ENERGY FROM THE WIND

Annotated Bibliography

SECOND SUPPLEMENT
December 1979

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COLORADO STATE

INTRODUCTION TO THE SECOND SUPPLEMENT

Something new has been added! This Second Supplement to ENERGY FROM THE WIND, which contains 1942 new references, was produced by computer, as the first phase of a project which will eventually put the retrospective file (Basic Volume and First Supplement) as well as all future supplements on computer.

A computer-produced ENERGY FROM THE WIND offers many advantages over the previously manually produced bibliography. The main ones for you, the user, are:

(1) More and better indexes. A much more detailed subject thesaurus has been developed and used to provide subject indexing in greater depth than the previous "Broad Subject or Type of Material Index." In addition to the subject and author indexes, two new indexes have been included for report number and conference proceedings.

(2) Customized searches. 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" to produce specialized lists on narrower aspects of wind energy. Any part of the reference can be searched, although combining descriptors from the subject index would be the recommended way to proceed for most topics. Some sample searches are:

All references on "design - small scale" and ("developing countries" or "remote areas)

All references from the Brace Research Institute

All references to "Patents" on "vertical axis" turbines from 1976 to date

A "SEARCH REQUEST FORM" has been included following this introduction for use in requesting a custom search from the ENERGY FROM THE WIND data base.

For information on the search capability, feedback on the new format and indexes, or to provide information on new references or corrections to entries, please contact:

Barbara L. Burke, Associate Professor
Colorado State University
Engineering Research Center
Fort Collins, Colorado 80523

Computerization of ENERGY FROM THE WIND was possible through a contract with the Department of Energy, Wind Systems Branch, to whom we express appreciation.

SEARCH REQUEST FORM

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" to produce specialized lists on narrower aspects of wind energy. Any part of the reference can be searched, for actual assigned descriptors, or for free terms.

SAMPLE SEARCHES:

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

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SUBJECT OF SEARCH:

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

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

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

_____
_____
_____
_____

Name_____
Address_____
_____
_____
Phone_____

Send request and prepayment* to:

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

*Prepayment of $5.00 is required to cover computer costs, handling, and mailing. An additional fee may be assessed for unusually large or complex searches.

BIBLIOGRAPHY

The bibliography is organized by year, in entry number order. So that the Second Supplement may be merged with the Basic Volume and First Supplement if desired, entry numbers in the Second Supplement are assigned to follow consecutively those entry numbers used in the first two 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 First Supplement.

The Second Supplement may be merged with the first two volumes, or left separate. The indexes in the Second Supplement are for that supplement only, so if the three volumes are merged, the old indexes must be retained and used with the indexes for the Second Supplement. By 1981, when the retrospective file has been added to the computer data base, cumulative indexes will be produced for all volumes.

79-0001 ACCESS CATALOG UPDATE.
WIND POWER DIG. NO. 15: 52-55, SPRING 1979.

79-0002 AKINS R E
FULL-SCALE PERFORMANCE EVALUATION OF WIND TURBINES.
ASCE CONVENTION + EXPOSITION, BOSTON, APRIL 2-6, 1979. PREPRINT 3530.
16 P.

THE ACCURATE ASSESSMENT OF WIND POWER AS AN ALTERNATIVE SOURCE REQUIRES AN UNDERSTANDING OF BOTH THE WIND RESOURCE AND HOW A PARTICULAR WIND TURBINE PERFORMS IN THIS ENVIRONMENT. THE INABILITY OF ANALYSTS TO INCORPORATE UNSTEADY EFFECTS OF ATMOSPHERIC TURBULENCE ON WIND TURBINE PERFORMANCE INTRODUCES UNCERTAINTY INTO PERFORMANCE PREDICTIONS. IN ORDER TO VERIFY THESE PREDICTIONS FIELD-TESTING OF FULL-SCALE PROTOTYPE WIND TURBINES HAS BEEN UNDERTAKEN BY BOTH THE FEDERAL GOVERNMENT AS A PART OF THE STIMULATION OF THE WIND-POWER INDUSTRY AND BY PRIVATE INDUSTRY AS A PART OF THEIR DEVELOPMENT PROGRAMS. THE RESULTS OF SUCH TESTING MUST BE PRESENTED IN A FORMAT WHICH IS USEFUL TO BOTH A TECHNICAL AUDIENCE AND TO POTENTIAL USERS OF WIND POWER, IN EITHER THE PUBLIC OR PRIVATE SECTOR. A STRAIGHTFORWARD TECHNIQUE TERMED [THE METHOD OF BINS[HAS BEEN DEVELOPED FOR USE IN DETERMINING THE MEAN PERFORMANCE OF WIND TURBINES IN A FIELD ENVIRONMENT. THIS TECHNIQUE IS BRIEFLY OUTLINED AND EXAMPLES OF RESULTS OBTAINED ARE PRESENTED. AN APPROACH IS PROPOSED WHICH ALLOWS THE UTILIZATION OF THESE PERFORMANCE DATA ALONG WITH A DESCRIPTION OF WIND CHARACTERISTICS TO PREDICT THE ANNUAL ENERGY PRODUCED BY A WIND TURBINE AT A PARTICULAR LOCATION.

79-0003 AULD H E, LODDE P F
A STUDY OF FOUNDATION/ANCHOR REQUIREMENTS FOR PROTOTYPE VERTICAL-AXIS WIND TURBINES.
NTIS, FEBRUARY 1979. 94 P.
SAND-78-7046

THE FOUNDATION/ANCHOR REQUIREMENTS FOR A RANGE OF VERTICAL AXIS WIND TURBINES WERE IDENTIFIED. FOUNDATION AND ANCHOR SYSTEMS MEETING THESE REQUIREMENTS WERE DESIGNED AND EVALUATED ON THE BASIS OF THEIR DEPLOYABILITY AND COST-EFFECTIVENESS. OPTIMUM FOUNDATION/ANCHOR SYSTEMS FOR EACH COMBINATION OF TURBINE SIZE AND SOIL CONDITION, AS WELL AS A COMPLETE DETAILED DESIGN FOR A VAWT SYSTEM SITED AT ROCKY FLATS, COLORADO, ARE PRESENTED.

79-0004 BERGESON L
SAIL POWER FOR THE WORLD'S CARGO SHIPS.
TECHNOL. REV. 81(5): 22-36, MARCH-APRIL 1979.

THROUGH THE END OF THE LAST CENTURY, SAILING SHIPS CARRIED A SIGNIFICANT PORTION OF THE WORLD'S TRANS-OCEAN CARGOES. BUT BY THE CLOSE OF WORLD WAR I, THEY HAD BEEN VIRTUALLY DRIVEN FROM THE SEAS BY STEAM SHIPS THAT USED LOW-COST FOSSIL FUELS FOR STEADY POWER AND THEREBY KEPT RELIABLY ON SCHEDULE. RECENT FORECASTS OF WORLD ENERGY CONSUMPTION AND COSTS INDICATE THAT THE PRICE OF MARINE BUNKER OIL, WHICH IS ABOUT $15 PER BARREL AS OF THIS WRITING, MAY DOUBLE OR TRIPLE WITHIN THE NEXT DECADE. SUCH PROJECTIONS ARE OF ENORMOUS CONCERN TO OPERATORS OF THE CARGO SHIPS NOW PLYING THE SEAS; EXPENDITURES FOR FUEL MAKE UP 20 TO 30 PER CENT OF THE TOTAL COST OF OPERATING A MODERN VESSEL. IN THIS CONTEXT IT IS POSSIBLE TO IDENTIFY THE BENEFITS OF EVEN A PARTIAL SWITCH OF THE WORLD'S COMMERCIAL FLEET BACK TO SAIL POWER. SAILS CONSTITUTE AN ELEGANT AND TECHNICALLY FEASIBLE SOLAR ENERGY CONVERSION SYSTEM THAT REMAINS UNEXPLOITED BY ENERGY PLANNERS AND INDUSTRY.

79-0005 BONDI H
ENERGY R AND D IN THE UNITED KINGDOM.
ATOM NO. 268: 40-41, FEBRUARY 1979.

A DISCUSSION ON NUCLEAR ENERGY, NUCLEAR RESOURCES, AND ENERGY R AND D IN THE UK ARE PRESENTED. WAVE, GEOTHERMAL AND WIND ENERGY ARE BRIEFLY COMMENTED ON.

79-0006 BONTIUS G H
IMPLICATIONS OF LARGE SCALE USE OF WIND ENERGY FOR PUBLIC POWER SUPPLY.
ENERGIESPECTRUM 3(4): 98-104, APRIL 1979.

THIS PAPER DISCUSSES THE IMPLICATIONS OF USING WIND DRIVEN GENERATORS TO

INCREASE THE SUPPLY OF ELECTRIC POWER. WIND POWER IS LIKELY TO ACCOUNT FOR ABOUT 3 PERCENT OF THE TOTAL ENERGY PRODUCTION, OR 15 PERCENT OF THE TOTAL PRODUCTION OF ELECTRIC POWER, IN 5000 STATIONS OF 1 MW EACH. LIKELY LOCATIONS AND COSTS ARE DISCUSSED.

79-0007 BOWLES D F, ROLLINS J P, HAWKS R J
PARAMETRIC PERFORMANCE ANALYSIS OF A DARRIEUS WIND TURBINE SYSTEM.
J. ENERGY 3(3): 140-144, MAY-JUNE 1979.

A STEADY-STATE COMPUTER SIMULATION WAS USED TO EVALUATE THE PERFORMANCE OF A SMALL DARRIEUS ROTOR AEROTURBINE LOADED BY SEVERAL DIFFERENT ENERGY CONVERSION DEVICES. FOR CONSTANT SPEED OPERATION IT WAS FOUND THAT THE GENERATOR SIZE MUST BE CAREFULLY MATCHED TO LOCAL WIND CONDITIONS. OVERALL SYSTEM PERFORMANCE CAN BE IMPROVED IF A VARIABLE SPEED LOAD IS USED OR IF VARIABLE ROTOR SPEED CAN BE PROVIDED FOR A CONSTANT SPEED LOAD. FOR A RANGE OF GENERATOR SIZES THE TOTAL POWER OUTPUT VARIES ONLY SLIGHTLY WITH GENERATOR CAPACITY.

79-0008 BRAUNSTEIN L A
WIND ENERGY: THE LONG ROAD TO COMMERCIALIZATION.
ENERGY 4(1): 10-11, WINTER 1979.

THIS ARTICLE REPORTS PRESENT ACTIVITY IN WIND GENERATORS THROUGHOUT THE UNITED STATES. MUCH OF THE ACTIVITY IS SPONSORED BY THE DEPARTMENT OF ENERGY (DOE), BUT A NUMBER OF LARGE AND SMALL INDUSTRIAL FIRMS ARE ALSO WORKING WITHOUT DOE FUNDING. BOTH SMALL AND LARGE WIND MACHINES USING HORIZONTAL OR VERTICAL AXIS ARE UNDER DEVELOPMENT AND TEST. THE DOE-SPONSORED MOD-1 WIND TURBINE, WITH A SET OF 200-FOOT STEEL ROTOR BLADES, IS EXPECTED TO BE COMPLETED BY THE SPRING OF 1979 NEAR BOONE, N.C. IT WILL SUPPLY 2,000 KILOWATTS (TWO MEGAWATTS) OF POWER TO THE LOCAL ELECTRICAL COOPERATIVE, AT 10 OR 11 CENTS PER KWHR. THE COST OF ENERGY WITH TODAY'S SMALL WIND MACHINES IS ABOUT 15 CENTS PER KWHR. IN ORDER TO BECOME ECONOMICALLY COMPETITIVE, DOE PROGRAM MANAGERS SAY, WIND SYSTEMS MUST BE ABLE TO PROVIDE ENERGY AT A VERY LOW COST: TWO TO THREE CENTS PER KWHR. THIS ENERGY COST WOULD MAKE WIND POWER COMPETITIVE WITH THE COST OF FUEL IN CONVENTIONAL POWER GENERATING FACILITIES; IT WOULD LEAVE ROOM FOR THE ADDITIONAL COST OF POWER TRANSMISSION AND DISTRIBUTION (FOR LARGE SYSTEMS), OR UTILITY SURCHARGES (FOR SMALL SYSTEMS). UTILITY SURCHARGES MIGHT BE ADDED TO A WIND SYSTEM OWNER'S BILL TO RECOUP THE COST OF PROVIDING STANDBY SERVICE. UTILITIES THAT DO NOT USE SURCHARGES WOULD BE SUBSIDIZING USE OF WIND SYSTEMS BY SPREADING STANDBY SERVICE COST AMONG THEIR CUSTOMERS. WIND ENERGY IS APPROACHING ECONOMIC COMPETITIVENESS WITH DIESEL-GENERATED POWER (AT NINE TO 21 CENTS PER KWHR), AND APPEARS CAPABLE OF ACHIEVING COMPETITIVE COST GOALS EARLIER THAN SOME OTHER SOLAR TECHNOLOGIES, SUCH AS PHOTOVOLTAICS (CURRENTLY AT 60-80 CENTS PER KWHR), OR SOLAR THERMAL POWER SYSTEMS (AT 40 TO 50 CENTS PER KWHR).

79-0009 BRAUSER B O, BRAUSER S O
WIND DRIVEN ELECTRIC POWER PLANT.
U.S. PATENT NO. 4,134,708, JANUARY 16, 1979.

THIS PATENT IS FOR A WIND TURBINE APPARATUS COMPRISING A VERTICALLY RISING EXOSKELETAL FRAME HAVING AT LEAST TWO VERTICALLY SPACED SETS OF RADIALLY CONVERGING RIBS, MEANS DEFINING AN AXIAL OPENING CONNECTING SAID RIBS, A VERTICAL DRIVE SHAFT DISPOSED IN SAID AXIAL OPENING, A COLLAR CONCENTRICALLY DISPOSED AROUND SAID SHAFT WITHIN SAID AXIAL OPENING, MEANS FOR ROTATABLY SUPPORTING SAID SHAFT AND SAID COLLAR WITHIN SAID AXIAL OPENING; A WIND SHIELD CARRIED BY SAID COLLAR, AND A ROTOR CARRIED BY SAID SHAFT BETWEEN SAID VERTICALLY SPACED SETS OF RADIALLY CONVERGING RIBS.

79-0010 THE CALIFORNIA WIND PROGRAM.
WIND POWER DIG. NO. 15: 6-11, SPRING 1979.

THE WIND ENERGY PROGRAM OF THE CALIFORNIA ENERGY COMMISSION IS DESCRIBED. THE GOALS OF THE PROGRAM ARE (1) TO DEMONSTRATE THE TECHNICAL VIABILITY AND POTENTIAL ECONOMIC ATTRACTIVENESS OF WIND-ELECTRIC CONVERSION SYSTEMS; (2) TO PROVIDE [HANDS ON[OPERATIONAL EXPERIENCE FOR AN ELECTRIC UTILITY OR A COMMERCIAL OR INDUSTRIAL USER OF ELECTRICITY; AND (3) TO PROVIDE PUBLIC VISIBILITY FOR WIND ENERGY.

79-0011 CARPENTER K, WHEELER C, SULLIVAN M

CULTURAL RESOURCE SURVEY AND EVALUATION OF SYSTEM VERIFICATION UNIT SITES, TRANSMISSION LINE AND ACCESS ROAD RIGHTS-OF-WAY; WIND ENERGY PROJECTS, ALBANY AND CARBON COUNTIES, WYOMING.
NTIS, JANUARY 1979. 37 P.
PB-292384

BETWEEN OCTOBER 27 AND OCTOBER 29, 1978, TWO ARCHEOLOGISTS AND A PALEONTOLOGIST AFFILIATED WITH WESTERN CULTURAL RESOURCE MANAGEMENT OF BOULDER, COLORADO, SURVEYED AN AREA AROUND MEDICINE BOW, WYOMING TO LOCATE AND EVALUATE ANY CULTURAL RESOURCES THAT MIGHT BE AFFECTED BY THE BUREAU OF RECLAMATION'S PROPOSED WIND ENERGY PROJECT. ALTHOUGH NO PALEONTOLOGICAL OR HISTORICAL SITES OR REMAINS WERE LOCATED, TWO ARCHEOLOGICAL SITES AND FIFTEEN (15) LOCI OF ISOLATED ARCHEOLOGICAL ARTIFACTS WERE DISCOVERED. SINCE BOTH SITES WERE LOCATED ALONG THE PROPOSED TRANSMISSION LINE RIGHT-OF-WAY FROM ALTERNATE "SITE C" TO THE EXISTING TRANSMISSION LINE ALONG WYOMING HIGHWAY 487, AND NOT ON ANY OF THE SYSTEM VERIFICATION UNIT LOCATIONS, IT IS RECOMMENDED THAT DIRECT SITE IMPACT DURING TRANSMISSION LINE CONSTRUCTION BE AVOIDED. CONSTRUCTION ON ANY OF THE ALTERNATE SYSTEM VERIFICATION UNIT LOCATIONS WILL NOT ADVERSELY AFFECT ANY CULTURAL RESOURCES, EITHER HISTORIC OR ARCHEOLOGICAL.

79-0012 CARTER J
USING WATER-PUMPING WINDMILLS.
WIND POWER DIG. NO. 16: 8-13, SUMMER 1979.

THIS ARTICLE IS ON DESIGNING AND USING LOW-PRESSURE WATER SYSTEMS.

79-0013 CARTER J
USING WATER-PUMPING WINDMILLS. PART II.
WIND POWER DIG. NO. 15: 44-50, SPRING 1979.

79-0014 CHEN J M, TSUE C K
VORTEX GENERATOR AFFECTED BY THE TOWER ASPECT RATIO.
J. IND. AERODYN. 4(2): 101-112, MARCH 1979.

A MATHEMATICAL ANALYSIS OF A VORTEX WHICH IS GENERATED BY A LARGE HOLLOW TOWER IS PRESENTED. THE TOWER ASPECT RATIO (HEIGHT/DIAMETER) IS CONSIDERED, AND IT IS SHOWN THAT THE LOWEST PRESSURE DROP CAN BE OBTAINED FROM THIS TORNADO-TYPE WIND ENERGY SYSTEM WHEN THE ASPECT RATIO IS BETWEEN 3 AND 5.

79-0015 CLIFF W C
WIND DIRECTION CHANGE CRITERIA FOR WIND TURBINE DESIGN.
NTIS, JANUARY 1979. 22 P.
PNL-2531

IN MANY CASES, THE WIND TURBINE DESIGN ENGINEER NEEDS TO KNOW WIND CHARACTERISTICS THAT ENGULF ALL OR PART OF THE TURBINE ROTOR SYSTEM BECAUSE A SPATIAL-FILTERING EFFECT, DEPENDING ON THE SIZE OF THE WIND TURBINE ROTOR SYSTEM, MUST BE ACCOUNTED FOR IN ORDER TO PROVIDE WIND CHARACTERISTIC DESIGN INPUTS. ONE SUCH INPUT IS THE WIND DIRECTION CHANGE WHICH OCCURS OVER TIME. THE DIRECTION CHANGE, WHICH IS ALSO AVERAGED OVER THE SWEPT AREA OF A ROTOR SYSTEM, IS LESS SEVERE THAN THE MAXIMUM DIRECTION CHANGE OCCURRING AT A POINT WITHIN THE SWEPT AREA. THAT IS, WITHIN THE SWEPT AREA OF THE ROTOR, AREAS OF DIRECTION CHANGE GREATER THAN THE AVERAGE DIRECTION CHANGE AS WELL AS AREAS OF LESSER CHANGE OCCUR SIMULTANEOUSLY. THIS PAPER PRESENTS FORMULAS FOR ESTIMATING THE DIRECTION CHANGE ENCOUNTERED OVER THE SWEPT AREA OF THE ROTOR SYSTEM. THE FORMULAS ARE GENERIC AND MAY BE USED FOR ANY SIZE OF WIND TURBINE SYSTEM OPERATING IN STRONG WIND CONDITIONS. A METER-KILOGRAM-SECOND (MKS) SYSTEM OF UNITS IS USED IN THIS REPORT.

79-0016 COIT L
WIND ENERGY: LEGAL ISSUES AND INSTITUTIONAL BARRIERS.
NTIS, JUNE 1979. 28 P.
SERI/TR-62-241

THE IDEA OF HARNESSING THE WIND'S ENERGY IS NOT A NEW ONE. PRIOR TO WORLD WAR II, OVER SIX MILLION SMALL WINDMILLS WERE BUILT IN THE UNITED STATES. UNFORTUNATELY, THE DEVELOPMENT OF CHEAPER FOSSIL FUELS DURING THE POSTWAR INDUSTRIAL BOOM RESULTED IN THE LARGE-SCALE ABANDONMENT OF WIND GENERATION DEVICES. SUDDENLY, HOWEVER, WITH THE PRICE OF FOSSIL

FUELS RISING ALMOST DAILY, WIND ENERGY HAS ONCE AGAIN BECOME AN ATTRACTIVE ENERGY ALTERNATIVE. BEFORE THE POTENTIAL OF WIND ENERGY CAN BE REALIZED, LARGE-SCALE COMMERCIALIZATION WILL HAVE TO OCCUR. STANDING IN THE WAY OF COMMERCIAL DEVELOPMENT ARE VARIOUS INSTITUTIONAL AND LEGAL BARRIERS. THESE INCLUDE(1) POSSIBLE CONFLICTS WITH EXISTING ZONING AND OTHER LAND-USE PLANNING SCHEMES, (2) THE QUESTION OF GUARANTEEING ACCESS TO THE WIND (3) POSSIBLE TORT AND ENVIRONMENTAL ISSUES RAISED BY WECS OPERATION, AND (4) THE CRITICAL PROBLEM OF CREATING FINANCIAL INCENTIVES.

THIS PAPER DISCUSSES THE IMPLICATIONS OF EACH OF THESE ISSUES AND SUGGESTS SOLUTIONS WHERE PRACTICABLE.

79-0017 CYCLOTURBINE TESTED IN N.M.
WIND POWER DIG. NO. 15: 20, SPRING 1979.

79-0018 DOE SOLAR BUDGET GETS $68-MILLION BOOST IN HOUSE SUBCOMMITTEE AUTHORIZATION BILL.
SOL. EN. INTELL. REP. 5(11): 102-103, MARCH 12, 1979.

79-0019 D'ALESSANDRO B
WIND ENERGY: THE SLEEPING GIANT.
SOLAR AGE 4(7): 39-41, JULY 1979.

THIS ARTICLE REVIEWS CURRENT WIND POWER PROJECTS IN THE US, FUNDED BY THE GOVERNMENT.

79-0020 DERRINGTON J A
MARINE STRUCTURES FOR ENERGY CONVERSION.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 152-155.

THIS PAPER DISCUSSES THE PROBLEMS INVOLVED IN THE USE OF MASSIVE OFFSHORE ENGINEERING STRUCTURES DESIGNED TO EXPLOIT EITHER RESERVES OF COAL, OIL, AND GAS FROM BELOW THE SEABED OR THE SO-CALLED BENIGN ENERGY SOURCES RESULTING FROM THE NATURALLY OCCURRING SOLAR, LUNAR OR WIND FORCES. FOR ALL SUCH STRUCTURES, EXPOSED THROUGHOUT THEIR USEFUL LIFE TO THE SEVERE ENVIRONMENTAL EFFECTS OFFSHORE, THE NATURAL CONSTRUCTION MATERIAL IS EITHER REINFORCED OR PRESTRESSED CONCRETE. THE CONSTRUCTIONAL PROCEDURES DISCUSSED INCLUDE THE USE OF CONCRETE CAISSON STRUCTURES, FLOATED INTO THE PLACE AND BALLASTED DOWN ONTO THE SEABED OR ALTERNATIVELY MOORED IN A PERMANENTLY FLOATING MODE, AND THE USE OF METHODS BASED ON CONSTRUCTION INSHORE AND INTEGRATION OF EXTENSIVE MECHANICAL AND ELECTRICAL EQUIPMENT IN SHELTERED WATERS, BEFORE TOWING TO THEIR OFFSHORE LOCATIONS.

79-0021 DESHMUKH R G, RAMAKUMAR R
PROBABILITY MODELS FOR WIND-ELECTRIC CONVERSION SYSTEMS AND THEIR APPLICATION TO RELIABILITY STUDIES.
IEEE POWER ENG. SOC., WINTER MEETING, PREPRINT, NEW YORK, FEBRUARY 4-9, 1979. NEW YORK, IEEE, PAP. A79036-5, 1979. 8 P.

AS THE PENETRATION OF WIND-ELECTRIC CONVERSION SYSTEMS (WECS) INTO COMMERCIAL UTILITY GRIDS INCREASES, THEIR INFLUENCE ON THE OVERALL SYSTEM RELIABILITY ASSUMES IMPORTANCE. THIS PAPER DISCUSSES THE DEVELOPMENT OF A PROBABILISTIC APPROACH FOR MODELING THE LOSS OF WIND GENERATION CAPACITY DUE TO THE INHERENT VARIABILITY OF THE WIND INPUT. IT IS BASED ON READILY AVAILABILE PARAMETERS SUCH AS THE MEAN AND/OR VARIANCE OF THE WIND SPEED. THE MODEL IS THEN APPLIED TO STUDY THE WIND GENERATION AVAILABILITY AND THE RELIABILITY OF WECS OPERATING IN PARALLEL WITH CONVENTIONAL GENERATORS SUPPLYING A COMMON LOAD. THE RESULTS OBTAINED ARE DISCUSSED AND SOME CONCLUSIONS ARE DRAWN REGARDING THE RELIABILITY OF WIND-ASSISTED UTILITY SYSTEMS.

79-0022 DIXON J C
LOAD MATCHING EFFECTS ON WIND ENERGY CONVERTER PERFORMANCE.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 418-421.

INVESTIGATED ARE THE CAUSES OF THE LOW EFFICIENCY OF WIND PUMPS AND OUTLINED ARE AREAS FOR DEVELOPMENT. IT IS SUGGESTED THAT THE LOW EFFICIENCY IS LARGELY THE RESULT OF POOR LOAD MATCHING OF THE TYPICAL RECIPROCATING PUMP. IMPROVEMENT OF THIS LOAD MATCHING OFFERS MUCH MORE POTENTIAL FOR IMPROVEMENT IN PERFORMANCE THAN AERODYNAMIC REFINEMENT OF THE ROTOR.

79-0023 DORNBERG J
DANISH AMATEURS BUILD THE WORLD'S BIGGEST WINDMILL.
POP. MECH. 214(1): 80-84, JANUARY 1979.

THE 2000-KW WINDMILL AT TVIND COLLEGE IN DENMARK IS DESCRIBED.

79-0024 DORNER H
WIND ENERGY-EXPERIENCES AND DEVELOPMENTS.
ELEKTROTECH. Z. 100(2): 75-79, JANUARY 1979. (IN GERMAN)

THIS IS A RESUME OF A 1978 CONFERENCE ON THE SUBJECT OF THE UTILISATION OF WIND ENERGY. THE DAILY TASK, FOR THIS 6-DAY CONFERENCE, WAS TO PROVIDE A REVIEW OF RESEARCH ACTIVITIES FOR WIND ENERGY IN WEST GERMANY, TO EXCHANGE EXPERIENCES ON THE UTILISATION OF SUCH ENERGY, TO HIGHLIGHT SPECIFIC PROBLEMS AND TO PUT FORWARD SOLUTIONS FOR SPECIAL AREAS OF UTILISATION.

79-0025 ENERTECH 1500 ON LINE IN MI.
WIND POWER DIG. NO. 15: 22-23, SPRING 1979.

THE ENERTECH 1500, A MACHINE OFFERED BY SOLARGY, DETROIT, MICHIGAN, IS DESCRIBED.

79-0026 EWERS M H
WIND TURBINE APPARATUS.
U.S. PATENT NO. 4,134,707, JANUARY 16, 1979.

79-0027 FARMER E D, NEWMAN V G, ASHMOLE P H
THE INTEGRATION OF A COMPLEX OF WIND-DRIVEN GENERATORS INTO A POWER SYSTEM.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 385-389.

TECHNICAL AND ECONOMIC PROBLEMS, RELATING TO DYNAMICAL RESPONSE, SYSTEM OPERATION AND PLANNING, THAT WOULD REQUIRE EVALUATION IF A SUBSTANTIAL COMPLEX OF WIND-DRIVEN GENERATORS WERE TO BE INTEGRATED INTO A POWER SYSTEM ARE IDENTIFIED. AN ARRAY OF MACHINES IS CONSIDERED WITH A TOTAL OUTPUT IN A RANGE BETWEEN SEVERAL HUNDRED AND A FEW THOUSAND MEGAWATTS. ALTHOUGH THE DECISIVE QUESTIONS WOULD RELATE TO CAPITAL COST, STRUCTURAL INTEGRITY AND AMENITY, THE ECONOMIC VALUE OF THE DERIVED ENERGY WOULD BE SIGNIFICANTLY INFLUENCED BY THE OPERATIONAL REQUIREMENTS OF INCREASED SPARE CAPACITY AND PLANT FLEXIBILITY. THE OPERATIONAL PROBLEMS WOULD DERIVE FROM TWO PRINCIPAL CAUSES, NAMELY, THE VARIABLE AND UNCERTAIN NATURE OF THE WIND AND THE REMOTENESS OF SUITABLE GENERATION SITES FROM THE MAIN CENTRES OF DEMAND.

79-0028 FIELD EVALUATION INITIATED.
WIND POWER DIG. NO. 15: 21, SPRING 1979.

79-0029 FIGARD R L, SCHETZ J A
STUDIES OF THE AERODYNAMIC PERFORMANCE OF A 10 KW HORIZONTAL-AXIS WINDMILL.
J. ENERGY 3(1): 3-7, JANUARY-FEBRUARY, 1979.

THE AERODYNAMIC PERFORMANCE OF A MODERN, HIGH-TIP SPEED, THREE-BLADED WINDMILL RATED AT 10KW AT 30 MPH WAS STUDIED BY THREE METHODS. FIRST, THE RESULTS OF FIELD TESTS OF THE ACTUAL DEVICE WITH BOTH A RESISTIVE AND A BATTERY-CHARGING ELECTRIC LOAD ARE REPORTED. SECOND, THE PREDICTIONS OF A SIMPLE BLADE-ELEMENT ANALYSIS ARE PRESENTED AND COMPARED WITH THE FIELD DATA. AERODYNAMIC BLADE SECTION COEFFICIENTS OF AN ACTUAL BLADE SECTION WERE MEASURED IN A WIND TUNNEL AND USED AS INPUT IN THE ANALYSIS. THIRD, WIND TUNNEL TEST RESULTS FOR A 1/5TH SCALE MODEL ARE GIVEN. REYNOLDS NUMBER SIMULATION FROM MODEL TO PROTOTYPE IS CONSIDERED IN DETAIL. THE RESULTS OF ALL THREE EFFORTS ARE COMPARED, AND GOOD AGREEMENT IS SHOWN.

79-0030 FITZPATRICK E R
CONCENTRATED ALTERNATOR DESIGN.
ALTERN. SOURCES ENERGY NO. 38: 18-19, JULY/AUGUST 1979.

THIS WINDING DESIGN WILL SHOW YOU HOW TO OBTAIN THE GREATEST OUTPUT FOR A GIVEN NUMBER OF STATOR TURNS, FIELD FLUX, AND SPEED. THIS DESIGN HAS MANY ADVANTAGES: 1. EASY TO OBTAIN A SUITABLE FRAME; 2. SIMPLE TO REWIND;

3. HIGH OUTPUT AT LOW RPM; 4. SIMPLE MACHINE-SHOP WORK; AND 5. THREE-PHASE PRINCIPLE FOR HIGH EFFICIENCY.

79-0031 FRERIS L L, BOLTON H, BEUHRING I K, NICODEMOU V C
A LOW COST WIND ENERGY CONVERSION SYSTEM FOR HEATING OF DOMESTIC PREMISES.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 282-285.

AN ATTEMPT IS MADE TO DEMONSTRATE THAT IF A NUMBER OF CONDITIONS ARE FULFILLED AND ON THE BASIS OF CERTAIN ASSUMPTIONS, AN ECONOMICALLY VIABLE CASE CAN BE MADE FOR SMALL SCALE WIND ENERGY EXPLOITATION.

79-0032 FRANK A
FRESH BREEZE IN THE PRIVATE SECTOR.
SOLAR AGE 4(7): 41-42, JULY 1979.

PRIVATE WIND ENERGY RESEARCH IS COVERED.

79-0033 FROST W, TURNER R E
SUMMARY OF ATMOSPHERIC WIND DESIGN CRITERIA FOR WIND ENERGY CONVERSION SYSTEM DEVELOPMENT.
NTIS, JANUARY 1979. 54 P.
NASA-TP-1389

THIS REPORT PRESENTS BASIC DESIGN VALUES OF SIGNIFICANT WIND CRITERIA, IN GRAPHICAL FORMAT, FOR USE IN THE DESIGN AND DEVELOPMENT OF WIND TURBINE GENERATORS FOR ENERGY RESEARCH. IT IS A CONDENSED VERSION OF PORTIONS OF THE "ENGINEERING HANDBOOK ON THE ATMOSPHERIC ENVIRONMENTAL GUIDELINES FOR USE IN WIND TURBINE GENERATOR DEVELOPMENT," NASA-TP-1359, 1978.

79-0034 GIPE P
CLOWNING AROUND AT DORNEY PARK; TERRY MEHRKAM INSTALLS HIS FIRST 250 KW WIND MACHINE.
WIND POWER DIG. NO. 15: 39-43, SPRING 1979.

TERRY MEHRKAM INSTALLED A 250 KW WIND MACHINE AT PENNSYLVANIA'S DORNEY PARK. THE MACHINE IS EXPECTED TO SUPPLY 20 PERCENT OF THE AMUSEMENT PARK'S ELECTRICITY NEEDS.

79-0035 GIPE P
DAKOTA SUN + WIND, MAKING A GOOD MACHINE BETTER.
WIND POWER DIG. NO. 15: 13-14, SPRING 1979.

THE SMALL MACHINE BUILT BY DAKOTA SUN + WIND IS DESCRIBED.

79-0036 GLASGOW J C, ROBBINS W H
UTILITY OPERATIONAL EXPERIENCE ON THE NASA/DOE MOD/OA 200-KW WIND TURBINE.
NTIS, 1979. 30 P.
NASA-TM-79084, N79-20494, DOE/NASA/1004-79/1

THE MOD-OA 200 WIND TURBINE WAS DESIGNED AND FABRICATED AS PART OF THE FEDERAL WIND ENERGY PROGRAM. EARLY WIND TURBINE OPERATION AND PERFORMANCE DATA WERE OBTAINED WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. THE MOD-OA 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. THE MACHINE IS DESCRIBED AND THE RECENT OPERATIONAL EXPERIENCE AT CLAYTON, NM IS DOCUMENTED.

79-0037 GUSTAVSON M R
LIMITS TO WIND POWER UTILIZATION.
SCIENCE 204(4388): 13-17, APRIL 6, 1979.

AS WIND ENERGY RECEIVES INCREASING ATTENTION IT IS IMPORTANT TO UNDERSTAND THE NONECONOMIC FACTORS LIMITING THE TOTAL POWER THAT CAN BE EXTRACTED FROM THE WIND. THESE FACTORS ARE EXAMINED HERE WITH A MACROSCOPIC APPROACH. POSSIBLE LEVELS FOR THE CONTINENTAL UNITED STATES ARE DEFINED. SOME GENERAL CONCLUSIONS ARE REACHED REGARDING THE SITES THAT WOULD HAVE TO BE UTILIZED TO ACHIEVE THESE LEVELS. EVEN WITHIN THESE LIMITS, WIND ENERGY IS SEEN TO OFFER A POTENTIAL FAR LARGER THAN

MANY OTHER SELF-RENEWING ENERGY SOURCES.

79-0038 HANLON J
VISITING WINDMILLS IN WALES.
NEW SCI. 76(1075): 216-218, OCTOBER 27, 1979.

EXHIBITS AT THE CENTRE FOR ALTERNATIVE TECHNOLOGY IN WALES INCLUDE: AN ENTIRE LOW ENERGY HOUSE, A SOLAR COLLECTOR, THREE WINDMILLS, FISH CULTURE, ORGANIC GARDENS, AND A DO-IT-YOURSELF COMPOST BIN.

79-0039 HANSEN A C
EFFECTS OF TURBULENCE ON WIND TURBINE PERFORMANCE.
ASCE CONVENTION + EXPOSITION, BOSTON, APRIL 2-6, 1979. PREPRINT 3537.
17 P.

SMALL WIND TURBINE GENERATOR TESTING AND DESIGN HAVE TRADITIONALLY NEGLECTED UNSTEADINESS IN THE WIND WHENEVER POSSIBLE. PRIMARILY FOR SIMPLIFICATION, STEADY-STATE CONDITIONS HAVE BEEN SOUGHT IN TESTING AND DESIGN ANALYSES HAVE ASSUMED STEADY OR QUASI-STEADY WIND CONDITIONS. THOUGH THIS PATTERN HAS BEEN CHANGING IN THE PAST FEW YEARS TOWARDS RECOGNITION OF THE NEED TO PROPERLY TREAT TURBULENCE EFFECTS, MUCH EFFORT REMAINS IN IDENTIFYING NEEDS AND METHODS IN BOTH TESTING AND DESIGN. SMALL WIND ENERGY CONVERSION SYSTEM (SWECS) RESEARCH ACTIVITIES MANAGED BY ROCKWELL INTERNATIONAL FOR THE DEPARTMENT OF ENERGY ARE ACTIVELY SEEKING TO DETERMINE THE EFFECTS AND IMPORTANCE OF TURBULENCE ON SYSTEM PERFORMANCE AND COSTS. THE PURPOSE OF THIS PAPER IS TO DESCRIBE EFFORTS UNDERWAY AND PRELIMINARY FINDINGS OF THE STUDY OF TURBULENCE EFFECTS. MORE SPECIFICALLY, THE PAPER WILL DESCRIBE RANDOM DATA ANALYSIS METHODS IN USE AT THE WIND SYSTEMS TEST CENTER AND THE EFFECTS OF TURBULENCE ON STRUCTURAL DESIGN IN NINE SUBCONTRACTED PROTOTYPE DEVELOPMENTS.

79-0040 HARLEY R G, BEN-DOV E
WIND ENERGY CONVERSION AND HYDROGEN PRODUCTION A FEASIBILITY STUDY FOR SOUTH AFRICA.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 273-276.

THIS PAPER DESCRIBES A FEASIBILITY STUDY INTO THE USE IN SOUTH AFRICA OF THREE DIFFERENT WIND ENERGY CONVERSION (WEC) SCHEMES: WEC GENERATES AC POWER AND IS SYNCHRONIZED TO AN ELECTRIC UTILITY GRID WHICH HAS ENERGY STORAGE CAPACITY SUCH AS PUMPED WATER STORAGE FOR EXAMPLE; A SCHEME SIMILAR TO SCHEME 1, BUT THE GRID HAS NO STORAGE CAPACITY; WEC GENERATED DC POWER IS USED IN AN ELECTROLYSIS MODE TO GENERATE HYDROGEN.

79-0041 HIGH KW WIND POWER PUT TO TEST.
ENG-NEWS REC. 203(3): 17, JULY 19, 1979.

THIS NEWS ARTICLE DESCRIBES THE 2,000 KW TURBINE CONSTRUCTED BY GE FOR DOE IN BOONE, N.C. ALSO MENTIONED IS A PLANNED 3,000 KW TURBINE TO BE BUILT IN SWEDEN.

79-0042 HINRICHSEN E N
INDUCTION AND SYNCHRONOUS MACHINES FOR VERTICAL AXIS WIND TURBINES. FINAL REPORT.
NTIS, JUNE 1979. 121 P.
SAND-79-7017

THIS REPORT DESCRIBES THE BEHAVIOR OF SYNCHRONOUS AND INDUCTION GENERATORS DRIVEN BY VERTICAL AXIS WIND TURBINES AND ASSESSES THE MERITS OF THE TWO TYPES OF MACHINES. MAJOR ADVANTAGES OF THE SYNCHRONOUS GENERATOR ARE REACTIVE POWER CONTROL AND GENERAL ACCEPTANCE BY UTILITY COMPANIES. THE MAJOR ADVANTAGE OF THE INDUCTION GENERATOR IS EXCELLENT DAMPING OF TORQUE PULSATIONS. THERE IS NO SIGNIFICANT DIFFERENCE IN STARTING ABILITY, EFFICIENCY, OR VOLTAGE RIPPLE.

79-0043 HOWELL Y, BERENY J A
ENGINEER'S GUIDE TO SOLAR ENERGY.
NTIS, FEBRUARY 1979. 330 P.
PB-297043

THE ENGINEER'S GUIDE TO SOLAR ENERGY IS DESIGNED TO ENABLE PROFESSIONALS IN ANY FIELD OF ENGINEERING, ARCHITECTS, BUILDERS, AND TRADESMEN TO DEVELOP A WORKING KNOWLEDGE OF SOLAR HEATING TECHNOLOGY. IT IS ALSO

DESIGNED TO SERVE AS A BASIC TEXTBOOK TO INTRODUCE COLLEGE STUDENTS TO THE FIELD OF SOLAR ENERGY.

79-0044 HSU C T
COMMENT ON "WIND POWER LIMITATIONS ASSOCIATED WITH VORTICES."
J. ENERGY 3(2): 127-128, MARCH-APRIL 1979.

HSU CRITICIZES TWO ARTICLES BY J. L. LOTH APPEARING IN EARLIER ISSUES OF JOURNAL OF ENERGY. LOTH RESPONDS.

79-0045 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY (A BIBLIOGRAPHY WITH ABSTRACTS).
NTIS, JULY 1979. 316 P.
NTIS/PS-79/0639

CITATIONS TO BIBLIOGRAPHIES, STATE-OF-THE-ART REVIEWS, AND LITERATURE SURVEYS ON VARIOUS ASPECTS OF FOSSIL FUELS, WIND, SOLAR ENERGY, HYDROGEN, GEOTHERMAL ENERGY, NUCLEAR ENERGY, AND BATTERIES ARE PRESENTED. A FEW CITATIONS PERTAIN TO ELECTRIC POWER.

79-0046 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE). VOL. 2. 1978-APRIL, 1979.
NTIS, JUNE 1979. 131 P.
NTIS/PS-79/0536

UPDATES 78-0106 (NTIS/PS-78/0417).

79-0047 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE). VOL. 1. 1970-1977.
NTIS, JUNE 1979. 225 P.
NTIS/PS-79/0535

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR.

79-0048 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE). VOL. 2. 1977-APRIL 1979.
NTIS, JUNE 1979. 282 P.
NTIS/PS-79/0534

SUPERCEDES 78-0108 (NTIS/PS-78/0416). UPDATES 78-0107 (NTIS/PS-78/0415).

79-0049 IGRA O
COST-EFFECTIVENESS OF THE VORTEX-AUGMENTED WIND TURBINE.
ENERGY 4(1): 110-130, FEBRUARY 1979.

COST ESTIMATES FOR THE CONVENTIONAL, HORIZONTAL-AXIS, WIND TURBINE AND FOR THE VORTEX-AUGMENTED WIND TURBINE ARE PRESENTED. FOR THE LATTER, THE VORTEX IS GENERATED BY AN APPROPRIATE DELTA WING. IT IS SHOWN THAT THE VORTEX-AUGMENTED WIND TURBINE COMPETES WELL WITH THE CONVENTIONAL TYPE. ITS ECONOMICAL ADVANTAGE INCREASES WITH INCREASING OUTPUT POWER.

79-0050 IGRA O
WIND DRIVEN ENERGY GENERATING DEVICE.
U.S. PATENT NO. 3,132,499, JANUARY 21, 1979.

THIS PATENT IS FOR A WIND-DRIVEN ENERGY GENERATING DEVICE COMPRISING A TURBINE INCLUDING WIND-DRIVEN ROTOR BLADES, AND A SHROUD ENCLOSING SAME; SAID SHROUD INCLUDING A THROAT WITHIN WHICH THE WIND-DRIVEN ROTOR BLADES ARE MOUNTED FOR ROTATION, AN INTAKE SECTION UPSTREAM OF AND HAVING AN INNER FACE CONVERGING TOWARDS THE THROAT, A DIFFUSER SECTION DOWNSTREAM OF AND HAVING AN INNER FACE DIVERGING AWAY FROM THE THROAT, AND BOUNDARY LAYER CONTROL MEANS TO PREVENT PREMATURE AIR SEPARATION ALONG THE INNER SURFACE OF THE DIFFUSER SECTION; SAID BOUNDARY LAYER CONTROL MEANS INCLUDING A PLURALITY OF AIR CHANNELS FORMED THROUGH THE SHROUD LEADING FROM AN EXTERNAL SURFACE OF THE SHROUD TO THE INTERNAL SURFACE OF ITS DIFFUSER SECTION FOR INJECTING A FLOW OF AIR OF HIGH KINETIC ENERGY FROM THE AIRSTREAM EXTERNAL OF THE SHROUD TO THE BOUNDARY LAYER OF THE AIRSTREAM WITHIN THE DIFFUSER SECTION OF THE SHROUD.

79-0051 AN INFORMAL DIRECTORY OF THE WIND ENERGY INDUSTRY.

MOTHER EARTH NEWS NO. 58: 94-95, JULY/AUGUST 1979.

THIS DIRECTORY WAS COMPILED BY MIKE EVANS OF "WIND POWER DIGEST".

79-0052 INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979.

THE FOLLOWING TOPICS WERE DEALT WITH: RENEWABLE ENERGY RESOURCES; ENERGY STORAGE; WAVE POWER GENERATION; WIND POWER SYSTEMS; WIND TURBINES; FLUIDISED BED COMBUSTION; SOLAR POWER SYSTEMS; TIDAL POWER SYSTEMS; COMPRESSED AIR STORAGE; SECONDARY CELLS; MAGNETOHYDRODYNAMIC GENERATION; COMBINED CYCLE POWER PLANTS; AND ENERGY ECONOMICS. 62 PAPERS WERE PRESENTED, ALL OF WHICH ARE PUBLISHED IN FULL IN THE PRESENT PROCEEDINGS.

79-0053 JOHNSON G T
EVALUATION OF SCHEMES FOR ESTIMATING SURFACE-WIND STRENGTH.
ATMOS. ENVIRON. 13(4): 437-442, 1979.

THREE METHODS OF ESTIMATING LOCAL SURFACE-WIND STRENGTH ON THE BASIS OF REMOTE MEASUREMENTS ARE COMPARED AGAINST ACTUAL MEASUREMENTS AT UP TO 12 PLACES IN THE SYDNEY REGION. THE METHODS INVOLVE (1) ASSUMING A UNIFORM WIND IN THE REGION (EQUAL TO THAT AT OBSERVATORY HILL), (2) SCALAR INTERPOLATION BETWEEN VALUES MEASURED BY THE NEAREST INSTRUMENTS, OR (3) VECTOR INTERPOLATION. FOR EACH METHOD, ADDITIONAL CLIMATOLOGICAL INFORMATION IS THEN PROVIDED IN TERMS OF LINACRE'S CONCEPT OF THE "WINDINESS RATIO", THE LOCAL WIND STRENGTH AS A FRACTION OF THAT AT A REFERENCE STATION. COMPARISONS FOR EACH HOUR OF FOUR SELECTED DAYS SHOW THAT THE ESTIMATES OF EACH METHOD ARE IMPROVED BY USING THIS INFORMATION. THIS SUGGESTS THAT THE WINDINESS CONCEPT MAY BE USEFUL IN SPECIFYING WIND FIELDS, ESPECIALLY IN COMPLICATED TOPOGRAPHY.

79-0054 KABAKER G
THE FUTURE OF OUR ENERGY SUPPLY.
ELEKTROTECH. Z. 100(7-8): 344-345, APRIL 1979. (IN GERMAN)

THE ARTICLE SUMMARISES, FROM THE W. GERMAN POINT OF VIEW, THE NOW COMMONLY HELD OPINION THAT NUCLEAR ENERGY IS THE ONLY PRACTICABLY AVAILABLE LARGE-SCALE ENERGY RESOURCE FOR THE MORE OR LESS IMMEDIATE FUTURE. GASIFICATION OF COAL WILL BECOME IMPORTANT BY THE YEAR 2000. OF ALTERNATIVE SOURCES ONLY METHANE PRODUCTION FROM WASTE AND WIND POWER SEEM LIKELY TO BE OF ANY USE TO W. GERMANY. SOME FIGURES ON ENERGY DENSITY IN VARIOUS ENERGY STORAGE MEDIA ARE GIVEN.

79-0055 KAHN E
RELIABILITY OF DISTRIBUTED WIND GENERATORS.
ELECTR. POWER SYST. RES. 2(1): 1-14, MARCH 1979.

THIS PAPER EXPLORES THE DATA AND MODELS NECESSARY TO EVALUATE THE RELIABILITY OF WIND GENERATORS THAT ARE GEOGRAPHICALLY DISTRIBUTED IN A UTILITY SYSTEM. A CASE STUDY IS CONDUCTED USING CALIFORNIA DATA. RESULTS ON CAPACITY CREDIT ARE FOUND TO DEPEND UPON THE SIZE OF THE REGION, THE RELIABILITY OF THE WIND REGIME, THE EXISTING POWER SYSTEM GENERATOR MIX, AND THE PENETRATION OF THE WIND GENERATORS.

79-0056 KATZENBERG R
WHERE ARE THE DALLAS COWGIRLS WHEN WE NEED THEM?
WIND POWER DIG. NO. 16: 5-7, SUMMER 1979.

THE TECHNOLOGY AND POTENTIAL ARE PROVEN. WHAT WIND ENERGY NEEDS IS A "CHEERLEADER"; SOMEONE, PREFERABLY FROM DOE, WHO WILL STAND UP AND SPEAK FOR IT AS A GOOD BET FOR A COST-EFFECTIVE, NEAR-TERM, LARGE SCALE ENERGY SOURCE.

79-0057 KAZA K R V, JANETZKE D C, SULLIVAN T L
EVALUATION OF MOSTAS COMPUTER CODE FOR PREDICTING DYNAMIC LOADS IN TWO BLADED WIND TURBINES.
NTIS, 1979. 21 P.
NASA-TM-79101, DOE/NASA/1028-72/2, N79-21549

CALCULATED DYNAMIC BLADE LOADS WERE 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 USES A TIME-AVERAGED COEFFICIENT APPROXIMATION IN CONJUNCTION WITH A MULTI-BLADE COORDINATE TRANSFORMATION FOR TWO BLADED ROTORS TO SOLVE THE EQUATIONS OF MOTION BY STANDARD EIGENANALYSIS. THE SECOND VERSION ACCOUNTS FOR PERIODIC COEFFICIENTS WHILE SOLVING THE EQUATIONS BY A TIME HISTORY INTEGRATION. A HYPOTHETICAL THREE-DEGREE OF FREEDOM DYNAMIC MODEL WAS INVESTIGATED. THE EXACT EQUATIONS OF MOTION OF THIS MODEL WERE SOLVED USING THE FLOQUET-LIPUNOV METHOD. THE EQUATIONS WITH TIME-AVERAGED COEFFICIENTS WERE SOLVED BY STANDARD EIGENANALYSIS.

79-0058 KETNER K
WIND CHARGERS: SMALL CAN BE BEAUTIFUL.
ALTERN. SOURCES ENERGY NO. 38: 24-29, JULY/AUGUST 1979.

THE AUTHOR PROVIDES SUGGESTIONS FOR THE "WIND-POWER ROOKIE" WHO IS TRYING TO REJUVENATE ONE OF THE OLDER SMALL WIND MACHINES SO COMMON IN THE 30'S AND 40'S.

79-0059 KNOX J B
LLL WIND ENERGY STUDIES (OAHU).
NTIS, JANUARY 1979. 21 P.
CONF-781239-1, UCRL-82171

THE ROLE IN THE NATIONAL WIND ENERGY PROGRAM ASSIGNED TO LLL IS THE DEVELOPMENT AND VERIFICATION OF A SITE SCREENING METHODOLOGY FOR WIND ENERGY RESOURCES. THE SITE SCREENING METHODOLOGY AND THE OAHU STUDIES OF THE PAST THREE YEARS INCLUDE: (A) 3-DIMENSIONAL, DIAGNOSTIC FLOW SIMULATION OVER COMPLEX TERRAIN, (B) MODERN STATISTICAL TECHNIQUES OF PATTERN RECOGNITION ADAPTED TO REGIONAL WIND FIELDS, AND (C) REMOTE SENSING OF ATMOSPHERIC WIND FIELD BY LASER SCINTILLATION. BY APRIL 1979, THE LLL TEAM WILL PROVIDE THE DOE WITH A SUITABLE SITE SCREENING METHODOLOGY FOR WIND ENERGY, AND A SIGNIFICANT DATA BASE OF TWO YEARS DURATION FOR THE ISLAND OF OAHU INCLUDING SPECIAL WIND STATIONS ON THE KAENA AND KAHUKU SUBAREAS, AND EIGHT STATIONS SELECTED FROM THE UNIVERSITY OF HAWAII STUDIES. SOME OF THE SIGNIFICANT RESULTS OF THESE STUDIES ARE PRESENTED.

79-0060 LEONARD T M
A USER'S MANUAL FOR THE COMPUTER CODE PAREP.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, APRIL 1979. 56 P.
SAND-79-0431

THIS REPORT DISCUSSES PAREP (PARAMETRIC REPRESENTATION), A COMPUTER CODE THAT USES NUMERICAL AND EMPIRICAL DATA TO ESTIMATE THE AERODYNAMIC PERFORMANCE OF DARRIEUS-TYPE VERTICAL AXIS WIND TURBINES. BOTH PROGRAM THEORY AND USAGE ARE DESCRIBED FOR THE CODE. SAMPLE RUNS AND PROGRAM LISTINGS ARE PROVIDED.

79-0061 LET 10,000 WINDMILLS TURN.
SWEDEN NOW 13(3): 33, 1979.

A REPORT BY THE NATIONAL SWEDISH BOARD FOR ENERGY SOURCE DEVELOPMENT IS DESCRIBED. THE REPORT IS ON A PROJECT WHICH USES WINDMILLS TO PROVIDE POWER TO BETWEEN 20,000 AND 40,000 ONE-AND ROW-FAMILY DWELLINGS IN SWEDEN LOCATED OUTSIDE DENSELY POPULATED AREAS IN REGIONS HAVING WINDY CONDITIONS.

79-0062 LIEBLEIN S, ROSS R S, FERTIS D G
EVALUATION OF URETHANE FOR FEASIBILITY OF USE IN WIND TURBINE BLADE DESIGN.
NTIS, APRIL 1979. 156 P.
NASA-CR-159530, DOE/NASA/7653-79/1, N79-20497/OST

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. DATA ARE ALSO INCLUDED FOR A LARGE-SCALE URETHANE BLADE SECTION COMPOSED OF CAST SYMMETRICAL HALF-PROFILES TESTED AS A CANTILEVER BEAM. BASED ON THESE RESULTS, AN ANALYSIS WAS CONDUCTED OF A FULL-SCALE BLADE DESIGN OF CAST URETHANE THAT MEETS THE DESIGN SPECIFICATIONS OF THE ROTOR BLADES FOR THE NASA/DOE EXPERIMENTAL 100-KW MOD-0 WIND TURBINE.

BECAUSE OF THE LOW VALUE OF ELASTIC MODULUS FOR URETHANE (AROUND 457,000 PSI), THE DESIGN LOADS WOULD HAVE TO BE CARRIED BY METAL REINFORCEMENT. CONSIDERATIONS FOR FUTURE EVALUATION ARE NOTED.

79-0063 LITTLER J G F, THOMAS R B
WIND POWER FOR DOMESTIC USE IN THE UNITED KINGDOM.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 313-316.

DISCUSSED IS THE CAMBRIDGE AUTARKIC HOUSING PROJECT ON THE SERVICING OF DWELLINGS WITH LITTLE OR NO NETWORK ENERGY. THE INVESTIGATION HAS REVEALED THE GREAT EXPENSE OF PROVIDING ALL HOUSEHOLD ELECTRICITY WITHOUT RELIANCE ON THE NATIONAL GRID, IN THE CASE OF EITHER ONE HOUSE OR EVEN A GROUP OF HOUSES; HOWEVER, THE COST OF USING WIND POWER FOR SPACE AND WATER HEATING IS CONSIDERABLY LESS. IN ADDITION TO DESCRIBING THE WIND TURBINE TO BE USED AT CAMBRIDGE, THE APPROACH USED IN OPTIMISING THE DIVISION OF EXPENDITURE OF THERMAL STORAGE AND WIND TURBINE SIZE WHEN CONSIDERING THE USE OF WIND POWER FOR SPACE AND WATER HEATING IS SUMMARISED.

79-0064 MCCONNELL R D
GIROMILL OVERVIEW.
WASHINGTON, D.C., GOV'T. PRINT. OFFICE, 1979. 12 P.
SERI/TP-35-263

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. MCDONNELL AIRCRAFT COMPANY COMPLETED A FEASIBILITY STUDY OF THE GIROMILL IN 1976. THEIR INITIAL WORK WAS FOLLOWED BY MODEL TESTS IN A WIND TUNNEL IN 1976 AND 1977. PRESENTLY THE PUMP DIVISION OF VALLEY INDUSTRIES, INC., IS COOPERATING WITH MCDONNELL AIRCRAFT TO DESIGN, BUILD, AND DELIVER A 40-KW (8.9-M/S) GIROMILL FOR THE U.S. DEPARTMENT OF ENERGY. DELIVERY TO ROCKY FLATS IS SCHEDULED FOR THE END OF 1979. IN ADDITION TO DESCRIBING THE ABOVE WORK, THIS PAPER PRESENTS AN EVALUATION OF THE GIROMILL CONCEPT IN TERMS OF SOME WIND ENERGY RULES-OF-THUMB.

79-0065 MCDERMOTT J
NYC'S ENERGY TASK FORCE.
ALTERN. SOURCES ENERGY NO. 38: 20-23, JULY/AUGUST 1979.

79-0066 MCGILL S
WIND-POWERED DAIRYING.
FURROW 84(7): 14-15, SEPTEMBER/OCTOBER 1979.

TWO IDEAS THAT COULD SAVE ON ENERGY COSTS AT SOME DAIRY FARMS ARE: (1) USE WIND POWER TO HELP COOL THE MILK AND WARM THE WASH WATER. LET IT GENERATE SUPPLEMENTAL ELECTRIC POWER THAT CAN BE HOOKED INTO EXISTING ELECTRIC CIRCUITS. (2) MAKE USE OF WASTE HEAT FROM THE COOLER'S CONDENSER. ENGINEERS AND DAIRY SCIENTISTS ARE TESTING THESE IDEAS IN THE 120-COW DAIRY AT COLORADO STATE UNIVERSITY.

79-0067 MARIER D
WHAT'S AVAILABLE IN WIND EQUIPMENT.
ALTERN. SOURCES ENERGY NO. 38: 3-8, JULY/AUGUST 1979.

THIS ARTICLE IS A GUIDE TO AVAILABLE EQUIPMENT IN THE WIND ENERGY FIELD, AND DEALS SPECIFICALLY WITH SYNCHRONOUS INVERTERS, INDUCTION GENERATORS, AND SEVERAL COMPANIES: ENERTECH, WIND ENGINEERING, DYNERGY, ASTRAL-WILCON. INCLUDED IS AN EXTENSIVE LIST OF COMMERCIALLY AVAILABLE WIND MACHINES GIVING THE FOLLOWING INFORMATION FOR EACH: SIZE (RATED KW), ROTOR DIAMETER (FEET), NUMBER OF BLADES, RATED SPEED (MPH) AND CUT-IN SPEED (MPH). ALSO INCLUDED IS A LIST OF MANUFACTURERS WITH ADDRESSES.

79-0068 MARSH W D, SCHACHLE C, SCHEFFLER R L, DUNNING R L
WIND ENERGY AND UTILITIES, EXCERPTS FROM THE PROCEEDINGS OF THE NATIONAL AWEA MEETING, AMARILLO, TEXAS.
WIND POWER DIG. NO. 16: 30-36, SUMMER 1979.

