549, 19770561,
19770564, 19770579, 19770607,
19770608, 19770626, 19770628,
19770633, 19770640, 19770644,
19770664, 19770685, 19770687,
19770688, 19780288, 19780290,
19780295, 19780298, 19780305,
19780323, 19780336, 19780381,
19780383, 19780416, 19780442,
19780449, 19780461, 19780462,
19780497, 19780499, 19780517,
19780527, 19780534, 19780590,
19780593, 19780595, 19780596,
19780614, 19780621, 19780655,
19780679, 19780686, 19780690,
19780701, 19780706, 19780782,
19780783, 19780802, 19780816,
19780819, 19780821, 19780827,
19780828, 19780835, 19780841,
19790133, 19790135, 19790137,
19790141, 19790147, 19790151,
19790154, 19790156, 19790164,
19790167, 19790180, 19790181,
19790189, 19790199, 19790206,
19790209, 19790211, 19790213,
19790218, 19790223, 19790233,
19790237, 19790248, 19790256-
19790259, 19790261, 19790264,
19790267, 19790268, 19790274,
19790282, 19790287, 19790289,
19790294, 19790296, 19790299,
19790309, 19790317, 19790325,
19790339, 19790343, 19790345,
19790349, 19790352, 19790362,
19790363, 19790367, 19790373,
19790375, 19790394, 19790409,
19790423, 19790424, 19790437,
19790441, 19790454, 19790457,
19790459, 19790465, 19790476,
19790483, 19790497, 19790500,
19790510, 19790518, 19790519,
19790524, 19790538, 19790543,
19790556, 19790557, 19790566,
19790568, 19790570, 19790571,
19790591, 19790593, 19790602,
19790603, 19790606, 19790609,

DESIGN - SMALL SCALE
19790614, 19790616, 19790631, 19790632, 19790635, 19790639, 19790640, 19790655, 19790658, 19790664, 19790670, 19790677, 19790680, 19790685, 19790708, 19790716, 19790719, 19790736, 19790737, 19790750, 19790753, 19790756, 19790757, 19790798, 19790807, 19790823, 19790830, 19790832, 19790843, 19790844, 19790853, 19790867, 19790873, 19800001, 19800003, 19800005, 19800012, 19800014, 19800022, 19800025, 19800030, 19800031, 19800036, 19800039, 19800040, 19800043, 19800048, 19800049, 19800053, 19800077, 19800101-19800103, 19800106-19800108, 19800113, 19800123, 19800128, 19800131, 19800137-19800139, 19800142, 19800147, 19800150, 19800157, 19800162, 19800165, 19800168, 19800170, 19800172, 19800183, 19800185, 19800198, 19800206, 19800255, 19800260, 19800266-19800268, 19800270, 19800272, 19800283, 19800314, 19800315, 19800318, 19800324, 19800325, 19800358, 19800374, 19800379, 19800396-19800398, 19800401, 19800407, 19800416, 19800422-19800424, 19800446, 19800449, 19800454, 19800457, 19800461, 19800462, 19800467, 19800474, 19800493, 19800503, 19800515, 19800518, 19800533, 19800535, 19800541, 19800556, 19800564, 19800570, 19810011, 19810020-19810023, 19810047, 19810048, 19810052, 19810056, 19810063, 19810068, 19810076, 19810077, 19810085, 19810089, 19810092, 19810103, 19810105, 19810114, 19810117, 19810124

DEVELOPING COUNTRIES
19730158, 19750564, 19750570, 19750603, 19750612, 19760605, 19760628, 19760637, 19770498, 19770537, 19770690, 19780286, 19780287, 19780298, 19780340, 19780354, 19780444, 19780520, 19780686, 19780691, 19780826, 19780831, 19780847, 19790137, 19790191, 19790270, 19790275, 19790307, 19790373, 19790374, 19790544, 19790691, 19790730, 19790743, 19790758, 19790846, 19800050

DIESEL
19790457, 19790838

DIFFUSER AUGMENTORS
19770637, 19770694, 19780464, 19780465, 19780481, 19780482, 19780505, 19780696, 19790183, 19790184, 19790186, 19790205, 19790207, 19790284, 19790370, 19790372, 19790493, 19790494, 19790559, 19790767, 19790771, 19790796, 19800049, 19800407, 19800529, 19810049, 19810061

DIFFUSERS
19780584, 19790693, 19790700

DIRECTORIES
19760562, 19770573, 19770632, 19780443, 19780549, 19780773, 19780777, 19790430, 19790731, 19790748, 19790818, 19800196, 19800558

DISKS
19780403

DISPERSED SYSTEMS
19790609, 19800507, 19810011, 19810021, 19810022

DISSERTATIONS AND THESES
19770630, 19780423, 19780484, 19780852, 19790288, 19790338, 19790561

DISTRIBUTED SYSTEMS
19800278

DISTRIBUTED WIND POWER SYSTEMS
19790578

DISTRIBUTION SYSTEM
19780619, 19790518

DISTRIBUTORS
19770573, 19770632

DIVONE L
19780456

DOE
19770508, 19770509, 19770681, 19780535, 19780601, 19780708, 19780782, 19780820, 19780828, 19790131, 19790174, 19790232, 19790268, 19790320, 19790341, 19790558, 19790566, 19790586, 19790871, 19800005, 19800006, 19800060, 19800073, 19800085, 19800086, 19800176, 19800194, 19800430, 19800438, 19800480, 19800520, 19800561

DOUBLE OUTPUT INDUCTION GENERATOR
19760607, 19760608

DREDGED MATERIALS
19770639

DREES H
19800008

DRIVE TRAIN
19780652, 19800158, 19810017-19810019, 19810085

DUCTED ROTORS
19800473

DUCTED WIND TURBINES
19810049

DUGWAY PROVING GROUND
19780352

DUNLITE
19770628, 19790424, 19790425, 19800268, 19800271

DYNAMIC ANALYSIS
19780471, 19780652, 19780673, 19780775, 19790277-19790279, 19790281, 19790329, 19790355, 19790440, 19790720, 19790867, 19800294, 19800301, 19800339, 19800340, 19810007, 19810008, 19810017-19810020, 19810024, 19810025, 19810042, 19810045, 19810059, 19810060, 19810085, 19810112, 19810124, 19810126

DYNAMIC DAM SYSTEM
19780453, 19780466

DYNAMIC INDUCER ROTOR
19780620, 19780622, 19790205, 19800410, 19810128

DYNAMOMETERS
19790632

DYNERGY
19800039

EARTH-SHELTERED HOUSES
19790708

ECONOMICS
19200011, 19490037, 19740358, 19740362, 19750559, 19750563, 19750569, 19750573, 19750575, 19750581, 19750598, 19750604, 19750608, 19750610, 19750613, 19750614, 19750618, 19760563, 19760565, 19760573, 19760575, 19760584, 19760589, 19760599, 19760602, 19760608, 19760609, 19760611, 19760615, 19760618,

ECONOMICS
19760628, 19760630, 19760636,
19760640, 19760644, 19760645,
19770498, 19770505, 19770512,
19770513, 19770518, 19770519,
19770521, 19770522, 19770525,
19770529, 19770539, 19770546,
19770549-19770552, 19770555,
19770577-19770580, 19770583,
19770586, 19770590, 19770593,
19770599, 19770601-19770603,
19770609, 19770613, 19770617,
19770621, 19770625, 19770627,
19770629, 19770630, 19770634,
19770635, 19770642, 19770672,
19770674, 19770678, 19770680,
19770683, 19770686, 19770690-
19770692, 19780285, 19780286,
19780290, 19780298, 19780304,
19780305, 19780308, 19780316,
19780319, 19780320, 19780322,
19780323, 19780325, 19780326,
19780329, 19780330, 19780337,
19780339, 19780340, 19780342,
19780343, 19780346, 19780354,
19780362, 19780363, 19780372,
19780376, 19780377, 19780380,
19780399, 19780409, 19780410,
19780417, 19780419, 19780420,
19780422, 19780426, 19780428,
19780430, 19780432, 19780434,
19780436, 19780437, 19780440,
19780441, 19780445, 19780453,
19780463-19780466, 19780476,
19780481-19780484, 19780488,
19780504, 19780519, 19780525,
19780527, 19780529-19780531,
19780534, 19780535, 19780544,
19780545, 19780549, 19780552,
19780553, 19780555-19780557,
19780560, 19780562, 19780564,
19780565, 19780567, 19780568,
19780570-19780572, 19780580,
19780588, 19780595, 19780596,
19780600, 19780601, 19780605,
19780618-19780620, 19780622,
19780629-19780631, 19780633,
19780635, 19780638, 19780649,
19780650, 19780658, 19780678,
19780687, 19780688, 19780694-
19780696, 19780700, 19780702,
19780706, 19780707, 19780711,
19780713, 19780718, 19780739,
19780746, 19780752, 19780753,
19780757, 19780782, 19780783,
19780786, 19780790, 19780791,
19780803-19780805, 19780813,
19780814, 19780818, 19780822,
19780826, 19780832, 19780839,
19780844, 19780849, 19780850,
19780855, 19780856, 19790150,
19790151, 19790153, 19790156,
19790158-19790160, 19790162,
19790163, 19790166, 19790171,
19790183, 19790184, 19790187,
19790191, 19790193, 19790207,
19790210, 19790218-19790220,
19790222-19790224, 19790227,
19790229, 19790241, 19790247,
19790249, 19790251, 19790252,
19790260, 19790266, 19790274,
19790284, 19790287, 19790289,
19790291, 19790294, 19790295,
19790300, 19790303, 19790309,
19790311, 19790312, 19790314,
19790315, 19790326, 19790332,
19790342, 19790353, 19790362,
19790364-19790366, 19790370,
19790379, 19790385, 19790388,
19790411, 19790412, 19790414,
19790431, 19790432, 19790449,
19790450, 19790453, 19790462,
19790463, 19790475, 19790487,
19790493-19790496, 19790500,
19790515, 19790516, 19790520,
19790523, 19790529-19790531,
19790537, 19790538, 19790544,
19790547, 19790571, 19790576,
19790578, 19790579, 19790584,
19790585, 19790589, 19790600,
19790603, 19790608, 19790624,
19790628, 19790638, 19790645,
19790648, 19790654-19790656,
19790670, 19790674, 19790683,
19790691, 19790692, 19790721-
19790725, 19790728, 19790737,
19790745, 19790750, 19790758,
19790784, 19790786, 19790812,
19790813, 19790817, 19790819,
19790820, 19790831, 19790832,
19790842, 19790852, 19790864,
19790869, 19790872, 19790874,
19790885, 19800011, 19800020,
19800021, 19800024, 19800040,
19800061, 19800064, 19800066,
19800070, 19800072, 19800076,
19800082-19800084, 19800087,
19800090, 19800107, 19800108,
19800112, 19800116, 19800132,
19800139, 19800147, 19800156,
19800172, 19800173, 19800177,
19800183, 19800186, 19800189,
19800191, 19800201, 19800205,
19800206, 19800212, 19800217,
19800218, 19800225, 19800233,
19800239, 19800243, 19800250,
19800255, 19800256, 19800270,
19800277, 19800291, 19800298,
19800307, 19800316-19800318,
19800320, 19800332, 19800341,
19800347, 19800349, 19800352,
19800355, 19800360, 19800373,
19800376, 19800380, 19800381,
19800386, 19800389, 19800399,
19800407, 19800416, 19800419,
19800450, 19800456, 19800463,
19800485, 19800490, 19800495,
19800509, 19800515, 19800523,
19800529, 19800535, 19800554,
19800556, 19800562, 19800570,
19800574, 19810010, 19810011,
19810036, 19810051, 19810063,
19810069, 19810081-19810083,
19810086, 19810102
EDDY CURRENT COUPLINGS
19780720
EDUCATION
19770510, 19770630, 19780847,
19800334
EDUCATIONAL MATERIALS
19770538, 19770557, 19780380,
19780488, 19780604, 19780697,
19780709, 19790165, 19790314,
19790423
EFFICIENCY
19760646, 19780302, 19780680,
19800141, 19800251
EGYPT
19750595, 19800444
ELECTRIC UTILITIES
19780400
ELECTRIC VEHICLES
19800195, 19800446, 19810089
ELECTRO
19790766
ELECTRODIALYSIS
19790254, 19790412
ELECTROFLUID DYNAMIC WIND DRIVEN GENERATOR
19770622, 19780674, 19780675,
19790400, 19790546, 19790547,

ELECTROFLUID DYNAMIC WIND DRIVEN GENERATOR
19790767, 19800049, 19800411, 19800529
ELECTROGASDYNAMIC WIND ENERGY DEVICES
19800190
ELECTROLYSIS
19750594, 19770519, 19770522, 19780349, 19780419, 19790467, 19800212, 19800225
ELECTROMAGNETIC FIELDS
19790144
ELECTROMAGNETS
19780427
EMBANKMENTS
19800308
EMPLOYMENT
19770547, 19770630, 19800026, 19800278
ENERGY AUDITING
19790752, 19800425
ENERGY CHARACTERISTICS
19770693
ENERGY CONSERVATION
19740361, 19750553, 19750560, 19750561, 19750565, 19750589, 19760573, 19760609, 19760616, 19770510, 19770538, 19770539, 19770547, 19770562, 19770584, 19770619, 19770632, 19770640, 19770678, 19770683, 19770687, 19780299, 19780322, 19780323, 19780339, 19780380, 19780416, 19780449, 19780488, 19780513, 19780593, 19780719, 19780746, 19780773, 19780791, 19790241, 19790271, 19790285, 19790292, 19790314, 19790405, 19790406, 19790514, 19790626, 19790751, 19790824, 19800071, 19800172, 19800176, 19800399, 19800429, 19800496
ENERGY DEVELOPMENT CENTERS
19770539
ENERGY ORGANIZATIONS
19780443, 19780777
ENERGY POLICY
19770672, 19810031
ENERGY SUPPLY AND DEMAND
19740345, 19750556, 19750566, 19760563, 19760577, 19770516, 19770543, 19780733-19780738, 19780764, 19790292, 19790339, 19790366, 19800152, 19800240, 19800496
ENERGY TASK FORCE - NYC
19800168
ENERGY TRANSPORT
19750567
ENERTECH
19790349
ENGINEERING DRAWINGS
19800098
ENGINEERING INFORMATION SYSTEM
19810071
ENVIRONMENT
19750561, 19750579, 19750584, 19750596, 19750613, 19760589, 19760599, 19760625, 19760644, 19760647, 19770502, 19770504, 19770512, 19770514, 19770516, 19770521, 19770523, 19770528, 19770529, 19770539, 19770584, 19770588, 19770590, 19770593, 19770599, 19770630, 19770653, 19770673, 19770677, 19770691, 19780329, 19780380, 19780434, 19780445, 19780529, 19780532, 19780535, 19780549, 19780568, 19780582, 19780596, 19780601, 19780603, 19780657, 19780692, 19780733-19780738, 19780746, 19780748, 19780768, 19780769, 19780822, 19790131, 19790144, 19790160, 19790174, 19790225, 19790229, 19790233, 19790238, 19790295, 19790310, 19790342, 19790357, 19790411, 19790446, 19790470, 19790475, 19790487, 19790538, 19790579, 19790598, 19790622, 19790648, 19790650, 19790654, 19790678, 19790845, 19790885, 19800061, 19800062, 19800097, 19800153, 19800169, 19800171, 19800201, 19800223, 19800268, 19800276, 19800298, 19800302, 19800324, 19800325, 19800359, 19800360, 19800364, 19800443, 19800492, 19800493, 19800495, 19800517, 19800562, 19810036, 19810039, 19810054, 19810064, 19810067, 19810073, 19810098, 19810100, 19810104, 19810111, 19810116, 19810119
ENVIRONMENTAL DEVELOPMENT PLAN
19790174
EOLIAN LANDFORMS
19770594, 19780647, 19780648, 19790527
EPRI
19770524, 19770613, 19790175, 19790335
EQUILIBRIUM
19780750
EQUIPMENT
19790824, 19790846, 19790875
ERDA
19750562, 19750593, 19760629, 19770567, 19770577, 19770602, 19780373
ETHIOPIA
19750570
EUROPE
19780656, 19800457
EVALUATION
19800021, 19800485
EXPORT
19790283
FAILURE
19780535, 19780644, 19780722, 19790355, 19790424, 19790427, 19790490, 19790509, 19790549, 19790739, 19790740, 19790779, 19790780, 19800162, 19800342, 19810033, 19810117
FATIGUE
19790424, 19790513, 19790610, 19800199, 19800533, 19810117
FAULTS
19780644, 19780722, 19790213, 19790427
FEDERAL ENERGY REGULATORY COMMISSION
19790181
FEDERAL WIND ENERGY COMMERCIALIZATION ACT
19780439
FEDERAL WIND ENERGY PROGRAM
19750569, 19770508, 19770681, 19780428, 19780429, 19780456, 19780561, 19790273, 19790274, 19790407, 19790741, 19800197, 19800561
FERTILIZERS
19760645, 19770531, 19780436, 19780437
FIBERGLASS
19780753, 19790276, 19790395, 19790594, 19790635, 19790728, 19790747, 19800213, 19800238