EXCERPTS ARE PRESENTED FROM THREE PAPERS: (1) WIND POWER IN ELECTRIC UTILITIES, BY W.D. MARSH; (2) SOUTHERN CALIFORNIA EDISON'S 3 MW WIND

79-0069 MENSFORTH T
WINDPOWER GENERATION ON A LARGE SCALE.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 268-272.

A GENERAL DESCRIPTION OF A 10 MW WINDMILL IS PRESENTED, PARTICULAR ATTENTION BEING PAID TO THE ROTOR DESIGN. THE INFLUENCE OF WIND-HEIGHT PROFILES IS DISCUSSED, CONSIDERING VARIOUS TYPES OF SITES, OPTIMAL GROUND CLEARANCE AND ACCURACY OF PERFORMANCE ESTIMATES.

79-0070 MOD-1 TURBINE ON-LINE.
WIND POWER DIG. NO. 16: 15, SUMMER 1979.

COMPLETION OF THE 200 FOOT DIAMETER MOD-1 TURBINE INSTALLED NEAR BOONE, N.C., IS REPORTED.

79-0071 MOORE D J
DEPLETION OF AVAILABLE WIND POWER BY A LARGE NETWORK OF WIND GENERATORS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 302-305.

A ROUGH EMPIRICAL TECHNIQUE IS DEVELOPED TO DETERMINE THE MAGNITUDE OF THE DEPLETION OF THE HUB LEVEL WIND BY THE SHADOWING EFFECT OF UPSTREAM GENERATORS. THE PROBLEMS OF FETCHES OF ORDER TENS OF KILOMETRES IS TACKLED FIRST AND THEN THE PROBLEM OF DEPLETION OVER A DISTANCE SUCH THAT THE MEAN RATE OF POWER EXTRACTION IS NOT SERIOUSLY AFFECTED BY THE UPSTREAM GENERATORS.

79-0072 MUSGROVE P J
OFFSHORE WIND ENERGY SYSTEM FOR THE UK.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 309-312.

THIS PAPER CONSIDERS SOME OF THE MORE IMPORTANT FACTORS AFFECTING THE DESIGN OF OFFSHORE WIND ENERGY SYSTEMS. IT IS CONCLUDED THAT THE POWER DENSITIES IN OFFSHORE WINDS ARE ATTRACTIVELY HIGH, OF THE ORDER 300 KW PER LINEAR METRE (PERPENDICULAR TO THE WIND DIRECTION) OR 1500 W PER SQUARE METRE OF ROTOR SWEPT AREA. SINCE MODERN WIND TURBINES ARE EFFICIENT ENERGY CONCENTRATORS THEY HAVE A VERY SHORT ENERGY RECOVERY PERIOD-ONLY ONE YEAR. THE ECONOMICS OF OFFSHORE OPERATION STRONGLY FAVORS THE USE OF LARGE WIND TURBINES, ABOUT 100 M DIAMETER, AND A LOW RATED WIND SPEED IS ALSO ADVANTAGEOUS. A TYPICAL OFFSHORE WIND ENERGY SYSTEM MIGHT THEREFORE COMPRISE A 10*10 ARRAY OF 100 M DIAMETER WIND TURBINES, TO GIVE A CLUSTER RATING OF 600 MW AND A PLANT FACTOR (AVERAGE OUTPUT RELATIVE TO RATED OUTPUT) OF ABOUT 40 PERCENT.

79-0073 NELSON L L
WIND AND WATER: PARTNERS IN POWER.
RECLAMATION ERA 64(3): 1-7, 1979.

A PROJECT IN WYOMING TO INTEGRATE WIND ENERGY WITH HYDROELECTRIC POWER IS DESCRIBED.

79-0074 NEUSTADTER H E
THE USE OF WIND DATA WITH AN OPERATIONAL WIND TURBINE IN A RESEARCH AND DEVELOPMENT ENVIRONMENT.
NTIS, 1979. 13 P.
NASA-TM-73832

THE NEED TO MEASURE AND COLLECT WIND DATA PERSISTS WELL AFTER A WIND TURBINE IS INITIALLY MADE OPERATIONAL. THIS IS PARTICULARLY THE CASE IN AN R+D PROGRAM SUCH AS THE WIND ENERGY PROJECT BEING CONDUCTED BY LEWIS RESEARCH CENTER FOR THE DEPARTMENT OF ENERGY. THIS REPORT PRESENTS THE STATUS OF OUR USE OF WIND INFORMATION IN FOUR AREAS, NAMELY: OPERATIONAL CONTROL, DESIGN VERFICATION, POWER PERFORMANCE ANALYSIS, AND LIFETIME ESTIMATION. ATTENTION IS ALSO GIVEN TO SOME OF THE IDENTIFIED, BUT AS YET UNMET, WIND INFORMATIONAL NEEDS AND THE STEPS WE PLAN TO TAKE TO MEET THESE NEEDS.

79-0075 NEW ENERGY SAVER HARNESSES WIND.

AGRIC. RES. 27(7): 3-4, JANUARY 1979.

A DARRIEUS TURBINE IS DESCRIBED WHICH IS USED IN A "WIND-ASSISTED SYSTEM" FOR IRRIGATION PUMPING. AT LOW SPEEDS AN ELECTRIC MOTOR SUPPLIES ALL POWER TO THE PUMP. WHEN WIND SPEED EXCEEDS 13 MPH (20.8 KILOMETERS PER HOUR) THE WIND TURBINE SUPPLIES MECHANICAL POWER TO THE PUMP THEREBY REDUCING THE ELECTRICITY COST.

79-0076 NEW STORAGE SYSTEM UNDER DEVELOPMENT.
WIND POWER DIG. 16: 17, SUMMER 1979.

79-0077 NICKOLS W R
DESIGN AND CONSTRUCTION OF THE ALDBOROUGH AEROGENERATOR.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 306-308.

DESCRIBED IS THE ALDBOROUGH HORIZONTAL AXIS MACHINE WHICH IS THE LARGEST AEROGENERATOR OPERATING IN THE UK IN 1978. IT HAS BEEN CONSTRUCTED WITH THE KNOWLEDGE AND EXPERIENCE OF THE WORK CARRIED OUT IN THE FIFTIES.

79-0078 NORTHWEST SEEN HAVING FAVORABLE WEC POTENTIAL.
SOL. ENERGY INTELL. REP. 5(3): 27, JANUARY 15, 1979.

79-0079 OOI B T, DAVID R A
INDUCTION GENERATOR/SYNCHRONOUS CONDENSER SYSTEM FOR WIND TURBINE POWER.
INST. ELECTR. ENG. PROC. 126(1): 69-74, JANUARY 1979.

A NOVEL WIND-TURBINE-DRIVEN ELECTRIC POWER SYSTEM FOR ISOLATED COMMUNITIES IS DESCRIBED. THE SYSTEM CONPONENTS CONSIST OF AN INDUCTION GENERATOR AND A SYNCHRONOUS CONDENSER. THE SYNCHRONOUS CONDENSER SUPPLIES THE MAGNETISATION CURRENT TO THE INDUCTION GENERATOR. BESIDES SUPPLYING THE LOAD POWER, THE INDUCTION GENERATOR FEEDS THE SYNCHRONOUS CONDENSER WITH REAL POWER TO REPLENISH WINDAGE, FRICTION AND I/SUP 2/R LOSSES TO SUSTAIN IT AT SYNCHRONOUS SPEED. THE THEORY OF OPERATION IS GIVEN AND PREDICTIONS BASED ON IT ARE EXPERIMENTALLY VERIFIED. THE CONTROLLERS REQUIRED TO MAINTAIN REGULATED VOLTAGE AND FREQUENCY IN SPITE OF LOAD AND WIND VELOCITY CHANGES ARE INVESTIGATED. SLIP-ENERGY RECOVERY IS INVOLVED, AND PRELIMINARY TEST RESULTS ARE PRESENTED.

79-0080 OSSENBRUGEN P J, PREGENT G P, MEEKER L D
OFFSHORE WIND POWER POTENTIAL.
AMER. SOC. CIV. ENG. ENERGY DIV. J. 105(EY1): 81-92, JANUARY 1979.

THE OFFSHORE REGION HAS BEEN CITED AS A LOCATION TO CONSTRUCT WIND ENERGY CONVERSION SYSTEMS BECAUSE THIS REGION OFFERS REDUCED SURFACE DRAG; THEREFORE, HIGHER WIND SPEEDS AND GREATER WIND POWER MAY BE HARNESSED THAN ON LAND. A RESULT OF A STATISTICAL ANALYSIS OF WIND SPEED RECORDS FOR THE GULF OF MAINE REGION SHOWS THAT SIX SEASONAL WIND GROUPS CAN BE IDENTIFIED AND THAT THE GAMMA DISTRIBUTION ADEQUATELY DESCRIBES THE WIND SPEED FREQUENCY. THE RESULTS SHOW THAT FOR SIX MONTHS OF THE YEAR HIGHER WIND SPEEDS CAN BE OBTAINED OFFSHORE THAN INLAND. THE USE OF THE GAMMA DISTRIBUTION OF WIND SPEED FOR OPERATIONAL CHARACTERISTICS OF WIND TURBINES SHOW THERE IS QUESTIONABLE GAIN IN OPERATING A TURBINE IN AN OFFSHORE ENVIRONMENT. HISTORICAL WIND SPEED RECORDS OF THE BOSTON LOGAN AIRPORT, THE BOSTON LIGHTSHIP, AND DATA COLLECTED ON BOARD SHIPS THAT TRAVERSED THE GULF OF MAINE REGION WERE USED IN THE STUDY.

79-0081 PARASCHIVOIU I, BILGEN E
FREE VORTICES FROM A WING FOR WIND TURBINE SYSTEMS.
J. ENERGY 3(3): 190-192, MAY-JUNE 1979.

79-0082 PERKINS F
SUMMARY OF CURRENTLY USED WIND TURBINE PERFORMANCE PREDICTION COMPUTER CODES.
NTIS, MAY 1979. 25 P.
SERI/TR-35-225

INFORMATION ON CURRENTLY USED WIND TURBINE AERODYNAMIC/ECONOMIC PERFORMANCE PREDICTION CODES IS COMPILED AND PRESENTED. AREAS OF INTEREST TO WIND ENERGY RESEARCHERS THAT ARE NOT INCLUDED IN THE REPORTED CODES ARE IDENTIFIED. AREAS WHICH ARE WEAK IN EXPERIMENTAL SUPPORT ARE ALSO IDENTIFIED.

79-0083 PERSHING B M
PERFORMANCE OF WINDMILLS IN A CLOSELY SPACED ARRAY.
J. ENERGY 3(3): 185-187, MAY-JUNE 1979.

79-0084 PETROUSEK K
ENERGY RESOURCES AND POWER AND HEAT PRODUCTION POSSIBILITIES.
ELEKTROTECHNIK 34(2): 34-38, FEBRUARY 1979. (IN CZECHOSLOVAKIAN)

DESCRIBED IS THE NECESSITY OF DEVELOPING ALTERNATIVE ENERGY RESOURCES DUE TO THE FAST RATE OF DEPLETION OF THE CONVENTIONAL FOSSIL FUELS. THE DEVELOPMENT OF NUCLEAR POWER STATIONS BASED ON THERMAL, FAST AND SYNTHETIC REACTORS IS FIRST DISCUSSED. OTHER POWER GENERATION SCHEMES DISCUSSED ARE MHD GENERATION, GEOTHERMAL PLANTS, WIND PLANTS, OCEAN-THERMAL POWER CONVERSION AND SOLAR POWER CONVERSION.

79-0085 PRITCHARD C
ENGINEERING CONSIDERATIONS IN THE IMPLEMENTATION OF NOVEL ENERGY CONCEPTS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P.398-401.

DISCUSSED ARE THE TECHNICAL AND ECONOMIC ASPECTS OF ADOPTING WATER POWER (WATER MILLS), WIND POWER AND SOLAR POWER GENERATING SCHEMES FOR THE SUPPLY OF REMOTE COMMUNITIES (HIGHLANDS IN SCOTLAND, SOUTHERN PARTS OF SAHARA).

79-0086 RPR'S ISSUED.
WIND POWER DIG. NO. 15: 24, SPRING 1979.

79-0087 GOVINDA RAJU S P, NARASIMHA R
A LOW-COST WATER PUMPING WINDMILL USING A SAIL TYPE SAVONIUS ROTOR.
NTIS, JANUARY 1979. 110 P.
79/FM/2, PB-294413

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 TIRE FOR THE PUMPING CHAMBER. TWO PROTOTYPES HAVE BEEN CONSTRUCTED AND THESE HAVE INDICATED A REASONABLE PERFORMANCE AND RELIABILITY.

79-0088 RAMLER J R, DONOVAN R M
WIND TURBINES FOR ELECTRIC UTILITIES: DEVELOPMENT STATUS AND ECONOMICS.
NTIS, 1979. 19 P.
DOE/NASA/1028-79/23, NASA-TM-79170

THE TECHNOLOGY AND ECONOMICS OF THE LARGE, HORIZONTAL-AXIS WIND TURBINES CURRENTLY IN THE FEDERAL WIND ENERGY PROGRAM ARE PRESENTED. WIND TURBINE TECHNOLOGY ADVANCEMENTS MADE IN THE LAST SEVERAL YEARS ARE DISCUSSED. IT IS SHOWN THAT, BASED ON CURRENT PROJECTIONS OF THE COSTS OF THESE MACHINES WHEN PRODUCED IN QUANTITY, THEY SHOULD BE ATTRACTIVE FOR UTILITY APPLICATION. THE COST OF ELECTRICITY (COE) PRODUCED AT THE BUSBAR IS SHOWN TO BE A STRONG FUNCTION OF THE MEAN WIND SPEED AT THE INSTALLATION SITE. THE BREAKEVEN COE AS A "FUEL SAVER" IS DISCUSSED AND THE COE RANGE THAT WOULD BE GENERALLY ATTRACTIVE TO UTILITIES IS INDICATED.

79-0089 REDDOCH T W, KLEIN J W
NO ILL WINDS FOR NEW MEXICO UTILITY.
IEEE SPECTRUM 16(3): 57-61, MARCH 1979.

PERFORMANCE OF A WIND GENERATOR IN A COMMON POWER SYSTEM IS EXAMINED AFTER MORE THAN A YEAR OF WORK. IT IS FOUND THAT THE GENERATOR SUPPLIES UP TO 200 KW OF OUTPUT POWER, NEARLY 15 PERCENT OF TOTAL POWER LOAD OF ELECTRIC UTILITY SYSTEM. A STUDY CONCLUDED THAT UNDESIRABLE INTERACTIONS BETWEEN DIESEL GENERATORS AND THE WIND-TURBINE'S CONTROL SYSTEM CAN BE AVOIDED IF WIND-TURBINE POWER FLUCTUATIONS CAUSED BY GUSTING STAY WITHIN THE REGULATING CAPABILITY OF THE DIESELS.

79-0090 REED J W
ANALYSIS OF THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, 1979. 24 P.
CONF-790114-1, SAND-78-2099C

THIS PRESENTATION (A) REVIEWS THE FLOW OF SOLAR ENERGY AND WIND, (B) DESCRIBES THE TIME AND SPACE DISTRIBUTION OF USEFUL WIND POWER, (C) CONSIDERS SOME OF THE MODERN MACHINERY THAT HAS BEEN CONCEIVED TO CAPTURE WIND ENERGY, (D) POINTS OUT SOME LIMITATIONS TO PRACTICAL WIND ENERGY EXTRACTION AND USE, AND (E) SUMMARIZES AVAILABLE AND PROJECTED WIND POWER HARDWARE SYSTEMS. IN KEEPING WITH A STATED CENTRAL THEME OF THIS CONFERENCE, MAJOR CONSTRAINTS TO WIND ENERGY EXPLOITATION WILL BE HIGHLIGHTED.

79-0091 REED J W
SOME VARIABILITY STATISTICS OF AVAILABLE WIND POWER.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, MARCH 1979. 51 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 PERCENT OF THE AVERAGE AT ALL LOCATIONS. LONG TERM INTEGRATED POWER PRODUCTION SHOWED MAXIMA AND MINIMA THAT DIFFERED BY 36 - 91 PERCENT FROM AVERAGE ANNUAL PRODUCTION.

79-0092 REED J W
WIND POWER CLIMATOLOGY OF THE UNITED STATES. SUPPLEMENT.
NTIS, APRIL 1979. 98 P.
SAND-78-1620

THIS SUPPLEMENT EXTENDS THE SUMMARIES IN THE EARLIER "WIND POWER CLIMATOLOGY OF THE UNITED STATES" TO INCLUDE MONTHLY AND ANNUAL AVERAGE WIND SPEEDS. STATION HISTORIES THAT ALLOW ADJUSTMENT FOR LOCAL AIR DENSITY, BASED ON STATION PRESSURE-ALTITUDE AND THE ANNUAL TEMPERATURE CYCLE, HAVE BEEN OBTAINED FROM THE NATIONAL CLIMATIC CENTER. THE LOGS OF ANEMOMETER EXPOSURES HAVE BEEN USED TO ADJUST BOTH WIND SPEEDS AND WIND POWERS TO STANDARD HEIGHT, 10 M ABOVE GROUND. EXTRAPOLATIONS FOR SPEED AND POWER AT 20- AND 50-M HEIGHTS HAVE ALSO BEEN PROVIDED. DATA ADJUSTMENTS TO 10-M HEIGHTS HAVE NOT SIGNIFICANTLY CHANGED THE ORIGINAL "ISODYN" CONTOUR MAPS EXCEPT IN THE NORTHEAST AND NORTHWEST COASTAL AREAS.

79-0093 REILLY D H
SAFETY CONSIDERATIONS IN THE DESIGN AND OPERATION OF LARGE WIND TURBINES.
NTIS, JUNE 1979. 36 P.
DOE/NASA/20305-79/3, NASA-TM-79193

THE ENGINEERING AND SAFETY TECHNIQUES USED TO ASSURE THE RELIABLE AND SAFE OPERATION OF LARGE WIND TURBINE GENERATORS UTILIZING THE MOD 2 WIND TURBINE SYSTEM PROGRAM AS AN EXAMPLE IS DESCRIBED. THE TECHNIQUES INVOLVE A CAREFUL DEFINITION OF THE WIND TURBINE'S NATURAL AND OPERATING ENVIRONMENTS, USE OF PROVEN STRUCTURAL DESIGN CRITERIA AND ANALYSIS

TECHNIQUES, AN EVALUATION OF POTENTIAL FAILURE MODES AND HAZARDS, AND USE OF A FAIL SAFE AND REDUNDANT COMPONENT ENGINEERING PHILOSOPHY. THE ROLE OF AN EFFECTIVE QUALITY ASSURANCE PROGRAM, TAILORED TO SPECIFIC HARDWARE CRITICALITY, AND THE CHECKOUT AND VALIDATION PROGRAM DEVELOPED TO ASSURE SYSTEM INTEGRITY ARE DESCRIBED.

79-0094 RIDLEY T R
IMPROVING A SMALL WECS.
WIND POWER DIG. NO. 15: 36-37, SPRING 1979.

THE AUTHOR DESCRIBES CHANGES HE MADE TO IMPROVE THE EFFICIENCY OF HIS 200-W WINDGENERATOR.

79-0095 ROBBINS W H, THOMAS R L
LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT.
NTIS, 1979. 14 P.
DOE/NASA/1059-79/2, NASA-TM-79174

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 ONGOING WIND SYSTEM DEVELOPMENTS ORIENTED PRIMARILY TOWARD UTILITY APPLICATION. IN ADDITION, A

COMPREHENSIVE TECHNOLOGY PROGRAM SUPPORTING THE WIND TURBINE PROJECTS IS BEING CONDUCTED. THIS PAPER PRESENTS AN OVERVIEW OF THE NASA ACTIVITIES. FIRST-GENERATION-TECHNOLOGY LARGE WIND TURBINES (MOD-OA AND MOD-1) HAVE BEEN DESIGNED AND ARE IN OPERATION AT SELECTED UTILITY SITES. SECOND-GENERATION MACHINES (MOD-2) ARE SCHEDULED TO BEGIN OPERATIONS ON UTILITY SITES IN 1980. THESE SECOND-GENERATION MACHINES ARE ESTIMATED TO GENERATE ELECTRICITY AT LESS THAN 4 CENTS/KWH WHEN MANUFACTURED AT MODEST PRODUCTION RATES. HOWEVER, TO MAKE A SIGNIFICANT ENERGY IMPACT, COSTS OF 2 TO 3 CENTS/KWH MUST BE ACHIEVED. THE FEDERAL PROGRAM WILL CONTINUE TO FUND THE DEVELOPMENT BY INDUSTRY OF WIND TURBINES WHICH CAN MEET THE COST GOALS OF 2 TO 3 CENTS/KWH. LOWER COSTS WILL BE ACHIEVED THROUGH THE INCORPORATION OF NEW TECHNOLOGY AND INNOVATIVE SYSTEM DESIGN TO REDUCE WEIGHT AND INCREASE ENERGY CAPTURE. THE NATIONAL CHALLENGE, HOWEVER, IS ASSOCIATED WIYH ACCEPTANCE BY THE UTILITIES OF WIND TURBINES AS PART OF THEIR ENERGY GENERATING CAPABILITY AND THE CREATION OF A COMPETITIVE INDUSTRY TO PRODUCE WIND TURBINES EFFICIENTLY. THE PRINCIPALS - GOVERNMENT, INDUSTRY, AND THE UTILITIES - ARE CURRENTLY INVOLVED IN MEETING THIS CHALLENGE.

79-0096 ROCKY FLATS ANNOUNCEMENTS. STUDY OF DYNAMIC STALL AS IT EFFECTS SMALL WIND ENERGY CONVERSION SYSTEMS (SWECS) DESIGN. PERFORMANCE MODEL COMPARISON STUDY.
WIND POWER DIG. NO. 16: 16-17, SUMMER 1979.

THIS BRIEF NEWS ITEM DESCRIBES TWO REQUESTS FOR PROPOSAL PLANNED BY DOE FOR THE ROCKY FLATS PROJECT.

79-0097 ROCKY FLATS CONTRACTS.
WIND POWER DIG. NO. 15: 24, SPRING 1979.

79-0098 SRI TO BUILD COMPOSITE BLADES.
WIND POWER DIG. NO. 16: 16, SPRING 1979.

79-0099 SWECS ECONOMICS EXAMINED.
WIND POWER DIG. NO. 15: 22, SPRING 1979.

79-0100 SCOTT D
OFFSHORE WIND POWER: THAR SHE BLOWS.
SWEDEN NOW 13(3): 34, 1979.

THE POTENTIAL OF OFFSHORE WIND POWER INSTALLATIONS IN THE BALTIC SEA, TO PROVIDE UP TO 10 PERCENT OF SWEDEN'S ELECTRICITY NEEDS BY 1995 IS DISCUSSED.

79-0101 SEELEY D, EUSER B, JOYCE C, MORGAN G H, LAITOS J G, ADAMS A
SOLAR ENERGY LEGAL BIBLIOGRAPHY.
NTIS, MARCH 1979. 160 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 THE FOLLOWING CATEGORIES: ANTITRUST, BIOMASS, BUILDING CODES, CONSUMER PROTECTION, ENVIRONMENTAL ASPECTS, FEDERAL LEGISLATION AND PROGRAMS, FINANCING/INSURANCE, INTERNATIONAL LAW, LABOR, LAND USE (COVENANTS, EASEMENTS, NUISANCE, ZONING), LOCAL LEGISLATION AND PROGRAMS, OCEAN ENERGY, PATENTS AND LICENSES, PHOTOVOLTAICS, SOLAR ACCESS RIGHTS, SOLAR HEATING AND COOLING, SOLAR THERMAL POWER SYSTEMS, STANDARDS, STATE LEGISLATION AND PROGRAMS, TAX LAW, TORT LIABILITY, UTILITIES, WARRANTIES, WIND RESOURCES, AND GENERAL SOLAR LAW.

79-0102 SELECTED REFERENCES ON SMALL WIND ENERGY CONVERSION SYSTEMS.
COMPILED BY THE DOE ROCKY FLATS WIND SYSTEMS PROGRAM, FEBRUARY 1, 1979.

79-0103 SHELLEY J J
A 1000 WATT WINDPLANT YOU CAN BUILD.
WIND POWER DIG. NO. 16: 38-49, SUMMER 1979.

79-0104 SHULTIS J K, POCH L A, ECKHOFF N D
OPTIMUM SELECTION OF A WIND TURBINE GENERATOR SYSTEM.
J. ENERGY 3(3): 145-150, MAY-JUNE 1979.

A METHOD IS DESCRIBED FOR THE SELECTION OF THE OPTIMUM SIZE (I.E., RATED POWER AND SPEED) FOR A WIND TURBINE GENERATING SYSTEM (WTGS) SUCH THAT, FOR GIVEN WIND SPEED CONDITIONS AND FOR GIVEN DEMAND POWER REQUIREMENTS, THE ANNUAL ECONOMIC SAVINGS ARE MAXIMIZED BY USING THE WTGS COMPARED TO PURCHASING ALL POWER FROM A UTILITY. NO STORAGE OF EXCESS GENERATED ELECTRICITY IS CONSIDERED AND ANY DEMAND IN EXCESS OF THAT GENERATED BY THE WTGS IS ASSUMED TO BE SUPPLIED BY THE UTILITY GRID. THE ECONOMIC SAVING REALIZED WITH THE OPTIMUM SIZED WTGS IS EXAMINED FOR VARIOUS PROBLEM VARIABLES SUCH AS THE DEGREE OF VARIABILITY IN THE WIND SPEED AND IN THE DEMAND LOAD THROUGHOUT THE DAY AND FROM SEASON TO SEASON.

79-0105 SMALL WIND SYSTEMS 1979. SWECS REPRESENTATIVES MEET IN BOULDER.
WIND POWER DIG. NO. 15: 25-35, SPRING 1979.

THE "SMALL WIND TURBINE SYSTEMS 1979" WORKSHOP HELD IN BOULDER, FEBRUARY 27 - MARCH 1, 1979, IS COVERED. A NUMBER OF SMALL MACHINES NOW BEING TESTED OR NOW UNDER DEVELOPMENT BY CONTRACT TO ROCKY FLATS WERE THE MAIN FEATURE OF THE WORKSHOP, AND ARE DESCRIBED IN THIS REPORT.

79-0106 SOLAR DIRECTORY AVAILABLE.
WIND POWER DIG. NO. 16: 16, SUMMER 1979.

A DIRECTORY OF SOLAR-RELATED EDUCATIONAL COURSES OFFERED BY POST-SECONDARY INSTITUTIONS HAS BEEN PREPARED BY SERI.

79-0107 STOIAKEN L
WIND SCAN, A REVIEW OF NEW DEVELOPMENTS.
ALTERN. SOURCES ENERGY NO. 38: 11-15, JULY/AUGUST 1979.

A NUMBER OF WIND POWER PROJECTS CURRENTLY UNDERWAY ARE DESCRIBED IN THIS REVIEW ARTICLE: SOUTHERN CALIFORNIA EDISON'S SCHACHLE PROJECT; CALIFORNIA CONSERVATION CORPS SAILWING IRRIGATION PROJECT; NEW YORK UNIVERSITY'S BARNEY BUILDING PROJECT IN NYC; CLARKSON'S FARM WINDMILL PROJECT; THE ROCKY FLATS SMALL WIND SYSTEMS RESEARCH PROGRAM; AND NASA'S PLUM BROOKE PROJECT.

79-0108 SWIFT-HOOK D T, BLACKBURN A J, MILBORROW D J, TAYLOR R H, LAWSON-TANCRED H, NICKOLS W R
PREDICTION AND MEASUREMENT OF AEROGENERATOR PERFORMANCE.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 298-301.

THIS PAPER PRESENTS THE RESULTS OF SOME PRELIMINARY FIELD MEASUREMENTS MADE ON THE 30 KW ALDBOROUGH AEROGENERATOR IN MARCH 1978 WHICH HAVE BEEN CARRIED OUT BY THE CEGB WITH THE AIM TO QUANTIFY THE TECHNICAL AND ECONOMIC PROBLEMS OF LARGE SCALE WIND GENERATION AS A POSSIBLE ALTERNATIVE SOURCE OF POWER.

79-0109 SWIFT-HOOK D T, TAYLOR R H
DIRECTIONAL ARRAYS OF WINDMILLS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 290-293.

THIS PAPER DEALS WITH THE PROBLEMS OF CLUSTERING, I.E. OF OPTIMISING THE POSITIONS AND SPACING BETWEEN INDIVIDUAL AEROGENERATORS IN A LARGE ARRAY. IT IS SUGGESTED THAT DIRECTIONAL ARRAYS APPEAR TO HAVE CONSIDERABLE ADVANTAGES OVER ISOTROPIC ARRAYS WITH RESPECT TO ENERGY DENSITY (PERHAPS 2.7 TIMES) AND POWER DENSITY (PERHAPS 4 TIMES). THEIR MAIN DISADVANTAGE (A GENERATION COST PENALTY OF 50 PERCENT OR MORE) MAY BE PARTLY OFF-SET BY REDUCED POWER MARSHALLING AND TRANSMISSION COSTS AND THEIR USE MAY BE DICTATED BY THE LIMITED POWER AVAILABLE FROM THE ATMOSPHERIC BOUNDARY LAYER.

79-0110 TAX CREDITS FOR WIND POWERED SYSTEMS.
ALTERN. SOURCES ENERGY NO. 38: 16-17, JULY/AUGUST 1979.

A HELPFUL TABLE IS PROVIDED GIVING TAX INCENTIVES, RESIDENTIAL USE, FOR WIND POWER APPLICATIONS IN TWENTY-THREE STATES.

79-0111 TRAUDT J
ESTIMATING WECS COSTS.
WIND POWER DIG. NO. 15: 16-18, SPRING 1979.

TABLES ARE PROVIDED TO HELP ESTIMATE THE AVERAGE COST OF ELECTRICITY FROM A WIND TURBINE DURING ITS WORKING LIFE, CONSIDERING INSTALLED COST, DOWN PAYMENT, OPERATING LIFE, LENGTH OF LOAN, INTEREST RATE, OPERATING + MAINTENANCE COSTS, AND INFLATION.

79-0112 A 200-KW WIND TURBINE GENERATOR CONCEPTUAL DESIGN STUDY.
NTIS, JANUARY 1979. 111 P.
NASA-TM-79032, DOE/NASA/1028-79/1, N79-17333

A CONCEPTUAL DESIGN STUDY WAS CONDUCTED TO DEFINE A 200 KW WIND TURBINE POWER SYSTEM CONFIGURATION FOR REMOTE APPLICATIONS. THE GOAL WAS TO ATTAIN AN ENERGY COST OF 1 TO 2 CENTS PER KILOWATT-HOUR AT A 14-MPH SITE (MEAN AVERAGE WIND VELOCITY AT AN ALTITUDE OF 30 FT.) THE COSTS OF THE CLAYTON, NEW MEXICO, MOD-0 (200-KW) WERE USED TO IDENTIFY THE COMPONENTS, SUBSYSTEMS, AND OTHER FACTORS THAT WERE HIGH IN COST AND THUS CONDIDATES FOR COST REDUCTION. EFFORTS DEVOTED TO DEVELOPING COMPONENT AND SUBSYSTEM CONCEPTS AND IDEAS RESULTED IN A MACHINE CONCEPT THAT IS CONSIDERABLY SIMPLER, LIGHTER IN WEIGHT, AND LOWER IN COST THAN THE PRESENT MOD-0A WIND TURBINES. IN THIS REPORT ARE DESCRIBED THE VARIOUS INNOVATIONS THAT CONTRIBUTED TO THE LOWER COST AND LIGHTER WEIGHT DESIGN AS WELL AS THE METHOD USED TO CALCULATE THE COST OF ENERGY.

79-0113 U.S. WIND POWER ASSOCIATES INK CALIFORNIA WIND CONTRACT.
WIND POWER DIG. NO. 16: 14, SUMMER 1979.

U.S. WIND POWER ASSOCIATES HAS SIGNED A CONTRACT WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES TO SELL WIND-GENERATED ELECTRICITY FROM THE NATION'S FIRST "WIND FARM". THE PROPOSED PROJECT IS DESCRIBED.

79-0114 UTILITIES EYE WIND-POWERED MACHINE.
MECH. ENG. 101(1): 46, JANUARY 1979.

A REVIEW OF THE MP1-200 WIND ENERGY CONVERSION SYSTEM, PRODUCED BY WTG ENERGY SYSTEMS, INC., AND LOCATED ON CUTTYHUNK ISLAND, MASSACHUSETTS, IS PRESENTED.

79-0115 WATSON G R, BAINBRIDGE G R
THE DESIGN CONSTRUCTION AND PROVING OF A LOW COST 5 KW WIND POWERED TURBINE FOR ISOLATED APPLICATIONS.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 277-281.

DISCUSSED IS THE DEVELOPMENT OF THE MAXIMILL WIND POWERED TURBINE DESIGNED WITH DARRIEUS AND SAVONIUS TYPE ROTORS ON A VERTICAL AXIS DRIVE SHAFT TO GIVE UP TO 5 KW OF ELECTRICAL OUTPUT. DESIGN ADVANCEMENTS, PARTICULARLY IN RESPECT OF THE AEROFOILS AND BEARINGS ARE DESCRIBED, WITH LOW COST AND RELIABLE OUTPUT AS THE FOREMOST CONSIDERATION.

79-0116 WEIS P
THE STATUS OF INFORMATION FOR CONSUMERS OF SMALL WIND ENERGY SYSTEMS.
NTIS, FEBRUARY 1979. 17 P.
SERI/TP-51-158

ALTHOUGH COMPETITION FROM CHEAP FUELS HAS LIMITED THEIR WIDESPREAD USE, WIND ENERGY SYSTEMS ARE A SOLAR TECHNOLOGY THAT HAS PERFORMED SUCCESSFULLY FOR DECADES. RENEWED INTEREST IN THIS SOLAR TECHNOLOGY IN BOTH THE PUBLIC AND PRIVATE SECTOR HAS PRODUCED A WIDE VARIETY OF DESIGNS SUITABLE FOR MANY APPLICATIONS. THIS PAPER SUMMARIZES PAST RESEARCH EFFORTS, EXISTING INFORMATION SOURCES, AND ONGOING WORK TO IMPROVE DATA NECESSARY FOR POTENTIAL CONSUMERS OF SMALL WIND ENERGY CONVERSION SYSTEMS.

79-0117 WILLMER A C
THE AERODYNAMIC DESIGN AND TESTING OF A VERTICAL AXIS WINDMILL.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 286-289.

IN SETTING OUT TO DESIGN A LARGE WINDMILL, IT WAS APPARENT THAT THE EXISTING AERODYNAMIC THEORIES FOR VERTICAL AXIS WINDMILLS WERE IN VARIOUS RESPECTS INADEQUATE. IT WAS THEREFORE DECIDED TO UNDERTAKE SOME WIND TUNNEL TESTS AT AN EARLY STAGE, USING THE RESULTS TO REFINE A MATHEMATICAL MODEL FOR THE DESIGN OF LARGE WINDMILLS. THESE TESTS AND THE DERIVATION OF THE MATHEMATICAL MODEL ARE DESCRIBED.

79-0118 WILSON D J, ZALAY A D, BRASHEARS M R, CRAVEN C E, SHRIDER K R, JORDAN A J
FULL-SCALE WAKE FLOW MEASUREMENTS WITH A MOBILE LASER DOPPLER VELOCIMETER.
J. AIRCR. 16(3): 155-161, MARCH 1979.

WAKE FLOW MEASUREMENTS WERE CONDUCTED WITH A MOBILE LASER DOPPLER VELOCIMETER (LDV). THE MEASUREMENTS INCLUDED SURVEYS OF AIRCRAFT WAKE VORTICES BEHIND A B-747 AIRCRAFT, AIRCRAFT CARRIER WAKE MEASUREMENTS FROM ABOARD THE U. S. S. NIMITZ, AND TOWER WAKE MEASUREMENTS FOR A 100-KW WIND TURBINE. RESULTS OF THESE TESTS DEMONSTRATED THAT A MOBILE GROUND-BASED LDV IS A VERSATILE AND USEFUL TOOL FOR THE MEASUREMENT OF FULL-SCALE-THREE-DIMENSIONAL WAKE FLOWS. THE POTENTIAL IS DEMONSTRATED FOR UTILIZATION OF THIS SYSTEM TO STUDY COMPLEX WAKES FOR A VARIETY OF APPLICATIONS.

79-0119 WIND ENERGY BUDGET SHOWS DOE UNDERRATES THE RESOURCE.
SOL. EN. INTELL. REP. 5(4): 35, JANUARY 22, 1979.

DOE FUNDING INCREASES ARE SEEN AS INADEQUATE FOR FULL DEVELOPMENT OF WIND ENERGY RESOURCES IN 1979 AND 1980.

79-0120 WIND POWER FOR CITY DWELLERS.
WIND POWER DIG. NO. 16: 18-28, SUMMER 1979.

THE DESIGN + INSTALLATION OF AN URBAN WINDMILL IN NEW YORK CITY IS DESCRIBED.

79-0121 WIND SLIDE-SHOW PLANNED.
WIND POWER DIG. NO. 16: 14, SUMMER 1979.

A SLIDE-SHOW IS PLANNED BY SERI TO COVER THE HISTORY, CURRENT RESEARCH, AND POTENTIAL OF WIND ENERGY SYSTEMS.

79-0122 WIND-WHEEL ELECTRIC-POWER GENERATOR.
MECH. ENG. 101(1): 46, JANUARY 1979.

THIS WIND-WHEEL ELECTRIC POWER GENERATOR MAXIMIZES USE OF AVAILABLE WIND, USING A NUMBER OF DUCTS. WIND CURRENTS CAPTURED BY DUCTS ARE DIRECTED AGAINST WHEEL BLADES. SYSTEM ROTATES AROUND ITS SUPPORTING COLUMN TO FACE THE PREVAILING WINDS.

79-0123 WINDMILL MYSTERY IN TEXAS.
WIND POWER DIG. NO. 15: 21, SPRING 1979.

79-0124 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. 20 P.
DOE/NASA/1028-79/24

IT WAS DESIRED TO OBSERVE THE BEHAVIOR OF A TWO BLADED WIND TURBINE WHERE THE TOWER FIRST BENDING NATURAL FREQUENCY IS LESS THAN TWICE THE ROTOR SPEED. THE SYSTEM THEN PASSES THROUGH RESONANCE WHEN ACCELERATING TO OPERATING SPEED. THE FREQUENCY OF THE ORIGINAL MOD-0 TOWER WAS REDUCED BY PLACING IT ON A SPRING FIXTURE. THE FIXTURE IS ADJUSTABLE TO PROVIDE A RANGE OF TOWER BENDING FREQUENCIES. FIXTURE DESIGN DETAILS ARE GIVEN AND BEHAVIOR DURING INITIAL OPERATION IS DESCRIBED.

79-0125 WORSTELL M H
AERODYNAMIC PERFORMANCE OF THE 17-METRE-DIAMETER DARRIEUS WIND TURBINE.
NTIS, JANUARY 1979. 65 P.

A TWO-BLADED 17-METRE DARRIEUS VERTICAL-AXIS WIND TURBINE WAS FIELD-TESTED AT THE SANDIA LABORATORIES WIND-TURBINE SITE. PERFORMANCE RESULTS FOR SEVEN CONSTANT OPERATING SPEEDS ARE PRESENTED ALONG WITH A DISCUSSION OF THE TRENDS. PREDICTED PERFORMANCE AND EXPERIMENTAL TEST DATA FOR TWO CONSTANT SPEEDS ARE ALSO COMPARED.

79-0126 WORTHINGTON P J
MATERIALS FOR WINDMILL BLADES.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P. 294-297.

THIS PAPER DISCUSSES MATERIAL PROPERTY REQUIREMENTS AND DESIGN ASPECTS OF THE BLADES FOR LARGE WINDMILLS, CAPABLE OF GENERATING MORE THAN 1 MW OF POWER. IT IS CONCLUDED THAT COMPOSITE MATERIALS OFFER A NUMBER OF ATTRACTIONS AS WINDMILL BLADE MATERIAL. TITANIUM ALLOY ALSO HAS SOME ATTRACTIVE PROPERTIES. FOR LONG TERM OPERATION MORE WORK IS REQUIRED TO DETERMINE THE EFFECT OF TIME AND ENVIRONMENT ON MATERIAL PROPERTY BEHAVIOUR.

79-0127 WYMAN P R, PEACHEY C J
TIDAL CURRENT ENERGY CONVERSION.
INTERNATIONAL CONFERENCE ON FUTURE ENERGY CONCEPTS, LONDON, JANUARY 30 - FEBRUARY 1, 1979. LONDON, IEE, 1979. P.164-166.

THE CONCEPT CONSIDERED IS THE EXTRACTION OF ENERGY FROM TIDAL CURRENTS BY MEANS OF IMMERSED ROTORS. THE ANALOGY WITH WINDMILLS CAN BE DRAWN, WITH THE DIFFERENCE THAT THE TIDAL CURRENTS ARE PREDOMINANTLY BIDIRECTIONAL, SO AN AXIAL FLOW ROTOR WHICH COULD ACCEPT REVERSAL COULD BE PRE-ALIGNED, AND THE CROSS-FLOW ROTOR (DARRIEUS TYPE) WOULD THUS LOSE ONE OF ITS IMPORTANT ADVANTAGES. THE ADVANTAGES OF "TIDE MILLS" COMPARED WITH A TIDAL BARRAGE ARE LOWER CAPITAL EXPENDITURE, AND SMALLER ENVIRONMENTAL IMPACT.

79-0128 YEN J T
WIND ENERGY: POTENTIAL, PROBLEMS AND POSSIBLE SOLUTIONS.
ASCE CONVENTION EXPOSITION, BOSTON, APRIL 2-6, 1979. PREPRINT 3532. 29 P.

THE AUTHOR DISCUSSES THE POTENTIAL OF WIND ENERGY, DIFFICULTIES ENCOUNTERED WITH CONVENTIONAL MACHINES, SOME INNOVATIVE SYSTEMS, AND PROVIDES A BASIS FOR HIS PREFERENCE FOR A "TORNADO-TYPE SYSTEM."

79-0129 YOUR WIND LIBRARY.
ATERN. SOURCES ENERGY NO. 38: 9-10, JULY/AUGUST 1979.

A FEW GENERAL BOOKS, AND THOSE FOR DO-IT-YOURSELFERS, ARE LISTED AND DESCRIBED.

78-0001 AFTER 1,000 HOURS OF SUCCESSFUL OPERATION, NASA, LOCKHEED TO INSPECT CLAYTON WINDMILL.
SOL. ENERGY INTELL. REP. 4(23): 168, JUNE 5, 1978.

78-0002 AKINS R E
WIND CHARACTERISTICS AT THE VAWT TEST FACILITY.
NTIS, 1978. 45P.
SAND-78-0760

A LIMITED PROGRAM OF FIELD MEASUREMENTS WAS UNDERTAKEN IN ORDER TO DEFINE THE WIND CHARACTERISTICS OF THE DOE/SANDIA VERTICAL AXIS WIND TURBINE TEST FACILITY. BECAUSE MICROMETEOROLOGICAL CONDITIONS UNDER WHICH A PARTICULAR WIND TURBINE IS TESTED MAY HAVE AN EFFECT ON THE PERFORMANCE OF THAT TURBINE, IT IS IMPORTANT THAT THESE CONDITIONS BE PROPERLY DOCUMENTED. THE MEAN VELOCITY PROFILE, LONGITUDINAL AND LATERAL TURBULENCE INTENSITIES, LONGITUDINAL VELOCITY SPECTRA, AND CROSSCORRELATIONS BETWEEN THE VELOCITIES AT SELECT LOCATIONS WERE MEASURED FOR A REPRESENTATIVE SAMPLE OF INCIDENT WINDS. THESE MEASUREMENTS ARE SUMMARIZED IN A FORM WHICH SHOULD FACILITATE COMPARISON WITH OTHER SITES.

78-0003 AKINS R E
PERFORMANCE EVALUATION OF WIND ENERGY CONVERSION SYSTEMS USING THE METHOD OF BINS-CURRENT STATUS.
NTIS, MARCH 1978. 24P.
SAND-77-1375

A DETAILED DESCRIPTION OF THE METHOD OF BINS, A TECHNIQUE OF DATA COLLECTION AND REDUCTION FOR FIELD PERFORMANCE EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS), IS PROVIDED. THE METHOD OF BINS IS A STRAIGHTFORWARD YET USEFUL APPROACH TO THE COMPLEX PROBLEM OF RELATING THE RESPONSE OF A WECS TO A VARIABLE WIND FIELD. EXAMPLES OF TYPICAL RESULTS OBTAINED USING THE METHOD OF BINS ARE PRESENTED. METHODS OF DETERMINING THAT THE MEASURE OF PERFORMANCE OF A WECS OBTAINED IS CORRECT ARE OUTLINED. AREAS IN WHICH FURTHER MODIFICATIONS TO THE TECHNIQUE MAY BE APPROPRIATE ARE ALSO DISCUSSED.

78-0004 ALTERNATE ENERGY SYSTEMS SEMINAR , PASADENA, CALIFORNIA, 30 MARCH, 1978. PROCEEDINGS.
NTIS, 1978. 184P.
ALTERNATE ENERGY SYSTEMS SEMINAR, PASADENA, CALIFORNIA, 30 MARCH, 1978.
N78-27522, NASA-CR-157255

THE ALTERNATIVE ENERGY SYSTEMS SEMINAR WAS HELD ON MARCH 30, 1978, AND WAS SPONSORED JOINTLY BY THE SOUTHWEST DISTRICT OFFICE OF THE U.S. DEPARTMENT OF ENERGY AND JPL. THE SEMINAR WAS AN EXPERIMENT IN INFORMATION EXCHANGE WITH THE AIM OF PRESENTING, IN A SINGLE DAY, STATUS AND PROSPECTS FOR A NUMBER OF ADVANCED ENERGY SYSTEMS TO A DIVERSE, LARGELY NONTECHNICAL AUDIENCE, AND TO SOLICIT POST-SEMINAR RESPONSES FROM THAT AUDIENCE AS TO THE SEMINAR'S USEFULNESS. THE MAJOR SYSTEMS PRESENTED ARE: (1) SOLAR PHOTOVOLTAIC (2) GEOTHERMAL (3) COGENERATION POWER (4) SOLAR THERMAL (5) SOLAR HEATING AND COOLING (6) WIND ENERGY, AND (7) SYSTEMS CONSIDERATIONS.

78-0005 ALEXANDER A J, HOLOWNIA B P
WIND TUNNEL TESTS ON A SAVONIUS ROTOR.
J. IND. AERODYN. 3:343-351, 1978.

TESTS HAVE BEEN MADE IN A WIND TUNNEL ON A NUMBER OF SAVONIUS ROTOR CONFIGURATIONS IN WIND SPEEDS OF 6-9 M/S. THE VARIABLES TESTED WERE BLADE ASPECT RATIO, BLADE OVERLAP AND GAP AND THE EFFECTS OF ADDING END EXTENSIONS, END PLATES AND SHIELDING. FOR LOW ASPECT RATIOS (APPROX.1) WITH NO ADDITIONS THE EFFICIENCY WAS LOW (APPROX.0.065) BUT FOR HIGHER ASPECT RATIOS (APPROX.5) WITH OPTIMUM BLADE CONFIGURATION AND SHIELDING A MAXIMUM VALUE OF EFFICIENCY OF 0.25 WAS OBTAINED. TESTS WITH THREE AND FOUR BLADED CONFIGURATIONS GAVE APPRECIABLY LOWER VALUES OF EFFICIENCY. A SPECIAL STUDY WAS MADE OF WIND TUNNEL CORRECTIONS FOR BLOCKAGE RATIOS UP TO 0.3.

78-0006 ANDREWS J S
FATIGUE LOAD SPECTRA FOR UPWIND AND DOWNWIND ROTORS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978.

P.219-225.
CONF-771148

THE EFFECT OF BOTH ALTERNATING AND MEAN LOAD ON THE FATIGUE LIFE OF AN UPWIND AND DOWNWIND MOD-2 WIND TURBINE SYSTEM IS PRESENTED. IT WAS SHOWN THAT THE FATIGUE DAMAGE VARIES AS THE PRODUCT OF THE STRESS RANGE CUBED AND THE MAXIMUM STRESS. HENCE, THE ALTERNATING FLAPWISE LOAD CAUSED BY TOWER SHADOW AND WIND GRADIENT IS AN IMPORTANT FACTOR IN DETERMINING ROTOR BLADE LIFE.

78-0007 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. VOLUME 1. STUDY SUMMARY AND CONCEPT SCREENING. FINAL REPORT.
NTIS, JANUARY 1978. 227P.
HCP/T22221-01/1

THIS STUDY WAS DIRECTED AT A REVIEW OF STORAGE TECHNOLOGIES, AND PARTICULARLY THOSE WHICH MIGHT BE BEST SUITED FOR USE IN CONJUNCTION WITH WIND AND PHOTOVOLTAICS. THE POTENTIAL "WORTH" ADDED BY INCORPORATING STORAGE WAS EXTENSIVELY ANALYZED FOR BOTH WIND AND PHOTOVOLTAICS. ENERGY STORAGE CONCEPTS STUDIED INCLUDE (1) ABOVE GROUND PUMPED HYDRO STORAGE, (2) UNDERGROUND PUMPED HYDRO STORAGE, (3) THERMAL STORAGE-OIL, (4) THERMAL STORAGE-STEAM, (5) UNDERGROUND COMPRESSED AIR STORAGE, (6) PNEUMATIC STORAGE, (7) LEAD-ACID BATTERIES, (8) ADVANCED BATTERIES, (9) INERTIAL STORAGE (FLYWHEEL), (10) HYDROGEN GENERATION AND STORAGE, AND (11) SUPERCONDUCTING MAGNETIC ENERGY STORAGE. THE INVESTIGATIONS PERFORMED AND THE MAJOR RESULTS, CONCLUSIONS, AND RECOMMENDATIONS ARE PRESENTED IN THIS VOLUME.

78-0008 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. VOLUME III. WIND CONVERSION SYSTEMS WITH ENERGY STORAGE. FINAL REPORT.
NTIS, JANUARY 1978. 330P.
HCP/T22221-01/3

THE VARIABILITY OF ENERGY OUTPUT INHERENT IN WIND ENERGY CONVERSION SYSTEMS (WECS) HAS LED TO THE INVESTIGATION OF ENERGY STORAGE AS A MEANS OF MANAGING THE AVAILABLE ENERGY WHEN IMMEDIATE, DIRECT USE IS NOT POSSIBLE OR DESIRABLE. THIS PORTION OF THE GENERAL ELECTRIC STUDY WAS DIRECTED AT AN EVALUATION OF THOSE ENERGY STORAGE TECHNOLOGIES DEEMED BEST SUITED FOR USE IN CONJUNCTION WITH A WIND ENERGY CONVERSION SYSTEM IN UTILITY, RESIDENTIAL AND INTERMEDIATE APPLICATIONS. BREAK-EVEN COST GOALS ARE DEVELOPED FOR SEVERAL STORAGE TECHNOLOGIES IN EACH APPLICATION. THESE BREAK-EVEN COSTS ARE THEN COMPARED WITH COST PROJECTIONS PRESENTED IN VOLUME I OF THIS REPORT TO SHOW TECHNOLOGIES AND TIME FRAMES OF POTENTIAL ECONOMIC VIABILITY. THE REPORT SUMMARIZES THE INVESTIGATIONS PERFORMED AND PRESENTS THE RESULTS, CONCLUSIONS AND RECOMMENDATIONS PERTAINING TO USE OF ENERGY STORAGE WITH WIND ENERGY CONVERSION SYSTEMS.

78-0009 ASHLEY H
SOME CONTRIBUTIONS TO AERODYNAMIC THEORY FOR VERTICAL-AXIS WIND TURBINES.
J. ENERGY 2(2): 113-119, MARCH-APRIL 1978.

A REVIEW AND MODEST EXTENSIONS ARE DESCRIBED OF QUASISTEADY AERODYNAMIC THEORY FOR PERFORMANCE PREDICTION ON DARRIEUS-TYPE TURBINES. RESULTS ARE GIVEN FOR BOTH PARALLEL-AXIS AND CURVED-BLADE CONFIGURATIONS. BLADE STALL AND VARIABLE INFLOW ARE NEGLECTED; IT IS HYPOTHESIZED THAT UNSTEADY EFFECTS SUPPORT THE FORMER APPROXIMATION DOWN TO LOWER VALUES OF TIP-SPEED RATIO THAN HITHERTO BELIEVED. BOTH PROFILE AND INDUCED DRAG ARE INCLUDED, AND THEIR INFLUENCES ON POWER AND DOWNWIND FORCE ARE EXPRESSED IN TERMS OF ELLIPTIC INTEGRALS. COMPARISONS ARE PRESENTED WITH POWER DATA FROM THE SANDIA 2-M TURBINE. FINALLY, A LINEARIZED ANALYSIS OF UNSTEADY FLOW EFFECTS ON PERFORMANCE IS SUMMARIZED. CALCULATIONS SUGGEST THAT THEY MAY BE LARGER THAN MIGHT BE EXPECTED IN VIEW OF THE LOW OPERATING REDUCED FREQUENCIES OF THESE MACHINES.

78-0010 ASHLEY H
USE OF ASYMPTOTIC METHODS IN VIBRATION ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978.
P.39-52.
CONF-771148

TWO SUBJECTS ARE DISCUSSED, WHICH ARE BELIEVED RELEVANT TO THE STRUCTURAL ANALYSIS OF VERTICAL-AXIS WIND TURBINES. THE FIRST INVOLVES THE DERIVATION OF DYNAMIC DIFFERENTIAL EQUATIONS, SUITABLE FOR STUDYING THE VIBRATIONS OF ROTATING, CURVED, SLENDER STRUCTURES. THE HAMILTONIAN PROCEDURE IS ADVOCATED FOR THIS PURPOSE. VARIOUS REDUCTIONS OF THE FULL SYSTEM ARE DISPLAYED, WHICH GOVERN THE VIBRATING TROPOSKIEN WHEN VARIOUS ORDER-OF-MAGNITUDE RESTRICTIONS ARE PLACED ON IMPORTANT PARAMETERS. THE FINAL SECTION DISCUSSES THE POSSIBLE ADVANTAGES OF THE WKB ASYMPTOTIC METHOD FOR SOLVING THESE CLASSES OF PROBLEMS. A SPECIAL CASE OF THIS METHOD IS USED ILLUSTRATIVELY TO CALCULATE EIGENVALUES AND EIGENFUNCTIONS FOR A "FLAT" TURBINE BLADE WITH SMALL FLEXURAL STIFFNESS.

78-0011 ASTLEY R J, BOWEN A J, LINDLEY D, PEARSE J
THE EFFECT OF SOME HILL SHAPES ON THE ATMOSPHERIC BOUNDARY LAYER NEAR THE GROUND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.93-108.

THE MODIFICATIONS TO THE VELOCITY-HEIGHT PROFILE AND THE TURBULENCE CHARACTERISTICS OF THE SURFACE WIND FLOW BY A SERIES OF TWO-DIMENSIONAL FORWARD-FACING ESCARPMENTS AND A SMOOTH SYMMETRICAL HILL ARE REPORTED. THESE TESTS ARE PART OF AN INVESTIGATION OF THE EFFECTS OF UNEVEN TERRAIN ON THE ATMOSPHERIC BOUNDARY-LAYER TO ASSIST IN THE PREDICTION OF STRUCTURAL WIND LOADING AND IN THE OPTIMUM SITING OF WIND TURBINES ON EXPOSED SITES. MODEL TEST RESULTS AND A LIMITED NUMBER OF FIELD RESULTS ARE PRESENTED AND COMPARED WITH THOSE OBTAINED FROM A FINITE-ELEMENT THEORETICAL SOLUTION USING A FROZEN VORTICITY ASSUMPTION. THE COMPUTED RESULTS COMPARE WELL WITH THE MEASURED DATA FROM THE MODEL AND FIELD TESTS.

78-0012 ASMUSSEN J, KRAUSS O, PARK G L, LINVILLE D E
APPLICATION STUDY OF WIND POWER TECHNOLOGY TO THE CITY OF HART, MICHIGAN, 1977. FINAL REPORT.
NTIS, JANUARY 1978. 250P.
COO/2992-78/1

TO DETERMINE THE FEASIBILITY OF WIND ELECTRIC SYSTEMS, SIX GENERATION EXPANSION ALTERNATIVES WERE EXAMINED FOR HART, MICHIGAN - A CITY OF 2,500 LOCATED NEAR LAKE MICHIGAN WHERE THE AVERAGE COASTAL WIND VELOCITIES RANGE FROM 5 TO 7 M/S. FIVE OF THE ALTERNATIVES INCLUDED COMBINATIONS OF 500 AND 1500 KW WIND TURBINES (1975 GE PARAMETERS) AND A 1 MW HYDRO PLANT WHILE THE LAST WAS A 3600 KW DIESEL GENERATOR. WIND VELOCITY WAS ESTIMATED USING DATA FROM US COAST GUARD STATIONS ALONG THE SHORE AND VERIFIED BY A TWO YEAR MEASUREMENT PROGRAM. THE HART ELECTRICAL SYSTEM WAS REPRESENTED BY AN HOURLY PRODUCTION COST PROGRAM AND THE TOTAL COST CALCULATIONS FOLLOWED THE ERDA/EPRI STANDARD FOR SOLAR ENERGY EVALUATION.

78-0013 BAIN D
AN ASSESSMENT OF THE AGRICULTURAL WIND POWER MARKET.
WIND POWER DIG. NO. 11:42-47, WINTER 1977-1978.

78-0014 BAIN D
WIND ENERGY: NET ENERGY + JOBS.
RAIN IV(7): 14-17, MAY 1978. ALSO WIND POWER DIG. NO.12:46-48, SPRING-SUMMER 1978.

78-0015 FRY C M
WIND DRIVEN HIGH ALTITUDE POWER APPARATUS.
US PATENT NO. 4,084,102, APRIL 11, 1978. 10P.

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 ENABLES THE ROTATING SHAFT TO BE AFFIXED TO A NONROTATING LIFTING OR SUSPENSION DEVICE. THE LIFTING DEVICE INCLUDES LIGHTER-THAN-AIR LIFTING BODIES, AERODYNAMIC LIFTING BODIES, AS WELL AS A COMBINATION THEREOF.

78-0016 BARDEKOFF A

WIND POWERED ELECTRICAL GENERATING PLANT.
U.S. PATENT NO. 4,068,132, JANUARY 10,1978. 4P.

A MULTI-LEVEL SUPPORT STRUCTURE IS DESCRIBED WHICH CONTAINS PLURAL POWER DRIVEN TURNTABLES ON EACH LEVEL AND EACH TURNTABLE CARRIES A PLURALITY OF WIND POWERED ELECTRICAL GENERATOR UNITS WHICH ARE PIVOTALLY SECURED TO THE TURNTABLE AND ELECTRICALLY COUPLED IN A POWER DISTRIBUTION SYSTEM THROUGH SLIP RING ELEMENTS. EACH GENERATOR UNIT HAS A RUDDER OR WIND VANE CAUSING THE DRIVING BLADES TO FACE THE WIND. THE GENERATING UNITS ARE READILY REMOVABLE FROM THEIR TURNTABLE SUPPORTS FOR REPAIR AND REPLACEMENT BY FUNCTIONING UNITS. THE PLANT MAY BE SIZED FOR COMMERCIAL OR HOME APPLICATION.

78-0017 BARTON R S
MOD-1 WIND TURBINE GENERATOR ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15,1977. PROCEEDINGS. NTIS, 1978. P. 167-178.
CONF-771148

A GENERAL SUMMARY OF THE MOD-1 WIND TURBINE GENERATOR CONTROL SYSTEM AND SIMULATION IS PRESENTED. MECHANICAL AND SPEED STABILIZATION CONTROL MEANS TO ADD DRIVE TRAIN DAMPING ARE MENTIONED AND MOD-1 SIMULATION RESULTS SHOWING THE EFFECTS OF SPEED STABILIZATION ARE DISPLAYED.

78-0018 CHENEY M C, SPIERINGS P A M
WIND TURBINE WITH AUTOMATIC PITCH AND YAW CONTROL.
U.S. PATENT NO. 4,083,651, APRIL 11, 1978. 12P.

A WIND TURBINE IS DESCRIBED WHICH HAS A FLEXIBLE CENTRAL BEAM MEMBER SUPPORTING AERODYNAMIC BLADES AT OPPOSITE ENDS THEREOF AND FABRICATED OF UNI-DIRECTIONAL HIGH TENSILE STRENGTH MATERIAL BONDED TOGETHER INTO BEAM FORM SO THAT THE BEAM IS LIGHTWEIGHT. THE MATERIAL HAS HIGH TENSILE STRENGTH TO CARRY THE BLADE CENTRIFUGAL LOADS, LOW SHEAR MODULUS TO PERMIT TORSIONAL TWISTING THEREOF FOR TURBINE SPEED CONTROL PURPOSES, AND ADEQUATE BENDING STIFFNESS TO PERMIT OUT-OF-PLANE DEFLECTION THEREOF FOR TURBINE YARD CONTROL PURPOSES. A SELECTIVELY OFF-SET WEIGHTED PENDULUM MEMBER IS PIVOTALLY CONNECTED TO THE TURBINE AND CONNECTED TO THE BEAM OR BLADES SO AS TO CAUSE TORSIONAL TWISTING THEREOF IN RESPONSE TO CENTRIFUGAL LOADING OF THE PENDULUM MEMBER FOR TURBINE SPEED CONTROL PURPOSES.

78-0019 BIG WIND TURBINE STARTS UP IN N.M.
SOLAR OUTLOOK, JANUARY 23, 1978. P.8.

A 200 KW WIND TURBINE BUILT BY NASA IN CLAYTON, N.M. IS DESCRIBED. THE TURBINE SHOULD GENERATE ENOUGH ELECTRIC POWER TO SUPPLY THE NEEDS OF 60 HOMES WHEN WINDS ARE 19 MILES AN HOUR OR MORE.

78-0020 BIG WINDS IN CA.
WIND POWER DIG. NO. 12:26-27, SPRING-SUMMER 1978.

MEASUREMENT OF CALIFORNIA WINDS TO ASSESS POTENTIAL FOR WIND POWER IS DISCUSSED.

78-0021 BINGHAM C E, JAYADEV T S
CORRELATION OF SOLAR AND WIND RESOURCES FOR HYBRID SYSTEMS APPLICATIONS.
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. 729-735.

SOLAR RADIATION AND WIND RESOURCE DATA ARE USED TO CORRELATE POWER AVAILABLE FROM EACH SOURCE. FOUR LOCATIONS: BISMARCK, NORTH DAKOTA, DODGE CITY, KANSAS, ALBUQUERQUE, NEW MEXICO, AND SANTA MARIA, CALIFORNIA, ARE STUDIED. THE CORRELATION OF WIND AND SOLAR POWER IS EXAMINED ON AN HOURLY, DAILY, AND MONTHLY TIME FRAME. ON THE BASIS OF THE CORRELATIONS, EVIDENCE OF THE COMPLEMENTARY NATURE OF WIND AND SOLAR RESOURCES IS SEEN IN THREE OF THE FOUR SITES. SIMPLE SYSTEM MODELS ARE USED TO CONVERT ENERGY AVAILABLE TO ENERGY OUTPUT. THIS PRELIMINARY ANALYSIS SHOWS THAT BOTH THE ENERGY AVAILABLE AND ELECTRICAL POWER OUTPUT FROM SOLAR AND WIND SOURCES ARE MOST COMPLEMENTARY ON A DAILY BASIS.

78-0022 WITWER J G, ALICH J A, KOHAN S M, LEVINE M D, MEAGHER P C, PICKERING E E, SCHOOLEY F A, SLEMMONS A J, THOMPSON T E
COMPARATIVE EVALUATION OF SOLAR ALTERNATIVES: IMPLICATIONS FOR FEDERAL RD+D.
NTIS, JANUARY 1978. 2 VOLS: 158P.,295P.
TID-28533/1, TID-28533/2

EACH OF THE SEVEN SOLAR ENERGY TECHNOLOGIES IS ASSESSED: PHOTOVOLTAIC DEVICES, SOLAR THERMAL POWER SYSTEMS, WIND ENERGY SYSTEMS, SOLAR HEATING AND COOLING SYSTEMS, AGRICULTURAL AND INDUSTRIAL HEAT PROCESSES, BIOMASS CONVERSION TECHNOLOGIES, AND OCEAN THERMAL ENERGY CONVERSION SYSTEMS. A BRIEF TECHNICAL OVERVIEW OF STORAGE FOR SOLAR ELECTRIC TECHNOLOGIES IS PRESENTED AND SOME PRINCIPLES ARE DISCUSSED CONCERNING HOW DIFFERENT LEVELS OF SUCCESS ON ELECTRICAL STORAGE CAN AFFECT THE COMMERCIAL VIABILITY OF SOLAR ELECTRIC OPTIONS. THE SOLAR MARKET PENETRATION MODEL THAT WAS DEVELOPED AND APPLIED AS AN ANALYTICAL TOOL IN THE STUDY IS DESCRIBED. THE SEVEN SECTIONS TREATING THE SOLAR ENERGY TECHNOLOGIES CONTAIN DISCUSSIONS IN EACH OF SIX SUBJECT AREAS: DESCRIPTION OF THE TECHNOLOGY; ECONOMIC PROJECTIONS; THE POTENTIAL CONTRIBUTION OF THE TECHNOLOGY IN DIFFERENT MARKETPLACES; ENVIRONMENTAL CONSIDERATIONS; INTERNATIONAL POTENTIAL; AND THE PRESENT AND POSSIBLE FUTURE EMPHASIS WITHIN THE RD AND D PROGRAM.

78-0023 BLOCK ISLAND WINDMILL MAY BE SCRAPPED, OUT OF ORDER SINCE OCTOBER 1977.
SOL. ENERGY INTELL. REP. 4(16): 113, APRIL 17, 1978.

78-0024 BOEING TO BUILD WORLD'S LARGEST WIND TURBINE.
WINDLETTER, P. 3, FEBRUARY 1978.

78-0025 BRAASCH C H, BRANDVOLD G E
VERTICAL AXIS WIND TURBINE STATUS.
NTIS, 1978. 12P.
SAND-78-0397C

RESEARCH AND DEVELOPMENT ACTIVITIES ON THE DARRIEUS WIND TURBINE AT SANDIA LABORATORIES ARE DESCRIBED.

78-0026 BRADLEY E F
AN EXPERIMENTAL STUDY OF THE PROFILES OF WIND SPEED, SHEARING STRESS AND TURBULENCE AT THE CREST OF A LARGE HILL.
CRANBERRA, AUSTRALIA, CSIRO, 1978. 60P.

DETAILED MEASUREMENTS HAVE BEEN MADE OF THE MEAN AND TURBULENT NEUTRAL VELOCITY PROFILES ON A 100M TV TOWER AT THE CREST OF A HILL OF HEIGHT H=170M, AND THE RESULTS COMPARED WITH SEVERAL PUBLISHED THEORIES.

78-0027 BRAGG G M, SCHMIDT W L
DETERMINATION OF OPTIMUM ARRAYS OF WIND ENERGY CONVERSION DEVICES.
J. ENERGY 2(3): 155-159, MAY-JUNE 1978.

THIS PAPER DISCUSSES THE USE OF LARGE-SCALE WIND ENERGY CONVERSION SYSTEMS CONSISTING OF ARRAYS OF INDIVIDUAL WIND MACHINES. THE ARRAYS HAVE BEEN ANALYZED IN SOME DETAIL WITH THE AID OF A ROUGH BOUNDARY-LAYER VELOCITY PROFILE MODEL. THE ANALYSIS INDICATES INTERMACHINE SPACINGS THAT WILL PROVIDE FOR MAXIMUM OUTPUT FROM EITHER THE TOTAL ARRAY OR INDIVIDUAL MACHINES WITHIN THE ARRAY. THESE ARRANGEMENTS ARE NOT COINCIDENT. USING THE RESULTS OBTAINED, DETAILED OPTIMIZATION AND ECONOMIC ANALYSES MAY BE MADE FOR LARGE-SCALE WIND SYSTEMS.

78-0028 BRITAIN TO TEST "WINDWALL" CONCEPT.
WINDLETTER, P.8, FEBRUARY 1978.

78-0029 CALIFORNIA MAY ALLOCATE 15 MIL FOR STATE WIND PROGRAM.
WIND POWER DIG. NO. 11: 29, WINTER 1977-1978.

78-0030 CALVERT N G
THE CHARACTERISTICS OF A SAIL MILL.
J. IND. AERODYN. 3: 79-84, 1978.

THIS SHORT ARTICLE REVIEWS CURRENT STATUS OF RESEARCH ON THE SAIL MILL.

78-0031 CARTER J
DOE FUNDS 13 WIND PROJECTS.

WIND POWER DIG. NO.12: 32-33, SPRING 1978.

IN FALL, 1977 DOE INITIATED AN "APPROPRIATE ENERGY TECHNOLOGY" PILOT PROGRAM THAT MADE SMALL GRANTS (UP TO $50,000) AVAILABLE TO SMALL BUSINESSES, COMMUNITY GROUPS, INDIAN TRIBES AND INDIVIDUALS IN CALIFORNIA, NEVADA, HAWAII, ARIZONA AND PACIFIC TRUST TERRITORIES. OF OVER 1100 APPLICATIONS, 108 PROPOSALS WERE FUNDED, INCLUDING 13 PROJECTS TOTALLING OVER $140,000 IN THE AREA OF WIND POWER OR TO PROJECTS THAT HAVE A WIND POWER COMPONENT. THE PROJECTS ARE DESCRIBED.

78-0032 CARTER J
THE MILLVILLE WINDMILL COMPANY.
WIND POWER DIG. NO. 11: 39-41, WINTER 1977-1978.

78-0033 CARTER J
WATER-PUMPING IN INDIA.
WIND POWER DIG. NO.12: 44-45, SPRING-SUMMER 1978.

78-0034 CARTER J
WIND ENERGY IN THE SOUTHWEST.
WIND POWER DIG. NO. 12: 16-19, SPRING-SUMMER 1978.

PROGRAMS IN THE SOUTHWEST, PRIMARILY TEXAS, ARE DESCRIBED.

78-0035 CHAJES A, COSTA A, KAMINSKY F C, KIRCHOFF R H, CROMACK C E
INVESTIGATION OF THE FEASIBILITY OF USING WINDPOWER FOR SPACE HEATING IN COLDER CLIMATES.
NTIS, 1978.
PB-284552

78-0036 CHARWAT A F
PERFORMANCE OF COUNTER- AND COROTATING ARRAYS OF SAVONIUS TURBINES.
J. ENERGY 2(1): 61-63, JANUARY-FEBRUARY, 1978.

THE EXPERIMENTS DESCRIBED IN THIS PAPER WERE CONDUCTED TO EXPLORE THE EFFECTS OF MUTUAL INTERACTION BETWEEN TWO CLOSELY SPACED COROTATING AND COUNTERROTATING SAVONIUS ROTORS.

78-0037 CHASTEAU V A L
METEOROLOGICAL INFORMATION REQUIRED FOR THE DETAILED OPERATION OF A LARGE WIND-TURBINE PLANT.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 33-42.

THE SPECTRUM OF WINDSPEED PRESENTED BY VAN DER HOVEN IS A CONVENIENT STARTING POINT FOR COMMENTING ON WINDSPEED INFORMATION RELEVANT TO WIND ENERGY CONVERSION SYSTEMS. THE REQUIREMENTS FOR ASSESSING THE PRIMARY POTENTIAL OF THE RESOURCE AND FOR DETERMINING ITS ROLE IN CONTRIBUTING TO AN ELECTRICAL GRID ARE DIFFERENT TO THOSE FOR ACTUALLY DESIGNING SUCCESSFUL HARDWARE. THE FORMER REQUIREMENTS CAN LARGELY BE MET BY ANALYSING EXISTING METEOROLOGICAL RECORDS, OR RECORDS STILL TO BE TAKEN BY EXTENDING THE COVERAGE OF CONVENTIONAL METEOROLOGICAL STATIONS. THE LATTER REQUIREMENTS INVOLVE WINDSPEED INFORMATION TYPICAL OF PERIODS OF SEVERAL MINUTES DOWN TO FRACTIONS OF A SECOND.

78-0038 CHEN J M
VORTEX AFFECTED BY THE CONICAL SHAPE OF GENERATOR IN TORNADO-TYPE WIND ENERGY SYSTEM.
J. INDUST. AERODYN. 3: 307-313, 1978.

A MATHEMATICAL ANALYSIS OF A VORTEX WHICH IS GENERATED BY A STATIONARY TOWER WITH A PARTIALLY OPENING TOP AND DIRECTED BY VERTICAL VANES IS PRESENTED. WITH THE CONICAL-SHAPE GENERATOR TOWER CONSIDERED, A CONCENTRATED VORTEX AND HIGHER PRESSURE DROP CAN BE OBTAINED FROM THIS TORNADO-TYPE WIND-ENERGY SYSTEM.

78-0039 CHENEY M C, BIELAWA R L
COMPARISON OF BLADE LOADS OF FIXED AND FREE YAWING WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978, P. 237-242.
CONF-771148

THE UTRC SELF REGULATING COMPOSITE BEARLINGLESS WIND TURBINE UTILIZES AN AUTOMATIC PITCH CONTROL CONCEPT AND A COMPLETELY UNRESTRAINED YAWING DEGREE OF FREEDOM. AERODYNAMIC MOMENTS CAUSED BY SKEWED FLOW PROVIDE THE CONTROL TO ALIGN THE WIND TURBINE WITH THE WIND. MODEL TESTS HAVE DEMONSTRATED THE FEASIBILITY OF THE CONCEPT AND ANALYTICAL STUDIES HAVE SHOWN THE FREE SYSTEM TO EXPERIENCE LOWER BLADE LOADS COMPARED TO THE FIXED SYSTEM.

78-0040 CHEREMISINOFF N P
FUNDAMENTALS OF WIND ENERGY.
ANN ARBOR, MICH., ANN ARBOR SCIENCE PUBL., 1978. 175P.

THIS BOOK IS PRESENTED AS AN OVERVIEW OF THE POTENTIALS OF WIND AS AN ENERGY SOURCE. IT IS INTENDED AS A DOCUMENTARY OFFERING A LOOK AT THE PAST AS WELL AS AT THE PRESENT AND FUTURE POSSIBILITIES.

78-0041 CHERRY N J
WIND ENERGY IN NEW ZEALAND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 15-32.

THE NEW ZEALAND METEOROLOGICAL SERVICE HAS A LARGE ARCHIVE OF WIND DATA. ANALYSIS OF SOME OF THIS DATA AS PART OF THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND GIVES AN INITIAL INDICATION OF THE WIND ENERGY RESOURCE NEW ZEALAND POSSESSES. THE ANALYSES BEING UNDERTAKEN ARE OUTLINED. THE DATA BASE IS BEING EXTENDED WITH OBSERVATIONS BEING MADE BY THIS PROJECT. A DESCRIPTION OF THIS PROGRAMME AND A REVIEW OF THE LONG TERM PROSPECTS FOR WIND ENERGY UTILISATION IN NEW ZEALAND ARE PRESENTED.

78-0042 CHEVALIER H L, MILBURN R T
A NEW WIND ENERGY CONVERSION DEVICE.
TEX. ENG. EXP. STA. BULL. NO. 78-1: 11-18, JANUARY 1978.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF A HORIZONTAL-AXIS WIND ENERGY CONVERSION DEVICE UTILIZING STRAIGHT BLADES AS THE FORCE-PRODUCING SURFACES WAS CONDUCTED. THE INHERENT ADVANTAGES OF THE DEVICE OVER OTHER SYSTEMS SUCH AS THE SELF-STARTING CHARACTERISTICS, THE ABILITY TO OPERATE OVER A WIDE RANGE OF TIP SPEED RATIOS, AND THE ADAPTABILITY TO LARGE-SCALE APPLICATIONS MAKE THE HORIZONTAL-AXIS WIND TURBINE A DESIRABLE CONCEPT FOR THE CONVERSION OF WIND ENERGY. A THEORETICAL PERFORMANCE PREDICTION MODEL BASED ON MOMENTUM THEORY WAS ALSO DEVELOPED AND APPLIED TO THE WIND TURBINE. THE THEORY PREDICTED THE PERFORMANCE OF THE TURBINE WELL; HOWEVER, FURTHER REFINEMENTS IN THE THEORY WOULD REDUCE SIGNIFICANTLY THE DIFFERENCE BETWEEN THE THEORETICAL PREDICTIONS AND THE EXPERIMENTAL DATA.

78-0043 CHILCOTT R E, SMYTH V G
ENERGY CONVERSION PERFORMANCE PARAMETERS FOR WIND TURBINES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.133-170.

THE ENERGY CONVERSION PERFORMANCE OF AN ORIENTING WIND TURBINE IN VARIOUS WEIBULL WIND REGIMES HAS BEEN DETERMINED AND IS PRESENTED IN PARAMETRIC FORM. THE ANALYTICAL RESULTS ARE COMPARED WITH PERFORMANCE PREDICTIONS BASED ON LONG TERM WIND RECORDS FOR CHRISTCHURCH INTERNATIONAL AIRPORT. THE ENERGY CONVERSION PERFORMANCE OF A FIXED ORIENTATION BIAXIAL WIND TURBINE IN WIND REGIMES WITH AXISYMMETRIC DIRECTIONAL CHARACTERISTICS HAS BEEN ANALYSED. UNDER THE ASSUMED CONDITIONS, BY ALIGNING THE BIAXIAL WIND TURBINE WITH THE PREVAILING WIND DIRECTION, THE ENERGY CONVERTED IS TYPICALLY ABOUT 75% OF THAT CONVERTED BY A FULLY ORIENTING WIND TURBINE. ESTIMATES OF THE ENERGY CONVERSION PERFORMANCE OF A FIXED ORIENTATION BIAXIAL WIND TURBINE IN THE CHRISTCHURCH AIRPORT WIND REGIME INDICATE THAT FOR MAXIMUM CAPACITY FACTOR THE ORIENTATION ANGLE SHOULD BE ABOUT 50 DEGREES EAST OF NORTH. THIS ORIENTATION GIVES GOOD EXPOSURE TO NORTHEAST AND SOUTHWEST WINDS. THE RESULTS ARE INTENDED TO ALLOW THE OPTIMISATION OF LONG TERM ENERGY CONVERSION PERFORMANCE OF WIND TURBINES IN ISOTROPIC AND DIRECTIONAL WIND REGIMES. FOR EXAMPLE THE CHRISTCHURCH AIRPORT CASE STUDY INDICATES THAT FOR MAXIMUM ENERGY CONVERSION EFFICIENCY LOCAL AEROGENERATORS SHOULD BE RATED AT ABOUT TWICE THE AVERAGE WIND SPEED OBTAINED BY EXCLUDING CALMS.

78-0044 CLAYTON MILL DEDICATED.
WIND POWER DIG. NO. 11: 27, WINTER 1977-1978.

78-0045 CLAYTON TURNS TO WIND POWER.
NEW SCI. 17(1090): 415, FEBRUARY 16, 1978.

THE 200KW WIND TURBINE AT CLAYTON, NEW MEXICO, IS DESCRIBED.

78-0046 CLIFF W C, JUSTUS C G, ELDERKIN C E
SIMULATION OF THE HOURLY WIND SPEEDS FOR RANDOMLY DISPERSED SITES.
NTIS, MAY 1978. 46P.
PNL-2523

A TECHNIQUE IS PRESENTED WHICH SIMULATES THE HOURLY WIND SPEEDS AT ANY NUMBER OF DISPERSED SITES WITHIN A REGION. THE REQUIRED INPUT FOR THE SIMULATION IS AN HOURLY WIND SPEED RECORD FROM A SINGLE "REPRESENTATIVE SITE" AND AN ESTIMATION OF THE SIZE OF THE REGION IN WHICH THE SITES WILL BE LOCATED. THIS TECHNIQUE IS NOT INTENDED FOR USE AT ANY SPECIFIC LOCATION BUT RATHER INTENDED TO BE USED FOR GENERIC MISSION ANALYSIS TYPE STUDIES. A "REPRESENTATIVE SITE" FOR THIS STUDY IS A SITE WHICH HAS AN ANNUAL MEAN WIND SPEED REPRESENTATIVE OF THE ANNUAL MEAN WIND SPEED AT ALL SITES UNDER CONSIDERATION. WITH THIS INFORMATION, A PROBABILITY DENSITY DISTRIBUTION FOR THE WIND SPEED AVERAGED OVER ALL THE SITES WITHIN THE REGION IS CONSTRUCTED. THE TIME HISTORY OF THE HOURLY MEAN WIND SPEEDS FROM THE REPRESENTATIVE SITE IS THEN USED WITH A FREQUENCY-MATCHING TECHNIQUE TO ESTABLISH THE HOURLY SEQUENCE OF REGIONAL AVERAGE WIND SPEEDS (REGIONAL AVERAGE BEING THE AVERAGE WIND SPEED FROM A VERY LARGE NUMBER OF POTENTIAL SITES WITHIN A REGION). A MONTE CARLO TECHNIQUE IS THEN USED TO DEVELOP THE HOURLY MEAN WIND SPEEDS AT ANY NUMBER OF DESIRED SITES, WHICH ARE ASSUMED TO BE RANDOMLY DISTRIBUTED THROUGHOUT THE AREA. THESE SIMULATED WIND HISTORIES MAY THEN BE USED TO SIMULATE THE HOURLY TIME HISTORY OF THE POWER OUTPUT OF A NETWORK OF WIND TURBINES LOCATED AT THESE RANDOM SITES, BY ASSUMING THE DESIRED NUMBER AND SIZE OF WIND TURBINES TO BE PLACED AT EACH SITE. USING THE SIMULATED WIND SPEED AT EACH SITE IN CONJUNCTION WITH THE WIND TURBINE'S OPERATING CHARACTERISTICS, THE HOURLY POWER FOR EACH SITE IS CALCULATED AND THE CALCULATED POWER FOR ALL SITES IS THEN SUMMED TO YIELD THE TOTAL POWER PRODUCED BY THE WIND TURBINES FOR THAT HOUR. THE POWER PRODUCED AT EACH CONSECUTIVE HOUR IS COMPUTED IN THE SAME MANNER, YIELDING A SIMULATED TIME HISTORY OF THE POWER PRODUCED BY THE WIND TURBINES.

78-0047 CLIFF W C, FICHTL G H
WIND VELOCITY-CHANGE (GUST RISE) CRITERIA FOR WIND TURBINE DESIGN.
NTIS, JULY 1978. 31 P.
PNL-2526

THIS PAPER DERIVES A CLOSED-FORM EQUATION FOR ROOT MEAN SQUARE (RMS) VALUE OF VELOCITY CHANGE (GUST RISE) THAT OCCURS OVER THE SWEPT AREA OF WIND TURBINE ROTOR SYSTEMS AND AN EQUATION FOR RMS VALUE OF VELOCITY CHANGE THAT OCCURS AT A SINGLE POINT IN SPACE. THESE FORMULAS CONFIRM THE INTUITIVE ASSUMPTION THAT A LARGE SYSTEM WILL ENCOUNTER A LESS SEVERE ENVIRONMENT THAN A SMALL SYSTEM WHEN BOTH ARE PLACED AT THE SAME LOCATION. THAT IS, BECAUSE OF A SPATIAL-AVERAGING EFFECT THE WIND CHARACTERISTICS THAT ENGULF A LARGE SYSTEM ARE LESS SEVERE THAN THOSE FOR A SMALL SYSTEM. ASSUMING A NORMAL PROBABILITY DENSITY FUNCTION FOR THE VELOCITY DIFFERENCES, AN EQUATION IS GIVEN FOR CALCULATING THE EXPECTED NUMBER OF VELOCITY DIFFERENCES THAT WILL OCCUR IN 1 HR AND WILL BE LARGER THAN AN ARBITRARY VALUE. A FORMULA IS PRESENTED THAT GIVES THE EXPECTED NUMBER OF VELOCITY DIFFERENCES LARGER THAN AN ARBITRARY VALUE THAT WILL BE ENCOUNTERED DURING THE DESIGN LIFE OF A WIND TURBINE. IN ADDITION, A METHOD FOR CALCULATING THE LARGEST VELOCITY DIFFERENCE EXPECTED DURING THE LIFE OF A TURBINE AND A FORMULA FOR ESTIMATING THE RISK OF EXCEEDING A GIVEN VELOCITY DIFFERENCE DURING THE LIFE OF THE STRUCTURE ARE GIVEN. THE EQUATIONS PRESENTED ARE BASED UPON GENERAL ATMOSPHERIC BOUNDARY-LAYER CONDITIONS AND DO NOT INCLUDE INFORMATION REGARDING EVENTS SUCH AS TORNADOS, HURRICANES, ETC.

78-0048 CLIFF W C, VERHOLEK M G
FLOW FIELD ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 71-76.
CONF-771148

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. THE WIND FIELD THAT A ROTATING ELEMENT WOULD EXPERIENCE IS PRESENTED WHICH HAS BEEN SYNTHESIZED FROM THE OUTPUTS OF AN ARRAY OF ANEMOMETERS.

78-0049 COATES V T
A HANDBOOK OF TECHNOLOGY ASSESSMENT. FINAL REPORT. VOL. 1.
NTIS, MARCH 1978. 108P.
TID-28503

PROCUREMENT PROCEDURES, PREPARATION OF REQUESTS FOR PROPOSALS, DEVELOPMENT OF WORK STATEMENTS, AND PROJECT MONITORING PROCEDURES CAN BE CRITICAL IN ACHIEVING SUCCESSFUL TECHNOLOGY ASSESSMENT. SOME GENERAL GUIDELINES ARE OFFERED IN THIS HANDBOOK.

78-0050 COROTIS R B
STATISTICAL ANALYSIS OF WIND POWER SITING REQUIREMENTS.
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. 741-745.

WIND RECORDS PRIMARILY FROM THE NATIONAL CLIMATIC CENTER ARE USED TO DEVELOP STATISTICAL MODELS FOR WIND POWER SITING. BROADLY GENERAL RESULTS INDICATE THAT ONE YEAR IS SUFFICIENT TO PREDICT THE LONG TERM MEAN SPEED FOR EACH SEASON WITHIN AN ACCURACY OF 10% WITH A CONFIDENCE OF ABOUT 90%. SIMILAR STATISTICS FOR THE SEASONAL MEAN POWER REQUIRE SIGNIFICANTLY MORE DATA COLLECTION. THE HOURLY VARIANCE DUE TO THE DIURNAL CYCLE IS COMPARED TO THE TOTAL INHERENT HOURLY VARIANCE, AND THE FORMER IS FOUND TO CONTRIBUTE ONLY ABOUT TEN PERCENT. AN ANALYSIS OF THE ANNUAL CYCLE SHOWS THE RELATIVELY HOMOGENEOUS NATURE OF THE CYCLE WITHIN A GIVEN REGION. AUTOCORRELATION ANALYSIS OF THE RECORDS PRODUCE AN EXPONENTIAL-TYPE FUNCTION WITH TWO TO THREE EQUIVALENT INDEPENDENT HOURLY READINGS PER DAY. HIGH CROSS-CORRELATION VALUES ARE DETERMINED BETWEEN SITES IN RELATIVELY SMOOTH TERRAIN FOR SEPARATIONS UP TO 100 KM.

78-0051 CROMACK D E
UMASS WIND FURNACE BLADE DESIGN.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 265-268.
CONF-771148

A BRIEF DESCRIPTION OF THE UMASS WIND FURNACE CONCEPT IS PRESENTED ALONG WITH SOME PRELIMINARY PERFORMANCE DATA. PARTICULAR EMPHASIS IS PLACED ON THE DESIGN, CONSTRUCTION, AND MANUFACTURING PROCEDURE FOR THE 32.5 FOOT DIAMETER GRP BLADES.

78-0052 CULEBRA ISLAND 200-KWE WINDMILL DEDICATED; CLAYTON MILL USING PLUM BROOK BLADES.
SOL. ENERGY INTELL. REP. 4(31): 231, JULY 31, 1978.

78-0053 DOE ANNOUNCES SEVEN AWARDS FOR SMALL WIND MACHINES.
SOL. ENERGY INTELL. REP. 4(13): 86, MARCH 27, 1978.

CONTRACTS TOTALING $2.2- MILLION HAVE BEEN ISSUED TO SEVEN COMPANIES TO DEVELOP PROTOTYPE SMALL WIND TURBINE GENERATORS (1-AND 8-KW RANGE) OVER A 20-24 MONTH PERIOD. THE TURBINES WILL THEN BE TESTED AT ROCKY FLATS, COLORADO.

78-0054 DOE AWARDS SMALL WEC CONTRACTS TO MCDONNELL, KAMAN AEROSPACE.
SOL. ENERGY INTELL. REP. 4(45): 344, NOVEMBER 6, 1978.

78-0055 DOE CONTRACT ANNOUNCED.
WIND POWER DIG. NO. 12: 28, SPRING 1978.

78-0056 DOE CONTRACTS AWARDED.
WIND POWER DIG. NO. 11:26-27, WINTER 1977-1978.

78-0057 DANIELS P A
EUROPEAN WIND ENERGY RESEARCH AND RECOMMENDATIONS FOR HAWAII.
NTIS, AUGUST 1978. 44P.
HCP/T1617-01

THE REPORT SUMMARIZES IMPRESSIONS OF WIND POWER RESEARCH IN SWEDEN, DENMARK AND WEST GERMANY AT THE END OF 1977. SPECIAL EMPHASIS IS PLACED ON METEOROLOGICAL ASPECTS. AFTER A LIST OF CURRENT WIND RESEARCH ACTIVITIES THE FOLLOWING SPECIFIC AREAS ARE TREATED: NUMERICAL MODEL DEVELOPMENT, WIND ENERGY FORECASTING, VISUAL IMPACT OF WINDMILLS, STATISTICS FOR WINDMILL DESIGN, WINDMILLS IN EUROPE, METEOROLOGICAL INSTRUMENTATION, WIND ENERGY MEASUREMENT PROGRAMS AND A REAL ASSESSMENT OF POTENTIAL WIND POWER. WIND POWER RESEARCH WHICH HAS BEEN GOING ON IN HAWAII FOR SEVERAL YEARS HAS ENCOUNTERED MUCH THE SAME PROBLEMS AS THOSE FOUND IN EUROPE. ONE OF THE REASONS FOR THE AUTHOR'S VISIT TO EUROPE WAS TO COMPARE HAWAII'S APPROACH AND RESULTS IN THIS FIELD WITH THEIRS IN ORDER TO MAKE RECOMMENDATIONS FOR FURTHER WORK IN HAWAII. EACH SECTION ENDS WITH RECOMMENDATIONS FOR HAWAII.

78-0058 DAVITIAN H
WIND POWER AND ELECTRIC UTILITIES: A REVIEW OF THE PROBLEMS AND PROSPECTS.
NTIS, APRIL 1978. 57 P.
BNL-50849

ELECTRIC UTILITIES COMPRISE THE LARGEST POTENTIAL MARKET FOR WIND MACHINES IN THE MEGAWATT POWER RANGE. AMONG THE TOPICS INCLUDED IN THIS PAPER ARE THE PROBLEMS UTILITIES ENCOUNTER USING WIND POWER, ECONOMIC CONSIDERATIONS, AND CONSIDERATION OF FAVORABLE LOCATIONS.

78-0059 DAWBER K R
WINTER WIND ENERGY RESOURCES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.85-92.

ELECTRICITY SUPPLY AUTHORITIES IN NEW ZEALAND HAVE MORE DIFFICULTY IN MEETING LOAD DEMANDS IN LATE WINTER AND EARLY SPRING THAN AT OTHER TIMES IN THE YEAR. THUS AEROGENERATION ON A LARGE SCALE WILL BE OF MOST VALUE IF IT CAN PROVIDE A RELIABLE SOURCE DURING THIS PERIOD. OF COURSE IT IS UNREALISTIC TO EXPECT TO BE ABLE TO PROVIDE A FULL-TIME BASE LOAD FROM THE AREA COVERED BY THE OTAGO SURVEY, MEASURING APPROXIMATELY 150 KM BY 100 KM, BUT WHEN SIMILAR STUDIES BECOME AVAILABLE FROM OTHER PARTS OF NEW ZEALAND THEN THE ABILITY OF WIND ENERGY TO PROVIDE WINTER BASE LOAD CAN BE ASSESSED. SIX SPECIAL ASPECTS OF WINTER WINDS IN OTAGO ARE EXAMINED IN THIS REPORT.

78-0060 DODD C W, SULLIVAN W N
THE BRAKE SYSTEM FOR THE 17 METER VERTICAL AXIS WIND TURBINE.
NTIS, FEBRUARY 1978. 25P.
SAND-77-1331

THIS REPORT DESCRIBES THE HYDRAULIC BRAKE SYSTEM ON THE 17-METER VERTICAL AXIS WIND TURBINE, VAWT, LOCATED AT SANDIA LABORATORIES. A DISCUSSION OF THE DESIGN PHILOSOPHY AND OPERATING PROCEDURE IS GIVEN. DESIGN DETAILS AND A FUNCTIONAL DESCRIPTION OF SYSTEM COMPONENTS ARE INCLUDED IN THIS REPORT.

78-0061 DORAN J C, VERHOLEK M G
NOTE ON VERTICAL EXTRAPOLATION FORMULAS FOR WEIBULL VELOCITY DISTRIBUTION PARAMETERS.
J. APPL. METEOROL. 17(3): 410-412, MARCH 1978.

THE ADEQUACY OF A VERTICAL EXTRAPOLATION SCHEME FOR WEIBULL WIND SPEED DISTRIBUTION PARAMETERS PROPOSED BY JUSTUS AND MIKHAIL IS EXAMINED. WHILE USEFUL FOR ENSEMBLE AVERAGES, THE TECHNIQUE CAN LEAD TO SIGNIFICANT ERRORS IN INDIVIDUAL CASES.

78-0062 DRAKE W
A NATIONAL WIND DEMONSTRATION PROGRAM.
WIND POWER DIG. NO. 12: 13-15, SPRING 1978.

78-0063 DREIER M E

PLANS FOR WIND ENERGY SYSTEM SIMULATION.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 261-264.
CONF-771148

TWO NEW ANALYSIS TOOLS, ONE A DIGITAL COMPUTER CODE AND THE OTHER A SPECIAL PURPOSE HYBRID COMPUTER, ARE INTRODUCED. THE DIGITAL COMPUTER PROGRAM, THE ROOT PERTURBATION METHOD OR RPM, IS A NEW IMPLEMENTATION OF THE CLASSIC FLOQUET PROCEDURE WHICH CIRCUMVENTS NUMERICAL PROBLEMS ASSOCIATED WITH THE EXTRACTION OF FLOQUET ROOTS. THE HYBRID COMPUTER, THE WIND ENERGY SYSTEM TIME-DOMAIN SIMULATOR (WEST), YIELDS REAL-TIME LOADS AND DEFORMATION INFORMATION ESSENTIAL TO DESIGN AND SYSTEM STABILITY INVESTIGATIONS.

78-0064 DUGUNDJI J
AEROELASTIC ANALYSIS OF WIND ENERGY CONVERSION SYSTEMS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 53-60.
CONF-771148

AN AEROELASTIC INVESTIGATION OF HORIZONTAL AXIS WIND TURBINES IS DESCRIBED. THE STUDY IS DIVIDED INTO TWO SIMPLER AREAS, NAMELY, THE AEROELASTIC STABILITY OF A SINGLE BLADE ON A RIGID TOWER, AND THE MECHANICAL VIBRATIONS OF THE ROTOR SYSTEM ON A FLEXIBLE TOWER. SOME RESULTING INSTABILITIES AND FORCED VIBRATION BEHAVIOR ARE DESCRIBED.

78-0065 EDWARDS P J, DAWBER K R, HURST R B, ROXBURGH A J
AEROGENERATOR PERFORMANCE AT REPRESENTATIVE OTAGO SITES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 69-84.

IN THIS PAPER WE HAVE INDICATED BY SEVERAL EXAMPLES HOW SINGLE POINT HIGH RESOLUTION WIND SPEED DATA, MAY WITH A NUMBER OF REASONABLE ASSUMPTIONS, BE USED TO MODEL THE PERFORMANCE OF STATE OF THE ART AEROGENERATORS. THE RESULTS FOR OTAGO ARE ENCOURAGING AS MIGHT BE ANTICIPATED FROM CONSIDERATION OF THE HIGH ANNUAL MEAN WIND SPEEDS AND LOW TURBULENCE.

78-0066 EKSTROM P A, VERHOLEK M G
A WIND PROSPECTOR'S INSTRUMENT.
NTIS, APRIL 1978. 13 P.
PNL-2514

IN THE INITIAL EVALUATION OF A PROSPECTIVE WIND TURBINE SITE, WIND MEASUREMENTS MUST BE MADE AT THAT SITE. THIS REPORT DESCRIBES AN INEXPENSIVE DATA COLLECTION DEVICE THAT CAN BE USED TO RECORD SUCH MEASUREMENTS, PRODUCING STATISTICAL SUMMARIES OF WIND BEHAVIOR AT THE SITE. PROSPECTORS HAVE OFTEN USED ANALOGOUS DEVICES TO LOCATE DEPOSITS OF MINERAL RESOURCES; THUS, WE CALL THIS DEVICE A WIND PROSPECTOR'S INSTRUMENT.

78-0067 ELDERKIN C E, WENDELL L L
SEMI-ANNUAL REPORT FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD JULY 1977 THROUGH DECEMBER 1977.
NTIS, JANUARY 1978. 98P.
PNL-2519

WITHIN THE FEDERAL WIND ENERGY PROGRAM, THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS A SERVICE ELEMENT ESTABLISHED TO PROVIDE THE APPROPRIATE WIND CHARACTERISTICS INFORMATION TO THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND EVALUATION OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR THE INSTALLATION OF WECS, AND THE OPERATION OF WECS. THE PROGRAM CONTRIBUTIONS ARE TO CONSIST OF RELIABLE ESTIMATES OF WIND CHARACTERISTICS PERTINENT TO WECS DESIGN, 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 THE DAY-TO-DAY VARIABILITY AND PREDICTABILITY OF WIND ENERGY FOR WECS OPERATIONS. TO ACCOMPLISH THESE GOALS, THE WCPE HAS BEEN DIVIDED INTO FOUR TECHNICAL PROGRAM AREAS: WIND CHARACTERISTICS FOR DESIGN AND PERFORMANCE EVALUATION; MESOSCALE WIND CHARACTERISTICS; DEVELOPMENT OF SITING METHODOLOGIES; AND WIND

CHARACTERISTICS FOR WECS OPERATIONS.

78-0068 THE 11TH STREET MOVEMENT.
ALTERN. SOURCES ENERGY NO. 30:31, FEBRUARY 1978.

THE SOLAR AND WIND ENERGY APPLICATION OF A COOP APARTMENT HOUSE IN NEW YORK CITY IS DESCRIBED.

78-0069 ENERGY FROM THE OCEAN.
REPORT OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, 95TH. CONGRESS, 2D. SESSION BY THE SCIENCE POLICY RESEARCH DIVISION, CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS. WASHINGTON, D.C., GOV. PRINT. OFF., 1978. 445 P.

IN THE AREA OF RENEWABLE SOURCES OF ENERGY FROM THE OCEAN, THE REPORT INCLUDES CHAPTERS ON OCEAN THERMAL ENERGY CONVERSION; ENERGY FROM OCEAN WAVES; ENERGY FROM OCEAN CURRENTS; ENERGY FROM TIDES; ENERGY FROM OCEANIC WINDS; ENERGY FROM SALINITY GRADIENTS; AND ENERGY FROM OCEANIC BIOCONVERSION. ALSO COVERED ARE THE NONRENEWABLE SOURCES OF ENERGY FROM THE OCEAN WITH CHAPTERS ON DEEP OCEAN OIL AND GAS; OFFSHORE GEOTHERMAL ENERGY; AND OFFSHORE HARD MINERAL ENERGY RESOURCES. THE REPORT CONCLUDES WITH A BIBLIOGRAPHY AND A SELECTION OF CURRENT ARTICLES ON THE GENERAL SUBJECT OF THE ENERGY POTENTIAL OF THE OCEANS.

78-0070 ENVIRONMENTAL DEVELOPMENT PLAN (EDP): WIND ENERGY CONVERSION, 1977.
NTIS, MARCH 1978. 36P.
DOE/EDP-0007

THIS ENVIRONMENTAL DEVELOPMENT PLAN FOR THE ERDA WIND ENERGY CONVERSION PROGRAM BRIEFLY DESCRIBES THE PRESENT STATUS, PROGRAM GOALS, AND POTENTIAL APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS) AND IDENTIFIES POTENTIAL AREAS OF CONCERN RELEVANT TO THEIR USE. AMONG THOSE CONCERNS ARE OCCUPATIONAL OR PUBLIC EXPOSURE TO HEALTH AND SAFETY HAZARDS, ENVIRONMENTAL EFFECTS, AND SOCIOECONOMIC IMPACTS. IDENTIFICATION AND SCREENING OF POSSIBLE IMPACTS RESULTS IN DELINEATION OF THOSE OF THE MOST SERIOUS, IRREVERSIBLE, AND CUMULATIVE NATURE, THOSE HAVING NEAR-TERM IMPORTANCE TO THE PROGRAM, AND THOSE FOR WHICH CURRENT KNOWLEDGE OF EFFECTS AND CONTROL TECHNOLOGIES ARE INADEQUATE. IN LIGHT OF THESE FACTORS AND THE LENGTH OF TIME NECESSARY TO COMPLETE APPLICABLE RESEARCH PROGRAMS, THE EDP SUGGESTS APPROPRIATE AND NECESSARY RESEARCH AREAS AND COORDINATES THESE STUDIES WITH THE EXPECTED SCHEDULES OF TECHNOLOGY DEVELOPMENT AND WIDESPREAD PUBLIC UTILIZATION OF WECS.

78-0071 ERDMAN A G, FROHRIB D A, CARLSON T P, HAGEN D L, GARRARD W L
DESIGN OF A WIND ENERGY STORAGE SYSTEM WITH A CELLULOSIC FLYWHEEL.
FLYWHEEL TECHNOLOGY SYMPOSIUM, SAN FRANCISCO, 5 OCTOBER 1977.
PROCEEDINGS. NTIS, MARCH 1978. P. 201-212.
CONF-771053

THE DESIGN OF A WIND ENERGY STORAGE SYSTEM IS DISCUSSED. THE DESIGN AND CONSTRUCTION, IN PROGRESS, OF A SMALL DEMONSTRATION MODEL IS DESCRIBED. SUGGESTIONS FOR FURTHER STUDY AND DEVELOPMENT ARE PRESENTED. THE DEVELOPMENT OF A COMPLETE ENERGY STORAGE SYSTEM WHICH IS COST COMPETITIVE WITH OTHER MEANS OF ENERGY STORAGE IS ADDRESSED. EMPHASIS IS PLACED ON THE DEVELOPMENT OF A FLYWHEEL OF A CELLULOSIC MATERIAL, SUCH AS WOOD OR WOOD PRODUCTS, AND ON THE IMPLEMENTATION OF MECHANICAL TRANSMISSIONS FOR THE INPUT AND RETRIEVAL OF ENERGY.

78-0072 ENVIRONMENTAL SAFETY HAZARDS SEEN FOR SOME SOLAR ENERGY TECHNOLOGIES.
SOL. ENERGY INTELL. REP. 4(48): 368, NOVEMBER 27, 1978.

THE CITIZEN'S ENERGY PROJECT HAS RELEASED A REPORT REFUTING THE CLAIMS OF MANY SOLAR ADVOCATES THAT SOLAR TECHNOLOGIES ARE "ENVIRONMENTALLY BENIGN," ARGUING THAT MANY ENVIRONMENTAL AND SAFETY PROBLEMS ARE ASSOCIATED WITH SOLAR SYSTEMS.

78-0073 FEDERAL PROGRAM SEES WECS COMPETING WITH PEAK-LOAD PLANTS IN 30 YEARS.
SOLAR ENERGY INTELL. REP. 4(12): 74-75, MARCH 20, 1978.

78-0074 FEDERAL WIND ENERGY PROGRAM. PROGRAM SUMMARY.
NTIS, JANUARY 1978. 78P.
DOE/ET-0023/1

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. TO ACHIEVE THIS OBJECTIVE FOR SMALL AND LARGE WIND SYSTEMS REQUIRES ADVANCING THE TECHNOLOGY, DEVELOPING A SOUND INDUSTRIAL TECHNOLOGY BASE, AND ADDRESSING THE NON-TECHNOLOGICAL ISSUES WHICH COULD DETER THE PROJECTS BEING SUPPORTED BY THE PROGRAM THROUGH FY 1977 TOWARD THE ACHIEVEMENT OF THESE GOALS. IT ALSO OUTLINES THE PROGRAM'S GENERAL ORGANIZATION AND SPECIFIC PROGRAM ELEMENTS.

78-0075 FENN D B, VITERNA L A
FIXED PITCH WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 243-254.
CONF-771148

WIND TURBINES DESIGNED FOR FIXED PITCH OPERATION OFFER POTENTIAL REDUCTIONS IN THE COST OF THE MACHINE BY ELIMINATING MANY COSTLY COMPONENTS. STUDIES HAVE SHOWN THAT A ROTOR CAN BE DESIGNED WHICH PRODUCES THE SAME ENERGY ANNUALLY AS MOD-0 BUT WHICH REGULATES ITS POWER AUTOMATICALLY BY PROGESSIVELY STALLING THE BLADES AS WIND SPEED INCREASES. EFFECTS OF BLADE TWIST, TAPER, ROOT CUTOUT, AND AIRFOIL SHAPE ON PERFORMANCE ARE DISCUSSED. UNFORTUNATELY, FIXED PITCH ROTORS ARE NOT SELF-STARTING WHEN THE PITCH IS SET TO MAXIMIZE ENERGY PRODUCTION PER YEAR. VARIOUS STARTING TECHNIQUES ARE DISCUSSED.

78-0076 FERTIS D G, ROSS R S
RESEARCH OF LOW COST WIND GENERATOR ROTORS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 257-260.
CONF-771148

THIS FEASIBILITY PROGRAM DETERMINED THAT IT WOULD BE POSSIBLE TO SIGNIFICANTLY REDUCE THE COST OF MANUFACTURING WIND GENERATOR ROTORS BY MAKING THEM OF CAST URETHANE. GOODYEAR DEVELOPED SEVERAL HIGH MODULUS URETHANES WHICH WERE STRUCTURALLY TESTED AT THE UNIVERSITY OF AKRON. A SECTION OF ROTOR WAS ALSO CAST AND TESTED SHOWING THE EXCELLENT AERODYNAMICS SURFACE WHICH RESULTS. A DESIGN ANALYSIS INDICATED THAT A COST REDUCTION OF ALMOST TEN TO ONE CAN BE ACHIEVED WITH A SMALL WEIGHT INCREASE TO ACHIEVE THE SAME STRUCTURAL INTEGRITY AS EXPECTED OF CURRENT ROTOR SYSTEMS.

78-0077 FIGARD R L, SCHETZ J Z
EXPERIMENTAL AND ANALYTICAL STUDIES OF THE AERODYNAMIC PERFORMANCE OF WINDMILLS.
NEW YORK, AIAA, PAPER NO. 78-277, 1978. 7P.

THE AERODYNAMIC PERFORMANCE OF A MODERN, HIGH TIP SPEED, THREE-BLADED WINDMILL RATED AT 10KW AT 30 MPH WAS STUDIED BY THREE METHODS. FIRST, THE RESULTS OF FIELD TESTS OF THE ACTUAL DEVICE WITH BOTH A RESISTIVE AND A BATTERY-CHARGING ELECTRIC LOAD ARE REPORTED. SECOND, THE PREDICTIONS OF A SIMPLE BLADE-ELEMENT ANALYSIS ARE PRESENTED AND COMPARED WITH THE FIELD DATA. AERODYNAMIC BLADE SECTION COEFFICIENTS OF AN ACTUAL BLADE SECTION WERE MEASURED IN A WIND TUNNEL AND USED AS INPUT IN THE ANALYSIS. THIRD, WIND TUNNEL TEST RESULTS FOR A 1/5TH SCALE MODEL ARE GIVEN. REYNOLDS NUMBER SIMULATION FROM MODEL TO PROTOTYPE IS CONSIDERED IN DETAIL. FINALLY, THE RESULTS OF ALL THREE EFFORTS ARE COMPARED.

78-0078 FLAY R G J, LINDLEY D, BOWEN A J
FIELD MEASUREMENTS OF THE ATMOSPHERIC BOUNDARY LAYER NEAR THE GROUND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.109-132.

ACCURATE FIELD MEASUREMENTS OF THE TURBULENCE CHARACTERISTICS AND WIND SPEED PROFILES NEAR THE GROUND ARE ESSENTIAL FOR THE OPTIMUM SITING OF WIND TURBINES AND IN THE INVESTIGATION OF THEIR PERFORMANCE AT A TEST SITE. A FIELD LABORATORY UNIT APPROPRIATE FOR THIS APPLICATION HAS BEEN DEVELOPED BY THE UNIVERSITY OF CANTERBURY MECHANICAL ENGINEERING DEPARTMENT FOR THE PURPOSE OF RECORDING TURBULENCE DATA FROM THE ATMOSPHERIC BOUNDARY LAYER. WIND VELOCITY COUNTS AT SCAN RATES OF 7.5 HZ

AND ABOVE CAN BE OBTAINED FROM UP TO TWELVE ORTHOGONAL ARRAYS OF FAST RESPONSE PROPELLER ANEMOMETERS AND RECORDED ON MAGNETIC TAPE FOR LAYER ANALYSIS. THE TECHNIQUES EMPLOYED IN THE HANDLING AND SUBSEQUENT PROCESSING OF THE DATA ARE DESCRIBED AND SOME RESULTS FROM PRELIMINARY MEASUREMENTS IN THE FIRST TWENTY METRES OF A RURAL BOUNDARY LAYER ARE DISCUSSED.

78-0079 RANGI R S, SOUTH P
OVERSPEED SPOILERS FOR VERTICAL AXIS WIND TURBINES.
U.S. PATENT NO. 4,082,479, APRIL 4, 1978. 4P.

AN OVERSPEED SPOILER IS DESCRIBED FOR VERTICAL AXIS WIND TURBINES OF THE TYPE HAVING STRAIGHT OR CURVED AIRFOIL BLADES ATTACHED TO A VERTICAL SHAFT FORMED BY A RELATIVELY THIN FLAT BLADE SHAPED SPOILER ELEMENT HINGE MOUNTED ON THE TRAILING EDGE, LEADING EDGE, OR AT A CENTRAL POSITION OF A PORTION OF THE AIRFOIL SECTION. THE ELEMENT HAS TWO PORTIONS ONE OF WHICH IS HELD FLUSH OR AGAINST A SURFACE BY SPRING MEANS WITH A SURFACE OF THE BLADE TOWARDS THE TURBINE ROTOR AXIS AND THE OTHER LIES SUBSTANTIALLY PARALLEL TO THE CHORDLINE OF THE AIRFOIL. THE WEIGHT AND CONFIGURATION OF THE ELEMENT IS SUCH THAT AT A PREDETERMINED TURBINE ROTOR SPEED THE ELEMENT ROTATES AGAINST THE SPRING FORCE BECAUSE OF CENTRIFUGAL ACTION AND TAKES UP A POSITION GENERALLY TRANSVERSE TO THE AIR FLOW DIRECTION SUCH AS TO CAUSE MUCH INCREASED DRAG AND CONTROL OVERSPEEDING OF THE ROTOR.

78-0080 GEMINI SYNCHRONOUS INVERTER SYSTEMS.
MUKWONAGO, WISC., WINDWORKS, INC., 1978. 12P.

THIS BROCHURE COVERS HOW TO CONVERT DC TO AC POWER AND FEED IT BACK INTO YOUR UTILITY'S ELECTRIC GRID, USING WIND TURBINES, SOLAR CELLS, SOLAR THERMAL ELECTRIC SYSTEMS AND SMALL HYDRO-DAMS.

78-0081 GIANSANTE N
DRIVE TRAIN DYNAMIC ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 157-166.
CONF-771148

A METHOD FOR PARAMETRIC VARIATIONS IN DRIVE TRAIN DYNAMIC ANALYSIS IS DESCRIBED. THE METHOD MODELS THE INDIVIDUAL COMPONENTS OF A DRIVE SYSTEM, FORMS THE APPROPRIATE SYSTEM INTERFACE COORDINATES AND CALCULATES THE SYSTEM DYNAMIC RESPONSE AT PARTICULAR FREQUENCIES. APPLICATION OF THE METHOD FOR PREDICTION OF THE DYNAMIC RESPONSE CHARACTERISTICS OF A HELICOPTER TRANSMISSION AND A COMPARISON OF RESULTS WITH TEST DATA IS ALSO INCLUDED.

78-0082 GILBERT L J
TRANSIENT RESPONSE TO THREE-PHASE FAULTS ON A WIND TURBINE GENERATOR.
NTIS, JUNE 1978. 146P.
NASA-TM-78902, E-9638, N78-26542

IN ORDER TO OBTAIN A MEASURE OF ITS RESPONSES TO SHORT CIRCUITS A LARGE HORIZONTAL AXIS WIND TURBINE GENERATOR WAS MODELED AND ITS PERFORMANCE WAS SIMULATED ON A DIGITAL COMPUTER. SIMULATION OF SHORT CIRCUIT FAULTS ON THE SYNCHRONOUS ALTERNATOR OF A WIND TURBINE GENERATOR, WITHOUT RESORT TO THE CLASSICAL ASSUMPTIONS GENERALLY MADE FOR THAT ANALYSIS, INDICATES THAT MAXIMUM CLEARING TIMES FOR THE SYSTEM TIED TO AN INFINITE BUS ARE LONGER THAN THE TYPICAL CLEARING TIMES FOR EQUIVALENT CAPACITY CONVENTIONAL MACHINES. ALSO, MAXIMUM CLEARING TIMES ARE INDEPENDENT OF TOWER SHADOW AND WIND SHEAR. VARIATION OF CIRCUIT CONDITIONS PRODUCE THE MODIFICATIONS IN THE TRANSIENT RESPONSE PREDICTED BY ANALYSIS.

78-0083 GIPE P
WIND OVER THE BRITISH ISLES.
WIND POWER DIG. NO. 12: 4-11, SPRING 1978.

A REVIEW OF WIND POWER RESEARCH CURRENTLY UNDERWAY IN THE BRITISH ISLES IS PRESENTED.

78-0084 GLASGOW J C
DOE/NASA MOD-0 100 KW WIND TURBINE: TEST RESULTS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS

CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 117-150.
CONF-771148

THE MOD-0 100KW WIND TURBINE WAS DESIGNED AND FABRICATED BY THE NASA UNDER THE DIRECTION OF THE U.S. DEPARTMENT OF ENERGY TO ASSESS TECHNOLOGY REQUIREMENTS AND ENGINEERING PROBLEMS OF LARGE WIND TURBINES. DATA WHICH IS ASSOCIATED WITH ROTOR AND MACHINE DYNAMICS PROBLEMS ENCOUNTERED AND THE MACHINE MODIFICATIONS INCORPORATED AS A SOLUTION ARE PRESENTED. THESE INCLUDE HIGH BLADE LOADS DUE TO TOWER SHADOW, EXCESSIVE NACELLE YAWING MOTION, AND POWER OSCILLATIONS. THE RESULTS OF EFFORTS TO CORRELATE MEASURED WIND VELOCITY WITH POWER OUTPUT AND WIND TURBINE LOADS ARE ALSO DISCUSSED.

78-0085 GLASGOW J C, BIRCHENOUGH A G
DESIGN AND OPERATING EXPERIENCE ON THE U.S. DEPARTMENT OF ENERGY EXPERIMENTAL MOD-0 100KW WIND TURBINE.
NTIS, 1978. 16P.
N78-26552, NASA-TM-78915

THE MOD-0 100KW EXPERIMENTAL WIND 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.

78-0086 GOLD H
METHODS OF ATTENUATING WIND TURBINE AC GENERATOR OUTPUT VARIATIONS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 179-186.
CONF-771148

WIND SPEED VARIATION, TOWER BLOCKAGE AND STRUCTURAL AND INERTIAL FACTORS PRODUCE UNSTEADY TORQUE IN WIND TURBINES. METHODS FOR MODIFYING THE TURBINE TORQUE SO THAT STEADY TORQUE IS DELIVERED TO THE COUPLED AC GENERATOR ARE DISCUSSED. THE METHOD THAT MAY EVOLVE WILL BE INFLUENCED BY THE POWER USE THAT DEVELOPS AND THE TRADE-OFFS OF COST, WEIGHT AND COMPLEXITY.

78-0087 GOWDA B H L, SWAMY N V C
AERODYNAMIC CHARACTERISTICS OF A CYLINDRICAL TYPE OF WIND TURBINE WITH INCLINED BLADES.
J. ENERGY 2(2): 122-124, MARCH-APRIL 1978.

78-0088 GRUNBAUM R
ALTERNATIVE ENERGY SOURCES IN THE USSR.
AMBIO 7(2): 49-55, 1978.

ALTERNATIVE ENERGY SOURCES ARE FILLING IMPORTANT GAPS IN THE SOVIET UNION'S ENERGY PROFILE. THE RUSSIAN VIEW IS THAT RENEWABLE ENERGY SOURCES CAN HAVE A SIGNIFICANT IMPACT IN MEETING LOCAL ENERGY DEMANDS, ESPECIALLY IN REGIONS WHERE MORE CONVENTIONAL FORMS ARE TOO EXPENSIVE OR INCONVENIENT. DESPITE THE DIFFICULTY IN OBTAINING RELIABLE INFORMATION, THE AUTHOR, AS AN OUTSIDE OBSERVER, PRESENTS AN OVERALL PICTURE OF THE SOVIET ALTERNATIVE ENERGY PROGRAM. THE COUNTRY IS RAPIDLY DEVELOPING WIND POWER AGGREGATES RANGING FROM A FEW KILOWATTS UP TO ONE HUNDRED KILOWATTS FOR DEPLOYMENT IN THE THINLY POPULATED REGIONS OF SIBERIA, THE FAR NORTH AND THE FAR EAST. SOME OF THESE AGGREGATES WILL BE USED TO PUMP WATER FOR GRAZING ANIMALS. SOLAR ENERGY IS BEING UTILIZED TO DESALINATE GROUNDWATER AND SEAWATER. SOLAR PANELS ARE WARMING HOUSES IN THE UZBEK REPUBLIC AND INEXPENSIVE PORTABLE SOLAR WATER HEATERS HAVE BEEN PRODUCED IN TASHKENT. POWER PLANTS USING TIDAL AND GEOTHERMAL ENERGY ARE BEING BUILT, MAINLY IN AREAS WHERE FOSSIL FUEL PLANTS ARE PROHIBITIVELY EXPENSIVE.

78-0089 A GUIDE TO COMMERCIALLY AVAILABLE WIND MACHINES.

ROCKY FLATS, COLORADO, ROCKWELL INTERNATIONAL, 3 APRIL 1978. 125P.

THIS REPORT DESCRIBES IN DETAIL WIND ENERGY CONVERSION SYSTEMS (WECS) COMMERCIALLY AVAILABLE IN THE U.S. THE TERMS USED TO DESCRIBE THESE WIND SYSTEMS ARE DEFINED AND THEIR SIGNIFICANCE DISCUSSED. LISTS OF MANUFACTURERS AND DISTRIBUTERS, SUBSYSTEM COMPONENTS AND SUPPLIERS, AND REFERENCES ARE PROVIDED.