FIELD MODULATED GENERATORS
19780724
FIJI
19760610
FINITE ELEMENT TECHNIQUES
19800417, 19800482
FINLAND
19780810
FIRE WEATHER LIBRARY
19790526
FISH
19780802, 19790382, 19790417
FIXED PITCH ROTORS
19800306
FLAPPING HINGES
19800248
FLAPPING VANE WIND MACHINE
19750554, 19750555
FLETTNER ROTORS
19800182
FLEXROTOR
19800387
FLORIDA
19810127
FLOW DISTRIBUTION
19810005
FLOW FIELD
19790243, 19810061
FLUID DYNAMICS
19780482, 19790775
FLUID FLOW
19770667, 19800511
FLUTTER
19800406, 19800413
FLUTTER ANALYSIS
19780520, 19810040, 19810050
FLYWHEELS
19760596, 19760597, 19770559,
19770560, 19770562, 19770695,
19770697, 19780387, 19780502,
19780503, 19780713, 19780732,
19790194-19790196, 19790304,
19790388, 19790434, 19790544,
19790602, 19790603, 19790746,
19790814, 19800127, 19800164,
19800239, 19800259, 19810086
FN INTERFERENCE
19780768, 19790470, 19790651
FOAM
19790669
FOKKER - VFW
19800010
FORKLIFT TRUCKS
19780857, 19810118
FOSSIL FUELS
19780297, 19800281, 19800282
FOUNDATION
19800342
FOURIER ANALYSIS
19800350
FRANCE
19760581, 19770564, 19780554,
19790669, 19790848, 19800089
FREE-WING TURBINE
19790172
FREQUENCY MATCHING
19800269
FUEL CELLS
19790383, 19790479, 19790661,
19800442
FUNDING - GOVERNMENT
19770508, 19770587, 19770681,
19780456, 19780506, 19780561,
19780589, 19780608, 19780820,
19790133, 19790153, 19790273,
19790341, 19790741, 19790821,
19800005, 19800006, 19800480,
19800481, 19810123
GEARS
19790697, 19810003
GEDSER
19790506-19790508, 19790590,
19800345
GELS
19760635
GEMINI
19760620
GENERAL ELECTRIC
19790418
GENERATORS
19570029, 19780427, 19790248,
19790762, 19800156, 19810072
GEORGETOWN UNIVERSITY
19790842
GEORGIA
19810127
GEOTHERMAL ENERGY
19740345, 19750556, 19750557,
19750567, 19750585, 19750596,
19750601, 19760565, 19760577,
19760581, 19760583, 19760589,
19760600, 19760623, 19760625,
19760631, 19760647, 19770507,
19770516, 19770537, 19770543,
19770557, 19770563, 19770566,
19770584, 19770599, 19770600,
19770614, 19770630, 19770676,
19770677, 19770683, 19770691,
19780329, 19780495, 19780506,
19780529, 19780544, 19780549,
19780582, 19780627, 19780749,
19790233, 19790236, 19790379,
19790383, 19790446, 19790731,
19790751, 19790794, 19800082,
19800097, 19800173, 19800281,
19800282, 19800322, 19800361,
19800392, 19800399, 19800440,
19800442, 19800516
GERMANY
19260022, 19260023, 19410030
GERMANY - FR
19760583, 19760618, 19770564,
19770614, 19770615, 19770650,
19770689, 19770690, 19780341,
19780344, 19780369, 19780371,
19780460, 19780553, 19780554,
19780592, 19780677, 19780690,
19780764, 19780766, 19790402,
19790468, 19790477, 19790645,
19790742, 19790794, 19800085,
19800119, 19800202, 19800220,
19800331, 19800361, 19800570,
19810051, 19810095
GERMANY - GDR
19780658
GIROMILL
19770505, 19770530, 19770658,
19770694, 19780345, 19780368,
19780599, 19780624, 19780685,
19790350, 19790352, 19790378,
19790512, 19790738, 19790767,
19790784, 19790795, 19800015,
19800016, 19800237, 19800423
GLADDEN WINDMILL
19800017
GOGINS L
19790172
GOLDSTONE ENERGY PROJECT
19780339
GREAT BRITAIN
19550039, 19750592, 19750597,
19760565, 19760615, 19760638,
19770599, 19770600, 19770608,
19770619, 19770629, 19780336,
19780359, 19780366, 19780511,
19780530, 19780553, 19780554,
19780683, 19780687, 19780688,
19780711, 19780762, 19780811,
19780821, 19790237, 19790271,
19790497, 19790622, 19790636,
19790729, 19790734, 19800028,

GREAT BRITAIN
19800155, 19800331, 19800332, 19800376, 19800399, 19800502, 19800554, 19810028
GREAT LAKES REGION
19780578
GREAT PLAINS
19780778, 19790197, 19800122
GREECE
19750599, 19770552
GREENE G G
19800039
GREENHOUSES
19750592, 19760616, 19760638, 19770556, 19770612, 19770640, 19770687, 19780625, 19780802, 19780826, 19790167, 19790322, 19790376, 19790417
GROWIAN
19770689, 19770690, 19780690, 19790327, 19790402, 19790468, 19790592, 19800220, 19800254, 19800285, 19800361, 19800570
GROWIAN II
19810095
GRUMMAN
19770527, 19780300, 19780305, 19790264, 19790606, 19800268, 19800461
GUAM
19800071
GUSTS
19790242, 19790435, 19790720, 19790836, 19790839, 19790878, 19790880, 19790881, 19800199, 19800333, 19800343, 19800405, 19800472, 19810001
GUY-WIRES
19800157, 19810015, 19810016, 19810124
GYROMILL
19800439
GYROTURBINE
19800412
HAIL DAMAGE
19790321
HAMILTON STANDARD
19800019, 19800564
HARRIS C
19790188
HAWAII
19750601, 19760600, 19770563, 19770593, 19770644, 19770647-19770649, 19770651, 19770668, 19780382, 19780391, 19780413, 19780593, 19780594, 19780616, 19790161, 19790229, 19790337, 19790357, 19790360, 19790361, 19790487, 19790489, 19790611, 19790612, 19790754, 19790876, 19790884, 19800027, 19800055, 19800071, 19800125, 19800167, 19800537, 19810033, 19810094
HAWAII NATURAL ENERGY INSTITUTE
19770563
HEALTH HAZARDS
19780546-19780548, 19790444, 19790445, 19800184, 19800265
HEAT EXCHANGERS
19760609
HEAT PUMPS
19760578, 19770507, 19770541, 19770568, 19770614, 19770678, 19780412, 19780414, 19780415, 19780513, 19780519, 19780658, 19790271, 19790645, 19790716, 19790794, 19790811, 19800198
HEAT RECOVERY SYSTEMS
19770638, 19780513
HEATING
19760587, 19760603, 19760609, 19760622, 19770520, 19770532, 19770545, 19770624, 19770657, 19770678, 19780288-19780290, 19780293, 19780300, 19780449, 19780519, 19780605, 19780623, 19780625, 19780638, 19780676, 19780677, 19780760, 19790142, 19790247, 19790255, 19790263, 19790325, 19790515, 19790524, 19790615, 19790639, 19790640, 19790811, 19800150, 19800183, 19800284, 19800361, 19800490, 19800518, 19810031, 19810102, 19810105
HEIGHT
19790542, 19800455
HELICAL VORTEX METHOD
19810053
HELICOPTER TECHNOLOGY
19800412
HERONEMUS W E
19780545
HIGH ALTITUDE
19800436
HIGH LIFT DEVICES
19790495
HIGH SCHOOL
19780380, 19780488
HIGH-SPEED SCREW
19790332
HIGH-SPEED WINDMILLS
19570028
HILLS
19780360, 19780361, 19780663, 19780664, 19790377, 19790703, 19790876, 19800167
HISTORY
19730160, 19740357, 19750566, 19750613, 19750614, 19770675, 19770692, 19780467, 19790171, 19790208, 19790575, 19790777, 19800017, 19800028, 19800122, 19800211, 19800224
HONNEF H
19770525
HORIZONTAL AXIS
19680028, 19750563, 19750590, 19760627, 19760639, 19770506, 19770544, 19770608, 19770611, 19770645, 19770685, 19780292, 19780313, 19780346, 19780355, 19780369, 19780381, 19780383, 19780397, 19780432, 19780438, 19780457, 19780469, 19780478, 19780511, 19780537, 19780591, 19780597, 19780598, 19780613, 19780655, 19780667, 19780671-19780673, 19780699, 19780714, 19780717, 19780768, 19780769, 19780774, 19780779, 19780793, 19780814, 19780816, 19780853, 19790144, 19790188, 19790202, 19790214, 19790280, 19790284, 19790296, 19790300, 19790355, 19790390, 19790410, 19790439, 19790440, 19790460, 19790471, 19790493-19790495, 19790524, 19790538, 19790545, 19790568, 19790572, 19790628, 19790629, 19790635, 19790638, 19790649-19790651, 19790674, 19790684, 19790689, 19790711, 19790743, 19790759, 19790809, 19790810, 19790817, 19790830, 19790855, 19800009, 19800085, 19800098, 19800102, 19800114, 19800115, 19800120, 19800136, 19800181, 19800215, 19800245, 19800257, 19800267, 19800274, 19800275, 19800293, 19800296, 19800297,

HORIZONTAL AXIS
19800300, 19800302, 19800306, 19800364, 19800385, 19800415, 19800417, 19800438, 19800445, 19800449, 19800489, 19800493, 19800499, 19800500, 19800510, 19800511, 19800520, 19800539, 19800540, 19800544, 19800552, 19800553, 19800557, 19800573, 19810008, 19810012, 19810024, 19810025, 19810037, 19810038, 19810044, 19810045, 19810047, 19810048, 19810050, 19810053, 19810062, 19810064, 19810067, 19810071, 19810084, 19810108, 19810112, 19810121, 19810126
HOT WATER GENERATORS
19780654
HUMID AIR
19770634, 19770635, 19780693, 19780694, 19780755, 19790576, 19790577
HUNGARY
19770591, 19780405
HYDRAULIC POWER CONVERSION SYSTEM
19800228
HYDRAULIC WIND TURBINE
19780762
HYDRAULIC WINDMILL
19810014
HYDRO PUMP BACK WIND ENERGY CONVERSION SYSTEM
19780450
HYDROELECTRIC POWER
19740345, 19750557, 19750607, 19760583, 19760610, 19760625, 19760631, 19770516, 19770540, 19770551, 19770557, 19770614, 19770663, 19770680, 19770686, 19770695, 19780326, 19780343, 19780385, 19780425, 19780444, 19780491, 19780525, 19780526, 19780529, 19780549, 19780567, 19780568, 19780600, 19780710, 19780740, 19780822, 19790233, 19790271, 19790292, 19790379, 19790408, 19790416, 19790450, 19790511, 19790585, 19790758, 19790792, 19790858, 19800019, 19800054, 19800063, 19800064, 19800083, 19800084, 19800087, 19800173, 19800184, 19800264, 19800276, 19800298, 19800442, 19800483, 19800560, 19800565, 19800567
HYDROGEN
19750579, 19760650, 19770503, 19770519, 19770522, 19770566, 19780342, 19780343, 19780349, 19780419, 19780545, 19800145, 19800212, 19800225, 19800281, 19800282
HYDROGEN ENERGY
19750573, 19770673, 19790446
HYPERBOLIC COOLING TOWERS
19780747
ICE
19800208, 19800236, 19810043
IDAHO
19770540, 19780382, 19780647, 19780838, 19790262, 19790532, 19790829, 19800125, 19800210
ILLINOIS
19780423, 19780779, 19790886, 19810080
INDIA
19640079, 19750585, 19750599, 19750600, 19750610, 19760577, 19760641, 19780292, 19780294, 19780430, 19780493, 19780727, 19780815, 19790656, 19800234, 19800289, 19800290, 19800419
INDIANA
19790510, 19810080
INDONESIA
19760580
INDUCTION GENERATORS
19760607, 19780676, 19790574, 19790790, 19790873, 19800207
INDUSTRIAL APPLICATIONS
19200011, 19770544, 19780857, 19790388, 19790405, 19790514, 19790537, 19800250
INERTIA
19810007, 19810008
INFORMATION
19790212, 19790558, 19790818, 19800542, 19810009, 19810071
INNOVATIVE SYSTEMS
19790741, 19790767, 19790768, 19800049, 19800211, 19800336, 19800459, 19800485, 19800525-19800529
INSTABILITY
19800193
INSTALLATION
19770628, 19780614, 19790306, 19810063
INSTITUTE FOR SOCIAL ECOLOGY
19770556
INSTITUTE OF MAN AND RESOURCES
19780625
INSURANCE
19790569, 19800128, 19800388
INTEGRATED SYSTEMS
19730158, 19740347, 19750592, 19750595, 19750605, 19760567, 19760572, 19760576, 19760610, 19760614, 19760616, 19760626, 19770515, 19770520, 19770545, 19770556, 19770561, 19770568, 19770608, 19770612, 19770638, 19770684, 19770687, 19770690, 19780287, 19780288, 19780290, 19780349, 19780369, 19780445, 19780526, 19780583, 19780607, 19780641, 19780831, 19790167, 19790210, 19790228, 19790260, 19790270, 19790289, 19790376, 19790420, 19790443, 19790446, 19790505, 19790516, 19790533, 19790589, 19790614, 19790708, 19790716, 19790792, 19790807, 19790838, 19790870, 19800003, 19800087, 19800101, 19800137, 19800164, 19800195, 19800198, 19800419, 19800444, 19800483, 19800518, 19800565, 19800567
INTERFERENCE - ARRAYS
19790492
INTERMITTENT GENERATION
19800326
INTERNATIONAL AGREEMENTS
19760625, 19770564, 19790436
INTERNATIONAL ENERGY AGENCY
19770542
INVERSE GAUSSIAN DISTRIBUTION
19800126
INVERTERS
19770679
IOWA
19750608, 19780423, 19790733, 19810034
IRAN
19770659, 19790286, 19790554
IRELAND
19780610, 19790247, 19790415
IRRIGATION
19750570, 19770499, 19780291, 19780294, 19780399, 19780476, 19780493, 19780686, 19790168,

IRRIGATION
19790169, 19790197, 19790336, 19790482, 19790646, 19790656, 19790719, 19790743, 19790835, 19800105
ISRAEL
19780343, 19800286
ITALY
19780316, 19790253, 19800069, 19800152, 19800153
JACOBS WIND ELECTRIC CO.
19790199
JACOBS WIND GENERATOR
19730160, 19790807, 19810052
JAPAN
19770564, 19790698, 19800097, 19800152
JET-STREAM
19790182
JORDAN COLLEGE
19780411, 19790322
KAMAN AEROSPACE CORPORATION
19790296, 19800564, 19810047, 19810048, 19810085
KANSAS
19770580, 19780382, 19780570, 19780650, 19780719, 19790510, 19810090
KANSAS STATE UNIVERSITY
19800025
KATZENBERG R
19780452
KENTUCKY
19800148
KINETIC ENERGY
19790204
KIRSTEN-ROTOR
19790599
KITE ANEMOMETERS
19800166
KITES
19790191
KOREA
19760613
KRAFTANLAGEN A.G.
19790794
L-180 POSEIDON
19800337
LAGOONS
19800227
LAKES
19750606
LANDING
19810102
LAMINATES
19810029
LANCHESTER'S DERIVATION
19790293
LAND USE
19780823, 19800517, 19810073, 19810074
LANDSAT
19770594, 19780379
LARGE-SPAN TENSIONED FOILS
19780331
LAWS AND LEGISLATION
19770643, 19770663, 19770683, 19780439, 19780563, 19780589, 19780657, 19780848, 19790150, 19790181, 19790224, 19790446, 19790470, 19790475, 19790523, 19790570, 19790579, 19790621, 19790627, 19790648, 19790854, 19800013, 19800033, 19800132, 19800216, 19810074
LEBOST WIND TURBINE
19770598, 19790207, 19800370
LESOTHO
19790275
LIABILITY
19790570
LICUS
19780304, 19790458
LIFE CYCLE COSTING METHODOLOGY
19800147
LIGHTNING PROTECTION
19810004
LINMET - COMPUTER CODE
19800514
LITERATURE SURVEYS
19770566, 19780347, 19800276
LOAD LEVELLING
19780300
LOAD MANAGEMENT
19800338
LOAD MATCHING
19780701
LOADS
19800328, 19800418, 19800513
LOCKHEED
19760645
LOW ENTROPY AGRICULTURAL FACILITY
19750561
LOW VOLTAGE SYSTEMS
19800261
LUND ENTERPRISES
19780383
LUNDELL ALTERNATORS
19720061
MADARAS ROTOR POWER PLANT
19770694, 19770696, 19780700, 19780707, 19780752, 19790767, 19790812, 19800015, 19800049
MAGDALEN ISLANDS
19770511, 19780451, 19780644, 19780728, 19790696, 19790701, 19790709, 19790739, 19790740, 19800347
MAGNETOHYDRODYNAMICS
19750567, 19780651, 19790479
MAINE
19770584, 19770608, 19780648, 19790263, 19800400
MAINTENANCE
19800146
MANITOBA
19780640
MANUFACTURERS
19770573, 19770589, 19770632, 19780677, 19780773, 19790430, 19790748, 19790873, 19790875, 19800040, 19800272, 19800558
MANUFACTURING
19790570, 19790815
MANUFACTURING COSTS
19790294, 19790674
MARKET POTENTIAL
19780347, 19780463, 19780783, 19780813, 19790283, 19790287, 19790394, 19790832, 19800116, 19800183, 19810032, 19810076, 19810077
MARYLAND
19800148, 19800360
MASSACHUSETTS
19780290, 19780564, 19780848, 19790290, 19790382, 19790634, 19790710, 19800390, 19800400, 19810090
MAURITANIA
19770533
MCLOUGHLIN P
19790822, 19800013
MEDINA F
19780467
MEHRKHAM T
19790375, 19790537, 19800358
METEOROLOGY
19780472, 19780577, 19780766, 19790462, 19790464

METHANE
19750561, 19750594
METHOD OF BINS
19790267, 19800058, 19800269
METHOD OF MOMENTS
19800450
MEXICO
19780286, 19790270, 19790420
MICHIGAN
19780325, 19780326, 19780382,
19780600, 19780780, 19790585,
19810080, 19810090
MICROCOMPUTERS
19790433
MICROPROCESSOR
19780489, 19790239
MICROWAVE COMMUNICATIONS
INTERFERENCE
19790470, 19790651
MICROWAVE RELAY STATIONS
19790333, 19790457, 19790533
MID-ATLANTIC COAST
19800512
MIDWESTERN U.S.
19780578, 19780735, 19780778,
19800122, 19800323, 19800429
MILK
19780412, 19790420, 19800056
MILLVILLE WINDMILL COMPANY
19790780
MINE VENTILATION
19770575
MINICOMPUTERS
19780776, 19780799
MINNESOTA
19750560, 19770541, 19780423,
19780618, 19790708, 19800353,
19810034, 19810052
MISSISSIPPI
19810127
MISSOURI
19760562
MOD-X
19790495
MOD-0
19760646, 19770602, 19770662,
19780485, 19780486, 19780542,
19780598, 19780611, 19780769,
19780793, 19780817, 19780818,
19780853, 19790145, 19790217,
19790227, 19790313, 19790341,
19790365, 19790817, 19800018,
19800301-19800303, 19800509,
19800510, 19800539, 19800552,
19800553, 19810013, 19810037,
19810038, 19810088, 19810108
MOD-0A
19770631, 19780485, 19780486,
19780537, 19780668, 19780714,
19780744, 19780745, 19780769,
19780818, 19790306, 19790347,
19790357, 19790390, 19790466,
19790490, 19790617, 19790618,
19790711, 19790715, 19790817,
19790850, 19790877, 19800098,
19800100, 19800302, 19800385,
19800426, 19800458, 19800509,
19810088, 19810101
MOD-1
19780337, 19780562, 19780769,
19780818, 19790178, 19790235,
19790237, 19790242, 19790302,
19790371, 19790385, 19790549-
19790551, 19790604, 19790711,
19790713, 19790728, 19790763,
19790817, 19800035, 19800238,
19800302, 19800486, 19800509,
19800510, 19810039, 19810054,
19810064, 19810088, 19810104,
19810108, 19810111, 19810116,
19810119
MOD-2
19780410, 19780818, 19790134,
19790237, 19790302, 19790331,
19790348, 19790474, 19790501-
19790503, 19790509, 19790531,
19790552, 19790553, 19790711,
19790817, 19800120, 19800273,
19800302, 19800341, 19800373,
19800384, 19800509, 19800510,
19800554, 19810003, 19810050,
19810057, 19810075, 19810088,
19810100
MOD-5
19800005, 19800054
MOD-6H
19800005
MOD-6V
19800005
MODAL ANALYSIS
19800369
MODEL OUTPUT STATISTICS
19790833
MODELS
19670021, 19690025, 19730162,
19740354-19740356, 19750556,
19750558, 19750571, 19750573,
19750586-19750588, 19760569,
19760575, 19760585, 19760586,
19760590, 19760616, 19760639,
19770499, 19770517, 19770522,
19770551, 19770553, 19770567-
19770571, 19770575, 19770581,
19770603, 19770605, 19770617,
19770620, 19770622, 19770623,
19770634, 19770641, 19770642,
19770656, 19770660, 19770669,
19770674, 19770680, 19770696,
19780285, 19780287, 19780290,
19780294, 19780306, 19780308,
19780325, 19780327, 19780330,
19780334, 19780350, 19780364,
19780370, 19780396, 19780397,
19780406-19780408, 19780422,
19780434, 19780440, 19780447,
19780454, 19780464, 19780465,
19780479, 19780481, 19780484,
19780487, 19780490, 19780509,
19780510, 19780514-19780516,
19780518, 19780531, 19780541,
19780542, 19780559, 19780565,
19780574, 19780576, 19780579,
19780584-19780587, 19780590,
19780591, 19780597, 19780600,
19780602, 19780637, 19780638,
19780653, 19780661, 19780662,
19780671-19780673, 19780680,
19780691, 19780693, 19780694,
19780704, 19780709, 19780717,
19780720, 19780722, 19780726,
19780729, 19780731, 19780743,
19780750, 19780761, 19780775,
19780780, 19780784, 19780785,
19780790, 19780793, 19780795,
19780797, 19780800, 19780805,
19780807, 19780808, 19780819,
19780824-19780826, 19780833,
19780845, 19780853, 19790132,
19790136, 19790144, 19790152,
19790155, 19790157, 19790158,
19790161, 19790179, 19790182-
19790184, 19790186, 19790197,
19790201, 19790217, 19790230,
19790239, 19790242-19790244,
19790246, 19790247, 19790251,
19790265, 19790279, 19790281,
19790293, 19790299, 19790302,
19790321, 19790323, 19790327,
19790328, 19790330, 19790332,
19790337, 19790338, 19790340,
19790351, 19790354, 19790358,