78-0090 GUIDE TO SOLAR ENERGY PROGRAMS.
NTIS, MARCH 1978. 72P.
DOE/ET-0036/1

THE MISSION AND OBJECTIVES OF THE U.S. DEPARTMENT OF ENERGY (DOE) ARE OUTLINED. AN OVERVIEW OF DOE'S SOLAR ENERGY PROGRAMS IS GIVEN, INCLUDING: (1) THE SOLAR THERMAL POWER SYSTEMS PROGRAM; (2) THE PHOTOVOLTAIC SYSTEMS PROGRAM; (3) THE FUELS FROM BIOMASS PROGRAM; (4) THE OCEAN THERMAL SYSTEMS PROGRAM; AND (5) THE WIND ENERGY SYSTEMS PROGRAM. ALSO, THE ENVIRONMENTAL AND RESOURCE ASSESSMENT PROGRAM AND THE SATELLITE POWER SYSTEM PROGRAM ARE DESCRIBED. SOLAR ENERGY PROGRAMS NOW FUNCTIONING UNDER THE DIVISION OF CONSERVATION AND SOLAR APPLICATIONS ARE DESCRIBED, INCLUDING THE SOLAR TECHNOLOGY TRANSFER PROGRAM AND THE THERMAL APPLICATIONS PROGRAM. METHODS OF PROCUREMENT AND GUIDES FOR PROPOSAL PREPARATION AND SOURCES OF SOLAR ENERGY INFORMATION AND ACTIVITIES SUPPORTING THE SOLAR ENERGY PROGRAM ARE DISCUSSED.

78-0091 GUIDE TO SOLAR ENERGY PROGRAMS.
NTIS, REVISED JUNE 1978. 76P.
DOE/ET-0036/1

THE MISSION AND OBJECTIVES OF THE U.S. DEPARTMENT OF ENERGY (DOE) ARE OUTLINED. AN OVERVIEW OF DOE'S SOLAR ENERGY PROGRAMS IS GIVEN, INCLUDING: (1) THE SOLAR THERMAL POWER SYSTEMS PROGRAM; (2) THE PHOTOVOLTAIC SYSTEMS PROGRAM; (3) THE FUELS FROM BIOMASS PROGRAM; (4) THE OCEAN THERMAL SYSTEMS PROGRAM; AND (5) THE WIND ENERGY SYSTEMS PROGRAM. ALSO, THE ENVIRONMENTAL AND RESOURCE ASSESSMENT PROGRAM AND THE SATELLITE POWER SYSTEM PROGRAM ARE DESCRIBED. SOLAR ENERGY PROGRAMS NOW FUNCTIONING UNDER THE DIVISION OF CONSERVATION AND SOLAR APPLICATIONS ARE DESCRIBED, INCLUDING THE SOLAR TECHNOLOGY TRANSFER PROGRAM AND THE THERMAL APPLICATIONS PROGRAM. METHODS OF PROCUREMENT AND GUIDES FOR PROPOSAL PREPARATION AND SOURCES OF SOLAR ENERGY INFORMATION AND ACTIVITIES SUPPORTING THE SOLAR ENERGY PROGRAM ARE DISCUSSED.

78-0092 HAM N D
FLUTTER OF DARRIEUS WIND TURBINE BLADES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 77-93.
CONF-771148

THE TESTING OF DARRIEUS WIND TURBINES HAS INDICATED THAT UNDER CERTAIN CONDITIONS, SERIOUS VIBRATIONS OF THE BLADES CAN OCCUR, INVOLVING FLATWISE BENDING, TORSION, AND CHORDWISE BENDING. A THEORETICAL METHOD OF PREDICTING THE AEROELASTIC STABILITY OF THE COUPLED BENDING AND TORSIONAL MOTION OF SUCH BLADES IS PRESENTED WITH A VIEW TO DETERMINING THE CAUSE OF THESE VIBRATIONS AND A MEANS OF SUPPRESSING THEM.

78-0093 HANLON J
NOT JUST ANOTHER WINDMILL.
NEW SCI. 79(1120): 756-758, SEPTEMBER 14, 1978.

THE ARUSHA APPROPRIATE TECHNOLOGY PROJECT IN TANZANIA IS DESCRIBED.

78-0094 HARDY D M
REGIONAL WIND ENERGY DEVELOPMENT.
SOLAR 78 NORTHWEST CONFERENCE, PORTLAND, OREGON, JULY 16-18, 1978.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, 1978. 19P.

REGIONAL WIND ENERGY DEVELOPMENT IS REVIEWED WITH EMPHASIS ON WIND RESOURCES AND APPLICATIONS IN THE WESTERN UNITED STATES. THE CONCLUSIONS OF EXISTING MAJOR STUDIES ARE NOTED TO INDICATE THE IMPORTANCE OF WIND ENERGY AS A MAJOR ENERGY SOURCE, ITS RELATIVE PLACE AMONG THE OTHER SOLAR TECHNOLOGIES AND EXPECTED SOCIAL BENEFITS. PROBLEMS OF WIND RESOURCE ASSESSMENT OF SPECIAL IMPORTANCE TO THE WEST ARE DESCRIBED AND PREVIOUS

WORK ON WIND ENERGY, HYDRO-ELECTRIC POWER, AND WATER RESOURCES ARE SUMMARIZED. ROLES OF THE REGIONAL SOLAR CENTERS AND THE NATIONAL SOLAR ENERGY RESEARCH INSTITUTE ARE DISCUSSED AND POSSIBLE AREAS OF INTERACTION IN THE WESTERN REGION ARE INDICATED. FURTHER ACTIVITIES IN THE DEVELOPMENT OF WIND ENERGY TECHNOLOGY AND ITS UTILIZATION ARE ALSO DESCRIBED.

78-0095 HARDY D M
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. VOL. 2.2, P. 713-718.

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 NATIONAL DEPARTMENT OF ENERGY PROGRAM INTERACTIONS WITH THE PRIVATE SECTOR IN WIND ENERGY DEVELOPMENT, AND EFFORTS TO PROMOTE INFORMATION TRANSFER THROUGHOUT THE WIND ENERGY COMMUNITY. OPPORTUNITIES FOR COOPERATIVE PROJECTS WITH UNIVERSITIES; WITH NATIONAL LABORATORIES AND OTHER RESEARCH CENTERS; AND WITH EXISTING OR FUTURE BUSINESS, MANUFACTURING, AND INDUSTRIAL CAPABILITIES ARE ALSO INDICATED.

78-0096 HAWAII FUNDS WIND.
WIND POWER DIG. NO. 12: 30, SPRING 1978.

78-0097 HELICOPTER TECHNOLOGY APPLIED TO WIND TURBINES.
WINDLETTER, P. 9, FEBRUARY 1978.

78-0098 HINRICHSEN D
SPIN-OFF FROM THE WORLD'S BIGGEST WINDMILL COULD CHANGE DENMARK'S ENERGY PROGRAMME.
NEW SCI. 77(1086): 140, JANUARY 19, 1978.

78-0099 HIRSHBERG G, BARNHART E, CASHMAN T, SHEPERDSON B
WIND + SOLAR AT NEW ALCHEMY.
WIND POWER DIG. NO. 11: 16-25, WINTER 1977-1978.

THE NEW ALCHEMY INSTITUTES' WIND POWER ACTIVITIES ARE DESCRIBED.

78-0100 AMERICAN WIND ENERGY ASSOCIATION. NATIONAL CONFERENCE. PROCEEDINGS.
CANYON, TEXAS, WEST TEXAS STATE UNIVERSITY, A.E.I., 1978. 183P.
AMERICAN WIND ENERGY ASSOCIATION. NATIONAL CONFERENCE. AMARILLO, TEXAS, MARCH 1-5, 1978.

TECHNICAL PAPERS COVER SEVERAL OF THE CURRENT DOE SUPPORTED WIND DESIGNS BEING WORKED ON. A REPORT IS INCLUDED ON THE TESTING OF VARIOUS WIND GENERATORS AT THE ROCKY FLATS TESTING SITE AND THE PROBLEMS THAT HAVE BEEN ENCOUNTERED.

78-0101 HOFFERT M I, MATLOFF G L, RUGG B A
THE LEBOST WIND TURBINE: LABORATORY TESTS AND DATA ANALYSIS.
J. ENERGY 2(3): 175-181, MAY-JUNE 1978.

PRELIMINARY AERODYNAMIC TORQUE AND POWER MEASUREMENTS AND DATA ANALYSIS ARE PRESENTED FOR THE LEBOST WIND TURBINE - A RECENTLY PATENTED VERTICAL-AXIS WIND ENERGY MACHINE INCORPORATING FLOW-FOCUSING INLETS FIXED TO A HOUSING SHROUD SURROUNDING BLADES ROTATING NORMAL TO THE FLOW. TWO LABORATORY-SCALE MODELS WERE CONSTRUCTED, INSTRUMENTED, AND TESTED IN A SPECIALLY MODIFIED SECTION OF THE NYU 30-M WIND TUNNEL.

78-0102 HOHENEMSER K H
SOME ALTERNATIVE DYNAMIC DESIGN CONFIGURATIONS FOR LARGE HORIZONTAL AXIS WECS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 195-218.
CONF-771148

THE PRESENT U.S. DEVELOPMENT EFFORT TOWARD LARGE HORIZONTAL AXIS WECS CONCENTRATES ON THE CONFIGURATION WITH TWO RIGID BLADES WITH COLLECTIVE

PITCH VARIATION AND A YAW GEAR DRIVE. ALTERNATIVE CONFIGURATIONS WITHOUT YAW GEAR DRIVE ARE CONSIDERED WHERE THE ROTOR IS EITHER SELF-CENTERING OR WHERE THE YAW ANGLE IS CONTROLLED BY BLADE CYCLIC PITCH INPUTS. A PRELIMINARY EVALUATION OF THE DYNAMIC CHARACTERISTICS FOR THESE ALTERNATIVE DESIGN CONFIGURATIONS IS PRESENTED.

78-0103 SZOEKE J
WIND POWERED ROTARY ELECTRIC GENERATOR.
U.S. PATENT NO. 4,086,498, APRIL 25, 1978. 8P.

A MACHINE AND METHOD ARE DESCRIBED FOR CONVERTING THE WIND'S LINEAR FORCE TO ELECTRICITY. THE DEVICE CONSISTS OF A ROTOR, WALLED AT BOTH INNER AND PERIPHERY RADIUSES, ENCIRCLED BY A PERIPHERY DEFLECTOR AND ITS INNER RADIUS COVERED WITH A CORE DEFLECTOR. TAPPING MEANS ATTACHED TO THE BACK PLANAR BASE OF ITS PLURALITY OF ROTOR VANES AND ROTABLY ASSOCIATED WITH PLURALITY OF RECIPROCATING GENERATORS. ROTATION SPEED AND GENERATING ELECTRICITY REGULATED BY OPERATING MEANS, MOUNTED TO ITS AXIS.

78-0104 PAL D, HUANG K T, SMITH M N
AUTOMATIC ELECTRICAL LOAD MATCHING DEVICE FOR WIND GENERATORS.
NTIS, MARCH 1978. 16P.
PAT-APPL-884 075, AD-D005056/7

AN AUTOMATIC ELECTRICAL LOAD MATCHING DEVICE IS DESCRIBED FOR APPLYING LOADS TO WIND DRIVEN GENERATORS. THE DEVICE SWITCHES FIVE DIFFERENT LOADS TO THE OUTPUT OF A WIND DRIVEN GENERATOR. EACH LOAD CORRESPONDS TO A RANGE OF SPEEDS OF THE WIND DRIVEN GENERATOR'S ROTOR.

78-0105 HUDSON G E
WIND POWER CONVERTER.
U.S. PATENT NO. 4,074,951, FEBRUARY 21, 1978. 8P.

A WIND POWER CONVERTER IS DESCRIBED WHICH COMPRISES A PAIR OF ROTATABLE TURBINES WITH ELONGATED CURVED BLADES DISPOSED WITHIN A ROTATABLE HOUSING ON AXIALLY PARALLEL SHAFTS, THE CURVATURE OF THE BLADES OF ONE TURBINE BEING OPPOSITE TO THE CURVATURE OF THE BLADES OF THE SECOND TURBINE TO THAT WIND PASSING BETWEEN THE TURBINES WILL ROTATE THE TURBINES IN OPPOSITE DIRECTIONS; THE HOUSING COMPRISING SHAFT-SUPPORTING SECTIONS AT THE ENDS OF THE TURBINES, LATERAL SECTIONS CONNECTING THE END SECTIONS, A PAIR OF WIND DEFLECTORS DISPOSED BETWEEN THE END SECTIONS AND EXTENDING FROM ADJACENT EDGES OF THE LATERAL SECTIONS TOWARD THE MIDPOINT BETWEEN THE TURBINES AND TERMINATING APPROXIMATELY THE SAME DISTANCE FROM EACH OTHER AS THE DISTANCE BETWEEN THE TURBINE SHAFTS, AND A PIVOTALLY MOUNTED VERTICALLY DISPOSED VANE EXTENDING FROM A PORTION OF THE HOUSING OPPOSITE TO THE WIND DEFLECTORS.

78-0106 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE). 1970- APRIL 1978.
NTIS, MAY 1978. 238P.
NTIS/PS-78/0417/2GA

SUPERCEDES PREVIOUS REPORTS LISTED UNDER 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.

78-0107 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE). VOL. 1. 1964-1976.
NTIS, MAY 1978. 206P.
NTIS/PS-78/0415

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR. 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.

78-0108 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE). VOL.2. 1977- APRIL 1978.
NTIS, MAY 1978. 158P.
NTIS/PS-78/0416/4GA

SUPERCEDES PREVIOUS REPORTS LISTED UNDER SAME AUTHOR. 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.

78-0109 HURST R B, EDWARDS P J, ROXBURGH A J
CHARACTERISATION OF WIND ENERGY SITES.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 57-68.

THE OTAGO UNIVERSITY PHYSICS DEPARTMENT, AS PART OF ITS INVOLVEMENT IN A NATIONAL SURVEY OF WIND ENERGY RESOURCES, HAS LOGGED A LARGE QUANTITY (APPROXIMATELY 10 LOGGER-YEARS) OF WIND SPEED DATA ON MAGNETIC TAPE FROM A SELECTION OF OTAGO SITES. THE BLOCKS OF DATA ARE CONTINUOUS AND UP TO 30 DAYS IN LENGTH. THE RECORDING FORMAT ALLOWS DIGITISATION WITH A TIME RESOLUTION CHOSEN WHEN THE TAPE IS READ OUT. TIME RESOLUTIONS OF 28 SECONDS AND 112 SECONDS HAVE OFTEN BEEN USED, TO GIVE CONVENIENT SPEED RESOLUTIONS OF 0.1 OR 0.2 MS-1 (DEPENDING ON THE VARIETY OF LOGGER). HOWEVER, RESOLUTION DOWN TO A FEW SECONDS IS ATTAINABLE. ACCESS TO COMPUTING FACILITIES IS AVAILABLE DIRECTLY (PDP 11) OR VIA PUNCHED PAPER TAPE. THIS PAPER DESCRIBES SOME OF THE ANALYSIS CARRIED OUT TO DATE ON THIS DATA TO EXTRACT STATISTICAL INFORMATION RELEVANT TO WIND POWER GENERATION.

78-0110 HWANG H H, MOZEICO H V, GUO T
EMPLOYING STATIC EXCITATION CONTROL AND TIE LINE REACTANCE TO STABILIZE WIND TURBINE GENERATORS.
NTIS, APRIL 1978. 74P.
N78-20603

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 SERVING AS A PRACTICAL CASE STUDY, RESULTS OF COMPUTER SIMULATIONS OF THE MODEL AS APPLIED TO THE PROBLEM OF DYNAMIC STABILITY AT RATED LOAD ARE 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 IN REACTANCE ARE USED IN THE SIMULATIONS. COMPUTER RESULTS REVEAL THAT A STATIC EXCITATION CONTROL SYSTEM COUPLED WITH THE OPTIMAL VALUES OF THE TIE LINE REACTANCE WILL EFFECTIVELY REDUCE OSCILLATIONS OF THE POWER OUTPUT, WITHOUT THE USE OF A SLIP CLUTCH.

78-0111 HWANG H H, GILBERT L J
SYNCHRONIZATION OF THE ERDA-NASA 100 KW WIND TURBINE GENERATOR WITH LARGE UTILITY NETWORKS.
NTIS, 1978. 16P.
NASA-TM-X-73613, CONF-770384-1

THIS PAPER WAS PRESENTED AT THE CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION SPONSORED BY THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, COLLEGE STATION, TEXAS, MARCH 14-16, 1977. 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 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 SYNCHRONIZATION CAN BE ACCOMPLISHED BY MEANS OF THE EXISTING SPEED CONTROL SYSTEM AND AN AUTOMATIC SYNCHRONIZER.

78-0112 IN THE WIND.

SOLAR AGE 3(6): 6-7, JUNE 1978.

A LIST OF WIND SYSTEM MANUFACTURERS IS PROVIDED.

78-0113 AN INDEX OF MANUFACTURERS, RESEARCHERS, AND DISTRIBUTORS CURRENTLY INVOLVED IN THE DEVELOPMENT OF WIND ENERGY CONVERSION SYSTEMS.
NTIS, FEBRUARY 1978. 72P.
DOE/RF/3533-78/1

THIS INDEX WAS PREPARED BY THE AMERICAN WIND ENERGY ASSOCIATION (AWEA). THE INDEX IS ORGANIZED INTO TWO SECTIONS: (1) INDIVIDUALS AND ORGANIZATIONS BY CATEGORY OF INTEREST AND (2) ALPHABETICAL ENTRIES BY ORGANIZATION OR INDIVIDUAL, GIVING COMPLETE INFORMATION SUPPLIED BY RESPONDENTS.

78-0114 INTERIOR REPORT GIVES BOOST TO WIND.
WINDLETTER, P.8, FEBRUARY 1978.

78-0115 INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS.
CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. 496P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976.

78-0116 INTERVIEW WITH COB BURANDT, WIND POWER INVENTOR.
WIND POWER DIG. NO. 11: 4-12, WINTER 1977-1978.

78-0117 JACOBS M L, JACOBS P R
WIND ELECTRIC PLANT.
U.S. PATENT NO. 4,068,131, JANUARY 10, 1978. 12P.

A MULTIBLADE, WIND-DRIVEN, VARIABLE PITCH PROPELLER IS USED IN A WIND ELECTRIC PLANT FOR THE GENERATION OF ELECTRICAL POWER FROM WIND FORCES, AND THE PROPELLER IS ROTATABLE IN A PLANE AT AN ANGLE TO THE TOWER AXIS, ENABLING LARGER PROPELLERS TO BE USED WITHOUT PROPELLER-TOWER INTERFERENCE AND ALSO REDUCING THE DISTANCE BETWEEN THE PROPELLER AND GEAR CASE. A SNUBBER ARRANGEMENT IS PROVIDED ON THE PROPELLER BLADE RETURN SPRINGS TO SLOW THE GOVERNOR ACTION AND PREVENT ABRUPT PITCH CHANGES AND DAMAGING FLUTTER OF THE BLADES, AND A SELF-CENTERING, DOUBLE-ACTING PIVOT WASHER IS PROVIDED BETWEEN THE PROPELLER BLADES AND THE RETURN SPRINGS TO ENSURE FREE PIVOTING AND LONG LIFE OF THE SPRING CONNECTING BOLTS. ADJUSTABLE POSITIVE BLADE STOP BOLTS ARE ENGAGED DIRECTLY BETWEEN THE HUB AND THE PROPELLER BLADES TO LIMIT RETURN MOVEMENT THEREOF.

78-0118 JAMISON A
DEMOCRATIZING TECHNOLOGY.
ENVIRONMENT 20(1): 25-28, JANUARY-FEBRUARY 1978.

THE TVIND POWER-PLANT IN DENMARK IS DESCRIBED.

78-0119 JOHNSON L
DOE, DEPARTMENT OF SOLAR EVASION.
WIND POWER DIG. NO. 12: 14-15, SPRING 1978.

LEE JOHNSON REPORTS ON A MEETING BETWEEN DOE AND ALTERNATIVE TECHNOLOGY PEOPLE.

78-0120 JOHNSON L
ROLL ON, COLUMBIA.
RAIN IV(9): 15-16, JULY 1978.

78-0121 JOHNSON L
WIND'S UP--LET'S GO!
RAIN 4(4): 15, JANUARY 1978.

THIS IS A REPORT ON THE THIRD WIND ENERGY CONVERSION SYSTEMS CONFERENCE, HELD IN WASHINGTON, D.C., SEPTEMBER 1977.

78-0122 JOHNSON L, MERRIAM M F
SMALL GROUPS, BIG WINDMILLS.
WIND POWER DIG. NO.11: 30-32, WINTER 1977-1978.

DESCRIBED ARE SEVERAL LARGE SCALE WIND PROJECTS: (1) 2-MEGAWATT TVIND WIND TURBINE IN DENMARK, (2) 200-KW AMERICANIZED GEDSER MILL ON THE ISLAND OF CUTTYHUNK, MASSACHUSETTS, (3) NASA-DOE MOD-0A WIND TURBINE ON BLOCK ISLAND, R.I. AND (4) 140 KW HYDRAULIC WIND GENERATOR BUILT BY CHARLES SCHACHLE IN WASHINGTON.

78-0123 JONES R
ANALYTICAL TESTING TECHNIQUES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 95-101.
CONF-771148

STRUCTURAL DYNAMIC ANALYTICAL TESTING TECHNIQUES CAN BE A TOOL TO DETERMINE THE SOURCE OF STRUCTURAL DYNAMIC PROBLEMS AND THE SOLUTION TO THESE PROBLEMS. ANALYTICAL TESTING TECHNIQUES ARE BASED UPON NEW AND UNIQUE DYNAMIC TESTING METHODS AND ANALYSIS OF TEST RESULTS. THUS, THESE METHODS APPLY PRIMARILY TO CONSTRUCTED WIND TURBINE SYSTEMS. THIS PAPER GIVES A SUMMARY OF THESE METHODS.

78-0124 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 30: 38-40, JANUARY 1978; NO. 31: 46, APRIL 1978 ; NO. 32: 38-39, JUNE 1978; NO. 33: 34-36, AUGUST 1978; NO. 34: 30, OCTOBER 1978; NO. 35: 39-40, DECEMBER 1978.

THIS REGULAR COLUMN IN A.S.E. FEATURES MARTIN JOPP RESPONDING TO LETTERS FROM READERS CONCERNING PROBLEMS WITH WIND GENERATORS.

78-0125 JUSTUS C G
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (NEW ENGLAND AND CENTRAL U. S. REGIONS).
SOLAR ENERGY 20: 379-386, 1978.

THE PERFORMANCE CHARACTERISTICS HAVE BEEN SIMULATED FOR LARGE DISPERSED ARRAYS OF 500-1500 KW WIND TURBINES PRODUCING POWER AND FEEDING IT DIRECTLY INTO THE NEW ENGLAND OR CENTRAL U.S. UTILITY DISTRIBUTION GRIDS. THESE STUDIES, BASED ON DESIGN POWER PERFORMANCE CURVES, INDICATE THAT IN GOOD WIND ENVIRONMENTS THE 500 KW GENERATORS CAN AVERAGE (ON AN ANNUAL BASIS) UP TO 240 KW MEAN POWER OUTPUT, AND THE 1500 KW GENERATORS CAN AVERAGE UP TO 350 KW MEAN POWER OUTPUT. HIGHER MEAN POWER OUTPUT (AVERAGING UP TO 470 KW) IS INDICATED, HOWEVER FROM A HYPOTHETICAL 1125 KW RATED POWER UNIT DESIGNED TO OPERATE AT WIND SPEEDS NEAR THOSE OBSERVED THROUGHOUT THE STUDY AREA, RATHER THAN THE HIGHER DESIGN OPERATING WIND SPEED OF THE 1500 KW UNIT. THE BENEFICIAL EFFECT OF OPERATING LARGE DISPERSE ARRAYS OF WIND TURBINES IS THAT AVAILABLE POWER OUTPUT CAN BE INCREASED -- IF WINDS ARE NOT BLOWING OVER ONE PART OF THE ARRAY, CHANCES ARE THEY WILL OVER SOME OTHER PART OF THE ARRAY. THESE STUDIES INDICATE THAT WIND POWER AVAILABILITY LEVELS OF 200 KW PER 1125 KW GENERATOR WERE 77-93 PERCENT, DEPENDING ON SEASON. REASONABLY STEADY HIGH WIND POWER IN WINTER AND HIGH AFTERNOON PEAK WIND POWER IN SUMMER (CORRESPONDING TO PEAK AIR CONDITIONING LOAD) MEANS THAT SIGNIFICANT PEAK LOAD DISPLACEMENT CAN BE ACHIEVED WITHOUT THE USE OF STORAGE.

78-0126 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (GREAT LAKES AND PACIFIC COAST REGIONS). ANNUAL PROGRESS REPORT, MAY 1, 1976 - APRIL 30, 1977.
NTIS, JANUARY 1978. 124P.
RLO/2439-77/2

THIS REPORT EXAMINES ARRAYS OF SIMULATED 0.5 MW, 1.5 MW, AND 2.0 MW WIND TURBINES IN THE GREAT LAKES AND PACIFIC COAST REGIONS. THE PARAMETERS ANALYZED ARE: BASIC WIND STATISTICS, TIME AND SPATIAL CORRELATIONS, MEAN WIND POWER OUTPUT, WIND POWER FREQUENCY (AVAILABILITY WITHOUT STORAGE), AND RUN DURATION OF WIND SPEED AND ARRAY POWER (PROBABILITIES OF WIND AND POWER LULLS OF VARIOUS DURATION, WITHOUT STORAGE). ALSO INCLUDED ARE EVALUATION OF DIURNAL AS WELL AS SEASONAL VARIATIONS OF WIND AND WIND POWER, INCLUSION OF DENSITY, WIND SHEAR, WIND GUSTS, AND OTHER FACTORS IN THE MODEL POWER OUTPUT CURVE SIMULATION, STUDY OF THE POSSIBLE RELATION BETWEEN WIND SPEED AND DEGREE DAYS (KNOWN TO AFFECT A PORTION OF UTILITY DEMAND) AND DEVELOPMENT AND VERIFICATION OF SIMPLIFIED ARRAY SIMULATION MODEL.

78-0127 JUSTUS C G, MIKHAIL A
GENERIC POWER PERFORMANCE ESTIMATES FOR WIND TURBINES.
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. 719-723.

THE OUTPUT POWER CURVES FOR A VERY WIDE RANGE OF WIND TURBINE DESIGNS CAN BE REPRESENTED BY TWO SIMPLE EXPRESSIONS -- ONE FOR CONSTANT RPM MACHINES, ONE FOR VARIABLE RPM MACHINES. A SET OF WIND TURBINES COVERING A WIDE RANGE OF DESIGN PARAMETER VALUES HAVE BEEN RUN THROUGH REFERENCE WIND DISTRIBUTIONS TO EVALUATE MEAN POWER OUTPUT.

78-0128 KADLEC E G
DOE/SANDIA DARRIEUS PROGRAM STATUS.
NTIS, 1978. 2P.
SAND-78-0851C

AS A DEPARTMENT OF ENERGY LABORATORY, SANDIA 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. OTHER RESEARCH IS AIMED AT DEFINING THE POTENTIAL APPLICATIONS, ECONOMICS, AND BEST GEOGRAPHIC LOCATIONS FOR THE VAWT SYSTEMS.

78-0129 KAHN E
RELIABILITY OF WINDPOWER FROM DISPERSED SITES: A PRELIMINARY ASSESSMENT.
NTIS, APRIL 1978. 47P.
LBL-6889

THE RELIABILITY BENEFIT OF GEOGRAPHICALLY DISPERSED WIND TURBINE GENERATORS IS ANALYZED. ELECTRICITY PRODUCED FROM WIND MACHINES EXPERIENCES WIDE FLUCTUATIONS OF OUTPUT AT A GIVEN SITE. YET THE VALUE OF ELECTRICITY IS A FUNCTION OF ITS RELIABILITY. PRICING SCHEDULES HAVE TRADITIONALLY VALUED FIRM POWER, THAT IS, RELIABLY AVAILABLE POWER, MUCH MORE HIGHLY THAN "DUMP POWER"; THAT IS, POWER WHICH IS AVAILABLE INTERMITTENTLY ON AN "IF AND WHEN" BASIS. THE CONVENTIONAL WISDOM ON WIND POWER SUGGESTS THAT IT IS UNREALISTIC TO EXPECT THAT WIND GENERATION WILL BE SUFFICIENTLY RELIABLE TO DISPLACE CONVENTIONAL CAPACITY. WHILE SUCH CONCLUSIONS MAY BE VALID FOR ANALYSIS OF INDIVIDUAL SITES, THE MAIN THESIS OF THIS PAPER IS THAT GEOGRAPHICAL DISPERSAL IMPROVES AGGREGATE RELIABILITY.

78-0130 KATZENBERG R
IN THE WIND.
SOLAR AGE 3(11):10,35, NOVEMBER 1978.

THE AUTHOR IDENTIFIES MISTAKES OF THE WIND ENERGY INDUSTRY, AT BOTH THE FEDERAL AND COMPANY LEVELS.

78-0131 KATZENBERG R
IN THE WIND.
SOLAR AGE 3(4): 42-43, APRIL 1978.

78-0132 KATZENBERG R
PLUGGING IN THE WIND; UTILITIES ARE WILLING. IS IT US AGAINST THEM?
SOLAR AGE 3(6): 23, JUNE 1978.

78-0133 KAUFMAN J W
WIND WHEEL ELECTRIC POWER GENERATOR. PATENT APPLICATION.
NTIS, FEBRUARY 24, 1978. 16P.
N78-22469, PAT-APPL-SN-880-726/6A

AN ELECTRIC GENERATOR DRIVEN BY THE WIND IS DESCRIBED. PRIMARY AND AUXILIARY FUNNEL-TYPE, VENTURI DUCTS ARE MOUNTED UPON A HOUSING FOR CAPTURING WIND CURRENTS AND CONDUCTING THE CURRENTS TO A BLADED WHEEL CONNECTED TO GENERATOR APPARATUS. ADDITIONAL AIR FLOWS ARE ALSO CONDUCTED ONTO THE BLADED WHEEL, ROTATING THE WHEEL. THE AUXILIARY DUCTS ARE DISPOSED AT AN ACUTE ANGLE WITH RESPECT TO THE LONGITUDINAL AXIS OF THE HOUSING, AND TOGETHER WITH THE ROTATABILITY OF THE HOUSING AND THE DUCTS, PERMITS CAPTURE OF WIND CURRENTS WITHIN A VARIABLE DIRECTIONAL

RANGE.

78-0134 KAZA K R V
AEROELASTIC STABILITY OF WIND TURBINE BLADES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 61-69.
CONF-771148

THE SECOND-DEGREE NONLINEAR AEROELASTIC EQUATIONS FOR A FLEXIBLE, TWISTED, NON-UNIFORM WIND TURBINE BLADE ARE DEVELOPED USING HAMILTON'S PRINCIPLE. THE DERIVATION OF THESE EQUATIONS HAS ITS BASIS IN THE GEOMETRIC NONLINEAR THEORY OF ELASTICITY. THESE EQUATIONS WITH PERIODIC COEFFICIENTS ARE SUITABLE FOR DETERMINING THE AEROELASTIC STABILITY AND RESPONSE OF LARGE WIND TURBINE BLADES. METHODS FOR SOLVING THESE EQUATIONS ARE DISCUSSED.

78-0135 KEN HARRIS' WINDMILL. SYMBOL OF YESTERDAY.
WIND POWER DIG. NO. 12: 34-36, SPRING 1978.

78-0136 KILLAM J
LOOKING BACK.
WIND POWER DIG. NO. 12: 24-25, SPRING 1978.

78-0137 KLIMAS P C, SHELDAHL R E
FOUR AERODYNAMIC PREDICTION SCHEMES FOR VERTICAL-AXIS WIND TURBINES: A COMPENDIUM.
NTIS, JUNE 1978.
SAND-78-0014

FOUR AERODYNAMIC MODELS/DESIGN TOOLS USED TO PREDICT THE PERFORMANCE FOR THE VERTICAL-AXIS WIND TURBINE (VAWT) ARE DESCRIBED. THESE MODELS ARE ALL BASED UPON THE CONSERVATION OF MOMENTUM, AND ARE EITHER CURRENTLY BEING USED AT SANDIA LABORATORIES OR HAVE BEEN RECENTLY USED THERE. A NUMBER OF COMPARISONS BOTH WITH THE EXPERIMENTS AND BETWEEN THE MATHEMATICAL TREATMENTS IS MADE.

78-0138 KLING A
WIND DRIVEN POWER PLANT.
U.S. PATENT NO. 4,073,516, FEBRUARY 14, 1978. 12P.

A TETHERED WIND-DRIVEN FLOATING POWER PLANT IS DESCRIBED WHICH INCLUDES A SUPPORT BODY CARRYING AT LEAST ONE ROTOR ASSEMBLY, A CURRENT GENERATOR COUPLED TO THE ROTOR AND ALIGNMENT ASSEMBLY FOR ALIGNING THE ROTOR TO FACE INTO THE WIND, A GROUND ANCHOR AND AT LEAST ONE CAPTIVATING STAY CONNECTING THE FLOATING POWER PLANT TO THE ANCHOR. THE SUPPORT BODY IS HOLLOW AND GAS-FILLED TO CARRY ITS OWN WEIGHT AS WELL AS THE WEIGHT OF THE ROTOR ASSEMBLY, CURRENT GENERATOR AND ALIGNMENT ASSEMBLY. THE SUPPORT BODY IS CONNECTED TO THE CAPTIVATING STAY THROUGH A JOINT CONNECTION HAVING THREE DEGREES OF FREEDOM. THE ROTORS ARE GIMBAL-MOUNTED, AT A VARIABLE RELATIVE POSITION WITH RESPECT TO THE SUPPORT BODY BUT IN FIXED POSITIONS RELATIVE TO ONE ANOTHER.

78-0139 KNECHT J
HARNESSING THE WIND. A NEW APPROACH.
WIND POWER DIG. NO. 12: 49-53, SPRING 1978.

THIS STUDY IS A DESCRIPTION OF A NEW APPROACH TO THE CONVERSION, STORAGE, AND USE OF WIND ENERGY. IT PROMISES TO MAKE A MAJOR CHANGE IN WINDPOWER SYSTEM COSTS. THIS NEW SYSTEM IS CALLED A "KINETIC NATURAL ENERGY CONVERSION AND HEAT TRANSFER" SYSTEM USING THE ACRONYM KNECHT, PRONOUNCED "CONNECT".

78-0140 KOCIVAR B
LIFTING FOILS: TAP ENERGY OF FLOWING AIR OR WATER.
POP. SCI. 212(2): 71-73, 168, FEBRUARY 1978.

EXTRACTING POWER FROM FLOW WATER OR SURFACE WIND IS ACCOMPLISHED BY USING A SERIES OF INTERCONNECTED FOILS. DIFFERENT CONFIGURATIONS AND APPLICATIONS ARE DISCUSSED.

78-0141 KOIDE G T, TAKAHASHI P K
UPDATE ON SOLAR AND WIND ENERGY APPLICATIONS IN HAWAII.

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. 724-728.

THE STUDY ON SOLAR AND WIND ENERGY APPLICATIONS IS A FACET OF THE TOTAL STATE OF HAWAII SOLAR ASSESSMENT PROGRAM. ENGINEERING CONSULTANTS, GOVERNMENTAL AUTHORITIES FROM THE DEPARTMENT OF ENERGY, STATE OF HAWAII, AND COUNTIES, TECHNOLOGY ASSESSMENT SPECIALISTS, AND BUSINESSMEN WERE CONTACTED FOR INPUT INTO THIS PAPER. THIS SURVEY IS A BROAD IMPLEMENTATION PLAN HIGHLIGHTING SEVEN TYPICAL APPLICATIONS -- THREE SOLAR, THREE WIND AND ONE COMBINATION. IN VARYING DEGREES, EACH PROJECT IS RECOMMENDED EITHER FOR FURTHER STUDY OR IMMEDIATE IMPLEMENTATION. ALTHOUGH UNECONOMICAL IN SOME ASPECTS WITHOUT APPROPRIATE GOVERNMENTAL AID OR INCENTIVES, THESE PILOT PROJECTS COULD SERVE TO IMPROVE ECONOMY OF SCALE, SPUR ASSOCIATED DEVELOPMENTS, AND IN THE LONG RUN, IMPROVE HAWAII'S BALANCE OF TRADE.

78-0142 KOLBE H
BUILD YOUR OWN BUDGET WINDCHARGER.
MECH. ILLUS. 74(597): 56-60, FEBRUARY 1978.

78-0143 LARSEN R
WHIRRING WINDMILLS PROMISE POWER.
IRR. AGE 12(5): 47,50, FEBRUARY 1978.

WIND TURBINES ARE BEING DEVELOPED FOR RURAL POWER APPLICATIONS IN THE 10 TO 200 KW POWER RANGE. A WIND TURBINE HAVING A RADIUS OF 11.3 METERS AT THE MIDDLE AND STANDING 16.8 M HIGH PRODUCES A POWER RATING OF 40 KW AT 11.2 M/SEC WIND SPEEDS AT A TEST FACILITY OF THE USDA SOUTHWEST GREAT PLAINS RESEARCH CENTER AT BUSHLAND, TEXAS. THE TURBINE DELIVERS POWER THROUGH AN 18:1 SPEED INCREASER, A RIGHT-ANGLE DRIVE, AND AN OVER-RUNNING CLUTCH TO A VERTICAL TURBINE PUMP. A WIND-SPEED SENSOR CONTROLS THE STARTER MOTOR AND BRAKE, WHILE AN ELECTRIC MOTOR SUPPLEMENTS WIND POWER. THE SYSTEM CAN PUMP APPROXIMATELY 47 LITERS/SECOND AGAINST A TOTAL DYNAMIC HEAD OF 80 METERS. DOE MAINTAINS A SIMILAR TEST FACILITY AT ROCKY FLATS, COL., IN WHICH A TURBINE MOUNTED ON A 40-FOOT TOWER AND HAVING A 3-BLADE, 12-FOOT ROTOR PRODUCES A POWER RATING OF 2000 WATTS AT A WIND SPEED OF 25 MPH. A SECOND FACILITY, IN THE CONTRACT STAGE, WILL HOUSE A 2.5 MEGAWATT ELECTRICAL GENERATING SYSTEM. THE SYSTEM, WHICH WILL HAVE A 300-FOOT ROTOR, IS DESIGNED FOR A SITE HAVING A MEAN ANNUAL WIND SPEED OF 14 MPH. IT WILL ECLIPSE GENERAL ELECTRIC'S BOONE, NORTH CAROLINA FACILITY, WHICH CURRENTLY GENERATES 2 MEGAWATTS OF POWER AT 24 MPH WIND SPEEDS. ENERGY OFFICIALS FEEL THAT WIND POWER MAY OFFER AN ECONOMICAL ALTERNATIVE ENERGY RESOURCE IF SYSTEM COSTS CAN BE REDUCED AND STORAGE BATTERY PROBLEMS CAN BE SOLVED.

78-0144 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT. JULY 1975-AUGUST 1976. EXECUTIVE SUMMARY.
NTIS, 1978. 23P.
COO/2618-1(SUMM.)

THE DECISION TO INTRODUCE A SIGNIFICANT WIND ENERGY CONVERSION SYSTEM (WECS) INTO A UTILITY REQUIRES THAT UTILITY MANAGEMENT CONCLUDE THE SYSTEM IS TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND ENVIRONMENTALLY ACCEPTABLE. UTILITY PLANNERS NEED A METHOD, COMPATIBLE WITH THEIR CURRENT PLANNING METHODS, TO EVALUATE THESE WECS TECHNOLOGY ISSUES. THIS STUDY WAS DIRECTED TOWARD 1) UNDERSTANDING THIS PLANNING/DECISION PROCESS AND 2) DEFINING THE TECHNICIAL, FINANCIAL, AND ENVIRONMENTAL ISSUES WHICH MUST BE ADDRESSED BEFORE A LARGE-SCALE APPLICATION OF WECS AS AN ENERGY ALTERNATE.

78-0145 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT. JULY 1975-AUGUST 1976.
NTIS, 1978. 350P.
COO/2618-1

THE DECISION TO INTRODUCE A SIGNIFICANT WIND ENERGY CONVERSION SYSTEM (WECS) INTO A UTILITY REQUIRES THAT UTILITY MANAGEMENT CONCLUDE THE SYSTEM IS TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND ENVIRONMENTALLY

ACCEPTABLE. UTILITY PLANNERS NEED A METHOD, COMPATIBLE WITH THEIR CURRENT PLANNING METHODS, TO EVALUATE THESE WECS TECHNOLOGY ISSUES. THIS STUDY WAS DIRECTED TOWARD (1) UNDERSTANDING THIS PLANNING/DECISION PROCESS AND (2) DEFINING THE TECHNICAL, FINANCIAL, AND ENVIRONMENTAL ISSUES WHICH MUST BE ADDRESSED BEFORE A LARGE-SCALE APPLICATION OF WECS AS AN ENERGY ALTERNATE.

78-0146 LINSCOTT B S, GLASGOW J C, ANDERSON W D, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
NTIS, JANUARY 1978. 19P.
N78-19642, NASA-TM-73883, DOE/NASA/1028-78/15

VARIOUS STUDIES HAVE INDICATED THAT WIND ENERGY HAS THE POTENTIAL TO MAKE SIGNIFICANT CONTRIBUTIONS TO THE NATION'S ENERGY NEEDS. THE LEVEL OF CONTRIBUTION DEPENDS ON THE INITIAL AND OPERATING COSTS OF THE MACHINES WHICH CAN CONVERT WIND ENERGY TO ELECTRICITY OR OTHER FORMS OF ENERGY USEFUL TO THE PUBLIC. PART OF THE COOPERATIVE EFFORT BETWEEN NASA AND THE ENERGY RESEARCH AND DEVELOPMENT AGENCY (ERDA) HAS BEEN THE DESIGN AND THE ERECTION OF AN EXPERIMENTAL WIND TURBINE BY THE NASA-LEWIS RESEARCH CENTER. 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. THE DEFICIT IN THE AMBIENT WIND FIELD DUE TO THE UPWIND TOWER TURBINE SUPPORT STRUCTURE WAS FOUND TO BE VERY SIGNIFICANT IN EXCITING HIGHER HARMONIC LOADS ASSOCIATED WITH THE FLAPPING RESPONSE OF THE BLADE IN BENDING.

78-0147 SCHULTZ L
THE ENERGY ADVENTURES OF ERNIE AN' BUD: BUILD A WIND GENERATOR.
BILLINGS, MONTANA, AERO, 1978. 6P.

THIS "CUT AND COLOR BOOK", WRITTEN FOR CHILDREN, CONTAINS SOME BASIC INFORMATION ON BUILDING YOUR OWN WINDMILL. CUTOUTS ENABLE YOU TO BUILD A PAPER MODEL OF A HOUSE, GARAGE, WINDMILL AND TREES.

78-0148 LITTLE ENVIRONMENTAL EFFECT SEEN FOR WINDMILLS: BATTELLE.
SOL. ENERGY INTELL. REP. 4(48): 366, NOVEMBER 2, 1978.

78-0149 LOIS L
APPARATUS FOR EXTRACTING ENERGY FROM WINDS AT SIGNIFICANT HEIGHT ABOVE THE SURFACE.
U.S. PATENT NO. 4,076,190, FEBRUARY 28, 1978. 6P.

A BUOYANT SAIL OR WING TETHERED TO A LINE AN APPRECIABLE DISTANCE ABOVE THE SURFACE WHERE THE WINDS ARE AT HIGHER SPEED THAN AT GROUND LEVEL IS PROVIDED WITH WIND VELOCITY GRADIENT SENSING MEMBERS TO GUIDE MOVEMENT OF THE BUOYANT SAIL TO THE ELEVATION OF GREATEST WIND VELOCITY, THE OTHER END OF THE LINE IS ATTACHED TO AN ELECTRIC GENERATOR. A SERIES OF SAILS ARE UTILIZED WITH ONE BEING RETRACTED WHILE AT LEAST ONE OTHER SAIL IS POSITIONED TO CATCH THE WIND AWAY FROM THE GENERATOR. THE WINGS MAY HAVE DIVIDERS TO INCREASE THE AMOUNT OF FLOW DISRUPTION OF THE WIND AND INCREASE THE DRAG COEFFICIENT AND HENCE THE AMOUNT OF ENERGY EXTRACTED, AND A PULLEY SYSTEM MAY BE UTILIZED IN LIEU OF A SINGLE PASS TETHER LINE.

78-0150 LOTH J L
WIND POWER LIMITATIONS ASSOCIATED WITH VORTICES.
J. ENERGY 2(4): 216-222, JULY-AUGUST 1978.

THE TOTAL PRESSURE DISSIPATION INSIDE VORTICES DUE TO VISCOUS SHEAR HAS BEEN ANALYZED. THE REDUCED LEVEL OF THE TOTAL PRESSURE FLUX OF THE FLOW INSIDE A VORTEX HAS AN ADVERSE EFFECT ON ALL VORTEX-INGESTING WIND MACHINES. THE BETZ LIMIT OF WIND TURBINES INGESTING THE VORTEX GENERATED BY AN AIRFOIL HAS BEEN COMPUTED AND IS NONDIMENSIONALIZED USING THE AREA OF THE VORTEX GENERATOR. THE VACUUM-PUMPING ABILITY OF VORTICES IS ALSO LIMITED. THE BETZ-TYPE LIMIT FOR WIND EXHAUSTING INTO THE CORE OF A VORTEX HAS BEEN COMPUTED FOR BOTH WINGTIP AND TORNADO-TOWER-TYPE VORTEX GENERATORS. THE ENERGY REQUIRED TO ELIMINATE A TORNADO HAS BEEN COMPUTED.

78-0151 MCGEORGE J

JOHN'S WORKSHOP: LOW POWER WINDMILL.
ALTERN. SOURCES ENERGY NO. 30: 50-53, FEBRUARY 1978.

78-0152 MCGUIGAN D
HARNESSING THE WIND FOR HOME ENERGY.
CHARLOTTE, VT., GARDEN WAY PUBLISHING, 1978. 134P.

78-0153 MCNEESE W C
WIND MOTOR.
U.S. PATENT NO. 4,080,100, MARCH 21, 1978. 8P.

A WIND MOTOR IS DESCRIBED WHICH HAS A DOUBLE SET OF ROTOR BLADES OF SPECIAL CONFIGURATION MOUNTED BETWEEN A CENTRAL HUB AND AN OUTER RIM. THE FRONT ROTOR HAS AN EXTENDING SHROUD PROTRUDING WELL IN FRONT OF THE BLADES FOR CAPTURING THE PREVAILING WIND. THE CENTER OF THE ROTOR IS SOLID WITH THE BLADES AT THE CENTER BEING CONFIGURED SO AS TO BE SUBSTANTIALLY AT RIGHT ANGLES TO THE WIND FLOW AND THUS FORM A SUBSTANTIALLY SOLID AREA AT THE CENTER OF THE ROTOR. THE SPECIALLY CONFIGURED BLADES ANGLE AWAY FROM THE CENTER HUB WITH A BACKWARD TILT OF APPROXIMATE 10 DEGS. ALSO, THE BLADES TWIST SO THAT THE PORTION ATTACHED TO THE RIM OR SHROUD OF THE DEVICE PRESENT AN AIR FOIL EFFECT WITH TIP STRUCTURE FOR THE LEADING EDGE BEING APPROXIMATELY 45 DEGS. FROM THE AXIS WHILE THE TRAILING EDGE IS SIMILARLY AT APPROXIMATELY A 45 DEG. ANGLE IN THE OPPOSITE PLANE. THE SECOND ROTOR STRUCTURE HAS SIMILARLY CONFIGURED BLADE STRUCTURE WITH ONE EMBODIMENT OF THE DEVICE PROVIDING THE SECOND ROTOR ON THE SAME SHAFT AS THE FIRST ROTOR, WHILE ANOTHER EMBODIMENT HAS THE SECOND ROTOR MOUNTED ON ANOTHER TUBULAR MEMBER FROM THE SHAFT ON WHICH THE FIRST ROTOR IS MOUNTED AND ALSO PROVIDED FOR ROTATION COUNTER IN DIRECTION TO THE ROTATION OF THE FIRST ROTOR.

78-0154 MARRS R, KOPRIVA S
REGIONS OF THE CONTINENTAL UNITED STATES SUSCEPTIBLE TO EOLIAN ACTION.
SPECIAL REPORT.
NTIS, MAY 1978. 15P.
RLO-2343-78/2

WITHIN THE 48 CONTERMINOUS UNITED STATES, APPROXIMATELY ONE THIRD OF THE SURFACE AREA (32%) IS SUFFICIENTLY ARID TO ALLOW DEVELOPMENT OF EOLIAN LANDFORMS. THROUGHOUT THESE BROAD ARID REGIONS, THE STRONGEST WIND REGIMES LEAVE THEIR RECORD IN EOLIAN LANDFORMS. SOME EOLIAN LANDFORMS OCCUR IN SMALL ISOLATED PATCHES; OTHERS COVER VAST STRETCHES OF THE WIND-SWEPT SURFACE. WHEREVER THEY OCCUR, EOLIAN LANDFORMS CAN BE INTERPRETED AS A LONGTERM CLIMATIIC RECORD. IN ARID AREAS WHERE EOLIAN LANDFORMS ARE ABSENT, ONLY TWO EXPLANATIONS ARE POSSIBLE: 1) EITHER THE SURFACE IS TOO RESISTANT TO PERMIT WIND EROSION OR 2) THE WINDS ARE NOT SUFFICIENTLY STRONG TO INFLUENCE THE SURFACE MORPHOLOGY. ONLY BROAD REGIONS OF CONTINUOUS ROCK OUTCROP, WATER, OR AREAS OF HIGH PRECIPITATION AND LUSH VEGETATION DEFY THE EROSIVE ACTION OF HIGH WINDS. MOST AREAS ARE AT LEAST PARTIALLY SUSCEPTIBLE TO EOLIAN ACTION AND WILL DEVELOP EOLIAN LANDFORMS IF THE WINDS ARE SUFFICIENTLY STRONG AND PERSISTENT. CONSEQUENTLY, THE IDENTIFICATION AND INTERPRETATION OF EOLIAN LANDFORMS IS A VERY USEFUL TOOL FOR WIND ENERGY ASSESSMENTS IN THE WESTERN UNITED STATES. IN EASTERN UNITED STATES, THERE ARE ONLY A FEW SCATTERED AREAS OF ARID LAND LARGE ENOUGH TO PROVIDE DATA ADEQUATE FOR A REGIONAL ASSESSMENT. HOWEVER MANY SMALL PATCHES OF BARREN LAND, WHICH WERE NOT IDENTIFIED IN THIS BRIEF SURVEY, MAY PROVIDE INFORMATION FOR LOCAL SURVEYS OR ANCILLARY INPUT TO REGIONAL WIND ENERGY ASSESSMENTS.

78-0155 MARTINEZ-SANCHEZ M
DYNAMICS OF DRIVE SYSTEMS FOR WIND ENERGY CONVERSION.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 187-193.
CONF-771148

CALCULATIONS ARE PERFORMED TO DETERMINE THE DYNAMIC EFFECTS OF MECHANICAL POWER TRANSMISSION FROM THE NACELLE OF A HORIZONTAL AXIS WIND MACHINE TO THE GROUND OR TO AN INTERMEDIATE LEVEL. IT IS FOUND THAT RESONANCES ARE LIKELY AT 2 OR 4/REV, BUT THEY OCCUR AT LOW POWER ONLY, AND SEEM EASILY CORRECTABLE. LARGE REDUCTIONS ARE FOUND IN THE HARMONIC TORQUE INPUTS TO THE GENERATOR AT POWERS NEAR RATED.

78-0156 MASON P J, SYKES R I

THREE-DIMENSIONAL NUMERICAL INTEGRATIONS OF THE NAVIER-STOKES EQUATIONS FOR FLOW OVER SURFACE-MOUNTED OBSTACLES.
BRACKNELL, G.B., METEOROLOGICAL OFFICE, 1978.

NUMERICAL INTEGRATIONS OF THE NAVIER-STOKES EQUATIONS FOR FLOW PAST A SMOOTH THREE-DIMENSIONAL, SURFACE-MOUNTED OBSTACLE ARE PRESENTED. THE VARIATION OF THE FLOW WITH REYNOLDS NUMBER, AND WITH GEOMETRIC RATIOS SUCH AS THE MAXIMUM SLOPE OF THE OBSTACLE, ARE INVESTIGATED. THE SEPARATED FLOW IS INVESTIGATED USING VISUALIZATIONS OF THE SURFACE STRESS PATTERNS, AND ALSO PARTICLE TRAJECTORIES THROUGH THE FLOW.

78-0157 MAYER D
THE DEVELOPMENT OF THE AWEA.
WINDLETTER, P.1, 6, FEBRUARY 1978.

78-0158 MEADOR R
FUTURE ENERGY ALTERNATIVES; LONG-RANGE PROSPECTS FOR AMERICA AND THE WORLD.
ANN ARBOR, MICHIGAN, ANN ARBOR SCIENCE PUBL., 1978. 206P.

THIS BOOK COVERS ENERGIES OF THE FUTURE THAT MAN MUST RELY ON TO KEEP HIS TECHNOLOGICAL CIVILIZATION GOING: FUSION ENERGY, SOLAR ENERGY, COAL AND HYDROGEN, NUCLEAR FISSION, WIND, OCEAN-THERMAL, GEOTHERMAL, TIDAL AND WATER.

78-0159 MERONEY R N
PROSPECTING FOR WIND ENERGY.
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. 736-740.

PHYSICAL MODELING OF WIND REGIMES IN THE RAKAIA GORGE REGION, SOUTHERN ALPS, NEW ZEALAND, WAS UTILIZED TO EVALUATE THE WIND ENERGY POTENTIAL. WIND TUNNEL MEASUREMENTS WERE COMBINED WITH LOCAL CLIMATOLOGICAL MEASUREMENTS AND A MOBILE FIELD PROGRAM TO ASSESS SITE LOCATIONS FOR WIND ENERGY CONVERSION SYSTEMS.

78-0160 HINKLEY L G, APOSTOLAKIS G C, BONELLO A H
ALTERNATIVE ENERGY SOURCES FOR FEDERAL AVIATION ADMINISTRATION FACILITIES. FINAL REPORT. MAY 1976 - JANUARY 1978.
NTIS, AUGUST 1978. 121P.
FAA-NA-77-17, FAA/RD-78-87

A LITERATURE AND INDUSTRY/GOVERNMENT SEARCH WAS MADE ON ALTERNATIVE ENERGY SOURCES. THIS ENERGY INVESTIGATION EFFORT CONCENTRATED ON PHOTOVOLTAICS, WIND, FUEL CELLS AND THERMOELECTRIC/THERMIONIC GENERATORS THAT WOULD PRODUCE ELECTRICAL ENERGY AND APPEARED FEASIBLE FOR USE AT FEDERAL AVIATION ADMINISTRATION (FAA) FACILITIES. AS AN AID TO IDENTIFY POTENTIAL FAA FACILITIES WHERE IT MIGHT BE FEASIBLE TO USE AN ALTERNATIVE ENERGY SYSTEM, TWO QUESTIONNAIRES WERE DEVELOPED AND DISTRIBUTED WITH THE INTENT THAT A FURTHER IN-DEPTH INVESTIGATION INTO A FEW SELECTED SITES WOULD FOLLOW. DATA FROM THESE QUESTIONNAIRES WERE RECEIVED AND TABULATED. AS A RESULT OF THIS INVESTIGATION, IT WAS RECOMMENDED THAT THE FAA PROCEED TO ESTABLISH ALTERNATIVE ENERGY DEMONSTRATION SITES IN ORDER TO GAIN EXPERIENCE IN THE DESIGN, IMPLEMENTATION, AND OPERATION OF SUCH SYSTEMS. IN ADDITION IT WAS RECOMMENDED THAT DUE TO THE CONSTANTLY CHANGING AND FAST ADVANCING NATURE OF ENERGY CONVERSION SYSTEMS, THE FAA SHOULD EXPEND SOME LEVEL OF EFFORT IN CONTINUING THE LITERATURE/INDUSTRY/GOVERNMENT SEARCH INITIATED UNDER THIS PROJECT IN ORDER TO REMAIN CURRENT ON THE SUBJECT. ALSO THE FAA SHOULD ESTABLISH A CENTRALIZED DATA COLLECTION AND TABULATION POINT FOR ENERGY REQUIREMENTS/CONSUMPTION/COST DATA ON A FACILITY BASIS.

78-0161 MERONEY R N
JOUSTING WITH THE WIND - A GENERAL REVIEW OF THE WIND ENERGY PROBLEM.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P.1-14.

THE WINDMILL, THAT FAMILIAR IF NOT ALWAYS RELIABLE WORKHORSE OF RURAL MANKIND, SEEMS HEADED BACK INTO THE WHIRL AGAIN. VISIONS OF WIND-DRIVEN POWER SOURCES HAVE TANTALISED MANKIND FOR CENTURIES. THE HISTORY OF WIND

GENERATED ELECTRICITY WILL BE SURVEYED, TOGETHER WITH VARIOUS INGENIOUS DEVICES TO PRODUCE ELECTRIC POWER FROM THE WIND. METEOROLOGICAL CONSTRAINTS ON WIND GENERATED ELECTRICITY WILL BE SUMMARISED. THE U.S. METEOROLOGICAL PROGRAMME AS IT RELATES TO WIND ENERGY RESEARCH OVER THE NEXT FEW YEARS WILL BE DISCUSSED.

78-0162 MERONEY R N
REVIEW OF SESSION I: WIND ENERGY.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 181-182.

THE 11 PAPERS ON WIND ENERGY GIVEN AT THIS CONFERENCE ARE SUMMARIZED.

78-0163 MERRIAM M F
THE GEDSER MILL REVITALIZED.
WIND POWER DIG. NO. 11: 34-38, WINTER 1977-1978.

THE 200 KW AEROGENERATOR AT GEDSER, DENMARK, WAS REHABILITATED IN 1977 AND IS TURNING AGAIN AFTER 10 YEARS.

78-0164 MERRIAM M F
THE TVINDMILL.
RAIN 4(4): 13-14, JANUARY 1978.

THE WORLD'S LARGEST WINDMILL, BUILT AT THE TVIND SCHOOLS IN DENMARK, IS DESCRIBED. IT IS HORIZONTAL AXIS, 3-BLADE, WITH A 54 METER DIAMETER SWEEP. THE HUB IS 50 METERS ABOVE THE GROUND. THE GENERATOR IS RATED AT 2000 KW, 3000 VOLTS.

78-0165 SOLAR ENERGY INFORMATION DATA BANK. READING LIST.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, MAY 1978. 3P.

THIS IS A READING LIST CITING REFERENCES ON WIND ENERGY.

78-0166 MILLER D R
SUMMARY OF STATIC LOAD TEST OF THE MOD-0 BLADE.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE, STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 109-116.
CONF-771148

A STATIC LOAD TEST WAS PERFORMED ON THE SPARE MOD-0 WINDTURBINE BLADE TO DEFINE LOAD TRANSFER AT THE ROOT END OF THE BLADE, AND TO VALIDATE STRESS ANALYSIS OF THIS PARTICULAR TYPE OF BLADE CONSTRUCTION (FRAME AND STRINGER). ANALYSIS OF THE LOAD TRANSFER FROM THE AIRFOIL SKIN TO THE SHANK TUBE PREDICTED A STEP CHANGE IN SPANWISE STRESS IN THE AIRFOIL SKIN AT STATION 81.5 INCHES (STA 81.5). FOR FLATWISE BENDING A 40 PERCENT REDUCTION IN SPANWISE STRESS WAS PREDICTED, AND FOR EDGEWISE BENDING A 6 PERCENT REDUCTION. EXPERIMENTAL RESULTS VERIFIED THE 40 PERCENT REDUCTION FOR FLATWISE BENDING, BUT INDICATED ABOUT A 30 PERCENT REDUCTION FOR EDGEWISE BENDING.