MODELS
19790359, 19790372, 19790383,
19790387, 19790391, 19790392,
19790409, 19790429, 19790431,
19790435, 19790440, 19790443,
19790448, 19790452, 19790461,
19790474, 19790480, 19790481,
19790484, 19790485, 19790492-
19790494, 19790515, 19790516,
19790529, 19790538, 19790541,
19790542, 19790561, 19790572,
19790576, 19790577, 19790585,
19790592, 19790610, 19790613,
19790626, 19790633, 19790639,
19790640, 19790645, 19790649,
19790657, 19790659, 19790673,
19790675, 19790676, 19790683,
19790695, 19790715, 19790718,
19790721, 19790722, 19790747,
19790754, 19790755, 19790759,
19790769, 19790771, 19790779,
19790785-19790789, 19790806,
19790827, 19790840, 19790876,
19790880, 19800009, 19800027,
19800042, 19800051, 19800056,
19800058, 19800078, 19800083,
19800084, 19800087, 19800092,
19800099, 19800101, 19800114,
19800115, 19800126, 19800135,
19800141, 19800150, 19800151,
19800163, 19800178, 19800180,
19800181, 19800183, 19800187,
19800200, 19800207, 19800219,
19800235, 19800256, 19800258,
19800274, 19800294-19800297,
19800309, 19800310, 19800326,
19800328, 19800333, 19800339,
19800340, 19800344, 19800345,
19800350, 19800354, 19800357,
19800363, 19800365, 19800367,
19800394, 19800402, 19800404,
19800405, 19800414, 19800418,
19800420, 19800421, 19800433,
19800445, 19800448, 19800450,
19800451, 19800472, 19800477,
19800483, 19800494, 19800499-
19800501, 19800513, 19800514,
19800530, 19800532, 19800536,
19800555, 19810013, 19810017-
19810019, 19810024, 19810026,
19810027, 19810035, 19810039,
19810043, 19810045, 19810050,
19810059, 19810061, 19810064,
19810066, 19810078, 19810081-
19810085, 19810100, 19810101,
19810109, 19810112, 19810116,
19810119, 19810120, 19810122,
19810124
MOIST AIR
19790308
MOMENTUM THEORY
19790480
MONTANA
19780382, 19780647, 19780716,
19780838, 19790262, 19790272,
19790532, 19790829, 19800125,
19800210
MOST PROBABLE POWER METHOD
19800269
MOSTAB-HFW - COMPUTER CODE
19810126
MOSTAS - COMPUTER CODE
19790217, 19800301
MOUNTAIN TERRAIN
19710044, 19780306, 19780509,
19790177, 19790240, 19790625
MULTIPLE PUMP STAGE SYSTEM
19790176
MUSES
19760567
MUSGROVE P
19800014
NASA
19750611, 19770567, 19770602,
19790232, 19800438
NASTRAN
19790330
NATIONAL ENVIRONMENTAL POLICY ACT
19790598
NATIONAL SCIENCE FOUNDATION
19730161
NATIONAL WIND DATA INDEX
19780388
NATURAL ENERGY
19760573
NATURAL GAS
19770543, 19780547
NAVIGATION SYSTEM INTERFERENCE
19780768, 19790470, 19790651
NEBRASKA
19790826, 19810034, 19810090
NETHERLANDS
19490037, 19750579, 19750603,
19770503, 19770642, 19780553,
19780554, 19780635, 19780712,
19780834, 19790344, 19790469,
19790601, 19790667, 19790690,
19790699, 19800010, 19800215,
19800245, 19800449, 19810062
NEVADA
19780382, 19780838, 19790262,
19790589, 19800087, 19800469,
19800514
NEW AGE ACCESS LTD.
19790791
NEW ALCHEMY INSTITUTE
19790382
NEW BRUNSWICK
19800198
NEW ENGLAND
19780564, 19780801, 19790531,
19790807
NEW HAMPSHIRE
19780382, 19780848, 19790295,
19790761, 19800033, 19800400
NEW JERSEY
19780848, 19800400
NEW MEXICO
19750616, 19770630, 19770631,
19770676, 19770691, 19780338,
19790167, 19790289, 19790618,
19800434, 19800452, 19810090
NEW MEXICO STATE UNIVERSITY
19750596
NEW YORK
19760630, 19770562, 19780382,
19780650, 19780740, 19780848,
19790292, 19790379, 19790475,
19790866, 19800216, 19800309,
19800400, 19800463, 19810090
NEW YORK CITY
19780558, 19790367, 19790441,
19800168
NEW YORK STATE ENERGY RESEARCH
DEVELOPMENT AUTHORITY
19790292
NEW ZEALAND
19760571, 19780401, 19780549,
19780617, 19780661, 19780662,
19790310-19790312, 19790834,
19790876, 19800007, 19800072,
19800080, 19800363
NIBE
19800393
NIMBUS-6 SATELLITE
19790231
NOABL - COMPUTER CODE
19790597, 19790755, 19800514
NOISE
19790470, 19800062, 19800092,
19800171, 19800268, 19800302,

NOISE
19810039, 19810054, 19810064, 19810067, 19810099, 19810100, 19810104, 19810111, 19810116, 19810119
NOISE CONTROL
19780582
NORTH CAROLINA
19800028, 19800148, 19810090
NORTH DAKOTA
19780382, 19810034
NORTH WIND
19780655, 19800462, 19810020
NORTHEAST SOLAR ENERGY CENTER
19800032, 19800033
NORTHEASTERN U.S.
19780578, 19780736, 19800389, 19800429, 19800470
NORTHWESTERN U.S.
19790356
NORWAY
19740346, 19800386, 19800484
NUCLEAR ENERGY
19750612, 19770566, 19780546, 19780547, 19790418, 19790444, 19800184, 19800281, 19800282
OCEAN CURRENTS
19780358, 19780453, 19780466
OCEAN THERMAL ENERGY CONVERSION
19730161, 19740350, 19750574, 19750582, 19750593, 19760566, 19760581, 19760582, 19760584, 19760589, 19760600, 19760622, 19760623, 19760629, 19770500, 19770502, 19770507, 19770521, 19770523, 19770551, 19770563, 19770584, 19770677, 19770680, 19780347, 19780351, 19780356, 19780358, 19780393, 19780463, 19780547, 19780548, 19780651, 19790320, 19790383, 19790447, 19790556, 19790648, 19790663, 19800176, 19800194, 19800205, 19800264, 19800276, 19800322
OCEAN THERMAL GRADIENTS
19780414, 19780415
OCEANIC WINDS
19780545, 19790623
OCEANOGRAPHY
19790462, 19790464
OFFSHORE SITES
19750594, 19770522, 19770590, 19770643, 19780310, 19780358, 19780359, 19780366, 19780545, 19780588, 19780687, 19780698, 19780811, 19790166, 19790219, 19790410, 19790411, 19790462-19790464, 19790573, 19790672, 19790675, 19790678, 19790730, 19790734, 19800228, 19800332, 19800337, 19800365, 19800376, 19800460, 19800502
OHIO
19810080
OIL
19770543, 19780512, 19780547
OIL SHALE
19770543
OKLAHOMA
19780330, 19780346
OLD WINDMILLS
19780467, 19790208, 19800079, 19800224
OPERATION
19750580, 19770555, 19780489, 19790213, 19790248, 19790266, 19790347, 19790390, 19790519, 19790797, 19790850, 19800076
OPERATION BOOTSTRAP
19770562
OPTIMIZATION
19770617, 19780330, 19780422, 19780787, 19790247, 19790721, 19790722
OPTIMUM DESIGN POINT GEOMETRY
19780579
OREGON
19750561, 19780382, 19780647, 19780650, 19780838, 19790262, 19790297, 19790393, 19790555, 19790595, 19790596, 19790638, 19790829, 19800125, 19800210, 19800356, 19800530, 19800563, 19810090
OSCILLATING VANE WIND ENERGY CONVERSION SYSTEM
19800406
OSCILLATION
19780763, 19790265
OSCILLATORS
19800487
OUTPUT
19780328, 19800251, 19800333, 19800404, 19800422, 19810087, 19810101
OVERSPEED CONTROLS
19790499, 19800046
OWNERS OF WIND SYSTEMS
19780441
P I SPECIALISTS
19790536, 19800014
PACIFIC
19760637
PACIFIC ISLANDS
19810094
PACIFIC NORTHWEST
19780333-19780335, 19780523, 19780578, 19780647, 19780710, 19780737, 19780741, 19780838, 19790804, 19790829, 19800125, 19800560
PALEONTOLOGY
19780639
PANEMONES
19750615, 19790419
PARAKITES
19780626
PARALLEL GENERATION
19780374, 19780816
PAREP - COMPUTER CODE
19790226
PATENTS
19260022, 19750555, 19750572, 19760588, 19760601, 19760604, 19760617, 19760624, 19760626, 19760633-19760635, 19760640, 19760642, 19760649, 19770497, 19770501, 19770558, 19770576, 19770598, 19770604, 19770611, 19770652, 19770654, 19770655, 19770657, 19770658, 19770667, 19770684, 19770695, 19770697, 19780313, 19780315, 19780348, 19780349, 19780355, 19780378, 19780427, 19780496, 19780498, 19780521, 19780528, 19780540, 19780581, 19780583, 19780626, 19780669, 19780681, 19780684, 19780685, 19780703, 19780715, 19780732, 19780751, 19780756, 19780759, 19780760, 19780792, 19780837, 19790316, 19790350, 19790378, 19790389, 19790400, 19790401, 19790408, 19790413, 19790419, 19790421, 19790434, 19790442, 19790491, 19790559, 19790567, 19790581, 19790582, 19790588, 19790647, 19790738, 19790746, 19790795, 19790796, 19790814, 19800059, 19800117, 19800118, 19800143, 19800161,

MODELS
19790359, 19790372, 19790383, 19790387, 19790391, 19790392, 19790409, 19790429, 19790431, 19790435, 19790440, 19790443, 19790448, 19790452, 19790461, 19790474, 19790480, 19790481, 19790484, 19790485, 19790492-19790494, 19790515, 19790516, 19790529, 19790538, 19790541, 19790542, 19790561, 19790572, 19790576, 19790577, 19790585, 19790592, 19790610, 19790613, 19790626, 19790633, 19790639, 19790640, 19790645, 19790649, 19790657, 19790659, 19790673, 19790675, 19790676, 19790683, 19790695, 19790715, 19790718, 19790721, 19790722, 19790747, 19790754, 19790755, 19790759, 19790769, 19790771, 19790779, 19790785-19790789, 19790806, 19790827, 19790840, 19790876, 19790880, 19800009, 19800027, 19800042, 19800051, 19800056, 19800058, 19800078, 19800083, 19800084, 19800087, 19800092, 19800099, 19800101, 19800114, 19800115, 19800126, 19800135, 19800141, 19800150, 19800151, 19800163, 19800178, 19800180, 19800181, 19800183, 19800187, 19800200, 19800207, 19800219, 19800235, 19800256, 19800258, 19800274, 19800294-19800297, 19800309, 19800310, 19800326, 19800328, 19800333, 19800339, 19800340, 19800344, 19800345, 19800350, 19800354, 19800357, 19800363, 19800365, 19800367, 19800394, 19800402, 19800404, 19800405, 19800414, 19800418, 19800420, 19800421, 19800433, 19800445, 19800448, 19800450, 19800451, 19800472, 19800477, 19800483, 19800494, 19800499-19800501, 19800513, 19800514, 19800530, 19800532, 19800536, 19800555, 19810013, 19810017-19810019, 19810024, 19810026, 19810027, 19810035, 19810039, 19810043, 19810045, 19810050, 19810059, 19810061, 19810064, 19810066, 19810078, 19810081-19810085, 19810100, 19810101, 19810109, 19810112, 19810116, 19810119, 19810120, 19810122, 19810124
MOIST AIR
19790308
MOMENTUM THEORY
19790480
MONTANA
19780382, 19780647, 19780716, 19780838, 19790262, 19790272, 19790532, 19790629, 19800125, 19800210
MOST PROBABLE POWER METHOD
19800269
MOSTAB-HFW - COMPUTER CODE
19810126
MOSTAS - COMPUTER CODE
19790217, 19800301
MOUNTAIN TERRAIN
19710044, 19780306, 19780509, 19790177, 19790240, 19790625
MULTIPLE PUMP STAGE SYSTEM
19790176
MUSES
19760567
MUSGROVE P
19800014
NASA
19750611, 19770567, 19770602, 19790232, 19800438
NASTRAN
19790330
NATIONAL ENVIRONMENTAL POLICY ACT
19790598
NATIONAL SCIENCE FOUNDATION
19730161
NATIONAL WIND DATA INDEX
19780388
NATURAL ENERGY
19760573
NATURAL GAS
19770543, 19780547
NAVIGATION SYSTEM INTERFERENCE
19780768, 19790470, 19790651
NEBRASKA
19790826, 19810034, 19810090
NETHERLANDS
19490037, 19750579, 19750603, 19770503, 19770642, 19780553, 19780554, 19780635, 19780712, 19780834, 19790344, 19790469, 19790601, 19790667, 19790690, 19790699, 19800010, 19800215, 19800245, 19800449, 19810062
NEVADA
19780382, 19780838, 19790262, 19790589, 19800087, 19800469, 19800514
NEW AGE ACCESS LTD.
19790791
NEW ALCHEMY INSTITUTE
19790382
NEW BRUNSWICK
19800198
NEW ENGLAND
19780564, 19780801, 19790531, 19790807
NEW HAMPSHIRE
19780382, 19780848, 19790295, 19790761, 19800033, 19800400
NEW JERSEY
19780848, 19800400
NEW MEXICO
19750616, 19770630, 19770631, 19770676, 19770691, 19780338, 19790167, 19790289, 19790618, 19800434, 19800452, 19810090
NEW MEXICO STATE UNIVERSITY
19750596
NEW YORK
19760630, 19770562, 19780382, 19780650, 19780740, 19780848, 19790292, 19790379, 19790475, 19790866, 19800216, 19800309, 19800400, 19800463, 19810090
NEW YORK CITY
19780558, 19790367, 19790441, 19800168
NEW YORK STATE ENERGY RESEARCH DEVELOPMENT AUTHORITY
19790292
NEW ZEALAND
19760571, 19780401, 19780549, 19780617, 19780661, 19780662, 19790310-19790312, 19790834, 19790876, 19800007, 19800072, 19800080, 19800363
NIBE
19800393
NIMBUS-6 SATELLITE
19790231
NOABL - COMPUTER CODE
19790597, 19790755, 19800514
NOISE
19790470, 19800062, 19800092, 19800171, 19800268, 19800302,

NOISE
19810039, 19810054, 19810064, 19810067, 19810099, 19810100, 19810104, 19810111, 19810116, 19810119
NOISE CONTROL
19780582
NORTH CAROLINA
19800028, 19800148, 19810090
NORTH DAKOTA
19780382, 19810034
NORTH WIND
19780655, 19800462, 19810020
NORTHEAST SOLAR ENERGY CENTER
19800032, 19800033
NORTHEASTERN U.S.
19780578, 19780736, 19800389, 19800429, 19800470
NORTHWESTERN U.S.
19790356
NORWAY
19740346, 19800386, 19800484
NUCLEAR ENERGY
19750612, 19770566, 19780546, 19780547, 19790418, 19790444, 19800184, 19800281, 19800282
OCEAN CURRENTS
19780358, 19780453, 19780466
OCEAN THERMAL ENERGY CONVERSION
19730161, 19740350, 19750574, 19750582, 19750593, 19760566, 19760581, 19760582, 19760584, 19760589, 19760600, 19760622, 19760623, 19760629, 19770500, 19770502, 19770507, 19770521, 19770523, 19770551, 19770563, 19770584, 19770677, 19770680, 19780347, 19780351, 19780356, 19780358, 19780393, 19780463, 19780547, 19780548, 19780651, 19790320, 19790383, 19790447, 19790556, 19790648, 19790663, 19800176, 19800194, 19800205, 19800264, 19800276, 19800322
OCEAN THERMAL GRADIENTS
19780414, 19780415
OCEANIC WINDS
19780545, 19790623
OCEANOGRAPHY
19790462, 19790464
OFFSHORE SITES
19750594, 19770522, 19770590, 19770643, 19780310, 19780358, 19780359, 19780366, 19780545, 19780588, 19780687, 19780698, 19780811, 19790166, 19790219, 19790410, 19790411, 19790462-19790464, 19790573, 19790672, 19790675, 19790678, 19790730, 19790734, 19800228, 19800332, 19800337, 19800365, 19800376, 19800460, 19800502
OHIO
19810080
OIL
19770543, 19780512, 19780547
OIL SHALE
19770543
OKLAHOMA
19780330, 19780346
OLD WINDMILLS
19780467, 19790208, 19800079, 19800224
OPERATION
19750580, 19770555, 19780489, 19790213, 19790248, 19790266, 19790347, 19790390, 19790519, 19790797, 19790850, 19800076
OPERATION BOOTSTRAP
19770562
OPTIMIZATION
19770617, 19780330, 19780422, 19780787, 19790247, 19790721, 19790722
OPTIMUM DESIGN POINT GEOMETRY
19780579
OREGON
19750561, 19780382, 19780647, 19780650, 19780838, 19790262, 19790297, 19790393, 19790555, 19790595, 19790596, 19790638, 19790829, 19800125, 19800210, 19800356, 19800530, 19800563, 19810090
OSCILLATING VANE WIND ENERGY CONVERSION SYSTEM
19800406
OSCILLATION
19780763, 19790265
OSCILLATORS
19800487
OUTPUT
19780328, 19800251, 19800333, 19800404, 19800422, 19810087, 19810101
OVERSPEED CONTROLS
19790499, 19800046
OWNERS OF WIND SYSTEMS
19780441
P I SPECIALISTS
19790536, 19800014
PACIFIC
19760637
PACIFIC ISLANDS
19810094
PACIFIC NORTHWEST
19780333-19780335, 19780523, 19780578, 19780647, 19780710, 19780737, 19780741, 19780838, 19790804, 19790829, 19800125, 19800560
PALEONTOLOGY
19780639
PANEMONES
19750615, 19790419
PARAKITES
19780626
PARALLEL GENERATION
19780374, 19780816
PAREP - COMPUTER CODE
19790226
PATENTS
19260022, 19750555, 19750572, 19760588, 19760601, 19760604, 19760617, 19760624, 19760626, 19760633-19760635, 19760640, 19760642, 19760649, 19770497, 19770501, 19770558, 19770576, 19770598, 19770604, 19770611, 19770652, 19770654, 19770655, 19770657, 19770658, 19770667, 19770684, 19770695, 19770697, 19780313, 19780315, 19780348, 19780349, 19780355, 19780378, 19780427, 19780496, 19780498, 19780521, 19780528, 19780540, 19780581, 19780583, 19780626, 19780669, 19780681, 19780684, 19780685, 19780703, 19780715, 19780732, 19780751, 19780756, 19780759, 19780760, 19780792, 19780837, 19790316, 19790350, 19790378, 19790389, 19790400, 19790401, 19790408, 19790413, 19790419, 19790421, 19790434, 19790442, 19790491, 19790559, 19790567, 19790581, 19790582, 19790588, 19790647, 19790738, 19790746, 19790795, 19790796, 19790814, 19800059, 19800117, 19800118, 19800143, 19800161,

PATENTS
19800188, 19800195, 19800237, 19800299, 19800304, 19800351, 19800377, 19800392, 19800441, 19800475, 19800479, 19800497, 19800511, 19800534, 19800538, 19810072
PAYBACK TIME
19780560, 19790187
PEDAL WIND TURBINE
19790774, 19800050
PENNSYLVANIA
19780848, 19790537, 19800013, 19800400
PENNSYLVANIA POWER & LIGHT
19790140, 19790375
PERFORMANCE
19740353, 19740356, 19750568, 19770499, 19770536, 19770679, 19780293, 19780362, 19780368, 19780454, 19780492, 19780494, 19780499, 19780534, 19780555, 19780571-19780573, 19780584, 19780587, 19780653, 19780667, 19780674, 19780679, 19780696, 19780701, 19780744, 19780799, 19780807, 19780808, 19780849, 19790140, 19790170, 19790226, 19790239, 19790242, 19790243, 19790246, 19790250, 19790267, 19790284, 19790300, 19790347, 19790353, 19790390, 19790398, 19790409, 19790425-19790428, 19790431, 19790432, 19790438, 19790443, 19790448, 19790459, 19790474, 19790485, 19790496, 19790506, 19790508, 19790546, 19790547, 19790562, 19790564, 19790570, 19790572, 19790599, 19790605, 19790618, 19790652, 19790653, 19790655, 19790665, 19790671, 19790677, 19790679, 19790686, 19790688, 19790693, 19790701, 19790756, 19790812, 19790836, 19790867, 19800018, 19800035, 19800042, 19800049, 19800058, 19800068, 19800107, 19800108, 19800110, 19800134, 19800182, 19800185, 19800187, 19800257, 19800258, 19800269, 19800271, 19800303, 19800306, 19800310, 19800316, 19800317, 19800350, 19800367, 19800387, 19800395, 19800417, 19800433, 19800448, 19800458, 19800478, 19800486, 19800503, 19800571, 19800572, 19810001, 19810026, 19810030, 19810069, 19810092, 19810097, 19810109, 19810128
PERU
19790336
PHOTODIODE-ARRAY OPTICAL TURBULENCE SENSOR
19800403
PHOTOPRODUCTION
19770502
PHOTOVOLTAICS
19730161, 19750574, 19750581, 19750582, 19750593, 19760579, 19760582, 19760622, 19760629, 19770500, 19770502, 19770504, 19770521, 19770523, 19770551, 19770564, 19770578, 19770595, 19770609, 19770680, 19780318, 19780319, 19780393, 19780418, 19780463, 19780531, 19780571, 19780603, 19780610, 19780776, 19780832, 19790167, 19790225, 19790304, 19790320, 19790322, 19790379, 19790383, 19790416, 19790418, 19790488, 19790517, 19790558, 19790589, 19790648, 19790661-19790663, 19790745, 19790751, 19790786-19790788, 19790842, 19790854, 19800061, 19800083, 19800084, 19800127, 19800164, 19800176, 19800187, 19800194, 19800212, 19800225, 19800262, 19800290, 19800490, 19810002, 19810011
PHYSICS
19790858
PINSON ENERGY CORPORATION
19770530, 19800008, 19800162
PLANNING
19790518, 19790579, 19800450, 19800560
PLASTICS
19790276, 19790747, 19800519
PLAYAS
19780379, 19780647, 19790527
PLUMEMILLS
19800477
PNEUMATIC POWER TRANSMISSION
19800306
POINT DESIGN
19790193
PONDS
19750558, 19790735, 19800236
POULTRY PRODUCTION
19790516, 19810102
POWER CONDITIONING CIRCUITS
19790661
POWER CURVES
19800226, 19800266
POWER LAWS
19780352, 19780407, 19790712, 19790886
POWER POTENTIAL
19200011, 19260021, 19350012, 19420034, 19490036-19490038, 19530049, 19590025, 19640079, 19660020, 19720063, 19730163, 19740345-19740350, 19740352, 19740357, 19740359, 19740362, 19750553, 19750556, 19750557, 19750559, 19750565, 19750573-19750575, 19750578, 19750580, 19750582, 19750585, 19750589, 19750597-19750599, 19750608-19750614, 19750616-19750618, 19760563, 19760565, 19760566, 19760568, 19760571, 19760573, 19760575, 19760577, 19760579-19760584, 19760595, 19760598-19760600, 19760602, 19760612, 19760613, 19760622, 19760623, 19760625, 19760629, 19760631, 19760637, 19760641, 19760650, 19770496, 19770500, 19770507, 19770511, 19770516, 19770519, 19770525, 19770526, 19770532, 19770535-19770537, 19770540, 19770541, 19770546, 19770548, 19770552, 19770564, 19770572, 19770574, 19770584, 19770585, 19770590-19770594, 19770599, 19770600, 19770609, 19770614, 19770615, 19770617, 19770619, 19770629, 19770635, 19770639, 19770642, 19770644, 19770647-19770651, 19770659, 19770668, 19770673, 19770674, 19770676, 19770682, 19770683, 19770699, 19780298, 19780299, 19780301, 19780303, 19780312, 19780314, 19780317, 19780325, 19780327, 19780329, 19780332-19780335, 19780341, 19780343, 19780352, 19780356, 19780358, 19780365-19780367, 19780371, 19780375,

POWER POTENTIAL
19780379, 19780389, 19780391,
19780393, 19780401, 19780402,
19780404, 19780405, 19780409,
19780413, 19780416, 19780426,
19780430, 19780442, 19780453,
19780459, 19780460, 19780463,
19780466, 19780477, 19780479,
19780483, 19780495, 19780501,
19780504, 19780510, 19780519,
19780530, 19780535, 19780536,
19780538, 19780539, 19780544,
19780553-19780556, 19780560,
19780564, 19780566-19780568,
19780578, 19780592, 19780594,
19780596, 19780600, 19780602,
19780609, 19780610, 19780615-
19780617, 19780633, 19780635,
19780640, 19780645, 19780650,
19780656, 19780658, 19780665,
19780666, 19780687, 19780688,
19780706, 19780709, 19780711,
19780712, 19780716, 19780718,
19780719, 19780727-19780730,
19780740, 19780741, 19780749,
19780755, 19780761, 19780766,
19780780, 19780783, 19780786,
19780788, 19780801, 19780803,
19780811, 19780812, 19780815,
19780838, 19780839, 19780844,
19780856, 19790136, 19790143,
19790150, 19790158, 19790171,
19790176, 19790182, 19790191,
19790200, 19790210, 19790218,
19790228, 19790229, 19790236,
19790249, 19790252, 19790262,
19790272, 19790275, 19790283,
19790286, 19790291, 19790293,
19790295, 19790300, 19790303,
19790311, 19790312, 19790319,
19790320, 19790339, 19790344,
19790356, 19790360, 19790361,
19790370, 19790379, 19790393,
19790407, 19790415, 19790416,
19790422, 19790437, 19790450,
19790457, 19790469, 19790487,
19790498, 19790526, 19790531,
19790541, 19790543, 19790548,
19790554, 19790555, 19790573,
19790577, 19790580, 19790601,
19790606, 19790611, 19790619,
19790625, 19790636, 19790638,
19790654, 19790690, 19790691,
19790698, 19790699, 19790731,
19790733, 19790745, 19790749,
19790760, 19790761, 19790769,
19790770, 19790777, 19790799,
19790803, 19790804, 19790808,
19790828, 19790829, 19790834,
19790843, 19790849, 19790860,
19790861, 19790887, 19800037,
19800052, 19800065, 19800069,
19800070, 19800075, 19800080,
19800082, 19800088, 19800089,
19800097, 19800099, 19800104,
19800112, 19800116, 19800119,
19800125, 19800129, 19800133,
19800139, 19800148, 19800152,
19800159, 19800160, 19800172,
19800173, 19800177, 19800186,
19800201, 19800202, 19800210,
19800216, 19800217, 19800221,
19800233-19800235, 19800244,
19800272, 19800280, 19800289-
19800291, 19800298, 19800305,
19800307, 19800313, 19800322,
19800323, 19800327, 19800335,
19800347, 19800349, 19800353,
19800355, 19800360, 19800361,
19800371, 19800376, 19800381-
19800384, 19800386, 19800389,
19800395, 19800400, 19800401,
19800416, 19800424, 19800434,
19800440, 19800442, 19800443,
19800463, 19800465, 19800468-
19800471, 19800490, 19800496,
19800505, 19800516, 19800529-
19800531, 19800545-19800547,
19800550, 19800563, 19800566,
19800567, 19810031, 19810032,
19810034, 19810051, 19810058,
19810070, 19810076, 19810077,
19810079, 19810080, 19810090,
19810094, 19810110, 19810127
POWERS I
19780346
POWERS II
19780346
PRINCE EDWARD ISLAND
19790685
PRINCIPAL COMPONENTS ANALYSIS
19780784
PROBABILITY
19770517, 19780407, 19790613
PROP - COMPUTER PROGRAM
19770499, 19810101
PROPELLERS
19780697
PROTECTION SYSTEM
19770601, 19780619, 19800454
PUBLIC ACCEPTANCE
19780458, 19790470, 19790662,
19790885, 19800171, 19810098
PUBLIC UTILITY REGULATORY POLICIES ACT
19790135, 19790608, 19800121,
19800132
PUERTO RICO
19780356, 19790577, 19800159,
19800160, 19810090
PUMPING
19690023, 19700033, 19750554,
19750570, 19750590, 19750599,
19750600, 19760632, 19760636,
19760637, 19760641, 19760643,
19770499, 19770593, 19770639,
19780294, 19780354, 19780399,
19780430, 19780476, 19780493,
19780495, 19780615, 19780677,
19780682, 19780686, 19780757,
19780765, 19790139, 19790168,
19790169, 19790197, 19790250,
19790336, 19790374, 19790382,
19790396-19790398, 19790482,
19790606, 19790646, 19790672,
19790674, 19790719, 19790743,
19790773, 19790835, 19800050,
19800122, 19800134, 19800419,
19800568
PUMPS
19770698, 19780491, 19780634,
19790373, 19790534, 19800236,
19810032
QUALITY ASSURANCE
19800252
QUEBEC
19770511, 19780287, 19780644,
19780728, 19810033
RADIO
19770515, 19780527, 19790257
RADIO METEOR WIND SYSTEM
19800081
RAGHAVA WIND TURBINE
19780721
RAMAPO COLLEGE
19770612
RAPAD
19790485
RATES
19770579, 19790366, 19790872,
19800112, 19800130, 19800535

RAYLEIGH DISTRIEUTION
19780518, 19800178
REDOX
19740360, 19760635, 19790369, 19790433, 19790563, 19790744, 19800262, 19800352, 19800428
REFRIGERATION
19780468, 19780841, 19790288, 19790847
RELAYS
19800454
RELIABILITY
19780418, 19780487, 19790161, 19790170, 19790252, 19790338, 19790363, 19790613, 19790655, 19790874, 19800252, 19800253, 19800465, 19800523, 19800556, 19810117
REMOTE AREAS
19260023, 19730158, 19740348, 19750591, 19750603, 19750608, 19750609, 19760576, 19760579, 19760605, 19760614, 19760619, 19760628, 19760637, 19770515, 19770533, 19770537, 19770659, 19780285, 19780286, 19780291, 19780292, 19780294-19780296, 19780298-19780302, 19780304, 19780425, 19780430, 19780444, 19780477, 19780493, 19780507, 19780831, 19780845, 19780855, 19790156, 19790160, 19790256-19790260, 19790300, 19790355, 19790363, 19790396-19790398, 19790404, 19790412, 19790523, 19790554, 19790568, 19790589, 19790593, 19790646, 19790691, 19790696, 19790730, 19790744, 19790785, 19790826, 19790838, 19790848, 19800037, 19800052, 19800068, 19800087, 19800101-19800103, 19800105, 19800106, 19800129, 19800137, 19800142, 19800234, 19800347, 19800443, 19800540, 19810032
REMOTE SENSING
19780379, 19790883, 19810046
REPAIRING
19800213
RESEARCH
19730161, 19750569, 19750593, 19750596, 19750613, 19760562, 19760565, 19760629, 19770508, 19770524, 19770542, 19770563, 19770587, 19770683, 19780321, 19780373, 19780394, 19780561, 19780812, 19780813, 19780820, 19790153, 19790292, 19790310-19790312, 19790341, 19790343, 19790418, 19790486, 19790528, 19790601, 19790672, 19790690, 19790750, 19790818, 19790821, 19790877, 19800073, 19800086, 19800176, 19800194, 19800196, 19800217, 19800245, 19800254, 19800280, 19800290, 19800291, 19800318, 19800321, 19800452, 19800480, 19800498, 19800561
RESERVOIRS
19780445, 19780710
RESID - COMPUTER CODE
19810115
RESIDENTIAL CONSERVATION SERVICE
19800036
RESONANCE RESPONSE
19810108
RESTORATION
19730159, 19800079, 19800224
RETROFITTING
19780821
REVERSE OSMOSIS
19790254, 19790534
REVIEW ARTICLE
19790654, 19810069
REYNOLDS NUMBER
19800295
RHODE ISLAND
19780848, 19790800, 19790807, 19800359, 19800400, 19810090
RIDGES
19780360, 19780664, 19790876
RIISAGER WINDMILLS
19800213, 19800214, 19800424
ROCKY FLATS COLORADO
19770509, 19780461, 19780462, 19780679, 19780827, 19790206, 19790362, 19790631, 19790632, 19790655, 19790664, 19790736, 19790737, 19790756, 19790757, 19790853, 19800016, 19800374, 19800503, 19800515, 19800556, 19810023, 19810117, 19810124
ROCKY MOUNTAIN REGION
19780738
ROTATING POROUS CYLINDER
19770671
ROTOR FED INDUCTION GENERATOR
19760608
ROTORS
19750563, 19780392, 19780473, 19780520, 19780572, 19780587, 19780620, 19780660, 19780789, 19790317, 19790429, 19790568, 19790628, 19790674, 19800009, 19800018, 19800248, 19800285, 19800346, 19810038
RUMANIA
19790236
RURAL ELECTRIC COOPERATIVES
19780557
SAFETY
19750579, 19750612, 19760611, 19770498, 19770554, 19780546-19780548, 19780557, 19780568, 19780754, 19790170, 19790355, 19790444, 19790466, 19790470, 19790549, 19790570, 19800100, 19800130, 19800184, 19800185, 19800208, 19800253, 19800265, 19800458, 19800478, 19800556, 19810004, 19810021
SAILING SHIPS
19690022, 19690024, 19750575, 19750618, 19810113
SAILMILLS
19750568, 19790396, 19790743
SAILS
19780376, 19780377, 19780691, 19790774
SAILWING BLADES
19750590, 19780383, 19780669, 19790630, 19800002, 19800050, 19800433
SAILWING WINDMILLS
19750599, 19750600, 19780843, 19790397, 19790398, 19790431, 19790432
SALINITY GRADIENTS
19780358, 19790623, 19800194
SAND DUNES
19780379, 19780647, 19790527
SANDIA
19780805, 19790179, 19790220, 19800011, 19800066
SASKATCHEWAN
19790458
SAUDI ARABIA
19790467
SAVONIUS
19750563, 19760644, 19770694,