78-0167 MILLER D R
WIND TURBINE STRUCTURAL DYNAMICS.
NTIS, 1978. 280P.
WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977.
N78-19616, NASA-CP-2034, DOE-CONF-771148

A WORKSHOP ON WIND TURBINE STRUCTURAL DYNAMICS WAS HELD TO REVIEW AND DOCUMENT CURRENT UNITED STATES WORK ON THE DYNAMIC BEHAVIOR OF LARGER WIND TURBINES, PRIMARILY OF THE HORIZONTAL-AXIS TYPE, AND TO IDENTIFY AND DISCUSS OTHER WIND TURBINE CONFIGURATIONS THAT MAY HAVE LOWER COST AND WEIGHT. INFORMATION WAS EXCHANGED ON THE FOLLOWING TOPICS: (1) METHODS FOR CALCULATING DYNAMIC LOADS; (2) AEROELASTICITY STABILITY; (3) WIND LOADS, BOTH STEADY AND TRANSIENT; (4) CRITICAL DESIGN CONDITIONS; (5) DRIVE TRAIN DYNAMICS; AND (6) BEHAVIOR OF OPERATING WIND TURBINES.

78-0168 MOD-0 TESTED UP-WIND.
WIND POWER DIG. NO. 12: 29, SPRING 1978.

78-0169 JAMES A H

SAFETY ASPECTS OF WIND ENERGY CONVERSION SYSTEMS: A REVIEW AND BIBLIOGRAPHY.
NTIS, AUGUST 1978. 25P.
ORNL/ICES-4

EFFORTS ARE BEING MADE TO HARNESS THE POWER OF THE WINDS FOR THE GENERATION OF ELECTRICITY AND OTHER FORMS OF ENERGY. THE WIND ENERGY CONVERSION (WEC) SYSTEMS THAT ARE THE PRODUCTS OF THESE EFFORTS ARE REVIEWED FROM THE SAFETY VIEWPOINT. ROTOR FAILURES, TOWER INTEGRITY, HAZARDS TO AVIATION, AND PUBLIC ACCESS TO SITES ARE REVIEWED AS PUBLIC SAFETY CONSIDERATIONS. OCCUPATIONAL SAFETY CONSIDERATIONS ARE ALSO REVIEWED. THE CONCLUSIONS REACHED INDICATE THAT NO UNUSUAL HAZARD POTENTIAL IS PRESENTED BY WEC SYSTEMS. THE BIBLIOGRAPHY INCLUDES ARTICLES AND REPORTS ON VARIOUS ASPECTS OF WEC SYSTEMS DEVELOPMENT, DESIGN, AND OPERATION WHICH RELATE TO SAFETY EITHER DIRECTLY OR INDIRECTLY. REPORTS ADDRESSING SOME OF THE ENVIRONMENTAL AND LEGAL ASPECTS ARE ALSO INCLUDED. THIS REPORT IS ONE OF A SERIES PREPARED BY THE INFORMATION CENTER FOR ENERGY SAFETY (ICES) AT THE OAK RIDGE NATIONAL LABORATORY.

78-0170 MORE ON SMALL WIND GENERATORS.
WINDLETTER, P.9, FEBRUARY 1978.

78-0171 ENGINEERING FOR ENERGY DEVELOPMENT.
SEAHORSE 10(3): 5, DECEMBER 1978.

A DESCRIPTION OF WIND ENERGY PROJECTS BY TETRA TECH, INC., IS PRESENTED.

78-0172 NEW STUDY RECOMMENDS FUNDING FOR WIND ENERGY.
WIND POWER DIG. NO. 11: 29, WINTER 1977-1978.

78-0173 OCKERT C E
DEVICE FOR EXTRACTING ENERGY, FRESH WATER, AND POLLUTION FROM MOIST AIR.
U.S. PATENT NO. 4,080,186, MARCH 21, 1978. 6P.

A DEVICE IS DESCRIBED WHICH EXTRACTS USEFUL ENERGY AND FRESH WATER FROM MOIST AIR, WITH AN ASSOCIATED REMOVAL OF POLLUTANT PARTICLES ENTRAINED IN THE EXTRACTED WATER. THE DEVICE COMPRISES AN ENCLOSURE WITH A TALL STACK AND AN EXTENDED BASE WHICH HAS MEANS FOR THE CREATION AND UTILIZATION OF A CONTAINED TORNADO WHICH IS POWERED BY THE ENERGY RELEASE ASSOCIATED WITH THE RAPID CONDENSATION OF WATER FROM THE INCOMING MOIST AIR.

78-0174 HUNDEMANN A S
STATE-OF-THE-ART REVIEWS AND BIBLIOGRAPHIES ON ENERGY. A BIBLIOGRAPHY WITH ABSTRACTS. FINAL REPORT. 1964--MAY 1978.
NTIS, JUNE 1978. 219P.
N78-31586

THIS UPDATED BIBLIOGRAPHY CONTAINS 214 ABSTRACTS. CITATIONS TO BIBLIOGRAPHIES, STATE-OF-THE-ART REVIEWS, AND LITERATURE SURVEYS ON VARIOUS ASPECTS OF FOSSIL FUELS, WIND, SOLAR ENERGY, HYDROGEN, GEOTHERMAL ENERGY, NUCLEAR ENERGY AND BATTERIES ARE PRESENTED. A FEW CITATIONS PERTAIN TO ELECTRIC POWER.

78-0175 PETERSON E W, HENNESSEY J P
ON THE USE OF POWER LAWS FOR ESTIMATES OF WIND POWER POTENTIAL.
J. APPL. METEOROL. 17(3): 390-394, MARCH 1978.

THE EVALUATION OF WIND POWER POTENTIAL AT A PROPOSED AEROGENERATOR SITE BY EXTRAPOLATION FROM MEASURED WINDS AT A REFERENCE LEVEL IS INVESTIGATED. IT IS SHOWN THAT THE TOTAL WIND POWER DENSITY IS NOT PARTICULARLY SENSITIVE TO THE SELECTION OF ROUGHNESS LENGTH OR POWER LAW EXPONENT; OVER THE ENTIRE LIKELY RANGE OF THESE PARAMETERS THE WIND POWER IN THE MEAN FLOW AT TYPICAL AEROGENERATOR HUB HEIGHTS IS WITHIN 1.4-4 TIMES THE POWER AT A REFERENCE HEIGHT OF ABOUT 10 M. IN LIEU OF IN SITU PROFILE MEASUREMENTS, IT IS SUGGESTED THAT A POWER LAW EXPONENT OF 1/7 IS ADEQUATE FOR REALISTIC BUT CONSERVATIVE ESTIMATES OF THE AVAILABLE WIND POWER EXCEPT AT EXTREMELY ROUGH SITES WHERE THE ESTIMATES MAY ONLY BE CONSERVATIVE.

78-0176 PETERSON J, HEWSON E W
PACIFIC NORTHWEST REGIONAL WIND ENERGY STUDY, CRT-39.
WALLA WALLA, WASHINGTON, WALLA WALLA DISTRICT CORPS OF ENGINEERS, MARCH

1978. 212P.

ALTHOUGH THIS STUDY FOCUSES ON VARIOUS COMBINATIONS OF WINDPOWER AND PUMPED STORAGE IN BOONEVILLE POWER ADMINISTRATION TERRITORY, THE INTERPRETATION OF DATA MAKE IT A MODEL FOR OTHER WIND REGIONS TO EMULATE. OF PARTICULAR INTEREST ARE EQUATIONS THAT ALLOW THE CALCULATION OF THE NUMBER OF LARGE WIND GENERATORS THAT A GIVEN HYDRO-STORAGE CAPACITY, IN DAMS OR PUMPED STORAGE, CAN ACCOMODATE IN ORDER TO SMOOTH (I.E. LOAD-LEVEL) THEIR VARIABLE OUTPUT. ALSO, PNW WIND DATA IS ANALYZED TO SHOW THE INTERACTION OF A NUMBER OF WIND FARMS WORKING TOGETHER TO PRODUCE POWER.

78-0177 PIERSON R E
TECHNICIANS AND EXPERIMENTERS GUIDE TO USING SUN, WIND, AND WATER POWER.
WEST NYACK, N.Y., PARKER PUBLISHING CO., 1978. 270P.

78-0178 "PIONEER" WIND TURBINE DEDICATION AT CLAYTON, NEW MEXICO.
WINDLETTER, P.8, FEBRUARY 1978.

78-0179 PLUGGED-IN WINDMILL.
NEW SCI. 77(1094): 709, MARCH 16, 1978.

78-0180 SEIDEL R C, GOLD H, WENZEL L M
POWER TRAIN ANALYSIS FOR THE DOE/NASA 100-KW WIND TURBINE GENERATOR.
NTIS, OCTOBER 1978. 58P.
NASA-TM-78997, DOE/NASA/1028-78/19, N79-16355

PROGRESS IN EXPLAINING VARIATIONS OF POWER EXPERIENCED IN THE ON-LINE OPERATION OF A 100-KW EXPERIMENTAL WIND TURBINE-GENERATOR IS REPORTED. DATA ARE PRESENTED THAT SHOW THE OSCILLATIONS TEND TO BE CHARACTERISTIC OF A WIND-DRIVEN SYNCHRONOUS GENERATOR BECAUSE OF LOW TORSIONAL DAMPING IN THE POWER TRAIN, RESONANCES OF ITS LARGE STRUCTURE, AND EXCITATION BY UNSTEADY AND NONUNIFORM WIND FLOW. THE REPORT INCLUDES A DYNAMIC ANALYSIS OF THE DRIVE-TRAIN TORSION, THE GENERATOR, PASSIVE DRIVELINE DAMPING, AND ACTIVE PITCH CONTROL AS WELL AS CORRELATION WITH EXPERIMENTAL RECORDINGS. EXPERIMENTAL MEASUREMENTS OF THE SYSTEM TRANSFER FUNCTION WERE MADE BY DISTURBING THE BLADE PITCH ANGLE. THEY COMPARED WELL WITH THE MODEL DYNAMICS UP THROUGH THE FREQUENCY OF THE FIRST MODE. OSCILLATIONS OF POWER WERE EXPERIENCED NEAR THE FIRST-MODE FREQUENCY AND ARE EXPLAINED AS RESULTING FROM THE FIRST-MODE RESONANCE AMPLIFYING DISTURBANCES FROM, FOR EXAMPLE, BLADE ASYMMETRIES. CONTROL OF POWER ABOUT A SET POINT USED PROPORTIONAL-PLUS-INTEGRAL FEEDBACK TO THE PITCH ACTUATOR, AND CONTROL GAINS WERE FORMULATED FOR REDUCING DISTURBANCES UP TO FREQUENCIES LESS THAN THE FIRST-MODE. A FLUID COUPLING INSTALLED IN THE HIGH-SPEED SHAFT IS ONE SOLUTION DEMONSTRATED FOR REDUCING THE FIRST-MODE RESONANT AMPLIFICATION. A PREDICTED SECOND-MODE RESONANCE AT 3.5 HERTZ IN THE POWER TRAIN WAS NOT OBSERVED EXPERIMENTALLY. A SMALL EFFECT OF TOWER MOTION WITHIN THE POWER TRAIN DYNAMICS (AN INTERACTION NOT MODELLED) WAS OBSERVED EXPERIMENTALLY. EXPERIMENTALLY OBSERVED VARIATIONS IN POWER AT THE TWO-PER-ROTOR-REVOLUTION (2P) FREQUENCY WERE MORE THAN PREDICTED. THE LARGER 2P VARIATION IS SUSPECTED TO BE THE IMPACT OF LOCAL TURBULENCES NOT MODELLED. A WIND FEED-FORWARD CONTROL SCHEME WAS EMPLOYED, BUT FAILED TO ATTENUATE WIND-SPEED-CHANGE EFFECTS AS WELL AS PREDICTED BECAUSE THE ANEMOMETER MEASUREMENT OF WIND SPEED USED IN THE CONTROL WAS NOT WELL CORRELATED WITH THE WIND SPEED AT THE ROTOR.

78-0181 PROGNOSIS FOR 1978: OPTIMISM FOR THE WIND INDUSTRY.
WINDLETTER, P.1-2, FEBRUARY 1978.

AN INTERVIEW WITH RICK KATZENBERG, AMERICAN WIND ENERGY ASSOCIATION PRESIDENT, IS PRESENTED.

78-0182 RAMSDELL J V
ESTIMATES OF THE NUMBER OF LARGE AMPLITUDE GUSTS.
NTIS, MARCH 1978. 55P.
PNL-2508

THE PURPOSE OF THIS REPORT IS TO PRESENT PRELIMINARY ESTIMATES OF THE NUMBER OF OCCURRENCES OF LARGE AMPLITUDE GUSTS FOR USE IN THE DESIGN OF WIND ENERGY CONVERSION SYSTEMS. EXISTING TURBULENCE INFORMATION HAS BEEN COMBINED WITH AN ASSUMED WIND SPEED DISTRIBUTION TO ARRIVE AT THE ESTIMATES. THE NUMBER OF LARGE AMPLITUDE GUSTS PER YEAR IS TREATED AS A

FUNCTION OF THE ANNUAL MEAN WIND SPEED AND TERRAIN ROUGHNESS. THIS TREATMENT IS BASED UPON THE ASSUMPTIONS THAT THE ATMOSPHERE HAS NEUTRAL STABILITY DURING HIGH WINDS AND THAT THE GUSTINESS IS INDUCED BY FLOW OVER SURFACE ROUGHNESS ELEMENTS. LARGE GUSTS DURING THUNDERSTORMS AND OTHER SEVERE WEATHER PHENOMENA ARE NOT TREATED. THE RESULTS OF THE STUDY ARE PRESENTED IN TABULAR FORM AS A FUNCTION OF GUST AMPLITUDE AND HOURLY AVERAGE WIND SPEED. TABLES OF ESTIMATES ARE GIVEN FOR TERRAIN VARYING IN ROUGHNESS FROM OPEN WATER TO HIGH MOUNTAINS, AND FOR ANNUAL MEAN WIND SPEEDS BETWEEN 4 AND 12 MS-1. POSITIVE AND NEGATIVE GUSTS ARE TREATED SEPARATELY.

78-0183 REDDOCH T W
GENERATOR COSTS FOR WIND POWER APPLICATION.
NTIS, APRIL 1978. 18P.
TID-28678

THIS ANALYSIS HAS ATTEMPTED TO EVALUATE THE COSTS OF THE THREE CONVENTIONAL MEANS OF ELECTROMECHANICAL ENERGY CONVERSION. IN GENERAL, THE LEAST EXPENSIVE FORM OF GENERATION APPEARS TO BE THE INDUCTION GENERATOR, WHILE THE MOST EXPENSIVE IS THE D.C. GENERATOR. ALL COSTING IS BASED ON TRADITIONAL MATERIALS AVAILABLE FROM COMMERCIAL OUTLETS BASED ON 1977 PRICES FOR 10 UNITS. SINCE MOST SMALL POWER GENERATION SYSTEMS REQUIRE D.C. AND THE SYNCHRONOUS GENERATOR PROVIDES ITS OWN SOURCES OF REACTIVE POWER, THE SYNCHRONOUS GENERATOR IS THE MOST POPULAR ON THE MARKET. FROM THE SUMMARY CURVES IT IS CLEAR THAT THE D.C. SYSTEM IS NOT COMPETITIVE IN THE A.C. PRODUCTION MODE. THE INDUCTION GENERATOR SYSTEM SHOWS SOME EDGE OVER THE SYNCHRONOUS SYSTEM IN COSTS, HOWEVER AS MACHINE SIZE INCREASES THE DIFFERENCE IS LESS. ON A WEIGHT BASIS THE INDUCTION SYSTEM IS THE LEAST, THE D.C. SYSTEM IS THE HEAVIEST. THE WEIGHT DIFFERENCE BETWEEN SYSTEMS IS NOT SIGNIFICANT.

78-0184 REED J W
WIND SPEED DISTRIBUTION CHANGES WITH HEIGHT AT SELECTED WEATHER STATIONS.
NTIS, AUGUST 1978. 54P.
SAND-76-0714

TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS AT 15 SELECTED WEATHER STATIONS HAVE BEEN SMOOTHED TO CORRECT FOR OBSERVER BIAS. RECORDS WERE ADJUSTED TO A CONSTANT, FINAL ANEMOMETER HEIGHT OVER LEVEL AIRFIELD TERRAIN AT NINE STATIONS WHERE THE ANEMOMETER WAS MOVED DURING THE PERIOD OF RECORD. THE ANEMOMETER ADJUSTMENT SCHEME IS DESCRIBED FOR EACH LOCATION, SINCE THE ANEMOMETER EXPOSURE CHANGE AND DATE OF CHANGE WERE UNIQUE FOR EACH LOCATION. FINALLY, WIND SPEED DISTRIBUTION CURVES AND TABLES OF SYNTHESIZED TIME SERIES AT FINAL ANEMOMETER HEIGHT AND AT 10 M, 20 M, AND 50 M ABOVE GROUND HAVE BEEN PREPARED. THESE HOMOGENIZED SERIES SHOULD BE USEFUL FOR VARIOUS ANALYSES OF WIND POWER SYSTEMS.

78-0185 REID S J
JOINT FREQUENCIES OF SUN AND WIND.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 191-202.

USING CLIMATOLOGICAL DATA FOR THE YEARS 1972 TO 1976 INCLUSIVE, THE FREQUENCY OF OCCURRENCE OF DAYS WITH AND WITHOUT GUSTS GREATER THAN 22 KT AND DAYS WITH AND WITHOUT SUNSHINE EXCEEDING 5 HOURS IS INVESTIGATED. THERE IS A SMALL NEGATIVE CORRELATION BETWEEN THE OCCURRENCES OF SUN AND WIND. SUNNY, WINDY DAYS ARE THE PREDOMINANT WEATHER TYPE AT MOST STATIONS. SUNNY, CALM DAYS PREDOMINATE AT HOKITIKA, NELSON, AND TAURANGA AND CLOUDY, WINDY DAYS AT DUNEDIN AND INVERCARGILL.

78-0186 REUTER R C, WORSTELL M H
TORQUE RIPPLE IN A VERTICAL AXIS WIND TURBINE.
NTIS, APRIL 1978. 45P.
SAND-78-0577

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.

78-0187 RICH E
WECS/UTILITY INTERFACE.
WIND POWER DIG. NO. 12: 12, SPRING 1978.

78-0188 RICHARDS T R, NEUSTADTER H E
DOE/NASA MOD-OA WIND TURBINE PERFORMANCE.
NTIS, 1978. 9P.
NASA-TM-78916, DOE/NASA/1004-78/13, CONF-780801-23, N78-26553, E-9654

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, NEW MEXICO. DESIGNATED THE MOD-OA-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, NEW MEXICO, IN NOVEMBER 1977. THIS PAPER PRESENTS A COMPARISION BETWEEN ITS PREDICTED AND MEASURED POWER VERSUS WIND SPEED PERFORMANCE.

78-0189 ROWE D R
ROWLAND MORGAN SAYS: YOU, TOO, MAY BE ABLE TO SELL POWER TO THE ELECTRIC COMPANY.
MOTHER EARTH NEWS NO. 49: 88-89, JANUARY-FEBRUARY 1978.

78-0190 ROXBURGH A J, EDWARDS P J, HURST R B
ACQUISITION AND ANALYSIS OF OTAGO WIND ENERGY DATA.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS. WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 47-56.

THIS PAPER DESCRIBES THE ACQUISITION AND ANALYSIS OF WIND DATA BY THE UNIVERSITY OF OTAGO AS PART OF THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND. FIELD OPERATION OF BOTH WIND-RUN AND WIND-SPEED ANEMOMETERS IS DETAILED TOGETHER WITH CALIBRATION DATA. THE OTAGO UNIVERSITY, PHYSICS DEPARTMENT WIND SPEED RECORDING SYSTEM IS DESCRIBED WITH PARTICULAR REFERENCE TO THE CONTINUOUS DATA FORMAT USED. THE FORMAT ALLOWS FLEXIBLE READOUT IN COMPUTER COMPATIBLE FORM, IN ANALOG AND NUMERIC PRINTER CHART FORM, OR ALLOWS DIRECT ANALYSIS OF THE RECOVERED ANALOG WIND-SPEED VARIABLE USING SPECIAL HARDWARE.

78-0191 SR1 STUDY FAVORS WIND.
WINDLETTER, P. 3, FEBRUARY 1978.

78-0192 SANDIA REPORTS ON DARRIEUS TESTING.
WIND POWER DIG. NO. 11: 28, WINTER 1977-1978.

78-0193 SAVINO J M, WAGNER L H, NASH M
WAKE CHARACTERISTICS OF A TOWER FOR THE DOE/NASA MOD-1 WIND TURBINE.
NTIS, APRIL 1978. 74P.
NASA-TM-78853, N78-23558, DOE/NASA/1028-78/17

A 1/40TH-SCALE MODEL OF A TOWER CONCEPT DESIGNED FOR THE DOE-NASA-MOD-1 WIND POWER TURBINE WAS TESTED IN A LOW-SPEED WIND TUNNEL. WAKE WIND SPEED PROFILES WERE MEASURED, AND FROM THESE WERE DETERMINED LOCAL VALUES OF WAKE MINIMUM VELOCITY RATIO, AVERAGE VELOCITY RATIO, AND WIDTH OVER A RANGE OF TOWER ELEVATIONS AND WIND APPROACH ANGLES. COMPARISON WITH RESULTS FROM TWO OTHER ALL-TUBULAR MODELS (MOD-0 AND EIGHT-LEG DESIGNS) TESTED EARLIER IN THE SAME TUNNEL INDICATED THAT WAKE WIDTH AND FLOW BLOCKAGE AT THE ROTOR PLANE OF ROTATION WERE SLIGHTLY LARGER FOR THE MOD-1 TOWER THAN FOR THE OTHER TWO MODELS. THE DIFFERENCES IN WAKE CHARACTERISTICS WERE ATTRIBUTED TO DIFFERENCES IN TOWER GEOMETRY AND MEMBER DIMENSIONS.

78-0194 SEALE J
HOW A WINDMILL TECHNOLOGY FOR AQUACULTURE MAY EVOLVE.
COMMER. FISH FARMER AQUACULT. NEWS 4(6): 11-14, SEPTEMBER 1978.

78-0195 SEIDEL R C
POWER OSCILLATION OF THE MOD-0 WIND TURBINE.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P.

151-156.
CONF-771148

THE MOD-O POWER HAS NOISE COMPONENTS WITH VARYING FREQUENCY PATTERNS. MAGNITUDES REACH MORE THAN FORTY PERCENT POWER AT THE FREQUENCY OF TWICE PER ROTOR REVOLUTION. ANALYSIS OF A SIMPLE TORSIONAL MODEL OF THE POWER TRAIN PREDICTS LESS THAN HALF OF THE OBSERVED MAGNITUDE AND DOES NOT EXPLAIN THE SHIFTING FREQUENCIES OF THE NOISE PATTERNS.

78-0196 SHELDAHL R E, BLACKWELL B F, FELTZ L V
WIND TUNNEL PERFORMANCE DATA FOR TWO- AND THREE-BUCKET SAVONIUS ROTORS.
J. ENERGY 2(3): 160-164, MAY-JUNE 1978.

FIFTEEN CONFIGURATIONS OF A SAVONIUS ROTOR WIND TURBINE WERE TESTED IN THE VOUGHT CORPORATION SYSTEMS DIVISION 4.9- X 6.1-M LOW SPEED WIND TUNNEL TO DETERMINE AERODYNAMIC PERFORMANCE. PARAMETERS CONSIDERED WERE NUMBER OF BUCKETS, NOMINAL FREESTREAM VELOCITY, REYNOLDS NUMBER PER METER, ROTOR HEIGHT, ROTOR DIAMETER, AND BUCKET OVERLAP. THE MEASURED TEST VARIABLES WERE TORQUE, ROTATIONAL SPEED, AND TUNNEL CONDITIONS. IT IS CONCLUDED THAT INCREASING REYNOLDS NUMBER AND/OR ASPECT RATIO IMPROVES PERFORMANCE. THE RECOMMENDED CONFIGURATION CONSISTS OF TWO SETS OF TWO-BUCKET ROTORS, ROTATED 90 DEGS. APART, WITH EACH ROTOR HAVING A DIMENSIONLESS GAP WIDTH OF 0.1-0.15.

78-0197 SIMMS D
ESTIMATING WIND ENERGY.
ALTERN. SOURCES ENERGY NO. 30: 27-31, FEBRUARY 1978.

ESTIMATING WIND ENERGY IN QUEBEC IS DISCUSSED.

78-0198 SIVASEGARAM S
EXPERIMENTAL INVESTIGATION OF A CLASS OF RESISTANCE-TYPE, DIRECTION-INDEPENDENT WIND TURBINES.
ENERGY 3(1): 23-30, FEBRUARY 1978.

THE RESISTANCE-TYPE, DIRECTION-INDEPENDENT WIND TURBINE IS SUITABLE FOR THE GENERATION OF POWER ON A SMALL SCALE IN DEVELOPING COUNTRIES. SO FAR, ALL WORK ON THIS CLASS OF WIND TURBINE SEEMS TO BE RESTRICTED TO THE SAVONIUS ROTOR. THE FINDINGS OF AN EXPERIMENTAL INVESTIGATION OF AN ENTIRE CLASS OF WIND TURBINES, WHICH INCLUDES THE CONVENTIONAL SAVONIUS ROTOR, ARE PRESENTED. THE INFLUENCE OF FOUR ROTOR-GEOMETRY PARAMETERS (I.E., NUMBER OF BLADES, BLADE ANGLE, BLADE LOCATION AND ANGLE OF SETTING OF THE BLADE) IS STUDIED AND DISCUSSED ON THE BASIS OF TWO PERFORMANCE CRITERIA (I.E., TURBINE EFFICIENCY AND PERFORMANCE ON THE BASIS OF BLADE AREA). THE EXISTENCE OF OPTIMUM, DESIGN PARAMETERS IS ESTABLISHED AND THE POSSIBILITY OF IMPROVING SUBSTANTIALLY ON THE PERFORMANCE OF THE SAVONIUS ROTOR IS DEMONSTRATED. SOME POSSIBLE APPLICATIONS OF THE PRESENT CLASS OF TURBINES ARE BRIEFLY COMMENTED ON.

78-0199 SMALL FARM PROJECT.
WIND POWER DIG. NO. 12: 27, SPRING 1978.

78-0200 SMALL GROUPS, BIG WINDMILLS.
RAIN 4(4): 12, JANUARY 1978.

SEE ENTRY 78-0122

78-0201 SO R M C
ON VORTEX WIND POWER.
A.S.M.E. PAPER 77-WA/FE-20, 1978. 5P.

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 SHOW 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.

78-0202 SO R M C
VORTEX WIND POWER.
J. FLUIDS ENG. 100(1): 79-82, MARCH 1978.

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 SHOW 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.

78-0203 SOLAR ENERGY, A STATUS REPORT.
WASHINGTON, D.C., U.S. GOV'T. PRINTING OFFICE, JUNE 1978. 59P. ALSO NTIS, JUNE 1978. 59P.
DOE/ET-0062

WIND ENERGY SYSTEMS ARE DISCUSSED IN THIS OVERALL REPORT ON THE STATUS OF SOLAR ENERGY RESEARCH.

78-0204 SOLAR ENERGY DIRECTORY, 1978-79 EDITION.
PHOENIX, ARIZONA, CENTERLINE COMPANY, 1978. 215P.

THIS DIRECTORY HAS OVER 1400 LISTINGS IN 11 SECTIONS, INCLUDING ARCHITECTS, ASSOCIATIONS, CONTRACTORS, EDUCATION, GOVERNMENT AGENCIES, MANUFACTURING, MARKETING, NEWSLETTERS, RESEARCH, WIND ALTERNATIVES, AND INTERNATIONAL.

78-0205 SOLAR ENERGY RESEARCH AND DEVELOPMENT: PROGRAM BALANCE. ANNEX. VOLS. I AND II.
NTIS, FEBRUARY 1978. VOL. I, 158P. VOL. II, 285P.
HCP/M2693-01, HCP/M2693-02

SEVEN SOLAR ENERGY TECHNOLOGIES ARE ASSESSED IN THIS 2 VOLUME REPORT, INCLUDING WIND ENERGY SYSTEMS.

78-0206 GNECCO A J, WHITEHEAD G T
MICROPROCESSOR CONTROL OF A WIND TURBINE GENERATOR.
NTIS, MARCH 1978. 16P.
NASA-TM-79021, DOE/NASA/1028-78/20

THIS PAPER DESCRIBES A MICROPROCESSOR BASED SYSTEM USED TO CONTROL THE UNATTENDED OPERATION OF A WIND TURBINE GENERATOR. THE TURBINE AND ITS MICROCOMPUTER SYSTEM ARE FULLY DESCRIBED 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.

78-0207 SOUTHERN CALIFORNIA EDISON TO ANNOUNCE PURCHASE OF A 3-MWE SCHACHLE WINDMILL.
SOLAR ENERGY INTELL. REP. 4(18): 127, MAY 1, 1978.

78-0208 SOUTHWEST - SMALL WIND SYSTEMS FOR TEXAS.
WIND POWER DIG. NO. 12: 20-21, SPRING 1978.

78-0209 SOVIET WIND PROGRAM.
WIND POWER DIG. NO. 12: 11, SPRING 1978.

TSIKLON, THE SOVIET ASSOCIATION FOR THE USE OF WIND ENERGY, HAS ANNOUNCED AN AMBITIOUS PROGRAM FOR THE CONSTRUCTION OF A COUNTRY-WIDE WIND ENERGY GRID SYSTEM, WHICH IS DESCRIBED.

78-0210 SPERA D A
COMPARISON OF COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 1-13.
CONF-771148

THE DEVELOPMENT OF AT LEAST SEVEN CODES BY NASA AND ITS CONTRACTORS IS DESCRIBED. AS MIGHT BE EXPECTED IN AN AREA OF NEW TECHNOLOGY, THESE CODES DIFFER CONSIDERABLY IN APPROACH AND TECHNIQUE. BECAUSE OF THE GENERALLY COMPLICATED NATURE OF ANY STRUCTURAL DYNAMICS ANALYSIS, A DETAILED COMPARISON OF SEVEN COMPUTER CODES IS EXTREMELY DIFFICULT.

THEREFORE, THE OBJECTIVES OF THIS STUDY HAVE BEEN LIMITED TO THE FOLLOWING: TO PRESENT A BRIEF OVERVIEW OF EACH CODE 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, AN EXPERIMENTAL MACHINE IN OPERATION AT NASA'S PLUM BROOK STATION NEAR SANDUSKY, OHIO. COMPARISON ON THE BASIS OF CYCLIC LOADS, PEAK LOADS, AND HARMONIC CONTENTS WAS SELECTED.

78-0211 SPERA D A, JANETZKE D C
EFFECTS OF ROTOR LOCATION, CONING, AND TILT ON CRITICAL LOADS IN LARGE WIND TURBINES.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 227-236.
CONF-771148

THREE LARGE (1500 KW) HORIZONTAL ROTOR CONFIGURATIONS WERE ANALYZED TO DETERMINE THE EFFECTS ON DYNAMIC LOADS OF UPWARD AND DOWNWIND ROTOR LOCATIONS, CONED AND RADIAL BLADE POSITIONS, AND TILTED AND HORIZONTAL ROTOR AXIS POSITIONS. LOADS WERE CALCULATED FOR A RANGE OF WIND VELOCITIES AT THREE LOCATIONS IN THE STRUCTURE: THE BLADE SHANK, THE HUB SHAFT, AND THE YAW DRIVE. BLADE AXIS CONING AND ROTOR AXIS TILT WERE FOUND TO HAVE MINOR EFFECTS ON LOADS. HOWEVER, LOCATING THE ROTOR UPWIND OF THE TOWER SIGNIFICANTLY REDUCED LOADS AT ALL LOCATIONS ANALYZED.

78-0212 STAHLE C V
MOD-1 WTG DYNAMIC ANALYSIS.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 15-29.
CONF-771148

THE DYNAMIC ANALYSIS IS PRESENTED OF THE MOD-1 2000 KW HORIZONTAL-AXIS WIND TURBINE. AFTER BRIEFLY DESCRIBING THE MOD-1 DESIGN, THE DYNAMIC ANALYSIS USED TO EVALUATE THE DYNAMIC LOADS AND STRUCTURAL INTERACTIONS IS DISCUSSED. THE RESONANT FREQUENCY PLACEMENT, THE TREATMENT OF UNSTEADY WIND LOADING AND THE DYNAMIC LOAD SENSITIVITY TO FREQUENCY SHIFTS ARE REVIEWED FOR THE DESIGN.

78-0213 STANDARDS FOR WIND SYSTEMS.
WINDLETTER, P. 4-5, FEBRUARY 1978.

78-0214 STEWART H J
WIND ENERGY SYSTEMS.
ALTERNATE ENERGY SYSTEMS SEMINAR. PROCEEDINGS. MARCH 30, 1978. NTIS, 1978. P. 150-170.
N78-27528

A DISCUSSION ON WIND ENERGY SYSTEMS INVOLVED WITH THE DOE WIND ENERGY PROGRAM IS PRESENTED. SOME OF THE PROBLEMS ASSOCIATED WITH WIND ENERGY SYSTEMS ARE DISCUSSED. THE COST, EFFICIENCY, AND STRUCTURAL DESIGN OF WIND ENERGY SYSTEMS ARE ANALYZED.

78-0215 STIEFELD B
WIND TURBINE DATA ACQUISITION AND ANALYSIS SYSTEM.
NTIS, JULY 1978. 50P.
SAND-77-1164

UNDER DEPARTMENT OF ENERGY (DOE) SPONSORSHIP, SANDIA LABORATORIES HAS IMPLEMENTED A PROGRAM TO DEVELOP VERTICAL-AXIS WIND TURBINE (VAWT) SYSTEMS. ONE ASPECT OF THIS PROGRAM HAS BEEN THE DEVELOPMENT OF AN INSTRUMENTED TEST SITE ADJACENT TO SANDIA LABORATORIES' TECHNICAL AREA I ON KIRTLAND AIR FORCE BASE. THREE VAWTS ARE NOW IN OPERATION ON THIS TEST SITE. THIS PAPER DESCRIBES THE DATA ACQUISITION AND ANALYSES SYSTEM DEVELOPED TO MEET THE NEEDS OF THE VAWT TEST SITE. THE SYSTEM EMPLOYS A 16-BIT WORK-LENGTH MINICOMPUTER AS THE MAJOR ELEMENT IN A STAND-ALONE CONFIGURATION. A VARIETY OF PERIPHERAL DEVICES PERFORM THE REQUIRED DATA ACQUISITION FUNCTIONS AND PROVIDE FOR DATA DISPLAY AND ANALYSIS. INCLUDED IS A DISK-BASED SOFTWARE OPERATING SYSTEM THAT SUPPORTS A MASS STORAGE-FILE SYSTEM, HIGH-LEVEL LANGUAGE, AND AUXILIARY SOFTWARE PROCEDURES.

78-0216 STIEFELD B, TOMLINSON R N

DATA ACQUISITION AND SIGNAL PROCESSING FOR A VERTICAL AXIS WIND ENERGY CONVERSION SYSTEM.
NTIS, 1978. 8P.
SAND-78-1000C

THE DATA ACQUISITION AND ANALYSES SYSTEM DEVELOPED TO MEET THE NEEDS OF THE 17-METER VAWT IS DESCRIBED. THE SYSTEM EMPLOYS A MINICOMPUTER-BASED DATA ACQUISITION SYSTEM WITH SPECIAL PERIPHERAL EQUIPMENT. STATISTICAL METHODS WILL BE DESCRIBED THAT ARE EMPLOYED TO EVALUATE THE PERFORMANCE OF THE SYSTEM FROM BOTH A STRUCTURAL AND PERFORMANCE VIEWPOINT.

78-0217 STIEFELD B, TOMLINSON R
MINICOMPUTER BASED DATA ACQUISITION AND ANALYSIS SYSTEMS FOR VERTICAL AXIS WIND TURBINE TESTING.
NTIS, 1978. 10P.
SAND-78-0187C

THE COMPUTER BASED DATA ACQUISITION SYSTEM AND INSTRUMENTATION USED TO ACQUIRE ENVIRONMENTAL, STRUCTURAL, AND PERFORMANCE DATA FROM THE VAWT COMPLEX ARE DESCRIBED. AN AIRBORNE TYPE PCM ENCODER MOUNTED ON THE TURBINE SHAFT IS USED TO DIGITIZE MUCH OF THE DATA, PARTICULARLY THE LOW-LEVEL STRAIN INFORMATION FROM THE TURBINE BLADES AND SUPPORTING STRUCTURE. THE DATA SYSTEM IS AN EXTENSION OF RECENTLY COMPLETED WORK ON A SIMILAR SYSTEM FOR A LARGE, 8.8 METER (25 FOOT) CENTRIFUGE FACILITY.

COMPUTER SOFTWARE WHICH PROVIDES NEAR REAL TIME GRAPHIC AND ANALYTIC CAPABILITIES WILL ALSO BE DESCRIBED.

78-0218 CARLSON A, FULLER D, REYER R, MALLNER C, FOGELSON S
USAF TERRESTRIAL ENERGY STUDY. VOLUME III. PART 2. ENERGY CONVERSION SYSTEMS HANDBOOK.
NTIS, MAY 1978. 483P.

AD-A057252

THIS REPORT WAS PREPARED BY BURNS AND ROE, INC. 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. THESE INCLUDE 19 TYPES OF ENERGY CONVERSION SYSTEMS WHICH UTILIZE EITHER CHEMICAL FUEL, NUCLEAR FUEL, SOLAR ENERGY OR WIND ENERGY AND TWO TYPES OF ENERGY STORAGE SYSTEMS WHICH UTILIZE ELECTRIC POWER FOR RECHARGING. 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. A TOTAL OF EIGHTEEN SUCH PARAMETERS ARE PRESENTED FOR EACH TYPE OF SYSTEM FOR SEVERAL SETS OF REQUIREMENTS. THE REQUIREMENTS ARE DEFINED IN TERMS OF ELECTRIC POWER LEVEL, FREQUENCY AND DURATION OF OPERATION CORRESPONDING TO TYPICAL U.S. AIR FORCE GROUND APPLICATIONS.

78-0219 SULLIVAN T L
SIMPLIFIED MODELING FOR WIND TURBINE MODAL ANALYSIS USING NASTRAN.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 31-37.
CONF-771148

A SIMPLIFIED FINITE ELEMENT MODEL OF THE MOD-0 WIND TURBINE TOWER IS DESCRIBED. USE OF THIS MODEL GREATLY REDUCES THE COMPUTER TIME REQUIRED FOR MODAL ANALYSIS. THE MODEL PROVIDES GOOD ACCURACY IN PREDICTING TOWER FREQUENCIES AND MODE SHAPES AS LONG AS THE TOWER BENDING MODE SHAPE RESEMBLES THE FIRST BENDING MODE SHAPE OF A CANTILEVER BEAM. SEVERAL APPLICATIONS WHERE THE SIMPLIFIED MODEL WAS USED FOR MODAL ANALYSIS ARE DESCRIBED.

78-0220 SULLIVAN W N
STRUCTURAL PERFORMANCE OF THE DOE/SANDIA 17 METER VERTICAL AXIS WIND TURBINE.
NTIS, 1978. 7P.
SAND-78-0880C

THE DOE/SANDIA 17 METER DARRIEUS VERTICAL AXIS WIND TURBINE HAS BEEN OPERATED SINCE APRIL 1977 FOR THE PURPOSE OF GATHERING ENGINEERING DATA. THIS REPORT CONSIDERS ONE ASPECT OF THAT TEST PROGRAM, THE MEASUREMENT OF

BLADE STRUCTURAL RESPONSE.

78-0221 SURBROOK T C
WIND POWER.
MICHIGAN STATE UNIVERSITY COOPERATIVE EXTENSION SERVICE. ENERGY FACT SHEET NO. 2, EXTENSION BULLETIN E-112, JANUARY 1978. 8P.

78-0222 HEWSON E W, BAKER R W
NETWORK WIND POWER OVER THE PACIFIC NORTHWEST. REPORT NO. BPA77-2 SUBMITTED TO BONNEVILLE POWER ADMINISTRATION.
CORVALLIS, OREGON, OREGON STATE UNIVERSITY, JANUARY 1978. 164P.

78-0223 SYMPOSIUM ON METEOROLOGY AND ENERGY, PROCEEDINGS.
WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. 370P.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977.

INCLUDED IN THIS PROCEEDINGS ARE 14 PAPERS ON WIND ENERGY.

78-0224 TAKLE E S, BROWN J M, DAVIS W M
CHARACTERISTICS OF WIND AND WIND ENERGY IN IOWA.
IOWA STATE J. RES. 52(3): 313-339, FEBRUARY 1978.

A HYBRID WEIBULL DISTRIBUTION IS FOUND TO CHARACTERIZE SATISFACTORILY IOWA WIND-SPEED DATA FROM AN INSTRUMENTED TOWER AND FROM THE NATIONAL CLIMATIC CENTER. AVERAGE WIND SPEED (ALSO AVAILABLE WIND ENERGY) IS LEAST IN JULY AND AUGUST, INCREASES GENERALLY THROUGH THE FALL AND WINTER TO A MAXIMUM IN APRIL, THENCE DECREASES TO THE SUMMER MINIMUM. ANNUAL TOTALS OF WIND POWER CAN DIFFER BY 20 PERCENT IN ADJACENT YEARS. A POWER-LAW RELATIONSHIP IS USED TO CHARACTERIZE WIND VARIATION WITH HEIGHT, WITH THE INCREASE WITH HEIGHT BEING GREATEST (LEAST) DURING NIGHTTIME (DAYLIGHT) HOURS WHEN WIND SPEEDS ARE LEAST (GREATEST). ANNUAL AVERAGE WIND SPEEDS ARE SLIGHTLY HIGHER IN WESTERN AND NORTHWESTERN SECTIONS OF IOWA THAN ELSEWHERE. A WIND-POWER ROSE INDICATES THAT MOST WIND POWER IS ASSOCIATED WITH WINDS FROM THE SE THROUGH SW AND WNW THROUGH NNW. POWER OUTPUT CHARACTERISTICS OF A 100 KW AND A 6 KW GENERATOR ARE COMBINED WITH WIND-SPEED DISTRIBUTIONS TO MODEL ENERGY PRODUCTION OF THESE MACHINES IN IOWA.

78-0225 TAMANINI R J
WINDMILL WITH RADIAL VANES.
U.S. PATENT NO. 4,086,026, APRIL 1978. 4P.

AN ELONGATED CYLINDRICAL BODY IS PROVIDED FOR A GREATER LENGTH THAN ITS DIAMETER AND INCLUDING A CYLINDRICAL SIDE WALL. THE BODY IS OPEN AT ITS OPPOSITE ENDS AND JOURNALED FOR ROTATION ABOUT AN AXIS GENERALLY COINCIDING WITH THE CENTER AXIS OF THE BODY. THE BODY INCLUDES A PLURALITY OF CIRCUMFERENTIALLY SPACED LONGITUDINALLY EXTENDING SLOTS SIMILARLY SLIGHTLY INCLINED RELATIVE TO RADIAL PLANES OF THE BODY PASSING THROUGH THE SLOTS. ONE SET OF CORRESPONDING EDGE PORTIONS OF THE CYLINDRICAL SIDE WALL DEFINING CORRESPONDING LONGITUDINAL EDGES OF THE SLOTS INCLUDE INTEGRAL OUTWARDLY PROJECTING SUBSTANTIALLY RECTANGULAR VANES EXTENDING ALONG THE SLOTS AND THE VANES COMPRISE OUTWARDLY DEFLECTED INTEGRAL POSITIONS OF THE CYLINDRICAL SIDE WALL OF THE BODY.

78-0226 ENERGY FROM THE WINDS.
WASHINGTON, D.C., U.S. GOV. PRINT. OFF., JULY 1978. 9P.
DOE-OPA-0013R, E1.25:0013R

THIS SMALL PAMPHLET SUMMARIZES BRIEFLY THE CURRENT STATUS OF WIND POWER RESEARCH IN THE U.S.

78-0227 TEWARI S K
ECONOMICS OF WIND ENERGY USE FOR IRRIGATION IN INDIA.
SCIENCE 202(4367): 481-486, NOVEMBER 3, 1978.

THE PRODUCTION OF ENERGY FROM WINDMILLS DESIGNED SPECIFICALLY TO OPERATE IN THE LOW WIND VELOCITIES THAT USUALLY PREVAIL IN INDIA DURING THE MAIN IRRIGATION SEASON IS ESTIMATED TO BE REASONABLY ECONOMICAL FOR IRRIGATING SMALL FARMS FROM OPEN WELLS. THE ECONOMICS WOULD IMPROVE IF IRRIGATION WAS PRACTICED ALL YEAR ROUND, EVEN IN THE HOT SUMMER SEASON. THE CALCULATIONS MADE HERE ARE EXPECTED TO BE VALID FOR THE WINDIER 10

PERCENT OF THE LOCATIONS IDENTIFIED FROM AVAILABLE WIND SPEED RECORDS. OTHER, WINDIER LOCATIONS ARE EXPECTED TO BE IDENTIFIED WHEN MORE WIND SPEED DATA ARE COLLECTED IN THE FUTURE. GOVERNMENTAL POLICIES ALONG LINES SIMILAR TO THOSE FOR RURAL ELECTRIFICATION MAY BE NEEDED TO SUPPORT RESEARCH AND DEVELOPMENT EFFORTS TO OPTIMIZE THE DESIGNS OF WINDMILLS AND TO PROMOTE THEIR USE IN RURAL AREAS.

78-0228 3 MW WIND TURBINE SLATED FOR SOUTHERN CALIFORNIA.
WIND POWER DIG. NO. 12: 26, SPRING 1978.

78-0229 THOMAS R L, DONOVON R M
LARGE WIND TURBINE GENERATORS.
NTIS, MARCH 1978. 37P.
N78-29575, NASA-TM-73767, DOE/NASA/1059-78-1

THE DEVELOPMENT ASSOCIATED WITH LARGE WIND TURBINE SYSTEMS IS BRIEFLY DESCRIBED. THE SCOPE OF THIS ACTIVITY INCLUDES THE DEVELOPMENT OF SEVERAL LARGE WIND TURBINES RANGING IN SIZE FROM 100 KW TO SEVERAL MEGAWATT LEVELS. A DESCRIPTION OF THE WIND TURBINE SYSTEMS, THEIR PROGRAMATIC STATUS AND A SUMMARY OF THEIR POTENTIAL COSTS IS INCLUDED.

78-0230 THOMSON T A
THE THEORETICAL PERFORMANCE OF A STRAIGHT-BLADED, VERTICAL AXIS WIND TURBINE.
NTIS, JANUARY 1978. 42P.
N78-26561

EQUATIONS PREDICTING THE PERFORMANCE, UNDER UNSTALLED OPERATING CONDITIONS OF THE BLADING, OF STRAIGHT-BLADED, VERTICAL AXIS WIND TURBINE ROTORS ARE DERIVED ANALYTICALLY. PERFORMANCE CHARACTERISTICS OF ROTORS OF THIS TYPE ARE EVALUATED AND DISCUSSED.

78-0231 TODD J H
WINDMILLS: AN APPROPRIATE TECHNOLOGY FOR AQUACULTURE.
COMMER. FISH FARMER AQUACULT. NEWS 4(6): 8-10, SEPTEMBER 1978.

78-0232 TOMLINSON A I
THE WIND PROGRAMME OF THE NEW ZEALAND METEOROLOGICAL SERVICE.
SYMPOSIUM ON METEOROLOGY AND ENERGY, WELLINGTON, NEW ZEALAND, OCTOBER 11-12, 1977. PROCEEDINGS, WELLINGTON, NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, MAY 25, 1978. P. 43-47.

78-0233 TUERPE D R, GRESHO P M, SANI R L
VARIATIONAL WIND FIELD ADJUSTMENT OVER COMPLEX TERRAIN USING FINITE ELEMENT TECHNIQUES.
CONFERENCE ON THE SIERRA NEVADA METEOROLOGY, SOUTH LAKE TAHOE, NEVADA, 19 JUNE 1978. NTIS, 1978. 5P.
UCRL-80531

A FINITE DIFFERENCE COMPUTER CODE (MATHEW) FOR ENSURING MASS-CONSISTENCY IN WIND FIELDS, DEVELOPED BY SHERMAN (1978), HAS PROVEN SUCCESSFUL IN PROVIDING INPUT FOR ADPIC, A PARTICLE-IN-CELL ADVECTION-DIFFUSION CODE USED IN POLLUTION TRANSPORT STUDIES. AN ANALOG OF MATHEW IS DESCRIBED TO BE USED IN FINITE ELEMENT ADVECTION-DIFFUSION CODES, FINITE ELEMENT PLANETARY BOUNDARY MODELS, AND FOR WIND ENERGY ASSESSMENT STUDIES IN COMPLEX TERRAIN.

78-0234 "TVINDMILL" PERFORMS WELL IN TEST RUNS; NASA STARTS CONSTRUCTION ON BOONE MILL.
SOL. ENERGY INTELL. REP. 4(31): 230, JULY 31, 1978.

78-0235 THE 200-KILOWATT WIND TURBINE PROJECT.
NTIS, JANUARY 1978. 17P.
N78-29583, NASA-TM-79757

THE THREE 200 KILOWATT WIND TURBINES DESCRIBED COMPOSE THE FIRST OF THREE SEPARATE SYSTEMS. PROPOSED WIND TURBINES OF THE TWO OTHER SYSTEMS, ALTHOUGH SIMILAR IN DESIGN, ARE LARGER IN BOTH PHYSICAL SIZE AND RATED POWER GENERATION. THE OVERALL OBJECTIVE OF THE PROJECT IS TO OBTAIN EARLY OPERATION AND PERFORMANCE DATA WHILE GAINING INITIAL EXPERIENCE IN THE OPERATION OF LARGE, HORIZONTAL-AXIS WIND TURBINES IN TYPICAL UTILITY ENVIRONMENTS. SEVERAL OF THE KEY ISSUES ADDRESSED INCLUDE THE FOLLOWING: (1) IMPACT OF THE VARIABLE POWER OUTPUT (DUE TO VARYING WIND SPEEDS) ON

THE UTILITY GRID (2) COMPATIBILITY WITH UTILITY REQUIREMENTS (VOLTAGE AND FREQUENCY CONTROL OF GENERATED POWER) (3) DEMONSTRATION OF UNATTENDED, FAIL-SAFE OPERATION (4) RELIABILITY OF THE WIND TURBINE SYSTEM (5) REQUIRED MAINTENANCE AND (6) INITIAL PUBLIC REACTION AND ACCEPTANCE.

78-0236 GARSTANG M, ASPLIDEN C I, NNAJI S, PIELKE R A
COASTAL ZONE WIND ENERGY. PART I. SYNTHESIS AND RESULTS. FINAL REPORT.
NTIS, JANUARY 1978. 56P.
RLO-2344-76/77-5

THIS REPORT CONTAINS THE MAJOR RESULTS FROM THE CLIMATOLOGICAL STUDY AND PRESENTS THE NUMERICAL MODEL EXPERIMENTS AND RESULTS IN SOME DETAIL.

78-0237 GARSTANG M, ASPLIDEN C I, NNAJI S, PIELKE R A
COASTAL ZONE WIND ENERGY. PART II. CLIMATOLOGY. FINAL REPORT.
NTIS, JANUARY 1978. 192P.
RLO-2344-76/77-6

THIS REPORT CONTAINS A DESCRIPTION OF THE DATA USED AND THE DETAILED TABULATIONS AND GRAPHICAL PRESENTATIONS OF THE COASTAL WIND AND WIND ENERGY CLIMATOLOGY.

78-0238 USDA TO SOLICIT PROPOSALS.
WINDLETTER, P.7, FEBRUARY 1978.

78-0239 UPDATE ON TERRY MEHRKHAM.
WIND POWER DIG. NO. 12: 30, SPRING 1978.

78-0240 USHIYAMA I
THE DEVELOPMENT OF WIND POWER UTILIZATION IN JAPAN.
TECHNOCRAT 11(4): 23-32, APRIL 1978.

78-0241 ENVIRONMENTAL READINESS DOCUMENT, LARGE AND SMALL WIND SYSTEMS. COMMERCIALIZATION PHASE III PLANNING.
NTIS, SEPTEMBER 1978. 31P.
DOE/ERD-0006

ENVIRONMENTAL READINESS DOCUMENTS ARE PREPARED PERIODICALLY TO REVIEW AND EVALUATE THE ENVIRONMENTAL STATUS OF ANY ENERGY TECHNOLOGY DURING THE SEVERAL PHASES OF DEVELOPMENT OF THAT TECHNOLOGY. THIS ENVIRONMENTAL READINESS DOCUMENT WAS PREPARED TO ASSIST THE DOE COMMERCIALIZATION TASK FORCE ON LARGE AND SMALL WIND SYSTEMS TO EVALUATE THE COMMERCIAL READINESS OF THIS TECHNOLOGY WITH RESPECT TO ENVIRONMENTAL ISSUES. AN EFFORT HAS BEEN MADE TO IDENTIFY POTENTIAL ENVIRONMENTAL PROBLEMS THAT MAY BE ENCOUNTERED BASED UPON CURRENT KNOWLEDGE, PROPOSED AND POSSIBLE NEW ENVIRONMENTAL REGULATIONS, AND THE UNCERTAINTIES INHERENT IN PLANNED ENVIRONMENTAL RESEARCH.

78-0242 VERHOLEK M G
A MEASUREMENT PROGRAM TO CHARACTERIZE THE WIND AT A POTENTIAL WECS SITE.
NTIS, MARCH 1978. 25P.
PNL-2516

HAVING IDENTIFIED A POTENTIAL WIND TURBINE INSTALLATION SITE, THE INSTALLATION DECISION PROCESS INVOLVES TWO OPTIONS: A) DETERMINING IF THE SITE IS SUITABLE FOR THE INTENDED MACHINE DESIGN, OR B) DETERMINING AN APPROPRIATE MACHINE FOR THE INTENDED SITE. EITHER OPTION REQUIRES THAT ONSITE WIND CHARACTERISTICS BE COMPARED TO MACHINE CHARACTERISTICS TO DETERMINE THE PROPER SITE-MACHINE MATCH. THIS PAPER DESCRIBES AN ONSITE METEOROLOGICAL MEASUREMENT PROGRAM TO CHARACTERIZE THE WIND AT A POTENTIAL WIND TURBINE INSTALLATION SITE. THE BASIC INFORMATIONAL REQUIREMENTS HAVE BEEN POSTULATED, THE ANALYSIS DESCRIBED, AND AN APPROPRIATE MEASUREMENT PROGRAM HAS BEEN DEVISED. THIS PHASE OF SITING MEASUREMENTS PROVIDES THE INFORMATION FOR THE FINAL INSTALLATION DECISION PROCESS - WHICH WECS TO PUT AT WHICH SITE.

78-0243 VERHOLEK M G
PRELIMINARY RESULTS OF A FIELD EXPERIMENT TO CHARACTERIZE WIND FLOW THROUGH A VERTICAL PLANE.
NTIS, APRIL 1978. 42P.
PNL-2518

THIS REPORT CONTAINS PRELIMINARY RESULTS OF A FIELD EXPERIMENT TO STUDY

THE TURBULENT STRUCTURE IN THE WIND FLOW THROUGH A SIMULATED DISC OF ROTATION OF A LARGE, HORIZONTAL-AXIS WIND TURBINE BLADE. THE WIND FLOW IMPINGING ON THE HYPOTHETICAL TURBINE BLADE WAS SIMULATED BY A NINE-ELEMENT CIRCULAR ARRAY OF THREE COMPONENT ANEMOMETERS IN A SINGLE VERTICAL PLANE. THE WIND DATA WERE ANALYZED AS: A SINGLE POINT, BUT HEIGHT MEASUREMENT (AT THE CENTER OF THE ARRAY); AN ARITHMETIC AVERAGE OF ALL SENSORS; AND A SYNTHESIS OF THE DATA RECORDS ASSUMED TO REPRESENT MEASUREMENT LOCATIONS ON A HYPOTHETICAL, ROTATING TURBINE BLADE. THE EFFECTS OF AREAL AVERAGING WERE EXAMINED BY ARITHMETICALLY AVERAGING OPPOSING DATA POINTS REPRESENTING THE AIR FLOW PAST THE ROTATING BLADE. WIND FLOW THROUGH HYPOTHETICAL, ROTATING TURBINE BLADES WAS SIMULATED BY SAMPLING THE ANEMOMETER RECORDS IN A SEQUENCE AROUND THE ARRAY AS IF A SENSOR WERE ON A TURBINE BLADE ROTATING IN THE PLANE OF THE ARRAY. THE SYNTHESIZED WIND RECORDS WERE USED TO SIMULATE THE FLOW INTO A SOFT, FLEXIBLE BLADE LOADED BY THE ACTUAL NONUNIFORM WIND FIELD, AND A STIFF, NON-FLEXIBLE BLADE THAT AVERAGED THE FLOW OVER THE ENTIRE ROTOR. THE DIFFERENCES IN THE ANALYTICAL RESULTS OBTAINED IN THIS STUDY ILLUSTRATE SOME OF THE DIFFERENCES THAT CAN RESULT FROM USING VARIOUS ATMOSPHERIC FLOW FIELD ASSUMPTIONS WHEN DESIGNING WIND TURBINES. THIS STUDY DOES NOT ATTEMPT TO DETERMINE THE APPLICABILITY OF GIVEN ASSUMPTIONS; DIFFERENCES ARE POINTED OUT TO AID DESIGNERS IN DECIDING WHICH ASSUMPTIONS ARE MOST APPROPRIATE.

78-0244 VERHOLEK M G
REMOTE WIND MEASUREMENTS WITH A NEW MICROPROCESSOR-BASED ACCUMULATOR DEVICE.
NTIS, APRIL 1978. 21P.
PNL-2515

WIND MEASUREMENTS USING MICROPROCESSOR-BASED INSTRUMENTS ARE AN INEXPENSIVE WAY TO OBTAIN STATISTICAL SUMMARIES OF BASIC WIND DATA FOR THE WIND TURBINE SITING DECISION PROCESS. THE MEASUREMENTS PROVIDE DATA FOR STATISTICAL SUMMARIES OF JOINT FREQUENCY DISTRIBUTIONS OF SPEED AND DIRECTION, WIND POWER ESTIMATES, SEASONAL AND DIURNAL VARIATIONS, TURBULENCE CHARACTERISTICS (OPTIONAL), AND RUN DURATION OR PERSISTENCE (OPTIONAL). THE INSTRUMENT HAS THE DESIRABLE QUALITIES OF BEING INEXPENSIVE, SIMPLE, VERSATILE, RUGGED AND PORTABLE.

78-0245 WTG'S CUTTYHAWK WINDMILL BEGINS UNATTENDED FULL OPERATION.
SOL. ENERGY INTELL. REP. 4(43): 334, OCTOBER 30, 1978.

THE 200-KW THREE-BLADED TURBINE DEVELOPED BY WTG ENERGY SYSTEMS INC., FOR CUTTYHAWK ISLAND OFF MARTHA'S VINEYARD IS DISCUSSED.

78-0246 WADE J E, HEWSON E W
TREES AS AN INDICATOR OF 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. 753-756.

A TECHNIQUE HAS BEEN DEVELOPED TO SPEED THE PROCESS OF SELECTING SITES WITH GOOD WIND POWER POTENTIAL IN MOUNTAINOUS TERRAIN. THIS TECHNIQUE CALLED "BIOLOGICAL WIND PROSPECTING" USES TREE DEFORMATION AS AN INDICATOR OF THE PREVAILING WIND DIRECTION AND ANNUAL MEAN WIND SPEED. DURING THE FIRST TWO YEARS OF THE STUDY FIVE INDICES OF WIND EFFECTS ON CONIFEROUS TREES WERE DEVELOPED. THREE INDICES HAVE BEEN CALIBRATED WITH RESPECT TO THE ANNUAL MEAN WIND SPEED. WIND DATA AND MEASUREMENTS OF TREE DEFORMATION HAVE BEEN COLLECTED FOR MORE THAN A YEAR AT 24 LOCATIONS IN THE PACIFIC NORTHWEST. THE RESULTS INDICATE THAT THE ANNUAL MEAN WIND SPEED CAN BE PREDICTED WITH AN ACCURACY OF PLUS OR MINUS 17 PERCENT.