SAVONIUS
19780287, 19780353, 19780354, 19780493, 19780587, 19780705, 19780833, 19790180, 19790239, 19790245, 19790334, 19790396, 19790397, 19790564, 19790580, 19790653, 19790659, 19790665, 19790666, 19790693, 19800015, 19800025
SCHACHLE
19790302, 19790641, 19790642
SCOTLAND
19780511, 19790703, 19810028
SELF-START
19800007, 19800014
SEMIARID LANDS
19750609
SENCENBAUGH
19790428
SENEGAL
19760605, 19780286, 19790270, 19800327
SERI
19780317, 19780508, 19790246, 19790821, 19800562
SEWAGE LAGOONS
19790888
SHIPS
19770548, 19770572, 19770697, 19780761, 19810010, 19810113
SHROUDED
19750563, 19780628, 19790681, 19790811, 19800286, 19800370, 19810049
SIGMET - COMPUTER PROGRAM
19750571, 19760590, 19790587, 19790755, 19800514
SIMWEST - COMPUTER PROGRAM
19780440, 19790786-19790789
SINGAPORE
19790391, 19810070
SITE SELECTION
19750571, 19750602, 19760589, 19760590, 19770528, 19770529, 19770544, 19770565, 19770610, 19770613, 19770643, 19770668, 19770692, 19780304, 19780306, 19780307, 19780350, 19780360, 19780361, 19780370, 19780375, 19780379, 19780391, 19780401, 19780402, 19780406, 19780408, 19780423, 19780433, 19780450, 19780457, 19780470, 19780509, 19780511, 19780518, 19780522-19780524, 19780536, 19780575, 19780577, 19780596, 19780632, 19780637, 19780639, 19780645, 19780648, 19780657, 19780661-19780664, 19780692, 19780702, 19780706, 19780725, 19780727, 19780741, 19780769, 19780787, 19780809, 19780823-19780825, 19780830, 19780842, 19780846, 19780854, 19790143, 19790154, 19790155, 19790198, 19790200, 19790223, 19790229, 19790233, 19790237, 19790240, 19790253, 19790310, 19790343, 19790358, 19790377, 19790392, 19790393, 19790422, 19790423, 19790438, 19790452, 19790484, 19790487, 19790529, 19790541, 19790579, 19790584, 19790591, 19790612, 19790625, 19790685, 19790704, 19790754, 19790755, 19790769, 19790781, 19790798, 19790805, 19790834, 19790837, 19790844, 19790856, 19790857, 19790862, 19790876, 19790879, 19790882, 19790883, 19800023, 19800027, 19800032, 19800058, 19800072, 19800093, 19800113, 19800124, 19800135, 19800144, 19800153, 19800155, 19800159, 19800160, 19800167, 19800178-19800180, 19800202, 19800242, 19800307, 19800313, 19800318, 19800335, 19800348, 19800356, 19800357, 19800363, 19800365, 19800390, 19800394, 19800395, 19800416, 19800430, 19800442, 19800468, 19800470, 19800489, 19800507, 19800512, 19800514, 19800531, 19800537, 19800541, 19800545-19800550, 19800567, 19810041, 19810046, 19810063, 19810073, 19810074, 19810090, 19810093
SIZE SELECTION
19800524
SKYSCRAPER
19760574
SLOTTED DIFFUSERS
19810061
SOCIAL ASPECTS
19760628, 19770504, 19770528, 19770633, 19780380, 19780488, 19790131, 19790150, 19790160, 19790238, 19790249, 19790662, 19790885
SOLAR AIR TURBINES
19750605
SOLAR CELLS
19770614, 19780322, 19780567, 19780568, 19800298
SOLAR COLLECTORS
19780367, 19790149
SOLAR ENERGY
19730158, 19730161, 19740345, 19740348, 19740350, 19740358, 19750557, 19750560-19750562, 19750567, 19750574, 19750579, 19750581, 19750582, 19750584, 19750585, 19750589, 19750591-19750593, 19750595, 19750596, 19750601, 19750604, 19750605, 19750607-19750609, 19750612, 19760565-19760567, 19760571-19760573, 19760576-19760579, 19760581-19760584, 19760587, 19760589, 19760593, 19760598, 19760600-19760603, 19760605, 19760609, 19760610, 19760615, 19760616, 19760622, 19760623, 19760625, 19760626, 19760628, 19760629, 19760631, 19760638, 19760640, 19760647, 19770496, 19770500, 19770502, 19770504, 19770507, 19770510, 19770514-19770516, 19770519-19770521, 19770523, 19770532, 19770533, 19770537, 19770540, 19770541, 19770543, 19770545, 19770547, 19770551, 19770556, 19770557, 19770561-19770564, 19770566, 19770584, 19770586, 19770588, 19770589, 19770593, 19770595, 19770596, 19770599, 19770600, 19770603, 19770606-19770609, 19770612, 19770617, 19770630, 19770632, 19770633, 19770636, 19770638-19770640, 19770660, 19770663, 19770664, 19770672, 19770673, 19770676, 19770677, 19770680, 19770683, 19770684, 19770688, 19770690, 19770691, 19770697, 19780286, 19780288, 19780290, 19780293, 19780296, 19780316, 19780317, 19780321, 19780329, 19780339, 19780347, 19780349, 19780351, 19780356, 19780358, 19780367, 19780372,

SOLAR ENERGY
19780385, 19780393, 19780400,
19780411, 19780414-19780416,
19780418, 19780419, 19780422,
19780425, 19780444, 19780445,
19780449, 19780459, 19780460,
19780463, 19780476, 19780495,
19780504, 19780506, 19780507,
19780512, 19780513, 19780529,
19780544, 19780546-19780549,
19780556, 19780567, 19780568,
19780582, 19780583, 19780592-
19780594, 19780603, 19780604,
19780606, 19780607, 19780610,
19780627, 19780640, 19780641,
19780658, 19780719, 19780727,
19780740, 19780746, 19780749,
19780755, 19780757, 19780758,
19780773, 19780776, 19780781,
19780791, 19780802, 19780819,
19780821, 19780826, 19780831,
19780832, 19780847, 19780848,
19790131, 19790143, 19790149,
19790156, 19790165, 19790167,
19790210, 19790224, 19790225,
19790228, 19790236, 19790238,
19790241, 19790246, 19790255,
19790260, 19790263, 19790270,
19790271, 19790275, 19790286,
19790289, 19790292, 19790298,
19790304, 19790305, 19790307,
19790314, 19790320, 19790322,
19790360, 19790361, 19790366,
19790369, 19790376, 19790379,
19790380, 19790382, 19790383,
19790403, 19790405, 19790416,
19790418, 19790420, 19790430,
19790443, 19790444, 19790446,
19790447, 19790450, 19790453,
19790455, 19790457, 19790476,
19790478, 19790479, 19790482,
19790488, 19790497, 19790505,
19790514, 19790516, 19790517,
19790523, 19790533, 19790534,
19790544, 19790558, 19790589,
19790593, 19790611, 19790614,
19790621, 19790622, 19790626,
19790627, 19790645, 19790648,
19790662, 19790663, 19790706-
19790708, 19790716, 19790717,
19790731, 19790733, 19790735,
19790745, 19790746, 19790748,
19790751, 19790752, 19790758,
19790760, 19790770, 19790772,
19790786-19790789, 19790794,
19790814, 19790824, 19790845,
19790854, 19790858, 19790870,
19790872, 19790887, 19800003,
19800006, 19800026, 19800031,
19800071, 19800082, 19800097,
19800101, 19800112, 19800118,
19800144, 19800145, 19800173,
19800176, 19800184, 19800187,
19800194-19800196, 19800198,
19800212, 19800217, 19800219,
19800221, 19800223, 19800225,
19800234, 19800240, 19800250,
19800252, 19800253, 19800256,
19800260, 19800262, 19800264,
19800276, 19800281, 19800282,
19800284, 19800290, 19800298,
19800305, 19800321-19800323,
19800326, 19800349, 19800355,
19800361, 19800371, 19800389,
19800392, 19800399, 19800429,
19800440, 19800444, 19800452,
19800470, 19800471, 19800480,
19800481, 19800484, 19800490,
19800492, 19800495, 19800516-
19800518, 19800538, 19800543,
19800551, 19810011

SOLAR RADIATION
19770636, 19780390
SOLAR STILLS
19730158, 19780826
SOLAR-CLIMATIC STATISTICAL STUDY
19780365, 19790143
SOLSTOR - COMPUTER CODE
19810002
SOUTH CAROLINA
19810127
SOUTH DAKOTA
19790770, 19790772, 19810034,
19810090
SOUTHEAST U.S.
19790403
SOUTHERN CALIFORNIA EDISON
19790641, 19790642
SOUTHERN U.S.
19780734, 19800429
SOUTHWEST U.S.
19790403
SPAIN
19800088
SPEED
19770548
SPEED-CONTROL SYSTEMS
19790460
SPOILER CONTROL SYSTEMS
19800552, 19800553
SPRINGS
19790313
SQUIRREL CAGE
19760607, 19770646, 19780676,
19780723, 19790790, 19800288
SRI LANKA
19780286, 19790270
STABILITY
19770571, 19780447, 19780490,
19780542, 19780673, 19780796,
19780800, 19790242, 19790327,
19790472, 19790504, 19790607,
19800273, 19800274, 19810025,
19810042
STABLES
19790420
STANDARDS
19780543, 19790535, 19790627,
19790648, 19790737, 19800036
STATE ANEMOMETER LOAN PROGRAM
19800356
STATIC POWER ELECTRONIC CONVERTERS
19780723
STATIC STABILITY
19790277, 19790280, 19790281,
19790545
STATISTICAL ANALYSERS
19800111
STATISTICS
19760564, 19770543, 19790143
STEEL
19790290, 19790728, 19800138
STOCHASTIC MODELLING
19780406
STORAGE
19260023, 19550039, 19740350,
19740360, 19750558, 19750567,
19750573, 19750579, 19750581,
19750591, 19750598, 19750614,
19760565, 19760593, 19760601,
19760604, 19760623, 19760633,
19760635, 19770503, 19770512,
19770515, 19770545, 19770550,
19770558, 19770578, 19770603,
19770625, 19770657, 19770660,
19770664, 19770669, 19770686,
19770690, 19770695, 19770697,
19770699, 19780291, 19780296,
19780318-19780320, 19780322,
19780330, 19780343, 19780387,
19780416, 19780420, 19780422,

STORAGE
19780436, 19780440, 19780444, 19780445, 19780449, 19780487, 19780491, 19780504, 19780505, 19780525, 19780526, 19780531, 19780545, 19780555, 19780605-19780607, 19780623, 19780651, 19780710, 19780713, 19780715, 19780732, 19780754, 19780758, 19780790, 19780822, 19780840, 19780856, 19790156, 19790157, 19790247, 19790288, 19790291, 19790304, 19790369, 19790381, 19790388, 19790401, 19790405, 19790447, 19790467, 19790482, 19790514, 19790516, 19790517, 19790523, 19790524, 19790529, 19790538, 19790544, 19790563, 19790585, 19790589, 19790600, 19790602, 19790603, 19790615, 19790653, 19790733, 19790735, 19790744, 19790779, 19790786-19790789, 19790814, 19800061, 19800063, 19800068, 19800087, 19800127, 19800145, 19800154, 19800164, 19800239, 19800240, 19800259, 19800262, 19800272, 19800319, 19800349, 19800352, 19800428, 19800444, 19800465, 19800524, 19810086
STORM FRONTS
19790643, 19790644
STORM MASTER
19780381
STRAIN GAGES
19800051
STRESS ANALYSIS
19780396, 19780447, 19780559, 19780775, 19790217, 19790276, 19790506, 19790714, 19790715, 19800199, 19810059, 19810115
STRUCTURAL ANALYSIS
19760644, 19790132, 19790330, 19800257, 19800533
STRUCTURAL COMPOSITES INDUSTRIES INC.
19790635
STRUCTURAL DYNAMICS
19770620, 19780353, 19780432, 19780559, 19780742, 19780800, 19790145, 19790160, 19790203, 19790507, 19790715, 19800146, 19800229, 19800346
SWAZILAND
19790275
SWEDEN
19740352, 19770544, 19770582, 19770679, 19780310, 19780455, 19780499, 19780500, 19780536, 19780553, 19780554, 19780560, 19780567, 19780568, 19780602, 19780692, 19780785, 19780829, 19790214, 19790234, 19790256, 19790410, 19790438, 19790450, 19790548, 19790673, 19790677, 19790678, 19790680, 19790694, 19790843, 19790844, 19800067, 19800085, 19800093, 19800158, 19800279, 19800280, 19800290, 19800321, 19800331, 19800337, 19800484, 19800498, 19800504
SWINE PRODUCTION
19810102
SWITZERLAND
19780539, 19790760
SYNCHRONIZATION
19780541
SYNCHRONOUS GENERATORS
19700034, 19760585, 19760586, 19770567-19770569, 19780597, 19780720, 19790157, 19790354, 19790766, 19800140
SYNCHRONOUS INVERTERS
19760620, 19790873
SYSTEMS ANALYSIS AND TESTING PROGRAM
19790246
TABLES
19770677
TAIWAN
19810058
TANZANIA
19780298, 19780507, 19790691
TAX CREDITS AND INCENTIVES
19770630, 19780382, 19780630, 19780631, 19780840, 19790406, 19790500, 19790621, 19790706, 19790707, 19790717, 19790873, 19800230, 19800255, 19800314, 19800315, 19810103
TECHNOLOGY ASSESSMENT
19760640, 19790131, 19790383
TECHNOLOGY INFORMATION SYSTEM
19810071
TEETERING
19790439, 19800018, 19810037, 19810038
TELECOMMUNICATIONS
19760579, 19770515, 19780296, 19780527, 19790363, 19790404, 19790456, 19790458, 19790813, 19800106, 19800209
TELEVISION INTERFERENCE
19780767-19780769, 19790341, 19790470, 19790649-19790651, 19790670, 19790800, 19800171, 19800359, 19800504
TEMPERATURE
19750606
TENNESSEE
19800148
TERMINOLOGY
19790190
TESTING
19770536, 19780461, 19780517, 19780543, 19780679, 19780827, 19790164, 19790180, 19790306, 19790343, 19790409, 19790562, 19790652, 19790654, 19790823, 19800165, 19800292, 19800461, 19800462, 19800503
TETHERED AERODYNAMICALLY LIFTING ANEMOMETER
19790240, 19800023
TETHERED SYSTEMS
19800412, 19800473, 19800534
TETHERED WIND ENERGY SYSTEM
19800408, 19800475
TEXAS
19770683, 19780483, 19780589, 19790141, 19790168, 19790719, 19800365, 19810090
TEXTILE INDUSTRY
19780513
THAILAND
19760632
THERMOCOMPRESSION
19780475
TIDAL POWER
19740345, 19750556, 19750557, 19750585, 19750597, 19760565, 19760577, 19760581, 19760583, 19760584, 19760601, 19760623, 19760626, 19760647, 19770516, 19770543, 19770599, 19770600, 19780331, 19780358, 19780372, 19780453, 19780466, 19780495, 19780506, 19780666, 19780749, 19790623, 19790758, 19800082, 19800193, 19800264, 19800392, 19800399, 19800440, 19800468, 19810010

TIME SERIES ANALYSIS
19780731
TIPVANES
19770530, 19780620, 19780836, 19790700
TORNADO-TYPE SYSTEM
19760591, 19770527, 19770605, 19770637, 19770694, 19780453, 19780454, 19780466, 19780533, 19790148, 19790149, 19790207, 19790222, 19790308, 19790353, 19790560, 19790767, 19800047, 19800316, 19800317, 19800372, 19800574
TOROIDAL ACCELERATOR ROTOR PLATFORMS
19780739, 19800045, 19800109, 19800203, 19800544
TORQUE
19800143, 19800292, 19800414, 19810017-19810019, 19810065
TORQUE RIPPLE
19780743, 19800431, 19800432
TOWERS
19520042, 19760569, 19760646, 19770544, 19770662, 19780352, 19780397, 19780533, 19780590, 19780747, 19780775, 19780796, 19790145, 19790277, 19790299, 19790313, 19790326, 19790327, 19790329, 19790330, 19790359, 19790440, 19790461, 19790471, 19790472, 19790749, 19800059, 19800092, 19800157, 19800220, 19800475, 19800539, 19810015, 19810016, 19810037, 19810038, 19810062, 19810099, 19810105, 19810124
TRACKED-VEHICLE AIRFOIL SYSTEM
19730162, 19740353-19740356, 19800021
TRAINING PROGRAMS
19780847
TRANSFORMERS
19790762
TRANSMISSION LINES
19780424
TRANSMISSION SYSTEMS
19770601, 19780619
TREES
19780523, 19780524, 19780846, 19790198, 19790200, 19790422, 19790776, 19800531
TROPOSPHERE
19800439
TUMAC INDUSTRIES
19800048
TURBO-ELECTRIC
19790658
TURBO-PUMP
19790658
TURBULENCE
19780361, 19780471, 19780473, 19780585, 19790177, 19790269, 19790351, 19790409, 19790492, 19790610, 19790673, 19790682, 19790692, 19790836, 19790840, 19790865, 19790867, 19790881, 19800163, 19800174, 19800175, 19800226, 19800269, 19800403, 19800460, 19810001, 19810035, 19810045, 19810092, 19810099, 19810109, 19810112
TURKEY
19780291
TWERLE
19780806, 19790231
TWIN TURBINE VORTEX WIND MILL
19790560
TYPHOONS
19810058
U.S. AIR FORCE
19780504
U.S. NAVAL SHIPYARD - PORTSMOUTH N.H.
19790295
U.S. NAVY
19780627, 19790751, 19790823
UMASS SOLAR HABITAT I
19770520, 19780288, 19780289, 19780293, 19790255, 19790325, 19790465
UNDERCURRENTS LID/WIND GENERATOR
19750576
UNIFIED WIND DYNAMO
19800191
UNITED NATIONS SYSTEM
19790307
UNIVERSITY OF DAYTON RESEARCH INSTITUTE
19770696
UNIVERSITY OF MASSACHUSETTS
19780591
UNIVERSITY OF MICHIGAN
19750618
UNIVERSITY OF REGINA
19770510
UNIVERSITY OF TOKAI
19780405
URBAN AREAS
19770633, 19780583, 19790367, 19790475, 19800168, 19800370
URETHANE
19780611, 19790364, 19790365
USA
19780404
USDA
19780398, 19800330
USSR
19740345, 19750598, 19770564, 19780312, 19780495, 19780553, 19780554
UTILITY NETWORK
19570029, 19660020, 19740360, 19760611, 19760620, 19760644, 19770500, 19770511, 19770518, 19770554, 19770567, 19770570, 19770577, 19770579, 19770583, 19770601, 19770613, 19770617, 19770627, 19770631, 19770642, 19770646, 19770674, 19770685, 19770686, 19780309, 19780326, 19780330, 19780337, 19780342, 19780343, 19780348, 19780374, 19780400, 19780409, 19780410, 19780417, 19780421, 19780423, 19780426, 19780432, 19780477, 19780485, 19780486, 19780525, 19780537, 19780542, 19780552, 19780564, 19780565, 19780571, 19780600, 19780602, 19780606, 19780618, 19780619, 19780642, 19780643, 19780649, 19780650, 19780659, 19780704, 19780712, 19780714, 19780744, 19780745, 19780783, 19780787, 19780803-19780805, 19780807, 19780808, 19780816, 19780817, 19780822, 19780832, 19790135, 19790140, 19790146, 19790156, 19790160, 19790161, 19790175, 19790193, 19790224, 19790229, 19790237, 19790242, 19790251, 19790252, 19790289, 19790295, 19790315, 19790335, 19790337, 19790338, 19790345, 19790348, 19790354, 19790366, 19790371, 19790375, 19790380, 19790381, 19790386-19790388, 19790390, 19790402,

UTILITY NETWORK
19790403, 19790441, 19790443,
19790449, 19790453, 19790466,
19790479, 19790483, 19790487-
19790489, 19790501, 19790510,
19790518-19790520, 19790528-
19790530, 19790552, 19790553,
19790566, 19790578, 19790584,
19790585, 19790604, 19790605,
19790607-19790609, 19790613,
19790616-19790618, 19790629,
19790634, 19790638, 19790641-
19790644, 19790648, 19790653,
19790660, 19790661, 19790667,
19790680, 19790683, 19790685,
19790695, 19790703, 19790709,
19790721-19790723, 19790729,
19790732, 19790740, 19790742,
19790744, 19790745, 19790757,
19790761, 19790766, 19790777,
19790793, 19790797, 19790799,
19790817, 19790819, 19790820,
19790826, 19790831, 19790833,
19790848, 19790850, 19790851,
19790866, 19790872, 19800019,
19800036, 19800055, 19800063,
19800064, 19800067, 19800070,
19800074, 19800075, 19800077,
19800083, 19800084, 19800091,
19800099, 19800104, 19800112,
19800113, 19800121, 19800130,
19800131, 19800154, 19800163,
19800181, 19800185, 19800201,
19800218, 19800219, 19800228,
19800233, 19800243, 19800246,
19800256, 19800273, 19800309,
19800318, 19800326, 19800329-
19800331, 19800338, 19800354,
19800375, 19800379, 19800381,
19800384, 19800395, 19800396,
19800398, 19800401, 19800426,
19800427, 19800438, 19800450,
19800454, 19800476, 19800478,
19800489, 19800502, 19800520,
19800521, 19800523, 19800524,
19800535, 19800540, 19800551,
19800555, 19800560, 19800562,
19800565, 19800567, 19800570,
19810011, 19810021, 19810022,
19810032, 19810036, 19810041,
19810052, 19810056, 19810063,
19810072-19810075, 19810081-
19810083, 19810088, 19810114
UTRC TURBINE
19780796, 19790151
VALUE ANALYSIS
19810081-19810083
VARIABLE GEOMETRY VERTICAL AXIS WINDMILL
19790138, 19790536, 19790688,
19800014
VARIABLE PITCH VERTICAL AXIS WIND TURBINE
19790676
VARIABLE SPEED SYSTEMS
19760607, 19760608, 19770646,
19780550, 19780551, 19780569,
19780723, 19780724, 19790399,
19800249, 19800288
VAWTDYN
19800339, 19800340, 19810060
VDART3 - COMPUTER CODE
19810107
VEGETATION
19780523, 19780524, 19790198,
19790200, 19790422
VELOMETERS
19710044
VENTILATION
19790626
VENTURIS
19780584, 19800299
VERMONT
19420033, 19780382, 19780846,
19790777, 19800031, 19800400,
19810098
VERTICAL AXIS
19750563, 19750572, 19750590,
19750615, 19760588, 19760594,
19760633, 19760641, 19760644,
19770497, 19770506, 19770511,
19770550, 19770597, 19770598,
19770618, 19770638, 19770652,
19770694, 19770695, 19780285,
19780287, 19780292, 19780294,
19780295, 19780304, 19780310,
19780336, 19780345, 19780346,
19780353, 19780359, 19780362-
19780364, 19780369, 19780370,
19780376, 19780377, 19780384,
19780399, 19780412, 19780419,
19780431, 19780451, 19780457,
19780475, 19780476, 19780478,
19780496, 19780497, 19780514-
19780516, 19780521, 19780550,
19780559, 19780580, 19780583,
19780599, 19780623-19780625,
19780653, 19780684, 19780685,
19780691, 19780693, 19780699,
19780703, 19780705, 19780708,
19780715, 19780721, 19780728,
19780730, 19780742, 19780743,
19780776, 19780799, 19780804,
19780805, 19780833-19780835,
19780843, 19780849, 19780850,
19790146, 19790159, 19790162,
19790163, 19790179, 19790189,
19790192, 19790193, 19790216,
19790220, 19790221, 19790226,
19790243, 19790245, 19790259,
19790261, 19790266, 19790289,
19790297, 19790300, 19790301,
19790316, 19790324, 19790328,
19790332, 19790334, 19790352,
19790410, 19790419, 19790421,
19790442, 19790448, 19790456-
19790458, 19790494, 19790495,
19790499, 19790512, 19790522,
19790536, 19790539, 19790562,
19790564, 19790580, 19790582,
19790606, 19790615, 19790637,
19790647, 19790655, 19790665,
19790666, 19790671, 19790672,
19790676, 19790689, 19790701,
19790705, 19790709, 19790721-
19790727, 19790739, 19790740,
19790759, 19790771, 19790774,
19790779, 19790782-19790785,
19790791, 19790817, 19790835,
19790864, 19800002, 19800004,
19800008, 19800011, 19800012,
19800014, 19800015, 19800017,
19800024, 19800038, 19800039,
19800042-19800044, 19800048,
19800049, 19800055, 19800056,
19800066, 19800068, 19800085,
19800105, 19800188, 19800189,
19800192, 19800209, 19800287,
19800294, 19800295, 19800303,
19800310, 19800337, 19800339,
19800340, 19800342, 19800347,
19800350, 19800364, 19800369,
19800370, 19800372, 19800387,
19800391, 19800409, 19800431,
19800432, 19800435, 19800448,
19800453, 19800464, 19800466,
19800489, 19800493, 19800494,
19800499, 19800500, 19800520,
19800536, 19800557, 19800571,
19800572, 19810006, 19810015-
19810019, 19810030, 19810033,

VERTICAL AXIS
19810040, 19810055, 19810059, 19810060, 19810065, 19810078, 19810092, 19810096, 19810107, 19810115, 19810121
VERTICAL-AXIS ARTICULATED-BLADE TURBINES
19780345, 19780346
VIBRATION
19760569, 19780328, 19780424, 19780490, 19780497, 19780582, 19780673, 19780800, 19790313, 19790327, 19790330, 19790359, 19790384, 19790429, 19790439, 19790440, 19790461, 19790632, 19800231, 19800343, 19800487, 19810015, 19810016
VIRGINIA
19800148
VOITH WIND TURBINE
19800540
VORTEX AUGMENTORS
19750615, 19770604, 19770605, 19770665-19770667, 19770694, 19780528, 19780628, 19780770-19780772, 19790202, 19790205, 19790222, 19790652, 19790767, 19800316, 19800317
VORTEX CHAMBER
19780651
VORTEX-WAKE ANALYSIS
19800115
VORTICES
19760606, 19770616, 19770670, 19780533, 19780599, 19780624, 19780672, 19780771, 19780833, 19790148, 19790149, 19790243, 19790308, 19790577, 19790700, 19800042, 19810125
WAKE CHARACTERISTICS
19770662, 19780370, 19800501
WAKES
19790668, 19790673, 19800114, 19800267, 19800296, 19800297, 19800437, 19800489, 19800499, 19800500, 19800532, 19810006, 19810099, 19810122
WARRANTIES
19790854
WASHINGTON - STATE
19780647, 19780838, 19790134, 19790136, 19790262, 19790305, 19790393, 19790459, 19790555, 19790769, 19790829, 19800125, 19800210, 19800505, 19800530, 19800531, 19810075
WASHINGTON D C
19790842
WASTE WATERS
19800227
WATER AND POWER RESOURCES SERVICES
19800019
WATER BRAKES
19780654
WATER HEATING
19760578, 19770545, 19780290, 19780336, 19780412, 19780449, 19790255, 19790263, 19790606, 19790687, 19790852, 19800150, 19800183, 19800284, 19800543
WATER POWER
19770533, 19780749, 19790476, 19790824, 19800193, 19800568
WAVE POWER
19740351, 19760565, 19760601, 19760604, 19760623, 19760626, 19770504, 19770584, 19770599, 19770619, 19770639, 19770697, 19780332, 19780358, 19780372, 19780506, 19780606, 19780636, 19780666, 19780751, 19790228, 19790271, 19790623, 19790758, 19790814, 19790858, 19800065, 19800082, 19800194, 19800322, 19800361, 19800392, 19800440, 19800488
WEATHERVANING
19790545
WEIBULL MODEL
19780518, 19800178, 19800522
WEIBULL VELOCITY DISTRIBUTION PARAMETERS
19790718
WEIGHT
19790763
WESS
19780722
WEST INDIES
19490037
WEST VIRGINIA
19800148
WEST VIRGINIA UNIVERSITY
19800536
WESTERN U.S.
19780733, 19800429, 19800471
WICCA - COMPUTER PROGRAM
19760627
WILSA - COMPUTER PROGRAM
19750586, 19750587, 19760639
WIND - COMPUTER PROGRAM
19800204
WIND CHARACTERISTICS
19770534, 19780574, 19790160
WIND CHARACTERISTICS PROGRAM ELEMENT
19780632, 19780725, 19780842, 19780854, 19790704, 19790805, 19800547, 19800550
WIND ENERGY INDUSTRY
19780435
WIND ENERGY SYSTEM TIME-DOMAIN SIMULATOR
19790201, 19810024
WIND ENERGY TRANSFER
19770517
WIND ENGINEERING
19780394, 19790188
WIND ENGINEERING RESEARCH DIGEST
19780394
WIND FARMS
19760618, 19780359, 19780370, 19780532, 19780822, 19790172, 19790386, 19790387, 19790452, 19790492, 19790511, 19790608, 19790644, 19790792, 19790816, 19790856, 19800055, 19800063, 19800141, 19800151, 19800218, 19800241, 19800246, 19800333, 19800437, 19800451, 19800499, 19800501, 19800565, 19800567, 19810033, 19810073
WIND FORECASTING
19680026, 19770532, 19770534, 19770535, 19770553, 19770565, 19770610, 19770648, 19770649, 19770668, 19770682, 19780307, 19780312, 19780327, 19780333-19780335, 19780341, 19780344, 19780350, 19780375, 19780379, 19780388, 19780401-19780403, 19780406, 19780407, 19780413, 19780423, 19780455, 19780501, 19780509, 19780510, 19780518, 19780523, 19780539, 19780557, 19780570, 19780575-19780577, 19780586, 19780625, 19780632, 19780645, 19780647, 19780702, 19780725, 19780727, 19780729-19780731, 19780741, 19780778, 19780779, 19780797, 19780809, 19780810, 19780824, 19780825,

WIND FORECASTING
19780830, 19780842, 19780845,
19780846, 19780854, 19790155,
19790198, 19790200, 19790234,
19790240, 19790318, 19790344,
19790356, 19790358, 19790391-
19790393, 19790415, 19790422,
19790484, 19790526, 19790527,
19790532, 19790543, 19790555,
19790595, 19790596, 19790612,
19790620, 19790624, 19790625,
19790633, 19790657, 19790680,
19790685, 19790695, 19790712,
19790718, 19790729, 19790733,
19790754, 19790769, 19790799,
19790804, 19790805, 19790808,
19790828, 19790833, 19790834,
19790837, 19790841, 19790849,
19790859, 19790877, 19790882,
19790884, 19790886, 19800023,
19800072, 19800080, 19800124-
19800126, 19800133, 19800135,
19800144, 19800148, 19800159,
19800160, 19800166, 19800178,
19800180, 19800200, 19800202,
19800210, 19800242, 19800244,
19800344, 19800357, 19800365,
19800400, 19800402, 19800420,
19800421, 19800434, 19800463,
19800469-19800471, 19800507,
19800512, 19800530, 19800531,
19800546-19800550, 19810027,
19810034, 19810070, 19810080,
19810094, 19810127
WIND FURNACE
19770520, 19780288, 19780289,
19780293, 19780638, 19790325,
19790465, 19790639, 19790640
WIND GEN 25
19790188
WIND GENERATOR-ANALYZER
19800111
WIND MEASUREMENT INSTRUMENTS
19780390, 19780402, 19780455,
19790694, 19800242
WIND POWER DENSITY
19800455, 19800522
WIND POWER SYSTEMS
19780381
WIND SHEAR
19780726, 19790521, 19790855,
19800222, 19800296, 19800297
WIND TO HEAT CONVERTOR
19790368
WIND TUNNEL TESTS
19750568, 19760621, 19770622,
19770656, 19770662, 19770696,
19780308, 19780353, 19780360,
19780361, 19780368, 19780370,
19780392, 19780438, 19780454,
19780465, 19780482, 19780587,
19780661-19780664, 19780675,
19780691, 19780700, 19780707,
19780795, 19780796, 19780851,
19790145, 19790151, 19790183,
19790184, 19790245, 19790269,
19790309, 19790522, 19790525,
19790561, 19790564, 19790630,
19790653, 19790665, 19790666,
19790668, 19790693, 19790700,
19790759, 19790778, 19790812,
19790862, 19790876, 19800009,
19800050, 19800114, 19800134,
19800151, 19800167, 19800203,
19800308, 19800363, 19800367,
19800406, 19800410, 19800456,
19800499, 19800544, 19800574,
19810005, 19810006, 19810044,
19810096, 19810097, 19810099,
19810128
WIND VARIABILITY
19810001
WIND VELOCITY
19640079, 19670021, 19680026,
19690025, 19700035, 19750608,
19770496, 19770517, 19770532,
19770535, 19770553, 19770565,
19770594, 19770610, 19770648,
19770649, 19770661, 19770662,
19770668, 19770682, 19780307,
19780312, 19780327, 19780333,
19780334, 19780341, 19780343,
19780344, 19780350, 19780352,
19780361, 19780388, 19780401-
19780403, 19780406, 19780407,
19780423, 19780455, 19780460,
19780501, 19780509, 19780510,
19780518, 19780539, 19780557,
19780570, 19780574-19780577,
19780585, 19780586, 19780591,
19780625, 19780632, 19780645,
19780702, 19780727, 19780729-
19780731, 19780741, 19780778,
19780785, 19780797, 19780807-
19780810, 19780825, 19780830,
19780845, 19790130, 19790145,
19790155, 19790234, 19790240,
19790340, 19790344, 19790356,
19790358, 19790391-19790393,
19790415, 19790435, 19790484,
19790521, 19790526, 19790532,
19790541, 19790542, 19790555,
19790595, 19790596, 19790612,
19790620, 19790624, 19790625,
19790633, 19790657, 19790685,
19790694, 19790712, 19790718,
19790720, 19790729, 19790732,
19790749, 19790769, 19790804,
19790808, 19790825, 19790829,
19790830, 19790836, 19790837,
19790839, 19790841, 19790849,
19790855, 19790859, 19790861,
19790865, 19790876-19790878,
19790881, 19790882, 19790884,
19790886, 19800023, 19800072,
19800080, 19800125, 19800126,
19800133, 19800135, 19800144,
19800148, 19800155, 19800159,
19800160, 19800178-19800180,
19800200, 19800202, 19800210,
19800222, 19800226, 19800231,
19800242, 19800244, 19800327,
19800344, 19800357, 19800365,
19800400, 19800402, 19800420,
19800421, 19800434, 19800443,
19800460, 19800463, 19800465,
19800468-19800472, 19800512,
19800530, 19800531, 19800550,
19810027, 19810034, 19810070,
19810080, 19810087, 19810094,
19810127
WIND WHEEL
19790408, 19790719, 19800232
WIND WHEEL ELECTRIC POWER GENERATOR
19800299, 19800569
WIND/ELECTRIC POWER GENERATOR
19780646, 19790525
WINDBREAKS
19790377, 19790567
WINDFARMS LTD.
19800055
WINDFLOWER
19780383
WINDROSE
19800422
WINDS - COMPUTER CODE
19780370
WINDWALL
19770608
WINDWORKS
19790317

WINRO - COMPUTER PROGRAM
19800417
WIRING
19800467
WISCONSIN
19780382, 19780423, 19790339,
19790510, 19800130, 19810080,
19810114
WISCONSIN POWER AND LIGHT COMPANY
19790339
WMSTAB3 - COMPUTER CODE
19810084
WOOD
19790395, 19810029
WOOD HEATING
19790662
WORLD ENERGY DATA SYSTEM
19790436
WTG ENERGY SYSTEMS INC.
19790290, 19790710
WYOMING
19770594, 19780525, 19780526,
19780532, 19780639, 19780647,
19790511, 19790532, 19790816,
19790829, 19800019, 19800054,
19800125, 19800210, 19800565,
19800567, 19810033, 19810114
YAWING
19790720, 19800368, 19810037,
19810038, 19810084
YEN J T
19770527, 19800047
YUGOSLAVIA
19770575
ZEPHYR WIND DYNAMO
19790164
ZONING
19780563, 19790822, 19800013,
19800032, 19800033

REPORT NUMBER INDEX

AAI-ER-8374
19750594
AD-A086506
19790295
AD-A048312
19770639
AD-A059119
19780352
AD-A061071
19780504
AD-A066221
19780627
AD-A074869
19790156
AD-A076315
19790775
AD-A076614
19790531
AD-A076975
19790761
AD-A080451/8
19790384
AD-A94988
19800465
AD-A983961
19800068
AD-696229
19690025
AECB-1119(REV.)
19780548
AED-CONF-77-139-013
19770625
AER-75-00653
19760607
AESD-TME-3052
19800458
AGARD-AG-243
19790775
AGARD-CP-277
19790384
ALO-4272-T1
19790163
ALO-4272-T2
19790162
ALO-4291-1
19790321
ANL-AA-17
19800523
ANL-PNS-79-2(V.6)
19790436
ANL-78-65(PT.4)
19780774, 19780778
ANL-79-16
19790663
ANL/CES/TE-78-9
19780434
ANL/EES-TM-25
19780735
ANL/SPG-13(VOL.3)
19800338
AORD-80-001-L
19800500
ARL/STRUC-380
19800465
ASRL-TR-184-2
19760621
ASRL-TR-194-1
19790440
ASRL-TR-194-2-PT-10
19790480
ATR-75(7523-01)-1
19750593
ATR-77(7538)-1
19770512
ATR-78(7598)-1
19790487
ATR-78(7598)-2
19790229
BLWT-1-1979
19790862
BMFT-FB-T-77-35
19770525
BMFT-FB-T-79-04
19780353, 19790245
BNL-24867
19780736
BNL-50851
19780619
BNL-50988
19780847
BNWL-SA-6297
19770528
BNWL-SA-6457
19770529
BNWL/WIND-5
19770535
CON-75-10519
19750618
CONF-730747--(E)
19730158
CONF-7508105
19750562, 19750584
CONF-760307-4
19760569
CONF-7608116
19780522
CONF-761220
19760616
CONF-770384-1
19770567
CONF-7705119
19770506, 19770644, 19770647,
19770651
CONF-770539-4
19770528
CONF-770865
19770578
CONF-770921/1
19780289, 19780303, 19780307,
19780326, 19780406, 19780410,
19780428, 19780435, 19780458,
19780477, 19780479, 19780499,
19780524, 19780525, 19780534,
19780536, 19780552, 19780562,
19780564, 19780566, 19780574,
19780596, 19780612, 19780615-
19780618, 19780648, 19780657,
19780679, 19780690, 19780712,
19780725, 19780729, 19780745,
19780748, 19780767, 19780812,
19780817, 19780845
CONF-770921/2
19780361, 19780362, 19780368,
19780373, 19780421, 19780429,
19780432, 19780433, 19780454,
19780469-19780471, 19780474,
19780480, 19780509, 19780543,
19780563, 19780588, 19780595,
19780596, 19780620, 19780621,
19780628, 19780629, 19780637,
19780643, 19780646, 19780649,
19780653, 19780659, 19780670,
19780674, 19780693, 19780695,
19780696, 19780717, 19780742,
19780752, 19780753, 19780770,
19780793, 19780795, 19780798,
19780804, 19780809, 19780825,
19780849
CONF-7710136
19770685
CONF-771148
19770675
CONF-779021/1
19780337
CONF-780153-1
19780403
CONF-780253-1
19780730
CONF-780357
19780295, 19780338, 19780345,