78-0247 JUSTUS C G, HARGRAVES W R, MIKHAIL A, GRABER D
METHODS FOR ESTIMATING WIND SPEED FREQUENCY DISTRIBUTIONS.
J. APPL. METEOROL. 17(3): 350-353, MARCH 1978.

THE WEIBULL FUNCTION IS DISCUSSED FOR REPRESENTATION OF THE WIND SPEED FREQUENCY DISTRIBUTION. METHODS ARE PRESENTED FOR ESTIMATING THE TWO WEIBULL PARAMETERS (SCALE FACTOR C AND SHAPE FACTOR K) FROM SIMPLE WIND STATISTICS. COMPARISON IS MADE WITH A RECENTLY PROPOSED METHOD BASED ON THE "SQUARE-ROOT-NORMAL" DISTRIBUTION WITH MEAN WIND SPEED AND FASTEST MILE DATA AS INPUT STATISTICS. THE WEIBULL DISTRIBUTION IS SHOWN TO GIVE SMALLER ROOT-MEAN-SQUARE ERRORS THAN THE SQUARE-ROOT-NORMAL DISTRIBUTION

WHEN FITTING ACTUAL DISTRIBUTIONS OF OBSERVED WIND SPEED. ANOTHER ADVANTAGE OF THE WEIBULL DISTRIBUTION IS THE AVAILABLE METHODOLOGY FOR PROJECTING TO ANOTHER HEIGHT THE OBSERVED WEIBULL DISTRIBUTION PARAMETERS AT ANEMOMETER HEIGHT.

78-0248 WEGLEY H L, ORGILL M M, DRAKE R L
A SITING HANDBOOK FOR SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, MAY 1978. 118P.
PNL-2521

THIS HANDBOOK WAS WRITTEN TO SERVE AS A SITING GUIDE FOR INDIVIDUALS WISHING TO INSTALL SMALL WIND ENERGY CONVERSION SYSTEMS (WECS). SMALL WECS ARE DEFINED HERE AS SYSTEMS CONSISTING OF ONE OR TWO MACHINES, EACH HAVING A RATED CAPACITY OF LESS THAN 100 KILOWATTS. TO UNDERSTAND AND APPLY THE SITING PRINCIPLES DISCUSSED, THE USER NEEDS NO TECHNICAL BACKGROUND IN METEOROLOGY OR ENGINEERING; HE NEEDS ONLY A KNOWLEDGE OF BASIC ARITHMETIC AND THE ABILITY TO UNDERSTAND SIMPLE GRAPHS AND TABLES. ACCORDING TO MANUFACTURERS OF SMALL WECS, THE GREATEST CAUSE OF DISSATISFACTION AMONG OWNERS HAS BEEN IMPROPER SITING. A POTENTIAL OWNER OF A SMALL WECS SHOULD REALIZE THAT A RELATIVELY SMALL INVESTMENT TO LOCATE THE BEST AVAILABLE SITE CAN EASILY YIELD SAVINGS OF SEVERAL THOUSAND DOLLARS OVER THE LIFETIME OF THE SYSTEM.

78-0249 SHURTLEFF W W
SOLAR ENERGY SYSTEM TESTING: SOME EXPERIENCES WITH MINICOMPUTERS.
NTIS, 1978. 8P.
SAND-78-0879C

THIS PAPER IS FROM SEMINAR ON TESTING SOLAR ENERGY MATERIALS AND SYSTEMS, WASH., D.C., MAY 22, 1978. FOR THE PAST FEW YEARS, SANDIA LABORATORIES HAS BEEN INVOLVED WITH TESTING DIFFERENT COMPONENTS AND SYSTEMS ASSOCIATED WITH SOLAR (AND WIND) ENERGY STUDIES. SANDIA NOW 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 OF 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.

78-0250 WHO OWNS WINDMILLS.
WINDLETTER, P. 3, FEBRUARY 1978.

78-0251 WILSON R E
EFFECT OF HUB FAIRINGS ON WIND TURBINE ROTOR PERFORMANCE.
J. FLUIDS ENG. 100(1): 120-122, MARCH 1978.

HUB FAIRINGS OR SPINNERS ARE FREQUENTLY SUGGESTED FOR WIND TURBINES FOR REASONS OF AESTHETICS OR PERFORMANCE. WHILE HUB FAIRINGS RARELY, IF EVER, DECREASE THE APPEARANCE OF A WIND TURBINE, THE EFFECTS OF A NOSE FAIRING MAY ACTUALLY DECREASE RATHER THAN INCREASE WIND TURBINE ROTOR PERFORMANCE. ANALYSIS OF HUB FAIRINGS EFFECTS ON WIND TURBINE PERFORMANCE IS PRESENTED.

78-0252 HUBBARD K G
WIND ENERGY.
UTAH SCI. 39(3): 104-106, SEPTEMBER 1978.

78-0253 WIND IN CALIFORNIA.
CALIFORNIA. (STATE) DEPARTMENT OF WATER RESOURCES BULL. 185, JANUARY 1978. 275P.

THIS BULLETIN SUMMARIZES 15 MILLION HOURLY WIND OBSERVATIONS AT 220 STATIONS IN CALIFORNIA. IT DISCUSSES THE HISTORY AND NATURE OF WIND MEASUREMENTS AND OCCURANCE IN CALIFORNIA. THE OBJECTIVE OF THE BULLETIN IS TO SUMMARIZE READILY AVAILABLE WIND DATA IN CALIFORNIA IN A CONVENIENT VOLUME, AS A FIRST STEP IN ASSESSING THE WIND POWER POTENTIAL FOR THE STATE OF CALIFORNIA.

78-0254 WIND OWNERS SURVEY.
WIND POWER DIG NO. 12: 42-43, SPRING 1978.

78-0255 THE WIND PROGRAM STRUCTURE AT DOE.
WINDLETTER, P. 14, FEBRUARY 1978.

78-0256 WIND STUDY PLAN APPROVED.
SOL. ENERGY INTELL. REP. 4(19): 135, MAY 8, 1978.

78-0257 ANDERSON M B, NEWTON K, RYLE M, SCOTT P F
SHORT-TERM STORAGE AND WIND POWER AVAILABILITY.
NATURE 275(5679): 432-434, OCTOBER 5, 1978.

HOURLY WIND AND TEMPERATURE MEASUREMENTS OVER A 17-YEAR PERIOD ARE USED TO INVESTIGATE THE PERFORMANCE OF A SIMPLE SYSTEM IN WHICH WIND POWER IS USED IN CONJUNCTION WITH 150-H THERMAL STORAGE TO PROVIDE DOMESTIC SPACE HEATING. THE RESULTS ARE PROMISING, EVEN FOR THIS BASIC SYSTEM, AND CONFIRM THAT, WITH SOME MODIFICATIONS, SUCH A SYSTEM CAN PROVIDE ADEQUATE RELIABILITY. A SIGNIFICANT RESULT OF THIS ANALYSIS HAS BEEN TO INDICATE THE IMPORTANCE OF SELECTING AN APPROPRIATE VALUE FOR THE WIND SPEED AT WHICH THE WIND TURBINE IS TO PRODUCE ITS PEAK OUTPUT (THE "RATED" WIND SPEED).

78-0258 WIND WORK IN NEW MEXICO.
WIND POWER DIG. NO. 12: 21-22, SPRING 1978.

78-0259 WINDMILL CATALOG.
ROCKVILLE CENTER, N.Y., WIND DIRECTORY, 1978.

THIS BOOK DESCRIBES THE DIFFERENT WIND POWER SYSTEMS AVAILABLE IN THE U.S. AND CANADA, AND LISTS MANUFACTURERS AND CONSULTANTS.

78-0260 YEE S T
INFLUENCE OF WIND TURBINE FOUNDATION.
WIND TURBINE STRUCTURAL DYNAMICS. WIND TURBINE STRUCTURAL DYNAMICS CONFERENCE, CLEVELAND, NOVEMBER 15, 1977. PROCEEDINGS. NTIS, 1978. P. 103-108.
CONF-771148

THE 200KW MOD-0A WIND TURBINE WAS MODELED USING A 3 LUMPED MASS-SPRING SYSTEM FOR THE SUPERSTRUCTURE AND A ROTATIONAL SPRING FOR THE FOUNDATION AND SUPPORTING SOIL. NATURAL FREQUENCIES WERE CALCULATED USING SOIL ELASTIC MODULI VARYING FROM 3000 TO 22,400 P.S.I. THE REDUCTION IN NATURAL FREQUENCIES FROM THE RIGID FOUNDATION CASE RANGED UP TO 20 PERCENT.

78-0261 YEN J T
HARNESSING THE WIND.
IEEE SPECTRUM 15(3): 42-47, MARCH 1978.

VARIOUS TYPES OF WIND TURBINES ARE COMPARED. ECONOMIC ASPECTS OF WIND TURBINES ARE CONSIDERED. SPECIAL ATTENTION IS GIVEN TO THE TORNADO-TYPE WIND TURBINE.

78-0262 YEN J T
TORNADO TYPE WIND TURBINE.
U.S. PATENT NO. 4,070,131, JANUARY 24, 1978. 8P.

ATMOSPHERIC WIND IS ADMITTED TANGENTIALLY INTO A VERTICALLY EXTENDING STRUCTURE AND DIRECTED AGAINST THE INTERIOR CURVED SURFACE OF THE STRUCTURE TO PRODUCE VORTEX FLOW. THE STRUCTURE IS OPEN ENDED AND SPACED FROM GROUND OR CONNECTED TO A RAM-AIR SUBTERRANEAN TUNNEL. THE VORTEX FLOW AND CORRESPONDING LOW PRESSURE CORE DRAWS AMBIENT AND/OR RAM-AIR INTO THE BOTTOM OF THE STRUCTURE TO DRIVE A HORIZONTAL TURBINE.

78-0263 WIND TURBINE GENERATOR SYSTEM, BLOCK ISLAND, RHODE ISLAND. FINAL ENVIRONMENTAL IMPACT STATEMENT.
NTIS, JULY 1978. 153P.
DOE/EIS-0006

INFORMATION ON THE ENVIRONMENTAL IMPACTS OF A MOD-0A WIND TURBINE ON BLOCK ISLAND, RHODE ISLAND IS PRESENTED CONCERNING DESCRIPTION OF THE PROPOSED ACTION; CHARACTERISTICS OF THE EXISTING ENVIRONMENT; POTENTIAL ENVIRONMENTAL IMPACTS; UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS; ALTERNATIVES; RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM PRODUCTIVITY; RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND

CONTROLS; IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES; AND ENVIRONMENTAL TRADE-OFF ANALYSIS.

78-0264 WENDELL L L, WEGLEY H L, VERHOLEK M G
REPORT FROM A WORKING GROUP MEETING ON WIND FORECASTS FOR WECS OPERATION.
NTIS, MARCH 1978. 33P.
PNL-2513

THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM (FWEP) IS TO ACCELERATE THE DEVELOPMENT OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS) FOR COMMERCIAL USE. AS PART OF THE FWEP THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) AIDS IN ACCOMPLISHING THIS OBJECTIVE IN VARIOUS WAYS. ONE WAY IS THE DESCRIPTION OF THE DAY TO DAY VARIABILITY OF WIND ENERGY IN TERMS OF PREDICTIBILITY FOR WECS OPERATIONS. IF UTILITIES THAT USE WECS ARE TO USE THEM EFFECTIVELY ON A DAY TO DAY BASIS, THEY MUST HAVE RELIABLE FORECASTS OF WIND POWER. TO THIS END, A WORKING-GROUP DISCUSSION TO IDENTIFY THE SPECIFIC WIND FORECASTING NEEDS AND THE CURRENT SHORT TERM WIND FORECASTING CAPABILITIES WAS HELD AT PACIFIC NORTHWEST LABORATORY (PNL) IN RICHLAND, WASHINGTON, ON DECEMBER 15, 1977. PRIOR TO THE MEETING, AN ATTEMPT WAS MADE TO ASCERTAIN THE INTEREST IN AND THE NEED FOR WIND FORECASTING FOR WECS IN THE DISPATCHING AND/OR SCHEDULING OF WIND-ENERGY GENERATION IN THE UTILITY SYSTEM. RELEVANT INFORMATION FROM DISPATCHERS WAS GATHERED THROUGH TELEPHONE INTERVIEWS AND WAS PRESENTED DURING THE WORKING-GROUP DISCUSSION BY GARY VERHOLEK (PNL). ALTHOUGH THE UTILITY COMPANY DISPATCHERS WERE INVITED TO THE MEETING, ONLY ONE DISPATCHER ATTENDED THE WORKING-GROUP DISCUSSION. THE MEETING OPENED WITH SEVERAL PRESENTATIONS ON ASPECTS OF WIND FORECASTING AND WECS OPERATIONS. THE IDEAS PRESENTED WERE THEN DISCUSSED. AT THE MEETING'S CLOSE, RECOMMENDATIONS WERE FORMED. THIS REPORT REFLECTS THE MEETING'S ORGANIZATION, WITH THE ADDITION OF CONCLUSIONS AND RECOMMENDATIONS DEVELOPED BY PNL AFTER THE MEETING.

78-0265 WALTON J J, HARDY D M
PRINCIPAL COMPONENTS ANALYSIS AND ITS APPLICATION TO WIND FIELD PATTERN RECOGNITION.
NTIS, JUNE 15, 1978. 31P.
UCRL-52488

THE AUTHORS HAVE APPLIED THE METHOD OF PRINCIPAL COMPONENTS ANALYSIS TO THE PROBLEM OF RECOGNIZING RECURRENT WIND PATTERNS ON A REGIONAL SCALE. DATA FROM THREE VERY DIFFERENT GEOGRAPHICAL REGIONS HAVE BEEN ANALYZED, AND EIGENVECTORS AND ASSOCIATED EXPANSION COEFFIEIENTS USED TO COMPUTE TYPICAL WIND FIELDS FOR THESE REGIONS.

78-0266 WINDMILL CUTS ELECTRICAL NEEDS 22% AT DAIRY.
COLO. RANCH. FARM. 33(1): 26-27, NOVEMBER 1978.

THE WINDMILL IN USE AT CSU'S DAIRY FARM FOR MILK COOLING AND WATER HEATING IS DESCRIBED.

78-0267 SHEPERDSON B
WIND IN VERMONT. UTILITIES LEARN ABOUT WIND ENERGY POTENTIAL.
WIND POWER DIG. NO. 14: 6-7, WINTER 1978.

THE VT. WIND WORKSHOP, HELD IN BURLINGTON VT. ON NOVEMBER 9, 1978, IS DESCRIBED. THE MEETING WAS SPONSORED BY THE VERMONT STATE ENERGY OFFICE, AND THE STATED PURPOSE OF THE EVENT WAS TO INFORM THE VERMONT ELECTRIC UTILITY INDUSTRY ABOUT THE STATUS OF LARGE SCALE WIND ENERGY TECHNOLOGY DEVELOPMENT, SYSTEMS OF 100 KW POWER GENERATION CAPACITY AND GREATER.

78-0268 SOLAR POLICY REVIEW. OPTIONS FOR WIND ENERGY FUNDING + POLICY.
WIND POWER DIG. NO. 14: 8-12, WINTER 1978.

THIS IS THE FINAL REPORT OF A PANEL HEADED BY RICK KATZENBERG WHICH REVIEWED WIND ENERGY BUDGET POLICIES FOR THE DEPARTMENT OF ENERGY.

78-0269 MUSGROVE P J
BRITISH WIND RESEARCH.
WIND POWER DIG. NO. 14: 14-15, WINTER 1978.

THE STATUS OF WIND POWER RESEARCH IN GREAT BRITAIN IS REVIEWED.

78-0270 SHEPERDSON B
NOTES ON THE AWEA.
WIND POWER DIG. NO. 14: 14-16, WINTER 1978.

THE ROLE AND OBJECTIVES OF THE AMERICAN WIND ENERGY ASSOCIATION ARE DISCUSSED.

78-0271 DARRIEUS-SILO DEMONSTRATION PROJECT NOW UNDERWAY.
WIND POWER DIG. NO. 14: 18-19, WINTER 1978.

A UNIQUE WIND ENERGY DEMONSTRATION PROJECT FUNDED BY NINE PRIVATE AND INVESTOR-OWNER COMPANIES WAS DEDICATED AT CLARKSON COLLEGE IN POTSDAM, NEW YORK ON NOVEMBER 18, 1978. THE PROJECT FEATURES A SILO-MOUNTED DARRIEUS WIND TURBINE WITH A RATED OUTPUT OF 12,000 WATTS THAT IS EXPECTED TO PROVIDE 25% OF THE ELECTRICAL ENERGY REQUIRED BY A TYPICAL DAIRY FARM. DESIGNED BY PROFESSOR JOHN ROLLINS OF CLARKSON, THE PROJECT WAS LARGELY UNDERWRITTEN BY CONTRIBUTIONS FROM AGWAY, ALCOA, ALLEN BRADLEY COMPANY, CHROMALLOY FARM SYSTEMS, NIAGARA MOHAWK POWER CORPORATION, RELIANCE ELECTRIC COMPANY, SIGN X LAB, UNARCO ROHN AND PCB PIEZOTRONICS.

78-0272 CALIFORNIA WIND TAX CREDITS BEGIN.
WIND POWER DIG. NO. 14: 19, WINTER 1978.

78-0273 ALASKAN WINDS HARNESSED.
WIND POWER DIG. NO. 14: 20-21, WINTER 1978.

A HOME-BUILT WIND CHARGER WHICH RECHARGES RADIO BATTERIES AT AN ALASKAN SUMMER FIELD CAMP IS DESCRIBED.

78-0274 WIND-HYDRO STUDY CONTINUES.
WIND POWER DIG. NO. 14: 22, WINTER 1978.

THE BUREAU OF RECLAMATION HAS BEEN WORKING WITH THE CONCEPT OF INTEGRATING LARGE-SCALE WIND TURBINES WITH EXISTING HYDROELECTRIC SYSTEMS. FIVE POTENTIAL SITES HAVE BEEN IDENTIFIED, INCLUDING THE MEDICINE BOW AREA OF WYOMING.

78-0275 THE 1979 WIND ACCESS CATALOG.
WIND POWER DIG. NO. 14: WINTER 1978.

THIS 63-PAGE CATALOG IS EMBEDDED BETWEEN PAGES 22 AND 23 OF THE WINTER 1978 WIND POWER DIGEST. IT INCLUDES "THE WIND ENERGY PRIMER", AN INTRODUCTION TO THE USE OF WIND ENERGY SYSTEMS, AND THEN LISTS MANUFACTURERS OF WIND MACHINES, WATER-PUMPING WINDMILL DISTRIBUTORS, WIND SYSTEM DISTRIBUTORS, ANEMOMETERS, INVERTERS, STORAGE, TOWERS, ACCESSORIES, AND ENDS WITH AN ARTICLE ON SITE SELECTION ENTITLED "WIND ENERGY PROSPECTING".

78-0276 BAKER R W, WADE J E
WIND ENERGY PROSPECTING.
WIND POWER DIG. NO. 14: P. 59-63 OF THE 1979 WIND ACCESS CATALOG, WINTER 1978.

SINCE THE POWER IN THE WIND IS PROPORTIONAL TO THE CUBE OF THE WIND SPEED, IT IS CRUCIAL TO THE ECONOMIC VIABILITY OF WIND POWER THAT WIND SYSTEMS BE LOCATED IN AREAS WITH PERSISTENT, STRONG WINDS. THE METHODOLOGY PRESENTED IN THIS PAPER IS SUGGESTED AS A COST EFFECTIVE APPROACH TO SITE SELECTION AND EVALUATION.

78-0277 THE WIND ENERGY PRIMER. AN INTRODUCTION TO THE USE OF WIND ENERGY SYSTEMS.
WIND POWER DIG. NO. 14: P. 2-9 OF THE 1979 WIND ACCESS CATALOG, WINTER 1978.

THIS PRIMER IS IN THE 1979 WIND ACCESS CATALOG. IT IS A GENERAL INTRODUCTION TO THE SUBJECT OF WIND ENERGY AND HOW WIND ENERGY CAN BE HARNESSED TO PROVIDE POWER FOR HOMES, FARMS AND COMMUNITY-SCALE PROJECTS.

78-0278 SHEPERDSON B
A VISIT WITH ASTRAL-WILCON.
WIND POWER DIG. NO. 14: 36-38, WINTER 1978.

THIS ARTICLE DISCUSSES ASTRAL-WILCON, INC., AND THE PROTOTYPE WINDTURBINE GENERATOR, AW 10-B, WHICH THEY HAVE RECENTLY DEVELOPED.

78-0279 EVANS M
TAX CREDITS PASS--AT LAST!
WIND POWER DIG. NO. 14: 35, WINTER 1978.

THIS ARTICLE SERVES AS A SHORT GUIDE TO THE TAX CREDITS AND OTHER INCENTIVES AVAILABLE BY AGENCY FOR ALL PROSPECTIVE AND CURRENT WIND SYSTEM OWNERS.

78-0280 BAIN D
AIR QUALITY POLICY AND WIND ENERGY. ENVIRONMENT CREDITS COULD ENCOURAGE UTILITY USE OF LARGE-SCALE WIND TURBINES.
WIND POWER DIG. NO. 14: 32-34, WINTER 1978.

78-0281 CARTER J
USING WATER-PUMPING WINDMILLS. PART 1. SO YOU WANT TO BUY A WINDMILL?
WIND POWER DIG. NO. 14: 25-26, 28, 30-31, WINTER 1978.

78-0282 COLLEGE WIND.
WIND POWER DIG. NO. 14: 23, WINTER 1978.

78-0283 LARGE WECS STUDIED.
WIND POWER DIG. NO. 14: 23, WINTER 1978.

78-0284 RFPS ANNOUNCED.
WIND POWER DIG. NO. 14: 22-23, WINTER 1978.

77-0009 AGA R
A HAND CALCULATOR AS AN RPM COUNTER.
ALTERN. SOURCES ENERGY NO. 24: 24-27, FEBRUARY 1977.

77-0010 AGSTEN C F
WIND DRIVEN ELECTRIC POWER GENERATOR.
U.S. PATENT NO. 4,036,916, JULY 19, 1977. 10P.

A WIND DRIVEN ELECTRIC POWER GENERATOR IS DESCRIBED WHICH HAS A SHROUD ARRANGED IN A PATH OF FLUID FLOW. WITHIN THE SHROUD IS DISPOSED A STATIONARY SHAFT SUPPORTING A WIND GENERATOR ASSEMBLY. THE SHROUD CAN BE THE VEIL OF A CONVENTIONAL COOLING TOWER, WITH THE WIND GENERATOR ASSEMBLY INCLUDING A ROTOR CONNECTED TO AN ELECTRIC GENERATOR ARRANGED FOR CONVERTING ROTARY MOTION OF THE ROTOR TO ELECTRICAL ENERGY, THUS SAVING SOME OF THE ENERGY CREATED BY THE NATURAL DRAFT PASSING UP THE VEIL OF THE COOLING TOWER. SPACE FRAME BOX TRUSSES PROVIDED WITH AIRFOILS PROVIDE LIGHTWEIGHT ARMS FOR THE ROTOR, WITH THE ROTOR BEING ARRANGED ANYWHERE IN THE SHROUD. WHEN A HYPERBOLIC COOLING TOWER VEIL IS USED AS THE SHROUD, THE ROTOR WILL USUALLY BE POSITIONED IN THE THROAT OF THE VEIL.

77-0011 ALLISON W D
MULTIVANE WINDMILL.
U.S. PATENT NO. 4,065,225, DECEMBER 27, 1977. 6P.

A WINDMILL IS DESCRIBED WHICH HAS A PLURALITY OF PAIRS OF DIAMETRICALLY OPPOSED VANES MOUNTED FOR ROTATION ABOUT A HORIZONTAL AXIS IN ALIGNMENT WITH THE WIND. THE PAIRS OF VANES ARE SUPPORTED IN UNIFORMLY SPACED RELATIONSHIP TO EACH OTHER AXIALLY OF THE AXIS OF ROTATION AND EACH SUCCESSIVE PAIR IS INDEXED CIRCUMFERENTIALLY IN THE DIRECTION OF ROTATION RELATIVE TO THE PRIOR PAIR. THE VANES ARE AUTOMATICALLY MOVED TO A LESS EFFICIENT POSITION AS THE SPEED OF THE WIND INCREASES TO LIMIT THE MAXIMUM SPEED OF THE WINDMILL.

77-0012 ANDERSON T D, BOWER H I, DELENE J G, FULLER L C, KAPLAN S I, WILSON J V
SUMMARY REPORT: AN EXPLORATORY STUDY OF COST TARGETS FOR SOLAR ELECTRIC POWER PLANTS.
NTIS, MARCH 1977. 34P.
ORNL/TM-5787

A PRELIMINARY EVALUATION WAS MADE OF THE ECONOMIC GOALS THAT NEED TO BE ACHIEVED IN THE SOLAR-ELECTRIC R AND D AND DEMONSTRATION PROGRAMS SO THAT SOLAR CAN BECOME A VIABLE COMPONENT OF OUR NATIONAL ELECTRIC ENERGY PRODUCTION SYSTEM. SOLAR ELECTRIC TECHNOLOGIES CONSIDERED ARE: SOLAR THERMAL CONVERSION, SOLAR PHOTOVOLTAIC, WIND ENERGY CONVERSION, AND OCEAN THERMAL. TARGET COSTS WERE DEVELOPED FOR SELECTED APPLICATIONS OF SOLAR BY COMPARISON WITH KNOWN MEANS OF ACCOMPLISHING THE SAME END RESULTS. THE KNOWN TECHNOLOGIES WERE ASSUMED TO BE FOSSIL AND NUCLEAR ENERGY SOURCES.

77-0013 BAILEY D Z
LARGE-SPAN TENSIONED HYDRO (AERO) FOILS FOR POWER GENERATION ANCHORED ACROSS A STREAM, CURRENT, OR WIND.
MAR. TECHNOL. SOC. J. 11(5/6): 22-29, 1977.

LARGE-SPAN RIBBON FOIL SYSTEMS FOR THE EXTRACTION OF KINETIC ENERGY FROM THE WINDS AND OCEAN CURRENTS ARE ARRANGED IN THE FORM OF HORIZONTAL ROTARY SYSTEMS. THE CARDINAL FEATURE OF THESE SYSTEMS IS THE STRUCTURAL EFFICIENCY GAINED BY VIRTUE OF RIBBON FOILS WHICH ARE SUBJECT TO PURELY TENSILE LOADS. HENCE, THE MAIN STRUCTURAL ELEMENT OF THE FOILS IS PROVIDED BY CABLES. THE NECESSARILY LARGE TENSILE LOADS ARE APPLIED TO THE CABLES BY PLACING MASSIVE CONCRETE ANCHORAGES AT OPPOSING POINTS ACROSS A STREAM, AND THUS THE EARTH BECOMES THE COMPRESSION MEMBER. BASED ON A SIMPLIFIED FLOW MODEL PERFORMANCE CALCULATIONS INDICATE THAT, IN PRINCIPLE, POWER PRODUCTION CAN BE INCREASED OVER THAT OF CONVENTIONAL SYSTEMS BY SEVERAL ORDERS OF MAGNITUDE, AND IT IS THIS POWER POTENTIAL WHICH MAKES THESE SYSTEMS ATTRACTIVE.

77-0014 APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS. VOL. III. WIND CONVERSION SYSTEMS WITH ENERGY STORAGE. FINAL REPORT.
NTIS, SEPTEMBER 27, 1977. 330P.
TID-28287/3

THE PRINCIPAL OBJECTIVES OF THE STUDY WITH RESPECT TO WIND ENERGY CONVERSION SYSTEMS (WECS) AND THEIR USE OF ENERGY STORAGE WERE: THE ASSESSMENT OF SELECTED CANDIDATE STORAGE CONCEPTS; AND EVALUATION OF THE EFFECTS OF SELECTED PARAMETERS ON THE ATTRACTIVENESS AND WORTH OF ENERGY STORAGE UTILIZATION. THE SCOPE OF INVESTIGATIONS INCLUDED BOTH UTILITY AND NON-UTILITY APPLICATIONS. IN ADDITION TO ESTABLISHING COST GOALS FOR STORAGE, THE IMPACT OF CHARGING STORAGE FROM MULTIPLE SOURCES, AS WELL AS FROM WIND SYSTEMS ALONE, WAS INCLUDED, ALONG WITH THE EFFECTS OF WIND FORECASTING AND TRANSIENT SMOOTHING OF THE WIND SYSTEM OUTPUT.

77-0015 ARK; HOW TO BIOENGINEER HUMAN HABITATS.
ENVIRON. SCI. TECHNOL. 11: 744-746, AUGUST 1977.

77-0016 ASHLEY H
SOME CONTRIBUTIONS TO AERODYNAMIC THEORY FOR VERTICAL AXIS WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH. PROCEEDINGS.
LA GRANGE PARK, ILL., AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1624-1632.

A REVIEW AND MODEST EXTENSIONS OF QUASI-STEADY AERODYNAMIC THEORY FOR PERFORMANCE PREDICTION ON DARRIEUS-TYPE TURBINES ARE PRESENTED. RESULTS ARE GIVEN FOR BOTH PARALLEL-AXIS AND CURVED-BLADE CONFIGURATIONS. BLADE STALL AND VARIABLE INFLOW ARE NEGLECTED; IT IS HYPOTHESIZED THAT UNSTEADY EFFECTS SUPPORT THE FORMER APPROXIMATION DOWN TO LOWER VALUES OF TIP-SPEED RATIO THAN HITHERTO BELIEVED. BOTH PROFILE AND INDUCED DRAG ARE INCLUDED, AND THEIR INFLUENCES ON POWER AND DOWNWIND FORCE ARE EXPRESSED IN TERMS OF ELLIPTIC INTEGRALS. COMPARISONS ARE PRESENTED WITH POWER DATA FROM THE SANDIA 2-METER TURBINE. THREE VALUES OF PROFILE DRAG COEFFICIENT ARE EMPLOYED, AND IT IS ARGUED THAT NUMBERS IN THE RANGE DRAG COEFFICIENT RANGE OF 0.015-0.017 ARE MOST APPROPRIATE TO THE EXAMPLE CHOSEN. A LINEARIZED ANALYSIS OF UNSTEADY-FLOW EFFECTS ON PERFORMANCE IS SUMMARIZED. CALCULATIONS SUGGEST THAT THEY MAY BE LARGER THAN MIGHT BE EXPECTED IN VIEW OF THE LOW OPERATING REDUCED FREQUENCIES OF THESE MACHINES.

77-0017 AUER P L, BOS P B, ROBERTS V W, GOUGH W C
UNCONVENTIONAL ENERGY RESOURCES.
WORLD ENERGY RESOURCES, 1985-2020. EXECUTIVE SUMMARIES OF REPORTS ON RESOURCES, CONSERVATION, AND DEMAND TO THE CONSERVATION COMMISSION OF THE WORLD ENERGY CONFERENCE. NEW YORK, IPC SCIENCE AND TECHNOLOGY PRESS, 1977. P. 135-179.

THIS REPORT IS CONCERNED WITH THE FOLLOWING UNCONVENTIONAL ENERGY SOURCES: SOLAR (WHICH INCLUDES ENERGY DERIVED DIRECTLY FROM SUNLIGHT AS WELL AS INDIRECTLY IN THE FORM OF WIND, WAVES, TIDES, OCEAN THERMAL GRADIENTS, OR AS FUEL FROM BIOMASS AND OTHER PHOTOCHEMICAL REACTION PRODUCTS), GEOTHERMAL, AND FUSION. THESE POTENTIAL SOURCES OF COMMERCIAL ENERGY SUPPLIES REPRESENT EITHER RENEWABLE OR VIRTUALLY INEXHAUSTIBLE RESOURCES AND ARE NOT NOW IN WIDESPREAD COMMERCIAL USE. THE REPORT IS CONSIDERED A COMPLEMENT TO A REPORT ON NUCLEAR FUSION SINCE THEY ARE ALL PROSPECTIVE LONG-TERM ENERGY SUPPLIES. EACH OF THE PRINCIPAL TECHNOLOGIES AND SYSTEMS THAT ARE CURRENTLY BEING CONSIDERED AS MEANS FOR UTILIZING SOLAR, GEOTHERMAL, AND FUSION RESOURCES ARE DISCUSSED. INSOFAR AS POSSIBLE, THEIR POTENTIAL CONTRIBUTIONS TO COMMERCIAL ENERGY SUPPLIES ARE DISCUSSED. THE ROLE OF THESE UNCONVENTIONAL RESOURCES MAY BE EXPECTED TO VARY NOT ONLY AS A FUNCTION OF WHICH CATEGORY IS UNDER CONSIDERATION, BUT ALSO GEOGRAPHICALLY VARY.

77-0018 ARCHIBALD P B, KNOX J B
ANALYSIS OF THE WINDS OF SITE 300 AS A SOURCE OF POWER.
NTIS, APRIL 19, 1977. 15P.
UCRL-51469 (ADD.)

SITE 300 IS A STRATEGICALLY LOCATED AREA LYING EAST OF THE LAWRENCE LIVERMORE LABORATORY AT LIVERMORE, CALIFORNIA. IN A PREVIOUS REPORT, WIND SPEED AND DIRECTION FOR THE PERIOD OCTOBER 1972 TO SEPTEMBER 1973 ARE SUMMARIZED. THE PRESENT REPORT SUMMARIZES AN ADDITIONAL YEAR OF MEASUREMENTS. A COMPARISON OF THE MEASUREMENTS SHOWS THAT THE ANNUAL AVERAGE WIND SPEEDS FOR THE 2 YEARS IS ESSENTIALLY THE SAME; HOWEVER, THE MONTHLY AVERAGES DIFFER. THESE ADDITIONAL MEASUREMENTS CONFIRM THE OBSERVATION THAT THE SPRING AND SUMMER WINDS OF THIS REGION HAVE THE GREATEST POTENTIAL FOR WIND POWER DEVELOPMENT.

77-0019 BAIN D
AN ASSESSMENT OF THE RESIDENTIAL WIND POWER MARKET; EXCERPTS FROM THE LOCKHEED STUDY.
WIND POWER DIG. NO. 10: 34-47, FALL 1977.

IN EARLY 1975, THE LOCKHEED-CALIFORNIA COMPANY WAS AWARDED THE WIND ENERGY MISSION ANALYSIS (WEMA) CONTRACT BY ERDA. THE OBJECTIVES OF THIS $484,000 STUDY WERE TO ASSESS THE NATIONAL POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS (WECS), IDENTIFY THE SIZES AND APPLICATIONS OF WECS THAT HAVE THE HIGHEST PROBABILITY OF IMPLEMENTATION, AND ESTABLISH THE PERFORMANCE, COST AND OPERATIONAL REQUIREMENTS OF WIND TURBINE GENERATORS (WTGS). THE IMPACT ON NATIONAL RESOURCES AND THE AVAILABILITY OF SUITABLE SITES WERE SOME OF THE OTHER STUDY GOALS. IN APRIL 1976, THE STUDY WAS COMPLETED AND RESULTED IN AN 850 PAGE FINAL REPORT, OVER 1,000 PAGES OF PROCESSED WIND DATA, AND A 287-PAGE APPENDIX VOLUME. THIS ARTICLE CONTAINS EXCERPTS FROM THAT REPORT.

77-0020 BAIN D
WIND TOWER HEIGHT ECONOMICS.
ALTERN. SOURCES ENERGY NO. 29: 21-23, DECEMBER 1977.

MEASURING THE WIND CONDITIONS AT A PROSPECTIVE SITE CAN BE A COMPLICATED PROCESS. MOST INDIVIDUALS ARE NOT ABLE TO TAKE ALL OF THE MEASUREMENTS KNOWN TO BE IMPORTANT. ONE OF THE MOST DIFFICULT PARAMETERS TO MEASURE IS THE FACTOR, ALPHA, OR HOW MUCH WIND CAN BE EXPECTED ALOFT. A COMPUTER MODEL AND FINANCIAL ANALYSIS WERE COMBINED TO SEE HOW RELEVANT ALPHA IS TO THE SMALL WIND GENERATOR USER. THE RESULTS OBTAINED SHOW THAT, FOR LEAST COST OF DELIVERED ELECTRICAL POWER, DETERMINATION OF A SITE'S ALPHA BY MEASUREMENT IS NOT NECESSARY TO ESTABLISH OPTIMUM TOWER HEIGHT.

77-0021 BAKER R W, HENNESSEY J P
ESTIMATING WIND POWER POTENTIAL.
POWER ENG. 81(3): 56-57, MARCH 1977.

TESTS OF THE WIDGER METHOD AT FOUR PACIFIC NORTHWEST LOCATIONS SHOW THAT ACCURATELY ESTIMATING THE SHAPE OF WIND SPEED DISTRIBUTION IS CRITICAL, AND THAT AN EMPIRICAL METHOD OF WIND SPEED MEASUREMENT MAY NOT BE USABLE AT GOOD WIND POWER SITES.

77-0022 BOWEN A J
A REVIEW OF CURRENT RESEARCH RELEVANT TO THE OPTIMUM SITING OF WIND POWER INSTALLATIONS IN HILLY TERRAIN.
CHRIST CHURCH, NEW ZEALAND, UNIVERSITY OF CANTERBURY, MECHANICAL ENGINEERING DEPARTMENT, MAY 1977. 30P.

EXISTING INFORMATION THAT COULD ASSIST IN THE OPTIMUM SITING OF WIND POWER INSTALLATIONS IN HILLY TERRAIN IS WELL SCATTERED AND IT IS ONLY RECENTLY THAT SIGNIFICANT RESEARCH PROGRESS HAS BEEN MADE. IN AN ATTEMPT TO COLLATE THE RECENT ACTIVTIES IN THIS FIELD, THIS REPORT REVIEWS THE PROGRESS OF CURRENT RESEARCH INTO THE TOPOGRAPHICAL EFFECTS ON THE WIND FLOW CLOSE TO THE GROUND, FOLLOWING A SERIES OF VISITS TO THE ORGANISATIONS INVOLVED. THE RELEVANT PROJECTS THAT ARE UNDERWAY AT EACH LOCATION ARE DESCRIBED AND MAJOR CONCLUSIONS FROM THEIR RECENT WORK ARE SUMMARIZED BRIEFLY, WITH REFERENCES GIVEN IF MORE DETAILED INFORMATION IS REQUIRED.

77-0023 BARNETT K M
THE NEW MEXICO WIND ENERGY RESOURCE.
TECHNICAL COMPLETION REPORT. LAS CRUCES, NEW MEXICO ENERGY INSTITUTE, NOVEMBER 1977.
NMEI-7, PB-295842

WIND IS A VALUABLE NATURAL RESOURCE IN NEW MEXICO. LIKE OIL, GAS, COAL, URANIUM, SOLAR RADIATION AND UNDERGROUND HEAT, IT CAN PROVIDE ENERGY. NEW MEXICO HAS MORE WIND ENERGY THAN MANY OTHER STATES. THIS REPORT IS INTENDED TO ENCOURAGE FARMERS, RANCHERS AND HOME OWNERS TO USE MORE WIND ENERGY. IT PRESENTS NEW MEXICO WIND INFORMATION AND THE EFFECTS OF SEASONS, TERRAIN AND EQUIPMENT HEIGHT ON WIND ENERGY. STEPS IN PLANNING AND INSTALLING COMMON WIND ENERGY SYSTEMS ARE REVIEWED AND DIAGRAMMED. PRESENT WIND USE PATTERNS IN NEW MEXICO AND THE RESEARCH IN THE U.S. TO INCREASE USE ARE ALSO REVIEWED.

77-0024 BASE T E, RUSSELL L J

COMPUTER AIDED AEROGENERATOR ANALYSIS AND PERFORMANCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A4.53-A4.74.

THEORETICAL AND EXPERIMENTAL STUDIES HAVE BEEN MADE TO DETERMINE THE PERFORMANCE OF BOTH HORIZONTAL AND VERTICAL SHAFT AEROGENERATORS AND ALSO TO PREDICT THEIR PERFORMANCE IN A TURBULENT APPROACHING AIRFLOW. COMPUTER PROGRAMS HAVE BEEN WRITTEN, BASED ON THE THEORY OF RANKIE-FROUDE AND THE BLADE ELEMENT THEORY, WHICH CALCULATES THE AEROGENERATOR PERFORMANCE FROM THE BLADE GEOMETRY, AEROFOIL CHARACTERISTICS AND WIND CONDITIONS. THE DIFFICULTY WITH MOST PERFORMANCE CALCULATIONS, IN THE PAST, HAS BEEN THE ESTIMATION OF THE INFLOW FACTORS. HOWEVER, IN THE COMPUTER PROGRAMS DEVELOPED AT THE UNIVERSITY OF WESTERN ONTARIO, THIS IS OVERCOME BY AN ITERATIVE TECHNIQUE. AT PRESENT LITTLE INFORMATION IS AVAILABLE ON INFLOW FACTORS FOR VERTICAL SHAFT WINDMILLS OF THE DARRIEUS ROTOR TYPE. A SMALL SCALE MODEL OF A STRAIGHT BLADED VERTICAL AXIS WINDMILL WAS DESIGNED, FABRICATED AND TESTED IN A LOW SPEED WIND TUNNEL. SEVERAL AEROFOIL CROSS SECTIONAL SHAPES WERE USED FOR BLADES. STUDIES HAVE BEEN MADE TO DETERMINE THE EFFECT OF WIND SHEAR AND TURBULENCE STRUCTURE ON THE PERFORMANCE OF A HORIZONTAL SHAFT WINDMILL. PRESENT TENTATIVE RESULTS INDICATE THAT THE PERFORMANCE IS CHANGED, AND IN GENERAL DECREASED, DUE TO THE TURBULENCE. THE FLUCTUATING DRAG IS IMPORTANT FOR STRUCTURAL DESIGN REASONS.

77-0025 BAXTER A C
LOW COST WINDMILL ROTOR.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C8.101-C8.108.

THE ROTOR IS OF THE VERTICAL AXIS TYPE DEVELOPED IN CANADA BY THE NATIONAL RESEARCH COUNCIL, OTTAWA. THE NEW DESIGN REPLACES THE RIGID AEROFOIL SECTION OF THAT DESIGN WITH A FABRIC SLEEVE ENCLOSING STEEL LEADING AND TRAILING EDGES. THE FABRIC IS TENSIONED AND THE BLADE IS THEN FORMED INTO A CATENARY SHAPE TO MINIMIZE THE BLADE STRESSES DUE TO CENTRIPETAL ACTION. MODEL TESTS HAVE BEEN CARRIED OUT TO INVESTIGATE THE NEW DESIGN. A RIGID AEROFOIL IS COMPARED WITH ONE BLADE FORMED BY STRETCHING PARACHUTE FABRIC BETWEEN TWO RODS HELD APART BY SPRINGS AND WITH ANOTHER BLADE FORMED BY STRETCHING A LATEX RUBBER FILM OVER THE RODS. THE PAPER DISCUSSES THE PROMISE OF THE DESIGN, THE EFFECTS OF NON-UNIFORM TENSION IN THE FABRIC, THE EFFECT OF THE CENTRIPETAL FIELD ON THE FABRIC AND THE EFFECT OF NON-UNIFORM WIND VELOCITY ON THE BEHAVIOR OF A VERTICAL AXIS WINDMILL.

77-0026 BAUMGARTNER F W, MURPHY J M
WIND DRIVEN POWER GENERATOR.
U.S. PATENT NO. 4,012,163, MARCH 15, 1977. 6P.

A TURBINE TYPE POWER GENERATOR INCLUDES A ROTOR HAVING A VERTICAL SHAFT TO DRIVE A LOAD WHICH MAY BE AN ELECTRIC GENERATOR OR MECHANICAL GEAR TRAIN OR OTHER DEVICE FOR USING OR TRANSMITTING POWER. GENERALLY VERTICALLY EXTENDING BLADES ARE SECURED AT THEIR ENDS TO THE ROTOR SHAFT AND ARE SET AT AN ANGLE TO THE RELATIVE WIND TO BE DRIVEN THEREBY. THE ROTOR IS SURROUNDED BY WIND CONTROLLING SHIELD MEANS THROUGH WHICH THE AIR FLOW PASSES TO CONTACT THE BLADES IN THE PROPER DIRECTION FOR CAUSING ROTATION. THE FREE FLOW AIR INLET AREA IS SUBSTANTIALLY LESS THAN THE MAXIMUM PROJECTED AREA OF THE SHIELD MEANS NORMAL TO THE RELATIVE WIND SO THAT THE TOTAL WIND TRAPPED MUST FLOW THROUGH A REDUCED AREA WITH A CONSEQUENT INCREASE IN VELOCITY TO IMPART MORE ENERGY TO THE ROTOR BLADES.

77-0027 BEA K J
WIND POWERED FLUID COMPRESSOR.
U.S. PATENT NO. 4,008,006, FEBRUARY 15, 1977. 10P.

A WIND MACHINE COMPRISING A FIXED OR CONTROLLED PITCH BLADE ASSEMBLY DRIVES A VARIABLE DISPLACEMENT OR VARIABLE CLEARANCE FLUID COMPRESSOR. MEANS WHICH MAY BE MECHANICAL, HYDRAULIC, PNEUMATIC OR ELECTRICAL INTERCONNECT THE BLADE ASSEMBLY AND THE COMPRESSOR TO VARY THE FLUID DISPLACEMENT OR CLEARANCE VOLUME OF THE COMPRESSOR AS A FUNCTION OF THE DRAG OR LIFT FORCES OF THE WIND ON THE BLADE ASSEMBLY.

77-0028 BEGEMANN S H A, JANSEN P
RELATIVE COST-PERFORMANCE OF VARIOUS SOLAR-BASED POWER SUPPLY PACKAGES.
ACTA ELECTR. 20(2): 197-204, 1977.

THE DEVELOPMENT OR IMPROVEMENT OF VARIOUS SOLAR-BASED SYSTEMS TO PRODUCE ELECTRICITY IS CREATING MANY NEW POSSIBILITIES TO PROVIDE POWER IN PLACES WHERE AN ELECTRIC UTILITY DISTRIBUTION SYSTEM IS LACKING. THE EXTENT TO WHICH SOLAR-BASED SYSTEMS WILL BE USED DEPENDS ON THE OVERALL COST-PERFORMANCE OF THESE NEW SYSTEMS COMPARED TO THE CONVENTIONAL SYSTEMS. SEVERAL OF THE MORE PROMISING CONTINUOUS AND AUTONOMOUS SOLAR-BASED POWER SUPPLY SYSTEMS FOR APPLICATIONS REQUIRING DAILY AVAILABILITY OF A GIVEN (SMALL) NUMBER OF KWH'S HAVE BEEN COMPUTER SIMULATED FOR SIX DIFFERENT CLIMATIC REGIONS. THE COST-PERFORMANCE OF THESE SYSTEMS WAS CALCULATED FOR THE DIFFERENT CLIMATES FOR THE NEXT TEN YEARS, TAKING INTO ACCOUNT AN EXPECTED PRICE DECREASE OF PHOTOVOLTAIC CELLS, TO DETERMINE ITS EFFECT ON THE RELATIVE COST-PERFORMANCE OF THE VARIOUS SYSTEMS. THE SYSTEMS CHOSEN CONSISTED OF BATTERIES (STORAGE SYSTEM) AND ONE (SIMPLE SYSTEM) OR MORE (OF HYBRID SYSTEM) OF THE FOLLOWING GENERATING COMPONENTS: PHOTOVOLTAIC CELLS, WIND GENERATORS AND CONVENTIONAL GENERATOR. THE RESULTS SHOW THE IMPORTANCE OF CHOOSING THE RIGHT GENERATING COMPONENT(S) FOR A PARTICULAR CLIMATE AND THE SIGNIFICANT IMPROVEMENT IN COST-PERFORMANCE WHEN TWO OR MORE DIFFERENT GENERATING COMPONENTS ARE COMBINED IN A HYBRID SYSTEM.

77-0029 BELL G C
SOLAR THERMAL POWER GENERATION. A BIBLIOGRAPHY WITH ABSTRACTS.
ALBUQUERQUE, N.M., NEW MEXICO UNIVERSITY, TECHNOLOGY APPLICATION CENTER, JULY 1977. 55P.

THE BIBLIOGRAPHY CONTAINS 148 REFERENCES TO INFORMATION ON ENERGY OVERVIEWS, SOLAR OVERVIEWS, ECONOMICS AND LAW, THERMAL POWER, THERMIONIC AND THERMOELECTRIC, OCEAN THERMAL DIFFERENTIAL, WIND CONVERSION, BIOCONVERSION, RESIDENTIAL, AND OTHER (HYDROGEN PRODUCTION, LARGE-SCALE PHOTOVOLTAIC, ETC.).

77-0030 BENIM T E
PERFORMANCE MEASUREMENT OF A TEN KILOWATT HORIZONTAL AXIS WIND TURBINE.
M.S. THESIS. BLACKSBURG, VIRGINIA, VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, SEPTEMBER 1977. 103P.

A SYSTEM TO MEASURE THE PERFORMANCE OF A 10 KW HORIZONTAL AXIS WIND TURBINE WAS DESIGNED AND WAS EMPLOYED TO TEST AN ELECTRO WVG-120G WIND GENERATOR. PARAMETERS MEASURED WERE WIND SPEED, VOLTAGE, CURRENT, AND FREQUENCY. OUTPUT POWER AND TIP SPEED RATIO WERE CALCULATED FROM THE MEASURED PARAMETERS. A SYSTEM TO AUTOMATICALLY CALCULATE INSTANTANEOUS POWER AND TO INTEGRATE POWER WAS DEVELOPED. AN IMPROVED DIGITAL ANEMOMETER ODOMETER WAS DESIGNED AND BUILT. TESTS WERE PERFORMED WITH THE WINDMILL POWERING A RESISTIVE HEATING LOAD AS WELL AS CHARGING A BATTERY.

77-0031 BERENY J A
SURVEY OF THE EMERGING SOLAR ENERGY INDUSTRY.
SAN MATEO, CALIFORNIA, SOLAR ENERGY INFORMATION SERVICES, 1977. 416P.

THE SIX MAJOR SUBDIVISIONS OF SOLAR TECHNOLOGY ARE REVIEWED IN CONSIDERABLE DEPTH: I.E., HEATING AND COOLING; SOLAR THERMAL ELECTRIC; PHOTOVOLTAICS; WIND ENERGY; OCEAN THERMAL; AND BIOCONVERSION. THE CATALYTIC ROLE OF THE FEDERAL GOVERNMENT IN SPURRING THE DEVELOPMENT OF SOLAR TECHNOLOGY IS TRACED, AND A COMPREHENSIVE ANALYSIS OF ALL STATE GOVERNMENT SOLAR-ORIENTED LEGISLATION IS INCLUDED. THE IMPACT OF SOLAR TECHNOLOGY ON THE UTILITY INDUSTRY IS EXAMINED; ALL MAJOR "SOLAR" PROJECTS OF THE ELECTRIC UTILITIES ARE LISTED AND SOME OF THE MAJOR DEMONSTRATION PROJECTS ARE DISCUSSED IN DETAIL. THE RESEARCH ACTIVITIES OF UNIVERSITIES, NONPROFIT ORGANIZATIONS AND GOVERNMENT LABORATORIES ARE IDENTIFIED BY TECHNICAL AREA. ALL LEADING COMPANIES (BOTH PUBLICLY AND PRIVATELY OWNED -- INCLUDING A NUMBER OF THE "FORTUNE 500") WHICH ARE NOW ACTIVE IN THE FIELD ARE LISTED IN THE TWO DIRECTORIES THAT HAVE BEEN INCORPORATED AS PART OF THE SURVEY. CONSENSUS MARKET FORECASTS ARE PRESENTED AND COMMENTED UPON. THE LONG-RANGE FINANCIAL IMPLICATIONS OF "BREAKTHROUGHS" IN CERTAIN TECHNOLOGIES ARE POINTED OUT.

77-0032 BERTELSMEIER G
CLOSED WIND TURBINE WITH A CONICALLY ADJUSTABLE WIND TUNNEL FOR THE

GENERATION OF CURRENT AND DIRECT ENERGY.
GERMAN (FRG) PATENT NO. 2,539,058/A/, MARCH 10, 1977. 7P. (IN GERMAN)

THE INVENTION REFERS TO A CLOSED WIND TURBINE WITH A CONICALLY ADJUSTABLE WIND TUNNEL FOR THE GENERATION OF ELECTRIC AND/OR MECHANICAL POWER. THE DEVICE IS CHARACTERIZED BY A WIND WHEEL EQUIPPED WITH COVERS AND A WIND CATCHING DEVICE, WHICH IS INSTALLED WITHIN THE FRAME CONSTRUCTION IN A REVOLVING POSITION IN A CLOSED CASE.

77-0033 BLACKWELL B F, BANAS J F, REUTER R C, SULLIVAN W N
ENGINEERING DEVELOPMENT STATUS OF THE DARRIEUS WIND TURBINE.
NTIS, MARCH 1977. 67P.
SAND-76-0650

THE AERODYNAMIC, STRUCTURAL, AND SYSTEM CONSIDERATIONS REQUIRED FOR THE ENGINEERING DEVELOPMENT OF THE DARRIEUS TURBINE ARE DESCRIBED. PARTICULAR EMPHASIS IS GIVEN TO THE NECESSITY FOR CLOSE INTERACTION OF THESE THREE AREAS AND THEIR EFFECTS ON ENERGY COSTS. CURRENTLY AVAILABLE EXPERIMENTAL DATA AND ANALYTICAL METHODS ARE DISCUSSED, TOGETHER WITH SPECIFIC RESULTS AND TRENDS OBTAINED TO DATE.

77-0034 BLACKWELL B F, SHELDAHL R E
SELECTED WIND TUNNEL TEST RESULTS FOR THE DARRIEUS WIND TURBINE.
J. ENERGY 1(6): 382-386, NOVEMBER-DECEMBER 1977.

FIVE BLADE CONFIGURATIONS OF A 2-M-DIAMETER DARRIEUS WIND TURBINE HAVE BEEN TESTED IN THE VOUGHT CORPORATION 4.6- X 6.1-M (15- X 20-FT) LOW-SPEED WIND TUNNEL. ROTOR SOLIDITY, REYNOLDS NUMBER, AND FREESTREAM VELOCITIES WERE TESTED. THE PARAMETERS MEASURED WERE ROTOR TORQUE, ROTOR ROTATIONAL SPEED, AND TUNNEL CONDITIONS. DATA ARE PRESENTED IN THE FORM OF POWER COEFFICIENT AS A FUNCTION OF TIP-SPEED RATIO ALONG WITH COMPARATIVE RESULTS FROM AN ANALYTICAL MODEL.

77-0035 BLACKWELL B F, SHELDAHL R E, FELTZ L V
WIND TUNNEL PERFORMANCE DATA FOR TWO- AND THREE-BUCKET SAVONIUS ROTORS.
NTIS, JULY 1977. 107P.
SAND-76-0131

FIFTEEN CONFIGURATIONS OF A SAVONIUS ROTOR WIND TURBINE WERE TESTED IN THE VOUGHT CORPORATION SYSTEMS DIVISION 4.9- X 6.1-M LOW SPEED WIND TUNNEL TO DETERMINE AERODYNAMIC PERFORMANCE. THE MEASURED TEST VARIABLES WERE TORQUE, ROTATIONAL SPEED, AND TUNNEL CONDITIONS. THE DATA PRESENTED ARE IN THE FORM OF POWER AND TORQUE COEFFICIENTS AS A FUNCTION OF SPEED RATIO (OR ANGULAR POSITION FOR STATIC STARTING TORQUES). IT IS CONCLUDED THAT INCREASING REYNOLDS NUMBER AND/OR ASPECT RATIO IMPROVES PERFORMANCE. THE RECOMMENDED CONFIGURATION CONSISTS OF TWO SETS OF TWO-BUCKET ROTORS, ROTATED 90 DEGREES APART, WITH EACH ROTOR HAVING A DIMENSIONLESS GAP WIDTH OF 0.1 TO 0.15.

77-0036 BLACKWELL B F, REIS G E
BLADE SHAPE FOR TROPOSKEIN TYPE OF VERTICAL-AXIS WIND TURBINE.
NTIS, MARCH 1977. 27P.
SLA-74-0154

THE EQUATIONS DERIVED TO DEFINE A TROPOSKEIN (THE SHAPE A COMPLETELY FLEXIBLE CABLE ASSUMES WHEN IT IS SPUN AT A CONSTANT ANGULAR VELOCITY ABOUT A VERTICAL AXIS TO WHICH ITS TWO ENDS ARE ATTACHED) ARE DESCRIBED. THE IMPLICATIONS OF THE SOLUTIONS ON THE DESIGN OF A VERTICAL-AXIS WIND TURBINE ARE DISCUSSED FOR CASES WHERE GRAVITY IS NEGLECTED.

77-0037 BLANTON J C
DESIGN OF A WINDPOWERED COOLING SYSTEM FOR AN APPLE STORAGE FACILITY.
M.S. THESIS. BLACKSBURG, VIRGINIA, VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, AUGUST 1977. 57P.

A STUDY WAS UNDERTAKEN TO DETERMINE THE PROBLEMS INVOLVED IN APPLYING WIND-PRODUCED ELECTRIC ENERGY TOWARD THE NEEDS OF AN APPLE STORAGE FACILITY, AND TO DESIGN AN APPROPRIATE ENERGY SYSTEM. FRUIT REQUIREMENTS, WIND GENERATOR CHARACTERISTICS, AND ENERGY STORAGE ARE DISCUSSED. DETAILED DESIGN OF A COOLING SYSTEM WAS PERFORMED, INCLUDING DESIGN CALCULATIONS AND EQUIPMENT SPECIFICATIONS. THE EXPECTED COOLING LOADS FOR THE BUILDING WERE CALCULATED AND A VAPOR COMPRESSION REFRIGERATION CONDENSING UNIT WAS SELECTED. AN ENERGY STORAGE DEVICE

UTILIZING THE LATENT HEAT OF FUSION OF ICE WAS DESIGNED AND CALCULATIONS WERE PERFORMED TO DETERMINE ITS ENERGY CAPACITY AND HEAT TRANSFER CHARACTERISTICS. THE REQUIREMENTS OF THE AIR DISTRIBUTION SYSTEM ARE DISCUSSED, AND THE PRESSURE DROP CALCULATIONS ARE SHOWN IN CONNECTION WITH THE CIRCULATING FAN SELECTION. THE OVERALL SYSTEM OPERATION IS DISCUSSED, INCLUDING CONTROL SYSTEM REQUIREMENTS.

77-0038 BOLT J B D H
PROGRAMME OF MEASUREMENTS OF THE DUTCH EXPERIMENTAL WIND PLANT WITH VERTICAL AXIS.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 125-132. (IN GERMAN)

THE REPORT GIVES INFORMATION ON THE DESIGN CRITERIA OF THE EXPERIMENTAL DARRIEUS ROTOR, WHICH WAS BUILT IN 1976 BY FOKKER VFW FOR THE DUTCH RESEARCH PROGRAMME ON WIND ENERGY.

77-0039 BOSSEL U
COUPLING OF THE USE OF SOLAR AND WIND ENERGY.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 275-303. (IN GERMAN)

WIND ENERGY REPRESENTS AN INDIRECT FORM OF SOLAR ENERGY. AS A HIGH VALUE FORM OF MECHANICAL ENERGY, IT REPRESENTS A VALUABLE ADDITION TO DIRECT SOLAR ENERGY, WHICH IN THE THERMODYNAMIC SENSE HAS A LOW VALUE. THE FOLLOWING PAPER INVESTIGATES HOW FAR A COUPLING OF THE USE OF SOLAR AND WIND ENERGY IS POSSIBLE, WHAT ARE THE STARTING POINTS FOR THEIR COMPLEMENTARY USE, AND WHAT ONE CAN EXPECT IN THE SPECIAL CASE OF SPACE HEATING.