CONF-780357
19780439, 19780483, 19780501,
19780589, 19780714, 19780716,
19780813
CONF-780599-P2
19780297
CONF-780754
19780333, 19780614, 19780741,
19780846
CONF-780972-1
19780805
CONF-780983
19780365
CONF-781014-1
19780363
CONF-781014-2
19780842
CONF-7810148-1
19780371
CONF-781045
19780491, 19780713
CONF-781214-3
19780505
CONF-781235-P1
19780786
CONF-790352
19790274, 19790315, 19790335,
19790375, 19790386, 19790390,
19790403, 19790449, 19790470,
19790489, 19790503, 19790530,
19790578, 19790607, 19790617,
19790629, 19790634, 19790641,
19790643, 19790709, 19790725,
19790739, 19790792, 19790803
CONF-790352-1
19790724
CONF-7904111
19790486
CONF-7904120-1
19790624
CONF-790501
19790205-19790207, 19790221,
19790222, 19790353, 19790370,
19790495, 19790496, 19790512,
19790525, 19790547, 19790576,
19790586, 19790652, 19790741,
19790767, 19790768, 19790782,
19790805, 19790812
CONF-790501-2
19790220
CONF-7905109
19790133, 19790141, 19790142,
19790153, 19790154, 19790168,
19790169, 19790173, 19790179,
19790180, 19790211, 19790826,
19790832, 19790835, 19790843,
19790847, 19790852, 19790866,
19790868, 19790871, 19790874
CONF-790541-4
19790131
CONF-790611-2
19790744
CONF-790665-2
19790886
CONF-790665-3
19790841
CONF-790665-5
19790839
CONF-7908116-(VOL.1)
19790212, 19790859
CONF-790845
19790297, 19790356, 19790417,
19790423, 19790459, 19790596,
19790769
CONF-790845-(SUPPL.)
19790268, 19790638
CONF-790854
19790514, 19790523, 19790603
CONF-790854-1
19790304
CONF-790890
19790283
CONF-791097
19800060, 19800063, 19800066,
19800067, 19800074-19800077,
19800085, 19800086, 19800088,
19800090, 19800091, 19800093,
19800097, 19800099, 19800311,
19800312, 19800318, 19800329,
19800330, 19800378, 19800379,
19800386, 19800397, 19800401,
19800416, 19800486, 19800502,
19800506-19800509, 19800515,
19800525, 19800527-19800529,
19800546-19800549, 19800556,
19800570
CONF-791204-20
19790557
CONF-791204-32
19790252
CONF-791229
19790398, 19790412, 19790759,
19790771
CONF-7990128-1
19790318
CONF-800111-4
19800278
CONF-800327-3
19800402
CONF-800334-(VOL.2)
19800325, 19800359
CONF-800406-1
19800320
CONF-800406-2
19800448
CONF-800406-3
19800493
CONF-800406-5
19800165
CONF-800406-6
19800113
CONF-800406-7
19800255
CONF-800480-3
19800403
CONF-800482
19800247, 19800298
CONF-800517-6
19800169
CONF-800604-30
19800388
CONF-800706-2
19800250
CONF-800746-1
19800369
CONF-800780-(VOL.1)
19800490
CONF-800804-18
19800219
CONF-800806-40
19800428
CONF-8009108
19800116
CONF-800927-2
19800252
CONF-800995
19800307, 19800452, 19800545
CONF-801059-2
19800385
CONF-810226
19810006-19810008, 19810012-
19810014, 19810016, 19810017,
19810020, 19810024-19810026,
19810035, 19810037, 19810039,
19810040, 19810042, 19810044,
19810045, 19810050, 19810053-
19810055, 19810060, 19810064,
19810066, 19810067, 19810071,
19810078, 19810084, 19810085,
19810092, 19810093, 19810099-
19810101, 19810104, 19810108,

CONF-810226
19810109, 19810111, 19810112,
19810116, 19810117, 19810119-
19810121, 19810124-19810126
CONF-810226-1
19810019
CONF-810226-2
19810059
COO-0092-77/2
19770653
COO-2615-T2
19770656
COO-2616-2(PT.1)(REV.1)
19790184
COO-2616-2(PT.2)(REV.2)
19790183
COO-2617-76/1/1
19770505
COO-2646-1
19780769
COO-2992-78/1(EXEC.SUMM.)
19780325
COO-2992-78/1-T1
19780600
COO-4130-2
19790546
COO-4131-T1(VOL. 9)
19780397
COO-4131-T1(VOL.1)
19780671
COO-4131-T1(VOL.10)
19790806
COO-4131-T1(VOL.2)
19780672
COO-4131-T1(VOL.3)
19780673
COO-4131-T1(VOL.4)
19780652
COO-4131-T1(VOL.5)
19780438
COO-4131-T1(VOL.6)
19780396
COO-4131-T1(VOL.7)
19780775
COO-4131-T1(VOL.8)
19780490
COO-4150-77/8
19780796
COO-4206-10
19790302
COO-4278-1
19780380
COO-4389-1
19780582
COO-4450-79/1
19790584
COO-4450-79/2
19790644
CSIR-ME-1619
19790764
CSIR-ME-1638
19790765
CSU-ATSP-314
19790177
DM-26
19790323
DOE/BP/01310-T1
19790262
DOE/BP/01310-T1(APP.1)
19790393
DOE/BP/01310-T1(APP.2)
19790555
DOE/BP/10552-T1
19780838
DOE/BP/10552-17
19800560
DOE/BP/18979-T1
19800530
DOE/CS/0050
19800481
DOE/CS/0155
19800194
DOE/CS/20097-01
19800561
DOE/CS/20160-01(V.2)
19800470
DOE/CS/20160-01(V.5)
19800471
DOE/CS/20160-1(VOL.1)
19800144
DOE/CS/30098-1(VOL. 1-4)
19800429
DOE/DP/03533-T1(VOL. 1)
19790309
DOE/DP/03533-T2
19790294
DOE/DP/03533-T3
19790255
DOE/EA-0097
19790357
DOE/EDP-0030
19790174
DOE/EIA/10480-T1
19790383
DOE/ER/01198-1310
19790583
DOE/ET-0093
19780561
DOE/ET/20063-T1(EXEC. SUMM.)
19790819
DOE/ET/20063-T1(VOL.2)
19790820
DOE/ET/20274-7
19800235
DOE/ET/20280-T1
19790597
DOE/ET/20280-2
19790587
DOE/ET/20280-3
19780824
DOE/ET/20280-79/3
19790754
DOE/ET/20280-80/2
19800514
DOE/ET/20283-1
19790155
DOE/ET/20283-2
19800178
DOE/ET/20283-3
19800180
DOE/ET/20316-79/2
19790200
DOE/ET/20355-T1
19790542
DOE/ET/20355-79/4
19790452
DOE/ET/20560-1
19790351
DOE/ET/23007-80/1
19800512
DOE/ET/23116-79-1
19790521
DOE/ET/23116-80/1
19800222
DOE/ET/23136-T1(VOL.3)
19790842
DOE/ET/23151-80/1
19810046
DOE/ET/23160-80/1
19800437
DOE/ET/23170-80/1
19810043
DOE/ET/29100-11
19800163
DOE/ET/29246-T1
19800249
DOE/ET/4053-78/1
19780630
DOE/ET/4053-78/1(EXEC. SUMM.)
19780631

DOE/EV-0046(VOL.3)
19790651
DOE/EV-0059
19790238
DOE/EV-0067
19800517
DOE/EV-0089
19800302
DOE/EV-0099
19800495
DOE/EV-0103
19790538
DOE/EV/73002-1(VOL.3)
19800442, 19800443
DOE/IR-0004
19780321
DOE/JPL-955492(VOL.1)
19800225
DOE/JPL-955492(VOL.2)(PTS. 1 AND 2)
19800212
DOE/NASA-0002-80/2(VOL.2)
19790552
DOE/NASA/0002-79/1
19790509
DOE/NASA/0002-80/2
19790553
DOE/NASA/0026-79/1
19790201
DOE/NASA/0042-79/1-V-1
19790786
DOE/NASA/0042-79/2-V-2
19790789
DOE/NASA/0042-79/3-V-1
19790787
DOE/NASA/0042-79/4-V-2
19790788
DOE/NASA/0058-79/1
19790549
DOE/NASA/0058-79/2 - VOL. I
19790550
DOE/NASA/0058-79/2-V-2-APP
19790235
DOE/NASA/0058-79/3
19790178, 19790551
DOE/NASA/0134-1
19800273
DOE/NASA/0163-2
19800458
DOE/NASA/0163-3
19800098
DOE/NASA/0600-79/1
19790185
DOE/NASA/1002-79/3
19790744
DOE/NASA/1002-80-5
19800262
DOE/NASA/1004-77/12
19770567
DOE/NASA/1004-78/14
19780537
DOE/NASA/1010-79/5
19790713
DOE/NASA/1010-80/6
19800035
DOE/NASA/1028-27
19800303
DOE/NASA/1028-28
19800385
DOE/NASA/1028-31
19810038
DOE/NASA/1028-77/7
19760569
DOE/NASA/1028-79/24
19790313
DOE/NASA/1028-79/25
19790216
DOE/NASA/1028-80/26
19800018
DOE/NASA/1059-79/4
19790712
DOE/NASA/12726-6
19800428
DOE/NASA/20305-5
19810057
DOE/NASA/20320-30
19810029
DOE/NASA/20320-31
19810004
DOE/NASA/20370-79/17
19790145
DOE/NASA/20370-79/18
19790466, 19800100
DOE/NASA/23139-1
19800438
DOE/NASA/3082-78/1
19780750
DOE/NASA/3139-1
19800300
DOE/NASA/3277-1
19800553
DOE/NASA/5906-79/1
19790227
DOE/NASA/7653.79/1
19780611
DOE/PE-3871-1
19790291
DOE/RL/01830-T1
19800159
DOE/RL/01830-T2
19800160
DOE/R5/10120-T1
19790368
DOE/R5/10125-1
19790888
DOE/R5/10129-1
19800487
DOE/R5/10134-1
19810052
DOE/SEA-1109-20401/79/2
19790158
DOE/SEA-3408-20691/81/1
19810102
DOE/SEA-3707-20741/80/1
19790197
DOE/SF/01963-T2
19790861
DOE/TIC-10018
19780782
DOE/TIC-10038
19780601
DOE/TIC-10114/1
19780738
DOE/TIC-10114/2
19780733
DOE/TIC-10114/3
19780736
DOE/TIC-10114/4
19780734
DOE/TIC-10114/5
19780737
DOE/TIC-10114/6
19780735
DOE/TIC-10117
19790446
DOE/TIC-10227
19780412
DOE/TIC-11154
19800026
DOE/TIC/SDI-2002
19800073
DPG-TN-C625A
19780352
DREO-R-822
19800068
DSE-2332-T1
19780807
DSE-2332-T2
19780808
DSE-2332-T3
19780642

DSE-2553-79/1
19790577
DSE-2554-78/2(VOL.1)
19780700
DSE-2554-78/2(VOL.2)
19780707
E-424
19800062
E-633
19800274
E-9463
19770662
EG-77-C-01-4053
19780630
EMD-77-33
19770508
EMD-78-2227
19800434
EMR-827053
19800491
ENGR-COMP-TN-76-01
19760639
EPA-600/2-76-044B
19760563
EPRI-AP-1317
19800520
EPRI-AP-1614
19800246
EPRI-AP-1641
19800521
EPRI-AP-1713-SR
19800551
EPRI-ER-1299-SR
19790380
EPRI-ER-515-SR
19770502, 19770524, 19770613
EPRI-ER-649-SR
19780400
EPRI-ER-966-SR
19790488
EPRI-ER-978(V.1-3)
19790529
EPRI-WS-77-60
19780418
ERDA-TR-268
19780305
ERDA-77-52
19770546
ERDA-84
19750569
E1.28:UCID-18232
19790084
FEA/G-77/101
19770691
FFA-AU-1499
19790440
FFA-AU-1499-PT-10
19790480
FFA-AU-1499-PT-6
19790610
FFA-AU-1499-PT-7
19790269
FFA-HU-2126
19790355
FFA-TN-AU-1499-PT.1
19800257
FFA-TN-AU-1499-PT-12
19790439
FFA-TN-HU-2189-PT.1
19800328
FFA-TN-HU-2189-PT-4
19800417
FFA-TN-HU-2198-PT.3
19800297
FFA-133
19800296
FTD-HT-23-341-69
19690025
HCO/T1041-01
19780388
HCP/R4040-02
19790662
HCP/T-22221-01/1
19780318
HCP/T-22221-01/2
19780319
HCP/T-22221-01/3
19780320
HCP/T4016-01/2
19790143
HSER 7505
19770656
IITRI-M6052
19790295
INIS-MF-1550
19740346
INKA-CONF-78-012-001
19780371
ISD-243
19790280
ISD-244
19790278
ISD-258
19790279
ISD-259
19790281
ISD-260
19790276
ISD-261
19790277
ISD-262
19790827
JPL-PUB-78-5
19780339
JPL-PUBL-79-98
19800061
JUEL-SPEZ-28
19790203, 19790327, 19790359, 19790461, 19790472, 19790504, 19790506, 19790507, 19790592, 19790715, 19790747
JUL-CONF-27
19780371
KNMI-V-309
19790344
LA-UR-79-1369
19790131
LA-8044-TASE
19790538
LA-8383-MS
19800505
LBL-10098
19800071
LBL-6035
19770592
LBL-7821
19780733
LMSC-D-681058
19790433
LR-28338
19780436
LUTMDN/TMVK-3069/1-9(1978)
19780448
LUTMDN/TMVK-3070/1-31/(1978)
19780447
LUTMDN/TMVK-76-05-03(PT.1)
19760585
LUTMDN/TMVK-76-05-03(PT.2)
19760586
MTR-7159
19760589
MTR-7485(APP.)(VOL.1)
19770551
MTR-7485(VOL.1)
19770680
MTR-7485(VOL.6)
19770621
NASA-CASE-LEW-12364-1
19760635
NASA-CASE-MFS-23830-1
19800377

NASA-CASE-NFS-25302-1
19810072
NASA-CP-2106
19790266, 19790273, 19790290,
19790324, 19790331, 19790346-
19790348, 19790385, 19790387,
19790395, 19790414, 19790438,
19790468, 19790486, 19790490,
19790562, 19790590, 19790604,
19790642, 19790710, 19790711,
19790714, 19790726-19790728,
19790740, 19790763, 19790793,
19790864
NASA-CP-2165
19810006-19810008, 19810012-
19810014, 19810016, 19810017,
19810020, 19810024-19810026,
19810035, 19810037, 19810039,
19810040, 19810042, 19810044,
19810045, 19810050, 19810053-
19810055, 19810060, 19810064,
19810066, 19810067, 19810071,
19810078, 19810084, 19810085,
19810092, 19810093, 19810099-
19810101, 19810104, 19810108,
19810109, 19810111, 19810112,
19810116, 19810117, 19810119-
19810121, 19810124-19810126
NASA-CR-156133
19780339
NASA-CR-159478
19780750
NASA-CR-159494
19790549
NASA-CR-159495
19790550
NASA-CR-159496
19790235
NASA-CR-159497
19790178, 19790551
NASA-CR-159502
19800300
NASA-CR-159530
19780611
NASA-CR-159601
19790786
NASA-CR-159602
19790789
NASA-CR-159607
19790787
NASA-CR-159608
19790788
NASA-CR-159609
19790552, 19790553
NASA-CR-159632
19790509
NASA-CR-159725
19790227
NASA-CR-159737
19790201
NASA-CR-159775
19790185
NASA-CR-159779
19800491
NASA-CR-159856
19800553
NASA-CR-162538
19790474
NASA-CR-164030
19810005
NASA-CR-165128
19800458
NASA-CR-165129
19800098
NASA-CR-165156
19800273
NASA-TM-X-68079
19720061
NASA-TM-X-71879
19760569
NASA-TM-X-73613
19770567
NASA-TM-73868
19770662
NASA-TM-75404
19800220
NASA-TM-75497
19570029
NASA-TM-75512
19780550
NASA-TM-75822
19790477
NASA-TM-79034
19760537
NASA-TM-79143
19790744
NASA-TM-79200
19790313
NASA-TM-79202
19790145
NASA-TM-79275
19790712
NASA-TM-79284
19790466, 19800100
NASA-TM-79295
19790216
NASA-TM-81408
19790713
NASA-TM-81444
19800035
NASA-TM-81445
19800018
NASA-TM-81486
19800062
NASA-TM-81502
19800438
NASA-TM-81588
19800303
NASA-TM-81603
19800385
NASA-TM-81623
19800274
NASA-TM-81632
19800428
NASA-TM-81719
19810029
NASA-TM-81744
19810038
NASA-TM-81813
19800092
NASA-TM-82601
19810004
NASA-TM-82681
19810057
NASA-TP-1359
19780472
NASA-TP-1729
19800204
NASA-TT-F-15304
19520042
NBS-SP-548
19790626
NE-25173
19790411
NERACIAANT2679
19800205
NESEC-1
19780848
NNEI-44
19790399
NP-23032
19760631
NP-23453
19780549
NP-23513
19780568
NP-23622
19780654
NP-23666
19770498

NP-23761
19780806
NP-23796
19770562
NP-24030
19790794
NP-24048
19790706
NP-24105
19790560
NP-24145
19790397
NP-25005
19800289, 19800290
NP-25026
19800563
NP-25123
19800519
NP-25204
19790845
NPL-MP-78014-U
19780699
NTIS/PS-77/0520
19770566
NTIS/PS-77/0882/9ST
19770559
NTIS/PS-77/0883/7ST
19770560
NTIS/PS-78/0997/3ST
19780503
NTIS/PS-78/0998/1ST
19780502
NYSERDA-79-5
19790475
NYSERDA-79-7
19790379
NYSERDA-80-11
19800463
NYSERDA-80-7
19800109
NZERDC--P5
19780661
N72-20452
19720061
N74-15763
19520042
N75-10587
19490037
N76-24723
19750579
N76-28643
19760635
N77-13012
19750568
N78-11511
19770617
N78-18556
19770641
N78-20618
19780339
N78-24615
19770662
N79-18456
19770525
N79-19414
19780750
N79-30415
19790509
N79-31779
19570029
N79-32731/8
19780699
N79-33881
19790786
N79-33882/8
19790789
N79-33883/6
19790787
N79-33884/4
19790788
N80-11631/2
19790323
N80-13623
19790712
N80-14487/6
19790474
N80-17635/7
19780344
N80-18415/3
19780520
N80-18497/1
19800078
N80-18558/0
19780550
N80-18565/5
19790235
N80-18650/5
19790344
N80-20909
19790201
N80-21881/1
19790439
N80-22782/0
19800061
N80-22859/6
19790245
N80-23781/1
19790764
N80-23862/9
19790440
N80-25104/4
19800092
N80-26774/3
19800300
N80-26775/0
19790552
N80-27803/9
19800553
N80-28320/3
19790269
N80-28732/9
19790610
N80-28932/5
19790480
N80-28933/3
19790355
N80-30948/7
19790280
N80-30949/5
19790278
N80-30950/3
19790279
N80-31881/9
19790477
N80-32858
19800438
N80-33357
19800204
N80-33862
19800273
N80-33868
19790765
N81-11448
19800303
N81-12446
19800274
N81-12626
19790281
N81-12627
19790276
N81-12628
19790277
N81-12633
19800257
N81-12634
19800328
N81-13463
19800385
N81-13471
19800296