77-0040 BOURQUARDEZ G
WIND DRIVEN POWER SYSTEM.
U.S. PATENT NO. 4,050,246, SEPTEMBER 27, 1977. 10P.

A WIND DRIVEN POWER PLANT IS DESCRIBED WHICH HAS A VERTICAL AXIS ROTOR WHICH IS RIGIDLY CONNECTED TO A CENTER BODY IN TURN CONNECTED TO A ROTATING BASE. THE BASE IS SUPPORTED ON A FIXED PYLON BY MEANS OF A MECHANICAL, OR PREFERABLY FLUIDIC BEARING. THE ROTOR BLADES ARE STRONGLY BOWED, SOFT IN TORSION AND PROVIDED, NEAR THEIR TIP REGION, WITH AUTOMATIC PITCH PILOTING MEANS.

77-0041 BOCCI A J
NEW SERIES OF AEROFOIL SECTIONS SUITABLE FOR AIRCRAFT PROPELLERS.
AERONAUT. Q. 28(1): 59-73, FEBRUARY 1977.

THE SECTIONS COMBINE ADVANCED SUPERCRITICAL FLOW CHARACTERISTICS WITH GOOD LOW-SPEED PERFORMANCE AND ARE ALSO DIRECTLY APPLICABLE TO OTHER ROTATING AERODYNAMIC MACHINERY, SUCH AS LOW-SOLIDITY DUCTED FANS, WINDMILLS, ETC.

77-0042 BLACKWELL B F
STATUS OF THE ERDA/SANDIA 17-METRE DARRIEUS TURBINE DESIGN.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C6.81 TO C6.86.

77-0043 BLEGAA S, JOSEPHSEN L, MEYER N I, SORENSEN B
ALTERNATIVE DANISH ENERGY PLANNING.
ENERGY POL. 5(2): 87-94, JUNE 1977.

IN THE SPRING OF 1976 THE DANISH GOVERNMENT PUBLISHED AN ENERGY PLAN FOR DENMARK FOR THE PERIOD UP TO 1995. AN ESSENTIAL PART OF THIS PLAN WAS THE INTRODUCTION OF FIVE NUCLEAR POWER PLANTS IN THE DANISH SUPPLY SYSTEM. AN ALTERNATIVE ENERGY PLAN WHICH EXCLUDED NUCLEAR POWER WAS LATER PUBLISHED BY A GROUP OF DANISH SCIENTISTS. IT INCLUDES A RELATIVELY EXTENDED APPLICATION OF SOLAR AND WIND ENERGY, AND ALSO EMPHASISES THE USE OF DECENTRALISED FOSSIL FUEL PLANTS WITH COMBINED POWER PRODUCTION AND DISTRICT HEATING. THE MAIN FEATURES AND DATA OF THE ALTERNATIVE DANISH ENERGY PLAN ARE EXAMINED AND COMPARED WITH THE OFFICIAL GOVERNMENT PLAN.

77-0044 AMERICAN POWER CONFERENCE 1976.
ARCH. ENERGIEWIRTSCH. 31(1): 19-32, JANUARY 1977. (IN GERMAN)

A REPORT IS GIVEN OF SOME LECTURES HELD AT A MEETING WHICH DEALT WITH PUMPED STORAGE PLANTS AND OTHER STORAGE TECHNIQUES. OTHER TOPICS ARE WIND-ENERGY CONVERSION AND SITING PROBLEMS.

77-0045 BURR N
THE WIND OF CHANGE IN POWER PRODUCTION: DEVELOPING THE NEW.
NEW CIV. ENG. NO. 266: 27-28, OCTOBER 27, 1977.

77-0046 BROWN J E, BROWN A E
HARNESS THE WIND, THE STORY OF WINDMILLS.
NEW YORK, DODD, MEAD, 1977. 109P.

THIS IS A CHILDREN'S BOOK.

77-0047 BROWN S
WIND ENERGY ON THE FARM: IT'S A NATURAL.
FORT COLLINS COLORADOAN 104(111): 1, 3, SEPTEMBER 1, 1977.

THE WINDMILL USED BY THE CSU DAIRY FARM FOR MILK COOLING AND WATER HEATING IS DESCRIBED.

77-0048 BRULLE R V
FEASIBILITY INVESTIGATION OF THE GIROMILL FOR GENERATION OF ELECTRICAL POWER. VOLUME II. TECHNICAL DISCUSSION. FINAL REPORT, APRIL 1975 - APRIL 1976.
NTIS, JANUARY 1977. 73P.
COO/2617-76/1/2

THIS ONE YEAR STUDY CONCENTRATED ON DETERMINING THE FEASIBILITY OF THE GIROMILL FOR THE COST EFFECTIVE PRODUCTION OF ELECTRICAL ENERGY. 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.

77-0049 BUDENHOLZER R A, LAVAN Z
PUTTING ALTERNATIVE SOURCES OF ENERGY INTO PERSPECTIVE.
CIV. ENG. 47(1): 70-72, JANUARY 1977.

THE FUTURE OUTLOOK FOR NUCLEAR POWER; HYDROELECTRIC POWER; TIDAL POWER; OIL SHALE AND TAR SANDS; SYNTHETIC FUELS; GEOTHERMAL ENERGY; OCEAN THERMAL GRADIENT POWER; WIND POWER; AND SOLAR ENERGY ARE SURVEYED. THERE IS ENOUGH MODERATELY PRICED URANIUM AVAILABLE TO PROVIDE ALL U.S. ELECTRIC POWER REQUIREMENTS FOR ABOUT 100 YEARS. WITH THE BREEDER REACTOR, THIS COULD BE EXTENDED TO OVER 6000 YEARS. THE U.S. WILL HAVE TO RELY MAINLY ON THE FOSSIL AND NUCLEAR SOURCES WELL INTO THE 21ST CENTURY. THE FOSSIL COMPONENT WILL COME MOSTLY FROM COAL, WITH SOME SHALE OIL. ERDA ESTIMATES THAT BY THE YEAR 2000, 33% OF ALL HOUSES WILL USE SOME SOLAR HEATING, BUT THE BREEDER REACTOR WILL GRADUALLY PROVIDE A GREATER LOAD OF THE TOTAL ENERGY SUPPLY.

77-0050 BUICK T R, DOHERTY M A, MCMULLAN J T , MORGAN R, MURRAY R B
ON THE ENERGY PATTERN FACTOR IN WIND MEASUREMENTS.
INT. J. ENERGY RES. 1(2): 127-133, APRIL-JUNE 1977.

IT IS WELL KNOWN THAT THE POWER PRESENT IN A STEADY WIND OF SPEED V IS PROPORTIONAL TO THE CUBE OF THE SPEED. IT IS EQUALLY WELL KNOWN, ALTHOUGH RATHER LESS GENERALLY REALIZED, THAT, IN ESTIMATING THE AVERAGE POWER OVER A PERIOD OF TIME IN A GIVEN LOCATION, IT IS NOT ENOUGH TO MEASURE THE AVERAGE WIND SPEED AND TO CUBE IT TO YIELD THE CUBE OF THE AVERAGE, SINCE THE QUANTITY ACTUALLY REQUIRED IS THE AVERAGE OF THE CUBE, AND THESE ARE NOT IDENTICAL. MEASUREMENTS OF ENERGY PATTERN FACTOR WERE MADE USING A CONTINUOUS ANALOG TECHNIQUE, RATHER THAN BY THE MORE USUAL SAMPLING PROCEDURE. THE VALUES OBTAINED WERE SIGNIFICANTLY LARGER THAN THE USUALLY ACCEPTED FIGURE. THE DISCREPANCY IS ATTRIBUTED PARTLY TO THE

METHOD OF MEASUREMENT, AND PARTLY TO THE USE OF RATHER MORE TYPICAL WIND SPEEDS.

77-0051 BUNNELL S, FRIKE T
A SAVONIUS AQUACULTURE EXPERIMENT.
WIND POWER DIG. 10: 24-27, FALL 1977.

77-0052 BUTLER B L, BLACKWELL B F
APPLICATION OF LAMINATED WOODEN BLADES TO A TWO-METER DARRIEUS TYPE VERTICAL AXIS WIND TURBINE.
SAMPE Q. 8(2): 1-6, JANUARY 1977.

THIS PAPER DESCRIBES THE USE OF LAMINATED LAUAN PLYWOOD IN A 2-METER-DIAMETER, 3-BLADED DARRIEUS WIND TURBINE. THE MANUFACTURE, TESTING AND TENSILE STRESS ANALYSIS OF LAMINATED WOODEN BLADES ARE DESCRIBED. THE 2-METER WIND TURBINE MODEL TESTS INDICATED THAT, WITH APPROPRIATE BLADE DESIGN, WOOD HAS POTENTIAL FOR SMALL VERTICAL AXIS WIND TURBINES.

77-0053 BUTLER P
WIND TURBINE "FIRST" CLAIMED BY THE INDIAN NATIONAL AERONAUTICAL LABORATORY AT BANGALORE.
ENGINEER 244: 13, FEBRUARY 24, 1977.

THE INDIAN NATIONAL AERONAUTICAL LABORATORY AT BANGALORE HAS BUILT WHAT IT BELIEVES TO BE THE FIRST FULL-SCALE STRAIGHT BLADED DARRIEUS-TYPE WIND TURBINE. USING SAVONIUS STARTER BUCKETS IT GIVES ABOUT 1 KW SHAFT POWER AT 80 REV/MIN IN WINDS OF ABOUT 25 KM/H.

77-0054 BUTLER T W
ENERGY CONVERSION SYSTEM.
U.S. PATENT NO. 4,004,427, JANUARY 25, 1977. 14P.

AN ENERGY CONVERSION SYSTEM IS ASSOCIATED WITH AN EDIFICE FOR CONVERTING NATURAL ENERGY TO USABLE ENERGY. THE EDIFICE HAS A GENERALLY VERTICAL OUTWARDLY FACING SIDE SURFACE, AND THE SYSTEM INCLUDES RADIATION COLLECTING MEANS DEFINING A PLURALITY OF RADIATION RECEIVING SURFACES ADJACENT TO BUT SPACED FROM THE EDIFICE SIDE SURFACE. THUS, A FLOW-WAY IS DEFINED BETWEEN THE RADIATION RECEIVING SURFACES AND THE SIDE SURFACE OF THE EDIFICE. EACH OF THE RADIATION RECEIVING SURFACES FACES GENERALLY UPWARDLY AND HAS A PLURALITY OF HOLLOWS. THE SYSTEM FURTHER COMPRISES A ROTOR ROTATABLY MOUNTED ON THE EDIFICE ABOVE THE RADIATION RECEIVING SURFACES AND DUCTING APPARATUS FOR DIRECTING A GASEOUS MEDIUM, SUCH AS AIR, FROM THE FLOWWAY TO THE ROTOR TO ROTATE THE LATTER. THE ROTATION OF THE ROTOR IN TURN DRIVES AT LEAST A PART OF A SUITABLE ENERGY-USING FIRST OPERATOR MEANS. THE SYSTEM MAY ALSO COMPRISE WIND DRIVEN MEANS COMPRISING BRACED WEB MEMBERS OPERATIVELY CONNECTED TO A SECOND OPERATOR MEANS.

77-0055 C-TURBINE TESTED.
WIND POWER DIG. 1(8): 22, SPRING 1977.

PINSON ENERGY CORPORATION HAS BEGUN RESEARCHING THE USE OF THEIR CYCLOTURBINE WITH A COMPRESSED AIR POWER PRODUCTION SYSTEM. THE RESEARCH WILL BE DONE IN COLLABORATION WITH THE NEW ALCHEMY INSTITUTE, AND IS SPECIFICALLY AIMED TOWARD SUPPLYING ENERGY FOR A SOLAR GREENHOUSE.

77-0056 CADWALLADER E A, WILLIAMSON W R, WESTBERG J E
THE APPLICATION OF WIND ENERGY SYSTEMS TO DESALINATION.
NTIS, APRIL 1977. 68P.
PB-276174

THE IMPACT OF RAPIDLY INCREASING FUEL COSTS HAS ALL BUT MADE SALINE WATER CONVERSION UNECONOMICAL. HOWEVER THE APPLICATION OF WIND ENERGY SYSTEMS TO MEMBRANE PROCESSES FOR BRACKISH WATER CONVERSION OFFERS AN ECONOMICAL SOLUTION. COMMERCIALLY AVAILABLE WIND TURBINES AND THOSE UNDER DEVELOPMENT APPEAR PROMISING FOR PRODUCING ELECTRICAL ENERGY AT COSTS RANGING FROM FIVE CENTS DOWN TO 1.8 CENTS PER KILOWATT HOUR. IT IS STILL POSSIBLE TO REACH COSTS FOR DESALTING BRACKISH WATER AT LESS THAN $1.00 PER THOUSAND GALLONS WITH LARGE WIND ENERGY DESALINATION SYSTEMS. THE COUPLING OF WIND ENERGY TURBINES TO ELECTRODIALYSIS AND REVERSE OSMOSIS ALSO OFFERS TECHNOLOGICAL ADVANTAGES, SUCH AS VARIABLE FLUID FLOWS IN THE DESALINATION PROCESSES FOR MAXIMUM ECONOMIC PRODUCTION OF POTABLE WATER.

RESEARCH AND DEVELOPMENT EFFORTS IN THIS DIRECTION ARE INDICATED.

77-0057 CALIFORNIA ELECTRICITY GENERATION METHODS ASSESSMENT PROJECT. FINAL REPORT.
REDONDO BEACH, CALIFORNIA, TRW ENERGY SYSTEMS MANAGEMENT DIV., JANUARY 30, 1977. 390P.

INFORMATION IS PROVIDED ON CURRENT AND FORECASTED ECONOMIC COSTS OF DIFFERENT METHODS OF ELECTRICITY GENERATION NEEDED TO MEET BASE-, INTERMEDIATE-, AND PEAK-LOAD DEMAND REQUIREMENTS IN CALIFORNIA. IN ADDITION, THE RELIABILITY, FUEL REQUIREMENTS, OTHER RESOURCE REQUIREMENTS, AND ENVIRONMENTAL IMPACTS OF THE DIFFERENT METHODS OF GENERATING ELECTRICITY ARE ASSESSED. INFORMATION FOR THIS REPORT WAS OBTAINED BY REVIEWING AND SUMMARIZING MAJOR STUDIES ON ELECTRICITY GENERATION THAT HAVE BEEN CONDUCTED IN RECENT YEARS. ONE PORTION OF THIS REVIEW IS THE EVALUATION OF THE METHODS AND ASSUMPTIONS USED IN THESE MAJOR STUDIES. WHERE MAJOR ESTIMATES AND PROJECTIONS DIFFER SUBSTANTIALLY, REASONS FOR SUCH DIFFERENCES ARE IDENTIFIED. IN SOME INSTANCES, FURTHER RESEARCH NEEDS AND ADDITIONAL SOURCES OF ESTIMATES AND FORECASTS ARE IDENTIFIED. THE METHODS REVIEWED IN DIFFERENT CATEGORIES ARE: PRESENTLY AVAILABLE METHODS - NUCLEAR POWER, CONVENTIONAL COAL AND OIL POWER, GAS TURBINE AND COMBINED-CYCLE UNITS, GEOTHERMAL, HYDROELECTRIC, AND PUMPED STORAGE; POTENTIAL FUTURE METHODS - SOLAR THERMAL, HYDROTHERMAL AND HOT ROCK CONVERSION, ADVANCED COAL-FIRED POWER PLANTS, FUEL CELLS, WIND ENERGY CONVERSION, SOLAR PHOTOVOLTAIC, AND OCEAN THERMAL CONVERSION; CLEAN FUEL OPTIONS - NAPHTHA, SYNTHETIC GAS FROM NAPHTHA, LOW-SULFUR FUEL OIL, METHANOL, AND HYDROGEN; AND PEAK-LOAD TECHNOLOGIES - BATTERIES, FUEL CELLS, FLYWHEELS, COMPRESSED AIR. ADDITIONAL INFORMATION IS INCLUDED IN APPENDIX A ON A COST-VARIANCE ANALYSIS OF ELECTRIC POWER FROM CONVENTIONAL PLANTS; APPENDIX B, NUCLEAR FUEL-CYCLE COSTS, 1975; APPENDIX C, DETAIL OF COAL COST EVALUATION; AND APPENDIX D, CORRESPONDENCE AND ADDITIONAL COMMENTS PERTINENT TO THE REPORT.

77-0058 CARLIN P, KENNEDY D, FENG C, CARR R
ON SOME ENERGY PROJECTS AT THE UNIVERSITY OF COLORADO.
J. ENERGY DEV. 2(2): 332-334, SPRING 1977.

TWO ENERGY PROGRAMS AT THE UNIVERSITY OF COLORADO INVOLVE MOUNTAIN WIND TESTING AND A SOLAR HEATING SYSTEM FOR A SENIOR CITIZEN'S CENTER. A WIND TURBINE, DESIGNED TO WORK BEST AT 20 MPH BUT ABLE TO WITHSTAND 150-MPH WINDS, WILL BE INSTALLED ON A 12,300-FOOT RIDGE NEAR BOULDER TO RECORD AND ASSESS THE POTENTIAL USE OF STRONG WINDS. A MICROPROCESSOR KEEPING TRACK OF WIND CHANGES WILL ADJUST THE WINDMILL BLADES ACCORDINGLY. THE COMPUTER WILL ALSO MAKE ADJUSTMENT FOR TEMPERATURE CHANGES AND WILL SEARCH ITS OWN RECORDS FOR PREVIOUS ADJUSTMENT DATA. THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT IS COOPERATING IN THE SOLAR PROJECT FOR THE CENTER. SEVERE WIND CONDITIONS IN BOULDER WILL REQUIRE SPECIALLY DESIGNED SOLAR PANELS AND SUPPORTS. HEAT WILL BE AVAILABLE EITHER DIRECTLY OR FROM THE 5000-GALLON STORAGE TANK, WITH A BACKUP GAS HEATING SYSTEM. RETROFITTING DECISIONS WILL BENEFIT FROM THE INFORMATION GATHERED IN DESIGNING THIS PROJECT.

77-0059 CARTER J
AT HOME WITH MARTIN JOPP, WIND POWER PIONEER.
WIND POWER DIG. 1(8): 6-8, SPRING 1977.

77-0060 CARTER J
BUILD A SMALL INVERTER.
WIND POWER DIG. 1(8): 45, SPRING 1977.

77-0061 CARTER J
USDA'S SMALL-SCALE WIND SYSTEM PROGRAM.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P.20-22, SPRING 1977.

VARIOUS SMALL SCALE PROGRAMS UNDERWAY BY THE USDA ARE DESCRIBED INCLUDING: A STUDY AT USDA'S SOUTHWESTERN GREAT PLAINS RESEARCH CENTER ON DEEPWELL PUMPING WITH A DAF TURBINE; A STUDY AT KANSAS STATE UNIVERSITY USING WIND TURBINES FOR WATER PUMPING FROM SHALLOW WELLS; A STUDY AT IOWA STATE UNIVERSITY INTEGRATING A WIND SYSTEM WITH A WATER HEATER, FURNACE AND HEAT PUMP; A STUDY DONE AT THE VIRGINIA POLYTECHNIC INSTITUTE AIMED AT DEVELOPING A WIND-ASSISTED COOLING SYSTEM FOR APPLE STORAGE; A STUDY PERFORMED BY THE KAMAN SCIENCE CORPORATION IN

COLLABORATION WITH COLORADO STATE UNIVERSITY TO APPLY WIND POWER TO A DAIRY OPERATION; AND A STUDY AT CORNELL UNIVERSITY TO HEAT WATER BY INTENSE AGITATION.

77-0062 CARTER J
USDA'S WIND TESTING PROGRAM.
WIND POWER DIG. 1(8): 38-40, SPRING 1977.

THE ROCKY FLATS TESTING OF SMALL-SCALE SYSTEMS IS DESCRIBED.

77-0063 CARTER J
VAWT RESEARCH AT SANDIA LABS.
WIND POWER DIG. 1(9): 42-45. SUMMER 1977.

77-0064 CARTER J, FINCH T
WIND AND SOLAR AT EAST 11TH.
WIND POWER DIG. 1(9): 12-17, SUMMER 1977.

AN APARTMENT HOUSE IN NEW YORK CITY WHICH USES WIND AND SOLAR SYSTEMS IS DESCRIBED.

77-0065 CHAMIS C C, MANOS P, SINCLAIR J H, WINEMILLER J R
NASTRAN USE FOR CYCLIC RESPONSE AND FATIGUE ANALYSIS OF WIND TURBINE TOWERS.
NTIS, OCTOBER 1977. P. 213-233.
ERDA/NASA/1004-77/3

THIS PAPER IS FROM THE 6TH NASTRAN USER'S COLLOQUIUM. A PROCEDURE IS DESCRIBED WHICH USES NASTRAN COUPLED WITH FATIGUE CRITERIA VIA A POSTPROCESSOR TO DETERMINE THE CYCLIC RESPONSE AND TO ASSESS THE FATIGUE RESISTANCE (FATIGUE LIFE) OF WIND TURBINE GENERATOR TOWERS. THE CYCLIC LOADS TO WHICH THE TOWER MAY BE SUBJECTED ARE ENTERED EITHER IN A QUASI-STATIC APPROACH THROUGH STATIC LOAD SUBCASES (RIGID FORMAT 1) OR THROUGH THE DIRECT DYNAMIC RESPONSE (RIGID FORMAT 9) FEATURES OF NASTRAN. THE FATIGUE CRITERIA ARE APPLIED TO NASTRAN OUTPUT DATA FROM EITHER RIGID FORMAT THROUGH AN EXTERNALLY WRITTEN USER PROGRAM EMBEDDED IN A POSTPROCESSOR.

77-0066 CHEN P I, GARG V K
WIND ENERGY: A SUPPLEMENT TO HYDRO-ELECTRIC ENERGY USING THE COLUMBIA RIVER VALLEY AS AN EXAMPLE.
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. 19, SESS. B. 2. 6P.

THIS PAPER EXPLORES A CONCEPTUAL WIND ENERGY CONVERSON SYSTEM (WECS) WHICH CONSISTS OF A WIND POWER CONVERSION UNIT THAT PUMPS WATER FROM THE TAIL WATER LEVEL TO THE RESERVOIR LEVEL IN ORDER TO STORE IT THERE IN A FORM OF POTENTIAL ENERGY THAT CAN BE CONVERTED INTO ELECTRICAL ENERGY THROUGH EXISTING HYDRO-ELECTRIC POWER PLANT. SITE SELECTIONS FOR USING THIS WECS ARE CONSTRAINED THEREFORE NOT ONLY BY THE AVAILABILITY OF WIND POWER BUT ALSO THE EXISTENCE OF HYDRO-POWER FACILITIES. IN THIS STUDY, EXAMPLES OF THE TOTAL WIND ENERGY POTENTIAL AT CASCADE LOCKS, THE DALLES, JOHN DAY AND MCNARY SITES WERE ANALYZED BASED ON AVAILABLE DATA. ECONOMIC ASSESSMENTS OF THE WIND POWER SYSTEMS ARE PRESENTED.

77-0067 CHERRY N J
AN APPRAISAL OF NEW ZEALAND'S PRACTICAL ALTERNATIVES TO NUCLEAR POWER.
NEW ZEALAND, ROYAL COMMISSION ON NUCLEAR POWER GENERATION, SUBMISSION. NO. 118, MAY 1977. 68P.

77-0068 CHOPRA I
NONLINEAR DYNAMIC RESPONSE OF WIND TURBINE ROTORS. PHD. THESIS.
NTIS, FEBRUARY 1977. 230P.
N78-15565

THE NONLINEAR EQUATIONS OF MOTION FOR A RIGID ROTOR RESTRAINED BY THREE FLEXIBLE SPRINGS REPRESENTING 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.

77-0069 CHRISTIANSEN M, CRAIG P, MCGUIRE C B, SIMMONS M
DISTRIBUTED TECHNOLOGIES IN CALIFORNIA'S ENERGY FUTURE, VOLUME 1.
NTIS, SEPTEMBER 1977. 248P.
LBL-6831-VOL. 1

ALTERNATIVE ENERGY SOURCES BASED ON RENEWABLE ENERGY FORMS ARE CONSIDERED IN TERMS OF DEVELOPMENT OF DISTRIBUTION ENERGY SYSTEMS WITH EMPHASIS ON THE CALIFORNIA SETTING. TRENDS IN ENERGY SUPPLY AND PATTERNS OF ENERGY USE ARE REVIEWED, ENERGY RESOURCES ARE DISCUSSED INCLUDING BIOMASS, SOLAR ENERGY, GEOTHERMAL ENERGY, AND WIND ENERGY, AND ENVIRONMENTAL AND LAND USE FACTORS ARE CONSIDERED. ECONOMIC, SOCIAL, AND POLITICAL ISSUES ARE INCLUDED. IT IS CONCLUDED THAT IT IS POSSIBLE TO RUN A COMPLEX, HIGHLY INDUSTRIALIZED, POST-INDUSTRIAL SOCIETY ENTIRELY ON RENEWABLE RESOURCES INTERNAL TO THE STATE, AND THAT THIS CAN OCCUR IN THE PRESENCE OF GROWTH IN GROSS STATE PRODUCT.

77-0070 CHRISTIANSON M
WINDMILL POWER FOR CITY PEOPLE.
NTIS, MAY 1977. 73P.
PB-275658

THIS REPORT DISCUSSES THE FIRST URBAN WINDMILL USED AS AN ALTERNATIVE ENERGY SOURCE. THE WINDMILL WAS DESIGNED AND INSTALLED AT 519 EAST 11TH STREET, A TENEMENT BUILDING IN NEW YORK CITY. FINDINGS SHOW THAT THE ENERGY PRODUCED FROM THE WINDMILL IS AN IMPORTANT RENEWABLE ENERGY RESOURCE WHICH CAN BE USED IN MOST URBAN AREAS AND WHICH REDUCES DEPENDENCY ON UTILITY COMPANIES. A BRIEF HISTORY OF THE WINDMILL'S ORIGIN, DESIGN AND INSTALLATION PROCEDURES ARE OUTLINED. ALSO INCLUDED ARE COMPARISONS OF ENERGY SAVINGS OF THE WINDMILL ENERGY VERSUS THE UTILITY COMPANIES. AN APPENDIX CONSISTS OF LITERATURE, RESOURCES, A WIND SPEED AND DIRECTION MAP OF THE USA, STRUCTURAL ENGINEERING CALCULATIONS AND AN EXPLANATION OF WINDFORCES ON WINDMILLS.

77-0071 CLARK R
HEADING INTO THE WIND.
COLO. ENG. 73(2): 16-19, JANUARY 1977.

A BRIEF HISTORY AND CURRENT STATUS OF WIND POWER RESEARCH IS GIVEN.

77-0072 CLARKE R M
WIND POWER. IT'S POTENTIAL FOR ENERGY SAVING.
IRRIG. POWER 34(2): 191-195, APRIL 1977.

77-0073 CLIFF W C
THE EFFECT OF GENERALIZED WIND CHARACTERISTICS ON ANNUAL POWER ESTIMATES FROM WIND TURBINE GENERATORS.
NTIS, OCTOBER 1977. 57P.
PNL-2436

A TECHNIQUE IS PRESENTED FOR ESTIMATING THE AVERAGE POWER OUTPUT OF A WIND TURBINE USING, AS THE WIND CHARACTERISTIC INPUT, ONLY THE MEAN ANNUAL WIND MAGNITUDE. HOURLY WIND SPEEDS ARE ASSUMED TO HAVE A RAYLEIGH FREQUENCY DISTRIBUTION WHICH REQUIRES A SINGLE PARAMETER INPUT (E.G., THE MEAN VALUE, VARIANCE OR HIGHER MOMENT VALUES). BASED UPON A GENERAL SHAPE, FOR THE WIND SPEED VERSUS MACHINE OUTPUT, A GENERIC SET OF CURVES IS DEVELOPED TO ESTIMATE THE AVERAGE POWER OUTPUT OF WIND TURBINES. ALSO, ESTIMATES OF THE PERCENT OF TIME THE WIND TURBINE WOULD NOT PRODUCE POWER (PERCENT DOWN TIME) AND THE PERCENT OF TIME THE WIND TURBINE WOULD BE OPERATING AT ITS RATED POWER ARE PRESENTED.

77-0074 COCHRAN K
WESTERN REPORT.
WIND POWER DIG. 1(8): 32-33, SPRING 1977.

77-0075 COONLEY D R
THE USE OF BUILT FORM TO ENHANCE THE OUTPUT OF WIND COLLECTORS.
WIND TECHNOL. J. 1(2): 24-30, SUMMER 1977.

USE OF BUILT FORM TO INCREASE WIND VELOCITIES THROUGH WIND COLLECTION DEVICES IS EXPLORED; VARIATION OF FIXED WIND COLLECTOR OUTPUT WITH VARIATION IN WIND DIRECTIONS AND METHODS FOR REDUCING WIND PROBLEMS AROUND BUILDINGS; PLUS DESIGN CONSIDERATIONS AND INTEGRATED CONCEPTS.

77-0076 COROTIS R B
STOCHASTIC MODELING OF SITE WIND CHARACTERISTICS. PROGRESS REPORT, SEPTEMBER 15, 1976 - DECEMBER 14, 1976.
NTIS, JANUARY 1977. 6P.
RLO/2342-1

WORK WAS STARTED RELATIVE TO CHANGING THE EXISTING COMPUTER PROGRAMS TO ACCOMPLISH THE GOALS OF THE PRESENT CONTRACT. PRELIMINARY WORK WAS ALSO DONE ON SITE SELECTION AND FIVE REGIONAL SITES WERE IDENTIFIED FOR CLOSER STUDY. FROM THESE FIVE SITES THE FINAL SELECTION OF LOCATIONS FOR THE STUDY WILL BE MADE. LETTERS WERE SENT TO A NUMBER OF FELLOW RESEARCHERS INQUIRING INTO THE AVAILABILITY OF APPROPRIATE WIND RECORDS.

77-0077 COROTIS R B
STOCHASTIC MODELING OF SITE WIND CHARACTERISTICS. FINAL REPORT.
NTIS, SEPTEMBER 1977. 143P.
RLO/2342-77/2

STATISTICAL ANALYSIS PROCEDURES AND PROBABILITY MODELS THAT ARE APPLICABLE TO WIND ENERGY CONVERSION SITES IN GENERAL ARE DEVELOPED. SPECIAL COMPUTER ALGORITHMS ARE USED TO STUDY VARIANCES, FIT PROBABILITY DISTRIBUTIONS, ANALYZE RUN DURATION, AND DETERMINE CORRELATION STRUCTURE IN THE WIND. A TOTAL OF 20 ONE-HOUR OR THREE-HOUR RECORDS ARE ANALYZED FROM SITES IN NEW ZEALAND, ILLINOIS, MONTANA, KANSAS, WYOMING, AND TEXAS IN DEVELOPING AND TESTING THE MODELS.

77-0078 COROTIS R B, SIGL A B, COHEN M P
VARIANCE ANALYSIS OF WIND CHARACTERISTICS FOR ENERGY CONVERSION.
J. APPL. METEOROL. 16(11): 1149-1157, NOVEMBER 1977.

VARIANCE ANALYSIS OF HOURLY WIND DATA IS UTILIZED TO ASSIST IN WIND CHARACTERISTIC ASSESSMENT FOR DIRECT ENERGY CONVERSION SYSTEMS. FEASIBILITY OF LARGE-SCALE WIND ENERGY UTILIZATION, AS WELL AS SITING, SIZING AND OPERATING POLICY, DEPEND ON THE VARIABILITY OF THE WIND. SEVERAL MIDWESTERN SITES ARE USED TO ILLUSTRATE A TEMPORAL STUDY OF VARIANCE SOURCES THAT LEADS TO THE EVALUATION OF EQUIVALENT INDEPENDENT HOURS. FOR THE SITES CONSIDERED THESE VARY FROM TWO TO THREE PER DAY. THIS INFORMATION IS UTILIZED TO DETERMINE DURATION OF SURVEY REQUIREMENTS FOR STATED CONFIDENCE LEVELS AND DESIRED ACCURACY. REASONABLY RELIABLE AND ACCURATE ESTIMATES OF THE MEAN SEASONAL WIND CAN BE OBTAINED IN ONE OR TWO YEARS FOR THE SITES ANALYZED. AUTOCORRELATION AND CROSS-CORRELATION ANALYSIS CONFIRMS THE EXISTENCE OF SIGNIFICANT CORRELATION IN THE WIND AT A SINGLE SITE FOR A PERIOD OF 8-12 H AND BETWEEN SITES FOR SIMILAR TIME LAGS AND SEPARATIONS UP TO 100 KM OR MORE. MEANINGFUL PREDICTION OF VARIATION FROM THE MEAN APPEARS POSSIBLE IN THESE CASES. THE DIURNAL CYCLE EFFECT IS SEEN TO DEPEND SIGNIFICANTLY ON SEASON AND ELEVATION.

77-0079 COSNER S
AMERICAN WINDMILLS, HARNESSERS OF ENERGY.
NEW YORK, MCKAY, 1977. 50P.

THIS BOOK PRESENTS THE HISTORY AND DEVELOPMENT OF WINDMILLS IN THE UNITED STATES FROM THE EARLIEST ONES BUILT BY THE PILGRIMS TO THE GIANT, ILL-FATED WIND MACHINE BUILT IN VERMONT DURING WORLD WAR II.

77-0080 COSTE W H, LOTKER M
EVALUATING A COMBINED WIND POWER/ENERGY STORAGE SYSTEM.
POWER ENG. 81(5): 48-51, MAY 1977.

A COMPUTER MODEL IS DESCRIBED WHICH WAS DEVELOPED TO OPTIMIZE THE AMOUNT OF STORAGE AND GENERATING CAPACITY OF A COMBINATION WIND-DRIVEN GENERATOR PLUS STORAGE SYSTEM FOR A PARTICULAR LOCATION. THIS OPTIMIZED SYSTEM WILL HAVE THE LOWEST ENERGY COST WHILE STILL MEETING THE PREDETERMINED AVAILABILITY CRITERIA, WHICH WAS 80% FOR THIS STUDY. THE MODEL DETERMINES THE LOWEST COST CASE AT EACH CAPACITY FACTOR. A MAJOR RESULT OF THIS STUDY IS THE SUGGESTION THAT THE COMBINED WIND-DRIVEN GENERATOR/STORAGE SYSTEM IS CAPABLE OF PRODUCING RELIABLE, ALBEIT COSTLY, POWER AT ALL CAPACITY FACTORS WITH A REASONABLE AVAILABILITY. THE STUDY ALSO SUGGESTS THAT SITES WITH AVERAGE WIND SPEED IN EXCESS OF 15 MPH MAY BE REQUIRED FOR ECONOMIC VIABILITY OF THIS SYSTEM.

77-0081 COTY U A, VAUGHN L

EFFECTS OF INITIAL PRODUCTION QUANTITY AND INCENTIVES ON THE COST OF WIND ENERGY.
BURBANK, CALIFORNIA, LOCKHEED-CALIFORNIA CO., JANUARY 3, 1977. 9P.

THIS PAPER WAS GIVEN AT THE AAAS CONFERENCE IN DENVER, FEBRUARY 20, 1977. THE EFFECT OF INITIAL PRODUCTION QUANTITY ON THE SELLING PRICE OF A 2-MW 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. THE DATA PRESENTED ALSO SHOWS THE EFFECT ON INITIAL PRODUCTION QUANTITY REQUIRED OF INTRODUCING INCENTIVES SUCH AS GUARANTEED LOANS. THE EFFECT OF ANNUAL AVERAGE WINDSPEED AT THE SITE IS ASSESSED IN TERMS OF INITIAL PRODUCTION QUANTITY REQUIRED. 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 CENTS/KWH) FOR PRIVATE UTILITIES AND DOWN TO 1.5 CENTS/KWH FOR PUBLIC UTILITIES. WITH GUARANTEED LOANS PROVIDED AS AN INCENTIVE, THE INITIAL PRODUCTION QUANTITY REQUIRED DROPS TO 95 UNITS. IF SITES WITH 8 M/S ANNUAL AVERAGE WINDSPEED ARE USED, AND GUARANTEED LOANS ARE MADE AVAILABLE, THE INITIAL PRODUCTION QUANTITY REQUIRED TO MEET THE COMPETITIVE COST CRITERIA OF PUBLIC AND PRIVATE UTILITIES IS REDUCED TO 65 UNITS. FEDERAL POWER AGENCIES COULD MEET THE PRESENT COST OF OIL WITH ENERGY FROM WIND TURBINE GENERATORS WITH AN INITIAL PRODUCTION ORDER OF 40 UNITS.

77-0082 COTY U A, VAUGHN L
IMPLEMENTATION ISSUES OF WIND ENERGY.
NEW OPTIONS IN ENERGY TECHNOLOGY; PROCEEDINGS OF THE CONFERENCE, SAN FRANCISCO, CAL., AUGUST 2-4, 1977. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1977. P. 106-116.

INITIAL PRODUCTION QUANTITIES REQUIRED BY USERS (INCLUDING DEVELOPING NATIONS), COMPETITIVE ENERGY COST CRITERIA, AND ENERGY COST FRACTIONS ARE TABULATED AND COMPARED. AVAILABILITY OF ALTERNATIVE ENERGY SOURCES, AVAILABILITY OF INCENTIVES (FINANCING BY GOVERNMENT OR FOREIGN LOANS), AND AVAILABILITY OF SUITABLE HIGH-WIND SITES ARE TAKEN INTO ACCOUNT. MINIMUM INVESTMENTS AND COMMITMENTS TO PURCHASES OF WIND TURBINE GENERATORS TO IMPLEMENT A WIND POWER DEVELOPMENT PROGRAM ON A COMMERCIAL BASIS ARE ESTIMATED.

77-0083 CRITERIA FOR THE MANUFACTURE AND OPERATION OF WIND POWER PLANT UP TO 10 KW.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 353-362. (IN GERMAN)

THE REQUIREMENTS ARE DESCRIBED FOR THE MANUFACTURE AND OPERATION OF 10 KW WIND POWER PLANTS. THE FOLLOWING ARE TREATED IN DETAIL: SAFETY PROBLEMS, GENERATOR CONSTRUCTION, BATTERIES, CONVERTERS.

77-0084 CROMACK D E, HERONEMUS W E, MCGOWAN J G
DESIGN AND OPERATIONAL EVALUATION OF A 25 KW WIND TURBINE GENERATOR FOR RESIDENTIAL HEATING APPLICATIONS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILL., AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1668-1675.

AN IMMEDIATE APPLICATION AREA OF WINDPOWER SYSTEMS IS TO PROVIDE POWER FOR RESIDENTIAL HEATING. THIS PAPER PRESENTS A DESCRIPTION OF THE MAIN COMPONENT, THE WIND TURBINE GENERATOR (WTG) OF AN EXPERIMENTAL HEATING SYSTEM DESIGNED TO TEST THIS CONCEPT. THE DESIGN CRITERIA, CONSTRUCTION DETAILS, COMPONENT COSTS, AND PERFORMANCE TESTING OF THIS COMPONENT ARE INCLUDED. VARIOUS SUBSYSTEMS INCLUDING ROTOR, MAIN FRAME, DRIVE TRAIN, YAW CONTROL, GENERATOR, SUPPORT TOWER, AND CONTROL SYSTEMS ARE DISCUSSED. INITIAL EXPERIMENTAL RESULTS SHOW THAT THE PERFORMANCE OF THE WIND TURBINE GENERATOR IS CLOSE TO ANALYTICAL PREDICTION.

77-0085 CROMACK D E, LEFEBVRE P L
OPTIMUM AND NEAR OPTIMUM BLADE CONFIGURATIONS FOR HIGH SPEED WIND

TURBINES.
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. 19. P. 16-19.

PRESENTED ARE THE RESULTS OF A PARAMETRIC STUDY SHOWING COMPARISONS FOR HIGH SPEED WINDMILL ROTORS OF 2, 3, AND 4 BLADES AND OF AERODYNAMICALLY OPTIMUM, NEAR OPTIMUM, AND CONSTANT CHORD ZERO-TWIST BLADE SHAPES. NEAR OPTIMUM BLADES CONSISTING OF LINEAR-TAPER AND LINEAR-TWIST REPRESENT A SIGNIFICANT DEGREE OF SIMPLIFICATION FOR MANUFACTURE. RESULTS OF THIS STUDY INDICATE THAT ONLY A SMALL PERFORMANCE LOSS IS INCURRED FOR NEAR-OPTIMUM BLADES WHEN COMPARED TO THE OPTIMUM CHORD AND TWIST BLADES PROVIDING THAT THE TAPER AND TWIST ARE PROPERLY DISTRIBUTED. CURVES ARE PRESENTED FOR THE SELECTION OF DESIGN PARAMETERS FOR SEVERAL NEAR OPTIMUM BLADES.

77-0086 CROSNO D
THE INDUCTION GENERATOR FOR WIND ENERGY CONVERSION.
WIND TECHNOL. J. 1(3): 26-30, FALL 1977.

A WIND-DRIVEN INDUCTION GENERATOR MAY PROVE TO BE A PRACTICAL SOURCE OF SUPPLEMENTAL ELECTRIC ENERGY FOR HOMES AND SMALL FARMS WHICH ARE SERVED BY PUBLIC UTILITY POWER LINES. FOR SUCH A POWER SOURCE, THE WIND-DRIVEN GENERATOR IS CONNECTED TO THE CUSTOMER'S SIDE OF THE ELECTRIC COMPANY'S WATT-HOUR METER. SUCH A SYSTEM IS DESCRIBED.

77-0087 CROUZET-PASCAL J
A NON-AEROSPACE APPLICATION OF PLANS: PRELIMINARY STRUCTURAL DESIGN OF WIND TURBINE DIFFUSER.
NTIS, MARCH 1977. 88P.
RM-629, N77-31604

A BASELINE DESIGN FOR A LIGHTWEIGHT DIFFUSER, ITS CALCULATED WEIGHT, AND THE METHOD EMPLOYED TO CALCULATE THE SPECIFIC SIZES IN THE DESIGN ARE DESCRIBED. FORMULAS ARE PRESENTED THAT PERMIT THE STRAIGHTFORWARD ASSESSMENT OF THE EFFECT ON THE DIFFUSER WEIGHT, AND THE RELATED COST OF POWER GENERATION, OF CHANGES IN DIMENSIONS, MATERIAL, OR ALLOWABLE DEFLECTIONS. IT WAS ESTABLISHED THAT FOR A SCALE VARIATION IN THE OVER-ALL SIZE OF THE DIFFUSER, THE COST OF POWER GENERATION ATTRIBUTABLE TO THE DIFFUSER VARIES LINEARLY WITH THE DIFFUSER FRONT RADIUS. IT WAS ALSO ESTABLISHED THAT AS COMPARED TO USING ALUMINUM, THE COST WOULD ACTUALLY GO UP WITH STANDARD STRENGTH STEEL BUT DOWN WITH HIGHER STRENGTH STEEL. ALLOWING THE STRUCTURE TO BE MORE FLEXIBLE CANNOT YIELD A REDUCTION IN COST UNLESS A CHANGE IN MATERIAL PROPERTIES IS ALLOWED.

77-0088 CROWTHER R L
CLIMATE AND ARCHITECTURE.
AMER. METEOROL. SOC. BULL. 58(7): 595-598, JULY 1977.

ARCHITECTURE MUST BE DESIGNED TO RESPOND TO ITS MICROCLIMATE AND TO OPTIMIZE CHARACTERISTICS OF ITS INTERNAL ENERGIES. METEOROLOGISTS MUST PRODUCE A RELIABLE INFORMATION BASE FOR USE IN URBAN PLANNING AND ARCHITECTURAL DESIGN FOR OPTIMAL CONSERVATION OF ENERGY AND PRACTICAL USE OF ONSITE NATURAL ENERGIES, SUCH AS THE SUN AND THE WIND. ARCHITECTS AND METEOROLOGISTS MUST WORK TOGETHER TO DESIGN ENERGY EFFICIENT DWELLINGS.

77-0089 DARKAZALLI G
SOLAR AND WIND HOME HEATING AND DOMESTIC HOT WATER SYSTEMS: ENERGY AND ECONOMICS STUDY. PH.D. THESIS.
AMHERST, MASSACHUSETTS UNIVERSITY, 1977. AVAIL: ANN ARBOR, UNIVERSITY MICROFILMS, 1977. 273 P. ORDER NO. 77-13790.

A DEVELOPMENT OF A DIGITAL COMPUTER BASED METHODOLOGY TO CALCULATE SYSTEM PERFORMANCE AND COSTS IS PRESENTED. IN ADDITION TO WIND POWERED SYSTEMS, SOLAR, AND COMBINED WIND AND SOLAR SYSTEMS ARE CONSIDERED IN DETAIL. THE ANALYSIS IS BASED ON TWO SEPARATE COMPUTER PROGRAMS: (1) AN ENERGY PROGRAM THAT DETERMINES SYSTEM PERFORMANCE AS A FUNCTION OF SUBCOMPONENT PARAMETERS AND AUXILARY ENERGY REQUIREMENTS, AND, (2) AN ECONOMICS PROGRAM THAT CALCULATES PRESENT AND FUTURE (MASS PRODUCED) COSTS OF THE WIND AND/OR SOLAR COMPONENTS AND SYSTEM. COMPLETE DETAILS OF ALL PARTS OF THE MODEL, WHICH IS INTENDED TO BE A GENERAL DESIGN TOOL FOR SUCH SYSTEMS, ARE PRESENTED. THE RESULTS INCLUDE A DETAILED SERIES OF RUNS

BASED ON HOURLY WEATHER AND SOLAR DATA FOR A TYPICAL NEW ENGLAND SITE, USING AN AVERAGE AND RESIDENCE MODEL. ALSO, ADDITIONAL RUNS ARE PRESENTED FOR OTHER SITES AND RESIDENCES.

77-0090 DARKAZALLI G, MCGOWAN J G
ANALYTICAL PERFORMANCE AND ECONOMIC EVALUATION OF RESIDENTIAL WIND AND SOLAR HEATING SYSTEMS.
AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, PROCEEDINGS OF THE ANNUAL MEETING. VOL.1. ORLANDO, FLORIDA. JUNE 6-9, 1977. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1977. SECT. 24. P. 20-24.

A PERFORMANCE AND COST MODEL FOR A VARIETY OF WIND 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.

77-0091 DARVISHIAN A
HIGHER EFFICIENCY WIND MOTOR WITH RECEPTORS OF DIMINISHED DRAG CHARACTERISTICS.
U.S. PATENT NO. 4,015,911, APRIL 5, 1977. 8P.

A WIND MOTOR FOR THE CONVERSION OF WIND POWER TO MECHANICAL OR ELECTRICAL POWER OR OTHER FORM THEREOF IS DESCRIBED WHICH INCLUDES A PLURALITY OF WIND RECEPTORS, WHICH HAVE OPENINGS THEREIN FOR THE PASSAGE OF AIR THERETHROUGH DURING OPERATION OF THE WIND MOTOR, ESPECIALLY WHEN THE RECEPTORS ARE MOVING AGAINST THE WIND, SO AS TO DIMINISH AIR RESISTANCE (DRAG) OPPOSING SUCH MOVEMENT, THEREBY INCREASING THE EFFICIENCY OF THE WIND MOTOR.

77-0092 DAS S C, LINSCOTT B S
APPROXIMATE METHOD FOR CALCULATING FREE VIBRATIONS OF A LARGE WIND TURBINE TOWER STRUCTURE.
NTIS, DECEMBER 1977. 42P.
NASA-TM-73754

A SET OF ORDINARY DIFFERENTIAL EQUATIONS ARE DERIVED FOR A SIMPLIFIED STRUCTURAL DYNAMIC LUMPED-MASS MODEL OF A TYPICAL LARGE-WIND-TURBINE TOWER STRUCTURE. DUNKERLEY'S EQUATION IS USED TO ARRIVE AT A SOLUTION FOR THE FUNDAMENTAL NATURAL FREQUENCIES OF THE TOWER IN BENDING AND TORSION. THE ERDA-NASA 100-KW WIND TURBINE TOWER STRUCTURE IS MODELED, AND THE FUNDAMENTAL FREQUENCIES ARE DETERMINED BY THE SIMPLIFIED METHOD DESCRIBED. THE APPROXIMATE FUNDAMENTAL NATURAL FREQUENCIES FOR THE TOWER AGREE WITHIN 18 PERCENT WITH TEST DATA AND PREDICTIONS ANALYZED BY MEANS OF NASTRAN.

77-0093 DAVIDSON M, GRETHER D, WILCOX K
ECOLOGICAL CONSIDERATIONS OF THE SOLAR ALTERNATIVE.
UNIVERSITY OF CALIFORNIA, BERKELEY, LAWRENCE BERKELEY LABORATORY, FEBRUARY 1977. 48P.
LBL-5927

77-0094 DAVIS B L, ECKHERN M W
WIND FABRIC DIAGRAMS AND THEIR APPLICATION TO WIND ENERGY ANALYSIS.
J. APPL. METEOROL. 16(5): 522-531, MAY 1977.

BY MEANS OF THE LAMBERT PROJECTION, WIND VECTOR DATA MAY BE PLOTTED ONTO A FREQUENCY MAP. THE RESULTING DIAGRAM PORTRAYS THE "WIND FABRIC" FOR THE DATA SAMPLE OF A SINGLE STATION OR FOR GROUPS OF STATIONS. THE AREA-TRUE DISTRIBUTION OF WIND VECTORS IS THUS GIVEN IN GREAT DETAIL AND ALLOWS SEVERAL STANDARD TESTS FOR HOMOGENEITY AND ANOMALY SIGNIFICANCE. BY USING A "SWINGING PLATE" DEVICE THE WIND ENERGY DENSITY AND WIND POWER CAN BE CALCULATED FOR ANY VELOCITY-COMPASS HEADING SECTOR OF THE DIAGRAM DESIRED AND ALLOWS FOR A UNIVERSAL SCALING OF THE VELOCITY VARIABLE OF THE DIAGRAM.

77-0095 DAVITIAN H
USE OF WIND POWER BY ELECTRIC UTILITIES.

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. SECTION 19. P. 1-5.

TWO CHARACTERISTICS OF WIND MACHINES ARE PARTICULARLY PROBLEMATICAL FROM A UTILITY PERSPECTIVE: VARIATIONS IN OUTPUT AND THE SMALL SIZE OF THE MACHINES. CURRENTLY AVAILABLE ESTIMATES FOR THE COSTS OF PRODUCING AND INSTALLING MACHINES ARE IN THE RANGE OF $500 TO $700/KW FOR THE 100TH MACHINE PRODUCED. THE VALUE OF WIND MACHINES TO UTILITIES WILL BE IN THIS RANGE IN SOME PARTS OF THE U.S., GIVEN EXPECTED INCREASES IN FUEL COSTS. THIS PRELIMINARY ANALYSIS OF THE ECONOMICS OF WIND POWER INDICATES A PROMISING POTENTIAL FOR REGIONS OF THE U.S. WITH HIGH WIND POWER AVAILABILITY AND HIGH FUEL COSTS.

77-0096 DAVITIAN H
THE ROLE OF WIND POWER IN ELECTRIC UTILITIES.
NTIS, SEPTEMBER 1977. 15P.
BNL-50736

CURRENT ESTIMATES SUGGEST THAT THE COST OF WIND GENERATED POWER IS LIKELY TO BE COMPETITIVE WITH CONVENTIONALLY GENERATED POWER IN THE NEAR FUTURE IN REGIONS OF THE UNITED STATES WITH FAVORABLE WINDS AND HIGH COSTS FOR CONVENTIONALLY GENERATED ELECTRICITY. THESE PRELIMINARY ESTIMATES INDICATE COSTS OF $500-700 PER INSTALLED KW FOR MASS PRODUCED WIND TURBINES. THIS ASSESSMENT REGARDING COMPETITIVENESS INCLUDES THE EFFECTS OF THE REDUCED RELIABILITY OF WIND POWER COMPARED TO CONVENTIONAL SOURCES. UTILITIES EMPLOYING WIND POWER ARE LIKELY TO PURCHASE MORE PEAKING CAPACITY AND LESS BASELOAD CAPACITY THAN THEY WOULD HAVE OTHERWISE TO PROVIDE THE LOWEST COST RESERVE POWER. THIS RESERVE POWER IS NEEDED MAINLY WHEN WIND OUTAGES COINCIDE WITH PEAK LOADS. THE MONETARY SAVINGS ASSOCIATED WITH THIS SHIFT CONTRIBUTE SUBSTANTIALLY TO THE VALUE OF WIND ENERGY TO A UTILITY.

77-0097 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. EXECUTIVE SUMMARY.
NTIS, JULY 1977. 94P.
NASA-CR-134936

THIS REPORT PRESENTS A SUMMARY OF THE RESULTS OF A PROGRAM TO DEVELOP PRELIMINARY DESIGNS OF LOW POWER (50-500 KW) AND HIGH POWER (500-3000 KW) WIND GENERATOR SYSTEMS (WGS) FOR ELECTRIC UTILITY APPLICATIONS. THESE DESIGNS PROVIDE THE BASES FOR DETAIL DESIGN, FABRICATION, AND EXPERIMENTAL DEMONSTRATION TESTING OF THESE UNITS AT SELECTED UTILITY SITES. THE PROGRAM INCLUDED FOUR TASKS: A CONCEPTUAL DESIGN TASK; AN OPTIMAZATION TASK; A PRELIMINARY DESIGN TASK; AND A UTILITY REQUIREMENTS EVALUATION TASK.

77-0098 DEVINE W D
ENERGY ANALYSIS OF A WIND ENERGY CONVERSION SYSTEM FOR FUEL DISPLACEMENT.
NTIS, FEBRUARY 1977. 55P.
ORAU/IEA(M)-77-2

ENERGY CONVERSION MACHINES WHICH UTILIZE RENEWABLE SUPPLIES OF ENERGY AS FUEL MAY DELIVER CONSIDERABLY MORE ENERGY TO ULTIMATE USERS THAN IS CONSUMED DURING MANUFACTURE, DEPLOYMENT, AND OPERATION OF THE MACHINE. AN INPUT/OUTPUT APPROACH IS EMPLOYED TO ESTIMATE THE ENERGY EMBODIED IN A 1,500 KW(E) HORIZONTAL-AXIS WIND ELECTRIC GENERATING STATION USED TO DISPLACE FOSSIL FUEL IN AN ELECTRIC UTILITY SYSTEM. FIVE RATIOS COMPARING DELIVERED ELECTRICAL ENERGY TO THE ENERGY REQUIREMENT OF THE WIND MACHINE ARE DISPLAYED. THE RESULTS INDICATE THAT THE SYSTEM CONSIDERED COULD BE A LARGE NET PRODUCER OF ENERGY AND SHOULD DISPLACE A QUANTITY OF FOSSIL ENERGY EQUIVALENT TO THAT EMBODIED IN THE MACHINE IN CONSIDERABLY LESS THAN ONE YEAR.

77-0099 DEW J
A DOWN-WIND CONING-TYPE GENERATOR.
ALTERN. SOURCES ENERGY NO. 24: 11-14, FEBRUARY 1977.

77-0100 DIGGS R E
HIGH POWER WIND TURBINE WITH KINETIC ACCUMULATOR.
U.S. PATENT NO. 4,035,658, JULY 12, 1977. 10P.

A HIGH POWER WIND TURBINE WITH KINETIC ACCUMULATOR IS DISCLOSED. THE INVENTION INCLUDES A CIRCULAR WALL, A WALL TURBINE MOVABLY MOUNTED TO THE CIRCULAR WALL SO THAT IT CAN BE MOVED TO FACE THE WIND, A NON-LINEAR GENERATOR CONNECTED TO THE WIND TURBINE TO GENERATE ELECTRICAL POWER, A FLY WHEEL, AND A DRIVE WHEEL DISPOSED IN CONTACT WITH THE FLY WHEEL TO DRIVE THE FLY WHEEL. A REVERSIBLE NON-LINEAR MOTOR IS CONNECTED TO THE DRIVE WHEEL TO DRIVE THE DRIVE WHEEL OR TO BE DRIVEN BY THE DRIVE WHEEL. THE NON-LINEAR GENERATOR IS CONNECTED TO THE REVERSIBLE MOTOR TO ROTATE THE DRIVE WHEEL TO ROTATE THE FLY WHEEL WHEN THE NON-LINEAR GENERATOR GENERATES EXCESS ELECTRICAL POWER. THE FLY WHEEL ROTATES THE DRIVE WHEEL TO DRIVE THE REVERSIBLE MOTOR TO GENERATE ELECTRICAL POWER WHEN THE NON-LINEAR GENERATOR DOES NOT GENERATE SUFFICIENT ELECTRICAL POWER.

77-0101 DODD C W
LIGHTNING PROTECTION FOR THE VERTICAL-AXIS WIND TURBINE.
NTIS, OCTOBER 1977. 26P.
SAND-77-1241

THIS REPORT CONTAINS THE RESULTS OF LIGHTNING PROTECTION STUDIES FOR VERTICAL AXIS WIND TURBINES. THE METHODOLOGY IS ESTABLISHED FOR DETERMINING THE CHANCES FOR A LIGHTNING STRIKE AT A VAWT SITE. PROPOSED DESIGNS FOR LIGHTNING PROTECTION SYSTEMS ARE DESCRIBED. THESE DESIGNS INCLUDE AN INSULATOR DESIGN, A BRUSH BY-PASS DESIGN, A CONE OF PROTECTION, LIGHTNING ELIMINATION DEVICE, AND A CONCENTRIC TOWER PROTECTION SYSTEM. THE WORK ALSO DESCRIBES AN EFFECTIVE GROUNDING SYSTEM.

77-0102 DODD H M, STEWART R E D, VARNADO S G, ARONSON E A, CHANG G C
ASSESSMENT OF MECHANICAL ENERGY STORAGE FOR SOLAR SYSTEMS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2, P. 1174-1180.

THE PRIMARY OBJECTIVE OF THIS STUDY IS TO ASSESS THE RELATIVE MERITS OF VARIOUS MECHANICAL ENERGY STORAGE SYSTEMS WHEN USED IN CONJUNCTION WITH SOLAR AND WIND SOURCES. THIS INITIAL STUDY CONSIDERED FLYWHEEL, PNEUMATIC (COMPRESSED AIR) AND UNDERGROUND PUMPED HYDRO STORAGE CONCEPTS. BOTH THERMAL AND PHOTOVOLTAIC COLLECTORS UTILIZING STATIONARY FLAT PLATE THROUGH TOTAL TRACKING FOCUSED SYSTEMS WERE INCLUDED. FOR WIND COLLECTION, A HORIZONTAL AXIS WIND TURBINE WAS MODELED. ELECTRICAL LOAD DEMANDS FROM SINGLE RESIDENCES THROUGH UTILITY GRIDS WERE INCLUDED. ALTERNATIVE SYSTEMS WERE RANKED ACCORDING TO LEVELIZED, BUSBAR ENERGY COST CALCULATIONS, AND THE AMOUNT OF DISPLACED CONVENTIONALLY GENERATED ELECTRICITY ALSO SERVED AS A BENEFIT MEASURE.

77-0103 DORAN J C, BATES J A, LIDDELL P J, FOX T D
ACCURACY OF WIND POWER ESTIMATES.
NTIS, OCTOBER 1, 1977. 22P.
PNL-2442

SEVERAL ASPECTS OF POWER ESTIMATION TECHNIQUES FOR WIND ENERGY CONVERSION SYSTEMS ARE STUDIED. THE SAMPLING RATE AT WHICH THE DATA ARE COLLECTED, RANGING FROM ONCE EVERY 2 MINUTES TO ONCE EVERY 3 HOURS, DOES NOT APPEAR TO SIGNIFICANTLY AFFECT THE AVERAGE POWER FOR RECORDING PERIODS OF ONE SEASON. INCREASED AVERAGING TIMES PRODUCE SMALL UNDERESTIMATES (10 PERCENT) OF AVAILABLE POWER. THE RAYLEIGH AND WEIBULL DISTRIBUTIONS BOTH GIVE POOR ESTIMATES OF POWER FOR LOW MEAN WIND SPEED SITUATIONS; WITH THE FORMER BEING SIGNIFICANTLY WORSE. AT HIGHER WIND SPEED BOTH GIVE GOOD ESTIMATES, AND THE RAYLEIGH DISTRIBUTION IS CONSIDERABLY SIMPLER IN FORMAT AND APPLICATION. A HEIGHT EXTRAPOLATION SCHEME FOR WEIBULL PARAMETERS IS ALSO INVESTIGATED. RESULTS ARE SATISFACTORY FOR POWER ESTIMATES OF ENSEMBLES OF MACHINES, BUT THE SCATTER OF VALUES ABOUT THE MEAN MAKES THE METHOD INAPPROPRIATE FOR INDIVIDUAL CASES.