N81-14985
19800297
N81-15467
19790827
N81-18065
19810005
N81-19497
19800346
N81-19636
19800208
N81-19637
19800345
N81-20037
19800296
N81-20543/7
19800220
N81-22280
19810072
N81-22472
19810038
N81-22580
19800417
N81-23598
19800098
ORNL-5443
19780734
ORNL/SUB-7549/1
19780740
ORNL/SUB-7662/1
19810011
ORO-5135-77/1
19780850
ORO-5135-77/5
19790784
ORO-5135-77/5(SUMM.)
19790783
ORO-5135-77/7
19800366
ORO-5362-T1
19790314
OTA-E-120
19800176
P-500-79-016
19790621
P-500-80-006
19800173
P-500-80-031
19800201
P-500-80-053
19800468
P-700-80-005
19800223
PAT-APPL-6-129 780
19800377
PAT-APPL-6-193-877
19800479
PAT-APPL-6-243 683
19810072
PAT-APPL-707 124
19760635
PAT-036.3-7606
19760640
PB-231341
19730160, 19730161
PB-231955
19730163
PB-246639
19750602
PB-252617
19750615
PB-254188
19760640
PB-256198
19760621
PB-269898
19770691
PB-281200
19770500
PB-282565
19770506, 19770644, 19770647,
19770651
PB-282832
19750571
PB-282941
19780507
PB-284152
19760589
PB-286467
19770537
PB-287350
19770649
PB-287361
19770648
PB-287593
19770593
PB-287750
19760590
PB-287909
19770564
PB-288474
19760627
PB-290694
19780394
PB-290760
19780436
PB-291839
19770540
PB-292816
19780354
PB-294017
19770499
PB-295876
19790623
PB-296364
19770533
PB-297497
19790626
PB-297559
19750570
PB-297687
19770643
PB-297858
19780686
PB-298278
19760600
PB-298774
19780298
PB-299261
19770512
PB-299277
19770541
PB80-125586
19780639
PB80-129158
19750594
PB80-139751
19780340
PB80-141286
19790399
PB80-149776
19780765
PB80-159296
19780444
PB80-169899
19740353
PB80-170665
19730162
PB80-170681
19740355
PB80-170962
19740354, 19740356
PB80-171218
19800087
PB80-187826
19790241
PB80-188659
19750588
PB80-188667
19750587
PB80-188675
19750586

PB80-190010
19800392
PB80-190838
19760608
PB80-191125
19750601
PB80-191620
19760639
PB80-195167
19800133
PB80-214695
19790272
PB80-800303
19790194
PB80-800311
19790195
PB80-800329
19790196
PB80-811433
19800095
PB80-811441
19800094
PB80-811456
19800096
PB80-812886
19800281
PB80-812894
19800282
PB80-925303
19800569
PB80-971940
19800568
PB80-974480
19800569
PB81-109621
19800567
PB81-129678
19800479
PB81-140675
19800203
PB81-141467
19800370
PB81-142184
19800296
PB81-142754
19800463
PB81-162455
19810010
PB81-167207
19800236
PB81-174021
19800213
PB81-174039
19800214
PB81-174047
19800422
PB81-174054
19800423
PB81-174062
19800424
PB81-199937
19800360
PB81-800476
19800259
PB81-856478
19800205
PNL-RAP-28
19780737
PNL-SA-6739
19780403
PNL-SA-6918
19780842
PNL-SA-6918(REV.1)
19790804
PNL-SA-7270
19790624
PNL-SA-7603
19790591
PNL-SA-7831
19790839
PNL-SA-7832
19790841
PNL-SA-7840
19800430
PNL-SA-7965
19790856
PNL-SA-7966
19790880
PNL-SA-7967
19790318
PNL-SA-8678
19800200
PNL-SA-8875
19800125
PNL-SA-9066
19800394
PNL-2510
19780586
PNL-2511
19780585
PNL-2521(REV.1)
19800541
PNL-2522
19810041
PNL-2530
19790435
PNL-2538
19790526
PNL-2545
19780654
PNL-3074
19790358
PNL-3138
19800405
PNL-3195(WERA-5)
19800148
PNL-3195-WERA-1
19800210
PNL-3195-WERA-10
19800244
PNL-3195-WERA-11
19810094
PNL-3195-WERA-2
19810034
PNL-3195-WERA-3
19810080
PNL-3195-WERA-4
19800400
PNL-3195-WERA-6
19810127
PNL-3195-WERA-9
19800469
PNL-3211
19800550
PNL-3214
19790712, 19790720, 19790742,
19790749, 19790755, 19790776,
19790781, 19790797, 19790808,
19790815, 19790825, 19790826-
19790831, 19790833, 19790834,
19790836, 19790837, 19790839-
19790841, 19790844, 19790849,
19790851, 19790853, 19790855,
19790857, 19790863, 19790865,
19790867, 19790876-19790879,
19790881-19790883, 19790886
PNL-3408
19800104
PNL-3421
19800199
PNL-3426
19800175
PNL-3448
19800421
PNL-3622
19800023
PNL-3703
19810090
PNL-3781
19800222

PNL-3808
19810027
PPI-1030-6
19790201
PUB-41062
19800087
R-1575
19790185
RE-585
19790183, 19790184
RFP-TRANS-192
19760570
RFP-2841/1270/78/4
19780706
RFP-2920/3533/78/6-1
19780461
RFP-2920/3533/78/6-2
19780462
RFP-2974/3533-79-2
19790737
RFP-2992/3533/79-3
19790780
RFP-3000
19790557
RFP-3004(VOL.1)
19790631
RFP-3004(VOL.2)
19790632
RFP-3006/68186/3533/79/14-2
19790151
RFP-3007(VOL.1)
19800107
RFP-3007(VOL.2)
19800108
RFP-3014(VOL. 1)
19790264, 19790267
RFP-3014(VOL.1)
19790282, 19790296, 19790299,
19790317, 19790325, 19790343,
19790349, 19790352, 19790409,
19790465, 19790568, 19790650,
19790655, 19790750, 19790756,
19790798
RFP-3014(VOL.2)
19790287, 19790289, 19790339,
19790345, 19790362, 19790367,
19790455, 19790500, 19790515,
19790518, 19790535, 19790566,
19790609, 19790625, 19790757,
19790799
RFP-3025/64410/3533/79/16-1
19800102
RFP-3025/64410/3533/79/16-2
19800103
RFP-3026/3533/79-6
19790425
RFP-3027/67025/3533/79-9
19780800
RFP-3028-3533/79-12
19790424
RFP-3033/3533/79-4
19790426
RFP-3034/3533/79-5
19790428
RFP-3035/3533-79/10
19790427
RFP-3059/67025/3533/80/4-1
19790639
RFP-3059/67025/3533/80/4-2
19790640
RFP-3071/3533/79/13
19790164
RFP-3071/3533/80/9
19800462
RFP-3072
19800169
RFP-3085
19800165
RFP-3086
19800113
RFP-3087
19800255
RFP-3093/94445/3533/80/7
19800185
RFP-3094-1
19810048
RFP-3094-2
19810047
RFP-3120/3533/80-13
19800147
RFP-3121/3533/80/8
19800503
RFP-3126/3533/80-2
19790736
RFP-3127/05480/80-11
19800315
RFP-3128/05480/3533/80-0
19800314
RFP-3128/3533/80-16
19800162
RFP-3134
19800461
RFP-3135/3533/80-19
19800533
RFP-3136/3533/80/18
19800139
RFP-3149/3533/80-17
19800271
RFP-3177-1
19810022
RFP-3177-2
19810021
RFP-3178-80/21
19800128
RFP-3189
19800123
RISO-M-2153
19790132
RISO-M-2194
19790594
RISO-M-2197
19790508
RISO-M-2207
19800213
RISO-M-2220
19800214
RISO-M-2225
19800422
RISO-M-2226
19800423
RISO-M-2227
19800424
RISOE-M-2199
19800346
RISOE-M-2242
19800345
RLO-1002-T2(V.3)
19790233
RLO-1021-77/1
19780622
RLO-2227-T24-78-2
19780523
RLO-2227-T24-79-2
19790200
RLO-2227-T24-79/1
19790422
RLO-2227-79/3
19790198
RLO-2343-78/1
19770594
RLO-2343-78/4
19780379
RLO-2343-78/5
19780647
RLO-2343-79/1
19790532
RLO-2343-79/2
19790527
RLO-2344-4
19770553

RLO-2438-77/2
19780662
RLO-2438-78/1
19780663
RLO-2438-78/2
19780360
RLO-2438-78/3
19780664
RLO-2439-78/2
19780575
RLO-2439-78/3
19780578
RLO-2439-79/2
19790542
RLO-2439-79/3
19790541
RLO-2440-79/3
19790754
RLO-2441-76/16
19770610
RLO-2443-77/1
19790377
RLO-2444-78/1
19780306
R77-912668-8
19780796
SAI-76-510-LJ
19760590
SAN/1075-1/2
19760644
SAND-77-1701
19780731
SAND-78-0548C
19780730
SAND-78-0962
19790193
SAND-78-0962(VOL.1)
19790721
SAND-78-0962(VOL.2)
19790722
SAND-78-0962(VOL.4)
19790723
SAND-78-0984
19800024
SAND-78-1253C
19780363
SAND-78-1563
19790130
SAND-78-1735
19790620
SAND-78-1851C
19780805
SAND-78-1990
19800051
SAND-79-0001
19780531
SAND-79-0431
19790226
SAND-79-0434
19790144
SAND-79-0733C
19790724
SAND-79-0997C
19790220
SAND-79-1068
19780580
SAND-79-1508
19800350
SAND-79-1642C
19790304
SAND-79-1753
19800571
SAND-79-1984C
19800448
SAND-79-2259
19800164
SAND-79-2330
19810002
SAND-79-7058
19800042
SAND-79-7077
19800349
SAND-79-7098
19810086
SAND-80-0085
19800340
SAND-80-0179
19800038
SAND-80-0475
19800432
SAND-80-1155
19800310
SAND-80-1639C
19800369
SAND-80-2114
19810096
SAND-80-2407
19800494
SAND-80-2469
19810097
SAND-80-2646
19810018
SAND-80-2646C
19810019
SAND-80-2669
19810015
SAND-80-2776
19810065
SAND-80-2820C
19810059
SAND-80-7015
19800342
SAND-81-0896
19810091
SAND-81-0923
19810115
SAND-81-7006
19810001
SAND-81-7017
19810106
SAND-81-7020
19810107
SAND-81-7026
19810122
SEIDB INF. MOD. 10201
19800558
SEIS-77/01
19770500
SERI/CP-354-421
19800172
SERI/CP-635-1061
19800459
SERI/CP-635-1238
19810006-19810008, 19810012-
19810014, 19810016, 19810017,
19810020, 19810024-19810026,
19810035, 19810037, 19810039,
19810040, 19810042, 19810044,
19810045, 19810050, 19810053-
19810055, 19810060, 19810064,
19810066, 19810067, 19810071,
19810078, 19810084, 19810085,
19810092, 19810093, 19810099-
19810101, 19810104, 19810108,
19810109, 19810111, 19810112,
19810116, 19810117, 19810119-
19810121, 19810124-19810126
SERI/CP-635-1601
19800406-19800413, 19800473,
19800574
SERI/CP-635-938
19800191, 19800211, 19800232,
19800275, 19800287, 19800336,
19800387, 19800436, 19800439,
19800485, 19800536, 19800544
SERI/PR-13-054
19780839
SERI/PR-35-313
19790246

SERI/PR-351-480
19790821
SERI/PR-354-420
19800324
SERI/PR-52-076
19780347
SERI/PR-635-770
19800562
SERI/SP-434-470
19790717
SERI/SP-644-690
19800196
SERI/SP-69-071
19790558
SERI/SP-722-739
19800425
SERI/SP-732-728
19800373
SERI/SP-8003-01
19790431
SERI/TP-245-184
19790205-19790207, 19790221, 19790222, 19790353, 19790370, 19790432, 19790495, 19790496, 19790512, 19790525, 19790547, 19790576, 19790586, 19790652, 19790741, 19790767, 19790768, 19790782, 19790805, 19790812
SERI/TP-31-248(VOL.2)(PT.2)
19790513, 19790540, 19790664
SERI/TP-334-489
19800253
SERI/TP-35-217(PT.2)
19790661
SERI/TP-351-431
19800187, 19800256, 19800404
SERI/TP-351-545
19800219
SERI/TP-351-546
19800083
SERI/TP-354-466
19790569
SERI/TP-431-580
19800320
SERI/TP-49-186
19790418
SERI/TP-53-114R
19790225
SERI/TP-635-469
19800049
SERI/TP-641-773
19800252
SERI/TP-731-649
19800021
SERI/TP-732-1064
19810083
SERI/TP-732-343
19800542
SERI/TP-733-693
19800250
SERI/TP-743-621
19800493
SERI/TP-743-826
19800492
SERI/TP-744-1099
19810073
SERI/TP-744-466R
19800388
SERI/TR-35-078
19790210
SERI/TR-35-086
19780557
SERI/TR-35-234
19790170
SERI/TR-354-365
19790570
SERI/TR-36-088
19780510
SERI/TR-431-580
19800020
SERI/TR-52-055D(V.1-2)
19780463
SERI/TR-53-095
19790627
SERI/TR-54-066
19780317
SERI/TR-62-069
19790648
SERI/TR-62-255
19790224
SERI/TR-62-274
19790366
SERI/TR-732-604(VOL.I)
19810081
SERI/TR-732-604(VOL.II)
19810082
SERI/TR-744-778
19810074
SERI/TR-751-749
19810009
SERI/TR-8003-02
19790431
SERI/TR-8003-1
19800317
SERI/TR-8003-2
19800316
SERI/TR-8085-1-T2
19810128
SERI/TR-98003-05
19790431
SERI/TR-98003-1
19790493
SERI/TR-98003-2
19790494
SERI/TR-98003-3
19790284
SERI/TR-98125-1
19800132
SERI/TR-98282-11
19810076
SERI/TR-98282-11(APP.)
19810077
SERI/TR-98298-1
19800040
SLAC-PUB-2204
19780505
STU-75-3324
19770679
STUDSVIK-78/2
19780560
T-77-008
19770683
TID-28581
19770676
TID-28828
19780768
TID-28843(DRAFT)
19790342
TID-28975
19780486
TM-II-80-1
19800268
TM-IP-81-2
19800131
TM-IP/81-5
19810056
TM-TD-81-1
19800157
TM-TD/80-4
19800138
TM-TD/81-4
19800267
TM-TD/81-6
19810068
TM-TG/80-2
19800266
TR-47
19750615
TR-77/101-A
19770499

TRS 104
19790227
UCB/ERG-80-1
19800276
UCID-17827
19780784
UCID-18232
19790884
UCLA-ENG-7718
19780750
UCLA-ENG-7880
19780598
UCLA-ENG-7881
19780853
UCRL-15002
19780529
UCRL-15005
19780487
UCRL-15053
19790361
UCRL-15171
19790433
UCRL-50056-79
19800127
UCRL-52000-80-6
19800496
UCRL-52769
19790633
UCRL-52938
19800537
UCRL-83269
19800402
UCRL-84503
19800403
UDR-TR-79-35
19790156
UDSE-TR-79-02
19790156
UHMET-77-01
19770648
UHMET-77-05
19770649
UHMET-79-15
19790612
UTH-LR-272
19780520
UTIAS-218
19770641
UUIM-51
19780455
UUIM-55
19790234
WAOENG-79-5
19790305
WASH-2330-78/4(VOL.1)
19790462
WASH-2330-78/4(VOL.2)
19790463
WASH-2330-78/4(VOL.3)
19790166
WASH-2330-78/4(VOL.4)
19790464
WES-TR-D-77-32
19770639
WVU-AE-TR-58
19790783

CONFERENCE PROCEEDINGS INDEX

American Wind Energy Association, National Conference, Amarillo, Texas, March 1-5, 1978. 1978-0689

American Wind Energy Association, National Conference, Pittsburgh, Penn- sylvania, June 1980. 1980-0383

BWEA Wind Energy Workshop, 1st, London, July 13, 1978. 1978-0711

Conference and Workshop on Wind Energy Characteristics and Wind Energy Siting 1979, Portland, Oregon, June 19-21, 1979. 1979-0882

Conference and Workshop on Wind Energy Conversion Systems, 3rd Biennial, Washington, D.C., September 19-21, 1977. 1978-0596

Conference and Workshop on Wind Energy Conversion Systems, 4th Biennial, Washington, D.C., October 29-31, 1979. 1980-0318, 1980-0416

Conference on Community Renewable Energy Systems, Boulder, Colorado, August 20-21, 1979. 1980-0172

Conference on Large Wind Turbine Characteristics and R and D Requirements, Cleveland, Ohio, April 24, 1979. 1979-0486

Energie vom Wind, Conference on Wind Power with Exhibition, Bremen, Germany, F.R., June 7-8, 1977. (4th Meeting of the German Society for Solar Energy). 1977-0536

Energy in Minnesota. Energy Technology Information for Decision Makers, Northfield, Minnesota, August 14-16, 1977. 1977-0541

Fluids Engineering in Advanced Energy Systems, San Francisco, California, December 10-15, 1978. 1978-0651

Frontiers of Power Technology Conference, 9th, Stillwater, Oklahoma, October 27-28. 1976. 1976-0593

Greater Los Angeles Area Symposium, Los Angeles, California, May 23, 1978. 1978-0746

IEA WECS Sub-Task A1 Meeting, Stockholm, February 25, 1980. 1980-0208

International Forum on Appropriate Industrial Technology, New Delhi, Anand, India, November 20-30, 1978. 1978-0444

International Symposium on Wind Energy Systems, 2nd, Amsterdam, October 3-6, 1978. 1979-0672

International Symposium on Wind Energy Systems, Copenhagen, August 26-29, 1980. 1980-0489

Iowa Solar Operational Results Conference, 1st Annual, Cedar Rapids, Iowa, June 21, 1979. 1979-0478

Panel on Information Dissemination for Wind Energy, Albuquerque, New Mexico, August 2-3, 1979. 1980-0542

Seminar and Status Report on Wind Energy, Juelich, Germany, F.R., October 23-24, 1978. 1978-0371, 1978-0766

Seminar on Structural Dynamics, Munich, October 12, 1978. 1979-0203

Seminar on Wind Power, Juelich, Germany, F.R., September 12, 1974. 1974-0359

Summer Attic and Whole-House Ventilation Workshop, Gaithersburg, Maryland, July 13, 1978. 1979-0626

SWECS 1979: A Workshop on R and D Requirements and Utility Interface/Institutional Issues, Boulder, Colorado, February 20, 1979. 1979-0343, 1979-0345

Thermofluids Conference, Brisbane, Australia, December 3-5, 1975. 1975-0567

USDA Wind Workshop, Ames, Iowa, May 15-17, 1979. 1979-0211

Wind Energy Innovative Systems Conference, Colorado Springs, Colorado, May 23, 1979. 1979-0767

Wind Energy Innovative Systems Conference, 2nd, Colorado Springs, Colorado, December 3-5, 1980. 1980-0336, 1980-0459

Wind Turbine Structural Dynamics Conference, Cleveland, Ohio, November 15, 1977. 1977-0620

Workshop on Alternative Energy Sources for Hawaii, Honolulu, Hawaii, May 8-9, 1975. 1975-0601

Workshop on Economic and Operational Requirements and Status of Large Scale Wind Systems, Monterey, California, March 26, 1979. 1979-0315

Workshop on Mechanical Storage of Wind Energy, Albuquerque, New Mexico, December 14, 1978. 1978-0531

Workshop on Solar Energy for the Villages of Tanzania, Dar es Salaam, Tanzania, August 11-19, 1977. 1978-0507