77-0104 DORNER H
WIND ENERGY CONVERSION: UNITS WITH HORIZONTAL AXIS.
ENERGIE VOM WIND. PROCEEDINGS. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P.81-97. (IN GERMAN)

A GENERAL SURVEY IS PRESENTED ON THE PROBLEMS OF HORIZONTAL AXIS WIND ENERGY CONVERTERS (HA-WEK). DESIGNS ARE CONCENTRATED ON PLANT FOR PRODUCING ELECTRICAL POWER. ONLY THE FUNDAMENTAL PROBLEMS OF

INDIVIDUALLY FUNCTIONING SYSTEMS AND POSSIBLE VARIATIONS OF ARRANGEMENT FOR TOTAL PLANT ARE CONSIDERED. THE ADVANTAGE OF THE HORIZONTAL AXIS WIND ENERGY CONVERTER COMPARED TO OTHER SYSTEMS IS SHOWN IN AN EXTENSIVE COMPARISON.

77-0105 DROZD D
THE THEORY OF HIGH-SPEED WINDMILLS. PART 1.
WIND POWER DIG. NO. 10: 28-33, FALL 1977.

THIS IS THE FIRST OF A SERIES OF ARTICLES ABOUT THE THEORY OF HIGH SPEED WINDMILLS, I.E., THOSE WHOSE TIP SPEED RATIO, THE RATIO BETWEEN THE SPEED OF THE BLADE TIPS AND THE WIND VELOCITY, IS FOUR OR GREATER.

77-0106 DUBEY M
CONVERSION AND STORAGE OF WIND ENERGY AS NITROGENOUS FERTILIZER.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2,
P.525-532.

THE USE OF WIND ENERGY, AIR, AND WATER TO PRODUCE AMMONIA FOR USE AS A NITROGENOUS FERTILIZER IS DISCUSSED. A STUDY SHOWS THAT IT IS TECHNOLOGICALLY FEASIBLE TO REDUCE THE SCALE OF AN AMMONIA PROCESSING PLANT TO PRODUCE A TINY FRACTION OF THE OUTPUT RATES OF A FULL SCALE COMMERCIAL PLANT. SUCH A SYSTEM CAN BE ADEQUATELY POWERED BY A WIND TURBINE DRIVING AN ELECTROLYSIS CELL TO PRODUCE THE REQUIRED HYDROGEN FEEDSTOCK. THE PROCESS IS DESCRIBED, AND SEVERAL FACTORS, SUCH AS ENERGY STORAGE, PRODUCT STORAGE, AND ENERGY BALANCE AND COMPONENT MATCHING, ARE CONSIDERED. THE ECONOMICS OF THE SYSTEM ARE ANALYZED, AND IT IS THOUGHT THAT THE COST OF THE PRODUCED FERTILIZER WILL BE COMPETITIVE IF NATURAL GAS PRICES CONTINUE TO RISE.

77-0107 DUCHON C E
MEASUREMENT AND ANALYSIS OF WIND FLOW IN COMPLEX TERRAIN WITH APPLICATION TO SITING OF WECS. FINAL REPORT.
NTIS, MAY 1977, 74P.
DOE/NSF-00619/75/1

MEASUREMENTS OF WIND SPEED AND DIRECTION WERE MADE AT A HEIGHT OF ABOUT 8 M AT THREE LOCATIONS ALONG A TRANSECT THROUGH A DIVIDE-STREAMBED SYSTEM IN CENTRAL OKLAHOMA. STATION SPACING WAS ON THE ORDER OF 140 M AND THE VERTICAL DISTANCE FROM STREAMBED TO DIVIDE WAS ABOUT 20 M. THE RESULTS SHOW THAT FOR FLOW ACROSS THE DIVIDE AXIS AND FOR FLOW DOWN THE STREAMBED THE HIGHER THE WIND SPEED THE GREATER THE MAGNITUDE OF WIND SPEED REDUCTION AT A GIVEN LOCATION DOWN THE SLOPE. THE DECREASE IS APPROXIMATELY LINEARILY RELATED TO THE WIND SPEED AT THE DIVIDE. THE RELATIONSHIP BETWEEN THE RATIO OF WIND SPEED DOWN THE SLOPE TO THE DIVIDE SPEED AND THE DISTANCE DOWN THE SLOPE IS ALSO APPROXIMATELY LINEAR. FOR FLOW UP THE STREAMBED AND PARALLEL TO IT MEASUREMENTS INDICATE A SLIGHTLY HIGHER SPEED AT MID-SLOPE THAN AT THE STREAMBED OR DIVIDE. A METHOD WAS DEVISED FOR ESTIMATING THE ANNUAL DISTRIBUTION OF AVAILABLE WIND ENERGY WITH DIRECTION AT THE THREE FIELD STATIONS AND OKLAHOMA CITY, 50 KM AWAY. IT IS BASED ON A SHORT PERIOD OF SIMULTANEOUS WIND MEASUREMENTS AT BOTH SITES AND WIND CLIMATOLOGY AT OKLAHOMA CITY. AS EXPECTED THE AVAILABLE ENERGY FOR ALL STATIONS WAS GREATEST FOR THE SOUTHERLY WIND DIRECTION AND LEAST FOR THE EASTERLY DIRECTION. OVER ALL DIRECTIONS THE AVAILABLE WIND ENERGY WAS GREATEST AT THE DIVIDE LOCATION AND THE LEAST AT THE STREAMBED.

77-0108 ERDA ISSUES RFPS.
WIND POWER DIG. 1(8): 22, SPRING 1977.

77-0109 ERDA ISSUES THREE RFPS.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P.12-13, SPRING 1977.

77-0110 ERDA PLANS KING-SIZE ENERGY-PRODUCING WINDMILLS.
PLAST. WORLD 35: 9, JUNE 1977.

77-0111 ERDA SUPER TURBINE PROPELS FEDERAL WIND ENERGY PROGRAM.
ENG. NEWS-REC. 199(5): 19, AUGUST 4, 1977.

ERDA'S PLAN TO DO RESEARCH WITH A 2.5 MW WIND TURBINE, THE LARGEST YET IN THEIR WIND ENERGY PROGRAM, IS DISCUSSED.

77-0112 ECKERT R
REINFORCED-CONCRETE TOWERS FOR THE PRODUCTION OF GASEOUS HYDROGEN AND OXYGEN BY DECOMPOSITION OF WATER USING DIRECT CURRENT, ELECTROLYSIS.
GERMAN (FRG) PATENT NO. 2,532,676/A/, FEBRUARY 10, 1977. 5P. (IN GERMAN)

A TOWER EQUIPPED WITH WIND WHEELS IS PROPOSED FOR THE ELECTROLYTICAL DECOMPOSITION OF WATER. IN ORDER TO ENSURE CONTINUOUS OPERATION, THE HEIGHT OF THE TOWER SHOULD BE > 70 M, I.E. BE IN THE WHIRL ZONE OF EARTH. THE ELECTRIC CURRENT NECESSARY IS GENERATED BY THE WIND WHEELS VIA GENERATORS. THE TOWER IS VERTICALLY SEPARATED IN THE CENTER AND OCCLUDED BY A CANT COPE. BOTH CHAMBERS ARE FILLED WITH ELECTROLYTES, AND EQUIPPED WITH AN ANODE AND A CATHODE. THE GASES PRODUCED OUST THE ELECTROLYTE INTO A STORAGE TANK AND ARE SUCKED OFF IN INTERVALS. FURTHER CLAIMS DESCRIBE THE CONFIGURATION OF THE TOWER, THE DUCTS, AND VALVES.

77-0113 EDWARDS P J
LOW COST RECORDER FOR A WIND ENERGY SURVEY.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS, CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X20-X21.

AN OBSERVATIONAL PROGRAM FOR A WIND ENERGY SURVEY IS BEING CARRIED OUT IN SEVERAL AREAS OF NEW ZEALAND. THE INSTRUMENTATION REQUIRED, EXCLUDING THE ANEMOMETER ASSEMBLY, WAS DEVELOPED LOCALLY. WIND-RUN, OR MEAN WIND SPEED, IS OBTAINED BY COUNTING ONE PULSE PER REVOLUTION OF THE ANEMOMETER ON A MODIFIED POCKET CALCULATOR. MEAN WIND SPEEDS ARE RECORDED ELECTRONICALLY ON STANDARD TWO-CHANNEL REEL-TO-REEL OR CASSETTE TAPE DECKS. A FREQUENCY PROPORTIONAL TO THE WIND SPEED IS RECORDED ON CHANNEL ONE AND A CLOCK PULSE TRAIN ON CHANNEL TWO. MEAN WIND SPEEDS OVER TIME INTERVALS AS SHORT AS THREE TO FIVE SECONDS OR AS LONG AS ONE MONTH CAN BE RETRIEVED.

77-0114 EISENHARD R M
STATE SOLAR ENERGY LEGISLATION OF 1976: A REVIEW OF STATUTES RELATING TO BUILDINGS.
NTIS, SEPTEMBER 1977. 262P.
NBSR-77-1297

STATE LEGISLATION ON SOLAR ENERGY USE IN BUILDINGS ENACTED IN 1976 IS REVIEWED. ACTS INVOLVE TAX INCENTIVES FOR THE INSTALLATION OF SOLAR DEVICES, SUPPORT FOR THE PROPOSED SOLAR ENERGY RESEARCH INSTITUTE CALLED FOR IN PUBLIC LAW 93-473, SOLAR STANDARDS, STATE ENERGY OFFICES, STUDIES, BUILDING REQUIREMENTS AND SOLAR PROJECTS. DETAILED INFORMATION ON 44 ACTS ENACTED BY STATE LEGISLATURES IS GIVEN, AND RESPONSIBLE STATE OFFICIALS ARE LISTED. THE ACTS, AS WELL AS SUPPORTING FORMS AND OTHER INFORMATION, ARE INCLUDED IN THE APPENDIXES.

77-0115 ELDRIDGE F R
UNDERGROUND GAS STORAGE IN THE UNITED STATES, AND ITS POTENTIAL APPLICATION TO WIND-POWERED SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X77-X79.

IT IS SEEN THAT GAS TURBINE SYSTEMS THAT USE WIND POWER FOR COMPRESSING AIR, WHICH IS, IN TURN, STORED IN HIGH-CAPACITY, NATURAL UNDERGROUND RESERVOIRS, OFFER THE POSSIBILITY FOR NOT ONLY LOW-COST, SHORT-DURATION ENERGY STORAGE, SUCH AS FOR "CHANGEOVER BUFFER STORAGE" WHERE THE PURPOSE IS TO PROVIDE ENERGY DURING THE TIME REQUIRED TO SHIFT BETWEEN WECS AND A CONVENTIONAL ELECTRIC POWER SYSTEM, IN A FUEL-SAVER MODE OF OPERATION, OR FOR "DIURNAL LOAD SMOOTHING STORAGE" WHERE THE PURPOSE IS TO PROVIDE ADDITIONAL ENERGY TO MEET THE DIURNAL LOAD DURING PERIODS OF PEAK DEMAND.

77-0116 ELDERKIN C E, RAMSDELL J V, TENNYSON G P
WIND CHARACTERISTICS WORKSHOP--MEETING REVIEW, BOSTON, JUNE 2-4, 1976.
AM. METEOROL. SOC. BULL. 58(1): 45-51, 1977.

THE MEETING WAS HELD IN CONNECTION WITH THE ERDA WIND ENERGY CONVERSION PROGRAM. THE WORKSHOP RELATED WIND CHARACTERISTICS INFORMATION TO THE DEVELOPMENT OF WIND ENERGY CONVERSION SYSTEMS (WECS).

77-0117 ELDERKIN C E, RAMSDELL J V

ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERICD APRIL 1976 THROUGH JUNE 1977.
NTIS, JULY 1977. 129P.
BNWL/WIND-10

THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS A SERVICE ELEMENT TO PROVIDE METEOROLOGICAL INFORMATION TO OTHER PARTS OF THE WIND ENERGY CONVERSION PROGRAM. IN THIS ROLE, THE WCPE HAS AS ITS GENERAL OBJECTIVE ACCELERATION OF THE DEVELOPMENT, COMMERCIALIZATION AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS). TO ACCOMPLISH THIS OBJECTIVE, FOUR TECHNICAL PROGRAM AREAS HAVE BEEN ESTABLISHED WITHIN THE WCPE. THESE ARE: WIND CHARACTERISTICS FOR WECS DESIGN AND PERFORMANCE EVALUATION; WIND CHARACTERISTICS FOR WECS SITE SELECTION; WIND CHARACTERISTICS FOR WECS PRESITING EVALUATION; AND WIND CHARACTERISTICS FOR WECS PLANNING AND OPERATIONS. THIS REPORT DISCUSSES WORK UNDERTAKEN IN THE FIRST THREE OF THE PROGRAM AREAS.

77-0118 ELDERKIN C E, RAMSDELL J V
SEMI-ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT FOR THE PERIOD APRIL 1976 THROUGH DECEMBER 1976.
NTIS, JANUARY 1977, 83P.
BNWL/WIND-02

77-0119 ELDERKIN C E, WENDELL L L
SUMMARY OF THE DEVELOPMENT PLANS FOR THE WIND CHARACTERISTICS PROGRAM ELEMENT OF THE FEDERAL WIND ENERGY PROGRAM.
NTIS, OCTOBER 1977. 49P.
PNL-2501

THE WIND SYSTEMS BRANCH (WSB) OF THE SOLAR TECHNOLOGY DIVISION OF DOE IS RESPONSIBLE FOR THE FWEP AND HAS DIVIDED THE PROGRAM INTO SEVERAL PROGRAM ELEMENTS. THE FOCUS OF THIS REPORT IS ON THE DEVELOPMENT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCEP). PACIFIC NORTHWEST LABORATORY (PNL) PROVIDES TECHNICAL AND MANAGEMENT SUPPORT FOR THE WCPE (AS OF MAY 1976). THE DEVELOPMENT PLAN PRESENTED CONTAINS A DETAILED BREAKDOWN OF THE PROPOSED PROGRAM FOR FY-1978 AND A PROGRAM OVERVIEW AND PROJECTION THROUGH FY-1980. THE BASIC DOCUMENT PROVIDES A BASIS FOR COMMUNICATION BETWEEN THE WSB AND THE WCPE AND WILL BE CONTINUALLY UPDATED AS REQUIRED TO ACCOMPLISH THE OVERALL OBJECTIVES OF THE FWEP. THIS SUMMARY DOCUMENT IS AIMED AT APPRISING THE PARTICIPANT AND USER COMMUNITIES OF THE AIMS AND PRIORITIES OF THE WCPE.

77-0120 ELDRIDGE F R
A PRELIMINARY FEDERAL COMMERCIALIZATION PLAN FOR WECS.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P. 14-19, SPRING 1977.

THE AUTHOR DISCUSSES A STUDY PERFORMED BY THE MITRE CORPORATION WHOSE OBJECTIVE WAS TO FORMULATE, EVALUATE AND RECOMMEND A PRELIMINARY FEDERAL COMMERCIALIZATION PLAN FOR WIND ENERGY CONVERSION SYSTEMS, INCLUDING A PREFERRED SET OF FEDERAL INCENTIVES THAT COULD BE USED TO ACCELERATE THE COMMERCIALIZATION OF WECS. PROGRESS TO DATE ON THE PROJECT IS REPORTED.

77-0121 ELKO D G
DESIGN, INSTRUMENTATION, AND CALIBRATION OF A VERTICAL AXIS WIND TURBINE ROTOR.
NTIS, 1977. 112P.
TID-27754

THE DESIGN, INSTRUMENTATION AND CALIBRATION OF A VERTICAL AXIS WIND TURBINE THAT HAS BEEN BUILT BY THE DEPARTMENT OF AEROSPACE ENGINEERING AT WEST VIRGINIA UNIVERSITY (WVU) ARE DESCRIBED. THE TURBINE WAS DESIGNED STRICTLY FOR RESEARCH PURPOSES, IN ORDER TO CONFIRM THEORETICAL PERFORMANCE CALCULATIONS DEVELOPED BY THE DEPARTMENT. AREAS OF SPECIAL INTEREST ARE AERODYNAMIC PERFORMANCE AND STRUCTURAL ANALYSIS.

77-0122 ELLIOTT D L
SYNTHESIS OF NATIONAL WIND ENERGY ASSESSMENTS.
NTIS, JULY 1977. 58P.
BNWL/WIND-05

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.

77-0123 ENERGY LAB'S DIVERSE SEARCH LOOKS TO SUN, WIND AND ATOMS.
ENG. NEWS-REC. 198(15): 108-111, APRIL 14, 1977.

SANDIA LABORATORIES INVOLVEMENT IN THE SEARCH FOR VIABLE ENERGY ALTERNATIVES IS A POTPOURRI OF SOLAR, FISSION, FUSION, FOSSIL, AND SYNTHETIC FUELS RESEARCH. THOUGH ITS MAJOR CONCERN IS STILL DEFENSE RELATED, SANDIA BEGAN AN INTENSIVE ENERGY RESEARCH PROGRAM IN 1963. THE LABORATORIES' ASSETS, WORTH $353 MILLION, ARE OWNED BY ERDA, AND INCLUDE AN ENERGY BUDGET FOR 1977 TOTALING $85 MILLION. OF SPECIAL NOTE AMONG ITS MANY PROJECTS IS A 5 MW THERMAL TEST FACILITY, CONSISTING OF 300 SUN-TRACKING REFLECTORS, THAT IS SLATED TO BECOME THE WORLD'S LARGEST SOLAR POWER PLANT. NUCLEAR AND FOSSIL FUEL RESEARCH ARE ALSO DETAILED.

77-0124 ENERGY RATE INITIATIVES. STUDY OF THE INTERFACE BETWEEN SOLAR AND WIND ENERGY SYSTEMS AND ELECTRIC UTILITIES.
NTIS, MARCH 1977. 106P.
PB-265607

THE IMPLEMENTATION OF ALTERNATIVE UTILITY RATE STRUCTURE AS REQUIRED BY THE ENERGY CONSERVATION AND PRODUCTION ACT COULD EASILY IMPACT THE ECONOMICS OF FUTURE SOLAR HEATING AND COOLING SYSTEMS FOR BUILDINGS (SHACOB). IT IS EXPECTED THAT SUCH VARIATIONS IN SHACOB ECONOMICS MAY AFFECT THE DESIGN OF THESE SYSTEMS AND THEIR RATE OF MARKET PENETRATION AND ULTIMATELY IMPACT THE BACKUP ENERGY LOAD THAT THEY PLACE ON THE UTILITIES. THIS REPORT DISCUSSES THE PROBLEM IN TERMS OF SEVEN KEY ISSUES, AND SUGGESTS SEVEN POSSIBLE ACTIONS GOVERNMENT AND REGULATORY BODIES MAY WISH TO CONSIDER.

77-0125 ENERGY: WHO'S DOING WHAT.
ARLINGTON, VIRGINIA, NATIONAL RECREATION AND PARK ASSOCIATION, JANUARY 1977. 47P.

APPROXIMATELY 200 U.S. CITIZEN GROUPS, COMPANIES, AND NON-PROFIT AGENCIES THAT ARE INVOLVED IN SOME TYPE OF ENERGY WORK ARE LISTED. THE LIST WAS COMPILED AS A SERVICE TO INTERPRETERS AND NATURALISTS IN PARKS AROUND THE NATION PARTICIPATING IN AN EXPERIMENTAL EFFORT TO ENCOURAGE THE USE OF ENERGY CONSERVATION THEMES IN PARK PROGRAMS (THE PARK PROJECT ON ENERGY INTERPRETATION). THE ORGANIZATIONS INCLUDED WERE SELECTED BECAUSE THEY HAVE PROGRAMS OR FACILITIES THAT MAY BE OF EDUCATIONAL VALUE TO CITIZENS. THEY EMBRACE A VARIETY OF POLITICAL AND PHILOSOPHICAL SOLUTIONS TO ENERGY PROBLEMS. FOR EXAMPLE, PRO-NUCLEAR AS WELL AS ANTI-NUCLEAR GROUPS, AND HIGH-TECHNOLOGY-ORIENTED CORPORATIONS AND LOW-TECHNOLOGY, SELF-SUFFICIENT APPROACHES ARE INCLUDED. THE COMPILATION IS ARRANGED ALPHABETICALLY, BY STATE, ALTHOUGH ALL STATES ARE NOT REPRESENTED.

77-0126 ENGLARGED VERTICAL AXIS WIND TURBINE PRODUCES 60 KW.
DESIGN NEWS 33: 12-13, JULY 18, 1977.

77-0127 EPSTEIN E
GRUMMAN'S JIM YEN MAY MAKE WIND POWER PROFITABLE.
NEW ENG. 6(3): 19-23, MARCH 1977.

A GRUMMAN ENGINEER HAS INVENTED A WIND MACHINE THAT CREATES A TORNADO-LIKE WIND FLOW WITH THE POTENTIAL TO PRODUCE WIND PRESSURE ENERGY THAT IS ABOUT 3000 TIMES GREATER THAN THE KINETIC ENERGY TAPPED BY A WINDMILL. THE DESIGN CALLS FOR A TOWER WITH VANES THAT OPEN AND CLOSE. WHEN WINDS ENTER THE TOWER, THEY GAIN SPEED AND FORM A VORTEX; THE AIR THEN RUSHES INTO A TURBINE THAT DRIVES A GENERATOR. RESULTS OF EXPERIMENTS WITH A TOY MODEL OF THIS CONTRAPTION HAVE SHOWN THAT ENGINEER JIM YEN'S TORNADO MACHINE PRODUCES 10 TIMES MORE ENERGY THAN A CONVENTIONAL WINDMILL DOES.

77-0128 ESCOBAR I, IBACACHE M E
CONTRIBUTION TO THE ANALYSIS OF THE DEVELOPMENT OF UNCONVENTIONAL ENERGY SOURCES IN LATIN AMERICA. TRANSLATION OF SPANISH REPORT.
NTIS, APRIL 1977. 32P.
ERDA-TR-298

THE ENERGY DEMAND FOR LATIN AMERICA WILL BE SATISFIED BY THE END OF THE PRESENT CENTURY MAINLY THROUGH UTILIZATION OF ITS CONVENTIONAL HYDRAULIC AND FOSSIL RESOURCES. NUCLEAR ENERGY WILL EXPERIENCE A GREAT DEVELOPMENT

IN ARGENTINA, BRAZIL, AND MEXICO IN THE COMING 20 YEARS. THE ELECTRONUCLEAR ALTERNATIVE IN OTHER LATIN AMERICAN COUNTRIES WILL BE CONSIDERABLE DEPENDING ON THE DEGREE OF INDUSTRIALIZATION, GEOGRAPHICAL LOCATION AND THE POSSIBILITIES FOR INTERCONNECTING NETWORKS FOR TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY IN THE COUNTRY CONSIDERED AND DEPENDING ON REDUCTION IN DESIGN SCALE AND SAVINGS MADE IN NUCLEAR REACTORS PRESENTLY IN USE (DROPPING DOWN TO CAPACITIES OF ABOUT 150 MW PER PLANT). THE DEVELOPMENT OF WIND ENERGY, THERMAL GRADIENT OF THE OCEAN, SOLAR ENERGY, PHOTOVOLTAIC CELLS, PROCESSES OF PHOTOSYNTHESIS, MHD ENERGY, GEOTHERMAL ENERGY, AND TIDAL POWER AS ENERGY SOURCES IS DISCUSSED.

77-0129 EVANS A L, REID R L, HENDRICKS R C
FEASIBILITY STUDY OF A COMBINED WIND-SOLAR SYSTEM FOR SPACE AND DOMESTIC HOT WATER HEATING.
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. 19. P.41-45.

IN THIS STUDY, A COMBINED WIND-SOLAR SYSTEM WAS SIMULATED WHERE THE ELECTRICAL ENERGY PRODUCED BY THE WIND GENERATOR WAS STORED THERMALLY IN THE WATER STORAGE TANK OF THE SOLAR SYSTEM. AN EXAMINATION OF WIND AND SOLAR DATA FOR CLEVELAND, OHIO SHOWED THE SYSTEM TO BE PARTICULARLY ATTRACTIVE FOR THIS LOCATION. A COMPUTER SIMULATION WAS RUN OVER A YEAR PERIOD USING A MODIFIED VERSION OF TRNSYS. TRNSYS HAD PREVIOUSLY BEEN MODIFIED TO INCLUDE A WIND GENERATOR SUBROUTINE. THE ECONOMIC ANALYSIS SHOWED THAT A COMBINED WIND-SOLAR SYSTEM WITH HOME-ASSEMBLED WIND GENERATORS WILL BE ECONOMICAL.

77-0130 HIRST P, REES D H
THE REGULATION, STORAGE, AND CONVERSION OF WIND PRODUCED ELECTRICAL ENERGY AT THE LEVEL OF A FEW HUNDRED WATTS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F4-41 TO F4-48.

WIND PRODUCED ELECTRICAL ENERGY IS HIGHLY VARIABLE IN BOTH MAGNITUDE AND DURATION IN BOTH THE SHORT TERM--MINUTES, AND THE LONG TERM--HOURS AND DAYS. AS THE COST OF THE WIND TURBINE AND ITS SUPPORTING STRUCTURE IS VERY HIGH FOR THE POWER PRODUCED (COMPARED WITH OTHER PRIME SOURCES) IT IS DESIRABLE TO EXTRACT THE MAXIMUM PRACTICAL POWER FROM A FLUCTUATING WIND SPEED. NORMALLY POWER MUST BE EXTRACTED OVER A WIDE RANGE OF WIND SPEEDS, AND A LOAD BE APPLIED TO THE WIND TURBINE, APPROPRIATE TO THAT SPEED, TO OPERATE IT NEAR OPTIMUM EFFICIENCY. IT IS NECESSARY THAT ATTENTION BE PAID TO THE BEHAVIOUR WITH HIGH WIND SPEEDS TO PREVENT DAMAGE TO THE WIND TURBINE, ITS SUPPORT, OR THE POWER HANDLING EQUIPMENT. IN MANY CASES POWER IS REQUIRED AT A RATE WHICH BEARS NO RELATION TO WIND CONDITIONS AND STORAGE MUST BE PROVIDED. THIS PAPER DESCRIBES THE PROVISION OF A STEADY ELECTRICAL SUPPLY OF EITHER 50V, DC, OR 240V. 50HZ A.C., AT POWER LEVELS OF AROUND 100W. (THOUGH THESE FIGURES MAY BE VARIED), FROM WIND AS A PRIME SOURCE. THE TYPE OF APPLICATION ENVISAGED IS THE POWERING OF COMMUNICATIONS REPEATERS, NAVIGATIONAL AIDS, ETC.

77-0131 FEDERAL WIND ENERGY PROGRAM. SUMMARY REPORT. JANUARY 1, 1977.
WASHINGTON, D.C., U.S. GOVT. PRINTING OFFICE, 1977.
ERDA-77-32

TO ACCELERATE THE DEVELOPMENT, COMMERCIALIZATION AND UTILIZATION OF RELIABLE AND ECONOMICALLY VIABLE WIND ENERGY SYSTEMS: THIS IS THE OBJECTIVE OF THE FEDERAL WIND ENERGY PROGRAM, MANAGED BY THE WIND SYSTEMS BRANCH (WBS) OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S DIVISION OF SOLAR ENERGY. TO ACHIEVE THIS OBJECTIVE FOR BOTH SMALL AND LARGE WIND SYSTEMS INVOLVES ADVANCING THE TECHNOLOGY, DEVELOPING A SOUND INDUSTRIAL TECHNOLOGY BASE AND ADDRESSING THE NONTECHNOLOGICAL ISSUES WHICH COULD DETER THE USE OF WIND ENERGY. THIS SUMMARY REPORT OUTLINES THE PROJECTS BEING SUPPORTED BY THE PROGRAM THROUGH FY 76 TOWARD THE ACHIEVEMENT OF THESE GOALS. IT ALSO OUTLINES THE PROGRAM'S GENERAL ORGANIZATION AND THE PROGRAM ELEMENTS WHICH MAKE IT WORK.

77-0132 FEKETE G I
SELF-CONTAINED 5,000 KW CAPACITY WIND ENERGY CONVERSION SYSTEM WITH STORAGE.

INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F2.13-F2.29.

THE USE OF WIND ENERGY AS THE SOLE SOURCE OF GENERATING 5,000 KW-S OF CONTINUOUS ELECTRICAL POWER IS CONSIDERED FOR THE MAGDALEN ISLANDS. THE SYSTEM IS TO BE SELF-CONTAINED AND IT IS REQUIRED THAT IT CAN BE BUILT WITHIN THE NEXT FEW YEARS USING, BY THEN, KNOWN TECHNOLOGY. THE WIND ENVIRONMENT OF THE MAGDALEN ISLANDS IS FOUND TO BE IDEAL FOR WIND ENERGY CONVERSION SYSTEMS. PERFORMANCE CALCULATIONS ARE CARRIED OUT FOR TWO SYSTEMS WHICH ARE TECHNICALLY FEASIBLE. A CONSTANT LOAD DEMAND COMBINED WITH THE VARIATION IN THE AVAILABLE WIND ENERGY LEADS TO LARGE VARIATION IN THE GENERATOR LOAD FACTOR, AND TO EXTENSIVE STORAGE CAPACITY REQUIREMENTS. THE CAPITAL COST OF THE TWO SYSTEMS AND THE COST OF ELECTRICITY ARE ESTABLISHED TO FIRST ORDER.

77-0133 FERBER R, O'ROURKE D
ESTIMATION OF NUMBER OF INDIVIDUALS OWNING WIND ENERGY CONVERSION SYSTEMS. PROGRESS REPORT, SEPTEMBER 1, 1977 - NOVEMBER 30, 1977. NTIS, DECEMBER 1977. 4P.
COO/4549-1

THE PURPOSE OF THIS STUDY IS TO LOCATE AND INTERVIEW A SAMPLE OF INDIVIDUALS OWNING WIND ENERGY CONVERSION SYSTEMS (WECS) AND TO OBTAIN INFORMATION ABOUT THEIR USE AND EXPERIENCES WITH SETTING UP AND OPERATING THESE SYSTEMS. SINCE NO LISTS OF SUCH INDIVIDUALS ARE CURRENTLY AVAILABLE, A MAJOR TASK OF THIS STUDY WILL INVOLVE COMPILING SUCH A LIST, WHICH IS BEING DONE BY A VARIETY OF TECHNIQUES, INCLUDING THUS FAR SENDING LETTERS TO A LARGE RANGE OF INDIVIDUALS AND COMPANIES, REQUESTING THE NAMES OF ANY PERSONS WHO MAY OWN A WECS.

77-0134 FILAMENT WINDING FINDS A WINDFALL IN SEARCH FOR NEW ENERGY SUPPLIES. MOD. PLAST. 54(8): 54-55, AUGUST 1977.

BACKED BY FEDERAL FUNDING, COMPOSITES TECHNOLOGY IS BEING REFINED TO PRODUCE HUGE WINDMILL ROTOR BLADES. RP/CONCRETE AND URETHANE BLADES ARE ALSO DISCUSSED.

77-0135 FISHLOCK D
TAMING WINDS OF CHANGE IS ADVANCED TECHNOLOGY.
ENGINEER (SPECIAL ISSUE): 160-161, 163, 1977.

THE AUTHOR DISCUSSES THE POTENTIALS OF SEVERAL ALTERNATIVE SOURCES OF ENERGY IN ENGLAND.

77-0136 FLAY R G J, LINDLEY D, BOWEN A J
FIELD MEASUREMENT OF THE ATMOSPHERIC BOUNDARY LAYER NEAR THE GROUND. CHRISTCHURCH, NEW ZEALAND, UNIVERSITY OF CANTERBURY, 1977. 23P.

ACCURATE FIELD MEASUREMENTS OF THE TURBULENCE CHARACTERISTICS AND WIND SPEED PROFILES NEAR THE GROUND ARE ESSENTIAL FOR THE OPTIMUM SITING OF WIND TURBINES AND IN THE INVESTIGATION OF THEIR PERFORMANCE AT A TEST SITE. A FIELD LABORATORY UNIT APPROPRIATE FOR THIS APPLICATION HAS BEEN DEVELOPED BY THE UNIVERSITY OF CANTERBURY MECHANICAL ENGINEERING DEPARTMENT FOR THE PURPOSE OF RECORDING TURBULENCE DATA FROM THE ATMOSPHERIC BOUNDARY LAYER. WIND VELOCITY COUNTS AT SCAN RATES OF 7.5 HZ AND ABOVE CAN BE OBTAINED FROM UP TO TWELVE ORTHOGONAL ARRAYS OF FAST RESPONSE PROPELLER ANEMOMETERS AND RECORDED ON MAGNETIC TAPE FOR LATER ANALYSIS. THE TECHNIQUES EMPLOYED IN THE HANDLING AND SUBSEQUENT PROCESSING OF THE DATA ARE DESCRIBED AND SOME RESULTS FROM PRELIMINARY MEASUREMENTS IN THE FIRST TWENTY METRES OF A RURAL BOUNDARY LAYER ARE DISCUSSED.

77-0137 FREEMAN B E, TAFT J R
MATHEMATICAL MODELLING OF TOPGRAPHIC EFFECTS ON WIND.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A3.39-A3.52.

IT IS GENERALLY RECOGNIZED THAT ECONOMIC OPERATION OF LARGE-SCALE WIND ENERGY INSTALLATIONS MUST BE PRECEDED BY A COMPREHENSIVE STUDY TO SELECT OPTIMUM WIND ENERGY SITES. THE SURVEY MUST CONSIDER HOW SITES CAN BE EXPECTED TO DIFFER FROM EACH OTHER WITH RESPECT TO THEIR MULTI-YEAR WIND

CHARACTERISTICS. A NEW STEP TO OVERCOME SERIOUS DEFICIENCIES IN WIND CHARACTERESTICS ASSESSMENT PROCEDURES IS DESCRIBED. THIS STEP EMPLOYS MATHEMATICAL MODEL-BASED METEOROLOGICAL PREDICTION TOOLS. WITH THEM CLIMATOLOGICAL DATA FROM WEATHER STATIONS IN THE REGION ARE USED TO INFER CLIMATOLOGICAL DATA AT THE UNMEASURED LOCATIONS WITHIN THE REGION. METEOROLOGICAL PHENOMENA ARE CONSIDERED WHICH TAKE PLACE IN REGIONS COMPARABLE TO THE DISTANCE BETWEEN SYNOPTIC WEATHER STATIONS (APPROXIMATELY 200 KM) AND IN THE IMMEDIATE VICINITY OF THE WINDMILL SITE (APPROXIMATELY 1 KM). COMPUTER CODES WERE DEVELOPED FOR EACH OF THESE REGIMES, AND CALCULATIONS OF WIND FLOW OVER COMPLEX TERRAIN HAVE BEEN PERFORMED. RESULTS OF SOME OF THESE WIND CALCULATIONS ARE PRESENTED, ILLUSTRATING THE EFFECTS OF TERRAIN ON WIND ENERGY POTENTIAL.

77-0138 FREES H
FREE WATER SUPPLY FROM WIND POWER.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 345-351. (IN GERMAN)

PUMPS DRIVEN BY WIND POWER (WIND PUMPS) ARE DESCRIBED WHICH ARE USED FOR DRAINING THE SOIL OR FOR IRRIGATING ECONOMICALLY USED AREAS.

77-0139 FRERIS L L
PERFORMANCE-OPTIMISED WIND ENERGY CONVERSION SYSTEM FOR SPACE HEATING.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS, CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X60-X62.

THE OBJECTIVE OF THIS PROJECT IS TO SET UP AND DEMONSTRATE A SMALL SIZE WIND ENERGY CONVERSION SYSTEM THAT IS CHEAP TO MANUFACTURE AND CAN PROVIDE ENERGY AT COMPETITIVE COST IN COMPARISION TO OTHER FUELS. FOR THE ECONOMICS TO BE FAVORABLE, IT IS NECESSARY TO SATISFY THE FOLLOWING CONDITIONS: (1) THE ENERGY CONVERTED SHOULD BE UTILIZED IN SUCH A WAY THAT THE MINIMUM COMPLICATION AND COST IS INCURRED, (2) A CHEAP ENERGY STORAGE DEVICE IS USED, (3) THE WINDMILL ROTOR SHOULD OPERATE AT MAXIMUM CONVERSION EFFICIENCY IRRESPECTIVE OF WIND SPEED CHANGES AND THE LEVEL OF UTILIZATION OF ITS OUTPUT SHOULD BE AS HIGH AS POSSIBLE. THE ABOVE CONDITIONS ARE SATISFIED IF THE WIND ENERGY IS WHOLLY UTILIZED FOR THE SPACE HEATING OF BUILDINGS AND GREENHOUSES. IN A HOUSEHOLD, SPACE AND WATER HEATING REPRESENT ABOUT 80 PERCENT OF THE YEARLY ENERGY DEMAND, SPACE HEATING IN NORTHERN CLIMATES BEING NECESSARY FOR TEN MONTHS OF THE YEAR AND WATER HEATING DEMAND BEING CONTINUOUS. WITH THE WINDMILL COUPLED TO AN ALTERNATOR THE OUTPUT OF WHICH IS USED DIRECTLY TO GENERATE HEAT IN A DISSIPATIVE LOAD, IMMEDIATE USE IS MADE OF THE AVAILABLE WIND ENERGY. WITH SUCH AN APPLICATION THERE IS NO NEED TO CONTROL THE FREQUENCY OF THE ALTERNATOR. THIS SIMPLIFIES THE ELECTRICAL SYSTEM AND PERMITS THE USE OF SIMPLER CONTROLLERS TO MAXIMIZE THE POWER EXTRACTED FROM THE WIND.

77-0140 FRITZSCHE A A
ECONOMICS OF A VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. D1.1-D1.6.

SOME ECONOMIC ASPECTS OF THE VERTICAL-AXIS WIND TURBINE (DARRIEUS TYPE) ARE CONSIDERED. A SUMMARY OF THE VARIOUS KINDS OF APPLICATION IS PRESENTED. THE COMPONENTS OF THE TURBINE CONSIST OF CONVENTIONAL AND NEW DEVELOPED ONES. THE MANUFACTURING PROCESSES OF THE ROTOR BLADES AND THE ROTATING TOWER DEPEND ON THE SIZE OF THE UNIT TO A FAR EXTENT. IT IS PROVED BY A COST ESTIMATE THAT THE MANUFACTURING COSTS ARE HIGHLY INFLUENCED BY LABOR COST. SPLITTING UP OF THE TOTAL UNIT IN INDIVIDUAL COMPONENTS FACILITATES A LESS COMPLEX MANUFACTURE OF ALL COMPONENTS WITH HIGH LABOR RATE IN DEVELOPING COUNTRIES. BASED ON THE PRESENT STAGE OF TECHNICAL DEVELOPMENT, MANUFACTURING COSTS OF THE VERTICAL-AXIS TURBINE ARE TO BE EXPECTED IN THE SAME ORDER OF MAGNITUDE AS THE COMMERCIALLY AVAILABLE WIND TURBINE WITH HORIZONTAL-AXIS (10 KW). IN A POWER-RANGE ABOVE 20 KW IT CAN BE ASSUMED THAT THE DARRIEUS ROTOR WILL BE LESS ECONOMICAL.

77-0141 GARSTANG M, ASPLIDEN C, PIELKE R, NNAJI S
COASTAL WIND ZONE ENERGY. ANNUAL PROGRESS REPORT, MARCH 15, 1977 - JUNE 15, 1977.

NTIS, JUNE 23, 1977. 3P.
RLO/2344-5

DURING THE PAST QUARTER MOST OF THE DATA OUTLINED IN THE HALF-YEARLY REPORT HAS BEEN ACQUIRED OR IS NOW NEARLY COMPLETELY COMPILED. THESE CONSIST OF THE FOLLOWING: HIGH FREQUENCY WIND MEASUREMENTS FROM NASA WALLOPS FLIGHT FACILITY TOWERS; MEDIUM FREQUENCY WIND MEASUREMENTS FROM NASA WALLOPS 10 M TOWERS (ISLAND AND MAINLAND) FOR ONE YEAR; LOW FREQUENCY WIND MEASUREMENTS FROM 50 COASTAL STATIONS TOGETHER WITH OTHER SURFACE METEOROLOGICAL VARIABLES; AND COAST GUARD STATIONS AND OCEAN STATIONS.

77-0142 GEBBEN V D
INVESTIGATION OF EXCITATION CONTROL FOR WIND-TURBINE GENERATOR STABILITY.
NTIS, AUGUST 1977. 17P.
N77-31614, ERDA/NASA/1028-77/3

HIGH SPEED HORIZONTAL AXIS WIND TURBINE GENERATORS WITH BLADES ON THE DOWNWIND SIDE OF THE SUPPORT TOWER REQUIRE SPECIAL DESIGN CONSIDERATIONS TO HANDLE DISTURBANCES INTRODUCED BY THE FLOW WAKE BEHIND THE TOWER. EXPERIMENTS AND ANALYTICAL ANALYSES WERE MADE TO DETERMINE BENEFITS THAT MIGHT BE OBTAINED BY USING THE GENERATOR EXCITER TO PROVIDE SYSTEM DAMPING FOR REDUCING POWER FLUCTUATIONS.

77-0143 GENERATE YOUR OWN WIND POWER.
SCI. DIG. 82(4): 30-31, OCTOBER 1977.

77-0144 GERMAIN F
ENERGY STORAGE AND CONVERSION TECHNIQUE AND APPARATUS.
U.S. PATENT NO. 4,058,979, NOVEMBER 22, 1977. 6P.

THE KINETIC ENERGY OF THE WIND IS CONVERTED INTO COMPRESSED AIR WHICH IS STORED, IN A SYSTEM WHICH MAINTAINS A PREDETERMINED OUTPUT PRESSURE, FOR USE IN DRIVING A TURBINE COUPLED TO AN ELECTRICAL POWER GENERATOR. THE GAS STORAGE SYSTEM INCLUDES TWO PAIR OF SERIALLY CONNECTED STORAGE TANKS WITH THE FIRST TANK IN EACH PAIR RECEIVING COMPRESSED AIR FROM WIND DRIVEN COMPRESSORS AND INCLUDING A HYDRAULICALLY ACTUATED PISTON FOR USE IN FORCING THE AIR INTO THE SECOND TANK. EACH OF THE SECOND TANKS OF EACH PAIR INCLUDES A FLOATING PISTON WHICH WILL BE CAUSED TO ASCEND IN RESPONSE TO THE DELIVERY OF PRESSURIZED GAS THERETO FROM THE SERIALLY CONNECTED TANK INCLUDING THE HYDRAULICALLY ACTUATED PISTON AND THE PRESSURE IN EACH OF THE SECOND TANKS WILL BE MAINTAINED BY THE WEIGHT OF THE FLOATING PISTON.

77-0145 GIANT EGGBEATER TO HARVEST THE WIND.
MECH. ILLUS. 73: 16, OCTOBER 1977.

77-0146 GILBERT B L, OMAN R A, FOREMAN K M
FLUID DYNAMICS OF DIFFUSER AUGUMENTED WIND TURBINES.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2, P. 1651-1659.

THE DIFFUSER AUGUMENTED 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 EFFECT 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. FLOW FIELD SURVEYS, OVERALL PERFORMANCE, THE EFFECT OF GROUND PROXIMITY, AND THE PROSPECTS FOR FURTHER IMPROVEMENT ARE DESCRIBED. THE BASELINE CONFIGURATION IS A CONICAL, 60 DEG INCLUDED ANGLE DIFFUSER WITH AN AREA RATIO OF 2.78 CONTROLLED BY TWO TANGENTIAL INJECTION SLOTS. THIS FIRST GENERATION DAWT CAN PROVIDE 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 PERCENT CHEAPER THAN CONVENTIONAL WECS FOR THE SAME RATED POWER.

77-0147 GILBERT L J
SYNCHRONIZATION OF THE DOE/NASA 100 KW WIND TURBINE GENERATOR WITH A LARGE UTILITY NETWORK
NTIS, DECEMBER 1977. 19P.

NASA-TM-73861, DOE/NASA/1028/77/10

THE DOE/NASA 100 KILOWATT WIND TURBINE GENERATOR SYSTEM HAS BEEN ROUTINELY SUCCESSFULLY SYNCHRONIZED WITH A LARGE UTILITY NETWORK SINCE SEPTEMBER 1976. THE SYSTEM EQUIPMENTS AND PROCEDURES ASSOCIATED WITH THE SYNCHRONIZATION PROCESS ARE DESCRIBED. TIME-HISTORY TRACES OF TYPICAL SYNCHRONIZATIONS ARE PRESENTED INDICATING THAT POWER AND CURRENT TRANSIENTS RESULTING FROM THE SYNCHRONIZING PROCEDURE ARE LIMITED TO ACCEPTABLE MAGNITUDES.

77-0148 GIPE P B
TOMORROW'S WIND TURBINES BEING BUILT TODAY IN PENNSYLVANIA.
ALTERN. SOURCES ENERGY NO. 29: 5-10, DECEMBER 1977.

TERRY MEHRKAM'S TWO WINDMILLS ON THE FAMILY FARM NEAR HAMBURG PA. ARE DESCRIBED.

77-0149 GIPE P B
WIND ACTIVISTS IN THE COMMONWEALTH.
WIND POWER DIG. 1(9): 32-35, SUMMER 1977.

TWO PENNSYLVANIA PROJECTS ARE DESCRIBED. ONE IS A GROUP WORKING ON LARGE SCALE PROJECTS. THE OTHER IS DO-IT-YOURSELFERS ON SMALL SCALE PROJECTS.

77-0150 GIPE P B
THE MEHRKHAMS REVISITED.
WIND POWER DIG. NO. 10: 13-16, FALL 1977.

77-0151 GIPE P B
WIND POWER IN PA: TERRY MEHRKHAM'S WIND MACHINE.
WIND POWER DIG. 1(9): 27-31, SUMMER 1977.

77-0152 GLASER P E
SOLAR ENERGY -- WHERE ARE THE OPPORTUNITIES?
AWARE NO. 77: 2-5, FEBRUARY 1977.

WIND ENERGY, OCEAN THERMAL GRADIENTS, DIRECT ENERGY CONVERSION, SOLAR HEAT CONVERSION, AND OTHER DEVICES ARE BEGINNING TO BE TESTED AS ALTERNATIVE MEASURES FOR CONVERTING SOLAR ENERGY INTO USEFUL FORMS. ON A SHORTER SCALE OF TIME, SOLAR CLIMATE CONTROL--WATER HEATING AND COOLING OF BUILDINGS--ALREADY HOLDS PROMISE AS FEASIBLE TECHNOLOGY FOR SOLAR CONVERSION. SOLAR COLLECTORS, THERMAL STORAGE MEDIUMS, CONVENTIONAL ENERGY SOURCE INTERFACES, HEAT ACTUATED AIR-CONDITIONERS, HEAT PUMPS, AND AUXILIARY EQUIPMENT ARE BEING RESEARCHED FOR INTEGRATION INTO SOLAR CLIMATE CONTROL SYSTEMS.

77-0153 GLUCKIN N
WIND; WHEN PUSH COMES TO SHOVE, YOU MAY BE LEARNING ANEW THAT IT'S NOT SO UNKIND.
SCI. DIG. 82(4): 26-32, OCTOBER 1977.

77-0154 GOLDEN HAMMER.
MECH. ILLUS. 73(589): 34, JUNE 1977.

A BRIEF DESCRIPTION IS PRESENTED OF A TRAVEL TRAILER EQUIPPED WITH A WIND GENERATOR WHICH SUPPLIES ALL OF ITS ELECTRICAL NEEDS.

77-0155 GOLDING E W
THE GENERATION OF ELECTRICITY BY WIND POWER.
LONDON, E. AND F. N. SPON LTD., 1977. 350P.

THIS IS A REPRINT, WITH ADDITIONAL MATERIAL, OF THE 1955 EDITION.

77-0156 GOSLICH H D
CONCEPT FOR THE USE OF WIND ENERGY WITH FAVOURABLE COST IMPLICATIONS. RESULTS FROM EXPERIENCE WITH THE SYLT DOUBLE ROTOR.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 393-369. (IN GERMAN)

THE CONSTRUCTION OF AN 11 KW WIND ENERGY PLANT WHICH WAS CONSTRUCTED ON THE ISLAND OF SYLT IS DESCRIBED. THE ROTOR DIAMETER IS 10 METRES, AND THE NUMBER OF BLADES IS 2. THE CONTROL OF THE PLANT, WHICH IS USED FOR

HEATING PURPOSES, TAKES PLACE VIA LOAD EXTRACTION. THE BEHAVIOUR (OF THE PLANT) IN OPERATION WAS SATISFACTORY.

77-0157 GOSLICH H D
WIND TURBINE BLADE WITH SAFETY CONTRIVANCE AGAINST EXCESS LOADS.
GERMAN (FRG) PATENT NO. 2,546,884/A/, APRIL 21, 1977. 7P. (IN GERMAN)

THE INVENTION PERTAINS TO WIND TURBINE BLADES WITH A SAFETY CONTRIVANCE AGAINST EXCESS LOADS. THE BLADES ARE SEPARATELY HINGED ON TAPPETS WHICH ARE AT RIGHT ANGLES TO THE LONGITUDINAL AXES OF THE BLADES. SOME EXAMPLES OF REALIZATION OF THE INVENTION ARE GIVEN.

77-0158 GRASTRUP H
WIND ENERGY PROGRAMME OF THE DANISH GOVERNMENT AND THE DANISH ELECTRICITY UNDERTAKINGS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P.23-26. (IN GERMAN)

A SURVEY IS PRESENTED OF THE DANISH WIND ENERGY PROGRAMME, WHICH WAS APPROVED IN 1976. THIS PROGRAMME IS DESIGNED TO PRODUCE REALISTIC DATA ON THE TECHNOLOGY AND ECONOMIC FEASIBILITY OF THE UTILIZATION OF WIND ENERGY FROM CONCRETE, PRACTICAL SOLUTIONS TO TECHNICAL PROBLEMS, AND FROM MEASUREMENTS AND EXPERIENCE IN USING WIND TURBINES.

77-0159 GRIFFEE D G, GUSTAFSON R E, MORE E R
DESIGN, FABRICATION, AND TEST OF A COMPOSITE MATERIAL WIND TURBINE ROTOR BLADE.
NTIS, NOVEMBER 1977. 186P.
NASA-CR-135389

THE AERODYNAMIC AND STRUCTURAL DESIGN, FABRICATION, AND TEST OF A 60-FOOT (18.3-METER)- LONG FILAMENT WOUND, COMPOSITE MATERIAL, WIND TURBINE ROTOR BLADE ARE DESCRIBED. THE BLADE WAS DESIGNED FOR USE WITH THE DEPARTMENT OF ENERGY/NASA MOD-0 100 KILOWATT EXPERIMENTAL WIND TURBINE LOCATED IN SANDUSKY, OHIO.

77-0160 GRIFFITHS R T
THE EFFECT OF AEROFOIL CHARACTERISTICS ON WINDMILL PERFORMANCE.
AERONAUT. J. 81: 322-326, JULY 1977.

AN OUTLINE OF THE GENERAL DESIGN PROCEDURE FOR A MODERN HIGH SPEED WINDMILL IS PRESENTED ALONG WITH A REVIEW OF HOW THE AERODYNAMIC CHARACTERISTICS OF THE BLADE SECTION AFFECT THE POWER OUTPUT. THE ACTUAL WINDMILL PERFORMANCE IS EVALUATED WITH REGARD TO THE INTERFERENCE FACTORS, AND THE BASIC MOMENTUM CONSIDERATIONS. IT IS SHOWN THAT AIRFOIL CHARACTERISTICS HAVE SMALL EFFECTS ON PLANFORM SHAPE AND TWIST, BUT LARGE EFFECTS ON PERFORMANCE. SPECIFICALLY, IT IS CONCLUDED THAT THE MAXIMUM EFFICIENCY INCREASES RAPIDLY WITH A LIFT/DRAG RATIO OF UP TO APPROXIMATELY R = 30, THEREAFTER INCREASING LESS QUICKLY, AND THAT THE TIP SPEED RATIO ALSO DEPENDS ON THE CHARACTERISTIC OF THE AIRFOIL USED.

77-0161 GRIMMER D P, KOLSTAD C D
AN INEXPENSIVE METHOD FOR CONSTRUCTING DARRIEUS BLADES.
ALTERN. SOURCES ENERGY NO. 29: 14-20, DECEMBER 1977.

INEXPENSIVE WIND-POWER, PARTICULARLY FOR SMALL-SCALE APPLICATIONS, FROM VERTICAL-AXIS DARRIEUS WIND TURBINES HAS BEEN HAMPERED BY HIGH BLADE COSTS. THIS PAPER DISCUSSES A LOW COST BLADE DESIGN WHICH IS SIMPLE ENOUGH FOR CONSTRUCTION BY THE HOME CRAFTSMAN OR SMALL MANUFACTURER. MATERIALS COSTS ARE ESTIMATED AT $74 FOR A SINGLE 15 FOOT BLADE (1977 COSTS). CONSTRUCTION TECHNIQUES AS WELL AS DESIGNS ARE DISCUSSED.

77-0162 GROSSMAN R, DANEKER G
JOBS + ENERGY.
ENVIRONMENTALISTS FOR FULL EMPLOYMENT REPORT, SPRING 1977. 21P.

HISTORICALLY, INDUSTRY HAS SOUGHT TO SUBSTITUTE ENERGY-INTENSIVE ECONOMIES FOR HUMAN LABOR. IT HAS SUCCEEDED IN REPLACING HUMAN LABOR WITH ENERGY PURCHASES AT VERY LOW RATES FROM AN EXPANDING ENERGY INDUSTRY, WHICH HAS BEEN ACCUMULATING AN EVER-SPIRALING WEALTH OF PROFITS. INSTEAD, ENERGY SHOULD BE USED TO SERVE THE PEOPLE. ENERGY SUFFICIENCY, ECONOMIC PROSPERITY AND JOBS SHOULD BE PURSUED THROUGH A

PROGRAM WITH VARIOUS SAFE, ENERGY-EFFICIENT TECHNOLOGIES. ALTERNATIVE TECHNOLOGIES, SUCH AS SOLAR AND WIND ENERGY AND BIOMASS CONVERSION, CAN ACCOMPLISH THE DUAL GOAL OF PROVIDING BOTH ENERGY AND JOBS. A STRONG INPUT OF NEW LABOR WILL BE NEEDED TO DESIGN, MANUFACTURE, INSTALL, AND MAINTAIN SOLAR AND OTHER ALTERNATIVE EQUIPMENT.

77-0163 GROVER R D, VENERUSO A F
SANDIA VERTICAL AXIS WIND TURBINE PROGRAM. TECHNICAL QUARTERLY REPORT, JULY - SEPTEMBER 1976.
NTIS, JUNE 1977. 35P.
SAND-77-0711

THIS QUARTERLY REPORT DESCRIBES THE ACTIVITIES OF THE SANDIA LABORATORIES' VERTICAL-AXIS WIND TURBINE (VAWT) PROJECT DURING THE PERIOD JULY TO SEPTEMBER 1976, TRANSITIONAL QUARTER OF FISCAL YEAR 1976. INCLUDED ARE THE HIGHLIGHTS OF THE QUARTER; REVIEW OF THE STATUS OF GENERAL DESIGN EFFORTS IN THE AREAS OF AERODYNAMICS, STRUCTURES, AND TESTING.

77-0164 HAACK B N
AN EXAMINATION OF SMALL WIND ELECTRIC SYSTEMS IN MICHIGAN. PH.D. THESIS.
ANN ARBOR, UNIVERSITY MICROFILMS, ORDER NUMBER 77-18048, 1977. 223P.

THE USE OF SMALL WIND POWERED GENERATORS FOR SUPPLYING ELECTRICITY TO INDIVIDUAL HOUSEHOLDS IN MICHIGAN IS EXAMINED. SMALL WIND ELECTRIC SYSTEMS ARE NOT CURRENTLY ECONOMICALLY COMPETITIVE WITH ELECTRICITY FROM UTILITY COMPANIES. INCREASING COSTS OF ELECTRICITY FROM UTILITY COMPANIES, GOVERNMENTAL SUBSIDIES FOR INDIVIDUALS INSTALLING WIND ELECTRIC SYSTEMS, OR DECREASED CAPITAL COSTS OF THESE SYSTEMS AS A RESULT OF LARGE VOLUME PRODUCTION MAY GREATLY INCREASE THE ECONOMIC COMPETITIVENESS OF SMALL WIND ELECTRIC SYSTEMS. THE NET ENERGY ANALYSES OF SMALL WIND ELECTRIC SYSTEMS CONCLUDED THAT THESE SYSTEMS ARE ENERGETICALLY COMPETITIVE WITH EXISTING UTILITY COMPANY'S SYSTEMS. DIRECT ENVIRONMENTAL IMPACTS FROM THE NORMAL OR ABNORMAL OPERATION OF SMALL WIND ELECTRIC SYSTEMS APPEAR TO BE SLIGHT BUT INDIRECT ENVIRONMENTAL IMPACTS, E.G., INCURRED DURING ACQUISITION OF MATERIALS FOR CONSTRUCTION, MAY BE CONSIDERABLE.

77-0165 HAM N D
AEROELASTIC ANALYSIS OF THE TROPOSKIEN WIND TURBINE.
NTIS, APRIL 1977. 28P.
SAND-77-0026

THE TESTING OF TROPOSKIEN-TYPE WIND TURBINES HAS INDICATED THAT UNDER CERTAIN CONDITIONS SERIOUS VIBRATIONS OF THE BLADES CAN OCCUR, INVOLVING FLATWISE BENDING, TORSION, AND CHORDWISE BENDING. IT IS THE PURPOSE OF THIS REPORT TO PERFORM AN AEROELASTIC ANALSYIS OF THE STABILITY OF THE COUPLED BENDING AND TORSIONAL MOTION OF SUCH BLADES WITH A VIEW TO DETERMINING THE CAUSE OF THESE VIBRATIONS AS A MEANS OF SUPPRESSING THEM. THE EMPHASIS OF THE ANALYSIS IS ON OBTAINING PHYSICAL UNDERSTANDING RATHER THAN EXACT NUMERICAL RESULTS. THE EFFECT OF EXTREME VARIATION OF THE CHORDWISE LOCATION OF THE SECTION CENTER OF GRAVITY OF TROPOSKIEN-TYPE ROTOR BLADES WAS FOUND TO BE NEGLIGIBLE WITH REGARD TO BLADE FLUTTER. THIS CONCLUSION IMPLIES THAT CHORDWISE MASS BALANCING OF THE BLADES IS NOT REQUIRED, WITH CONSEQUENT LARGE REDUCTIONS IN BLADE DESIGN AND MANUFACTURING REQUIREMENTS, AND THEREFORE IN BLADE COST.

77-0166 HAMMOND A L
SOFT TECHNOLOGY ENERGY DEBATE: LIMITS TO GROWTH REVISITED?
SCIENCE 196(4293): 959-961, MAY 27, 1977.

CONGRESSIONAL INQUIRIES, OFFICAL STUDIES BY ERDA, AND IMPASSIONED REBUTTALS BY MUCH OF THE ENERGY ESTABLISHMENT ARE REACTIONS TO THE THESIS OF AMORY LOVINS, A PHYSICIST TURNED ENVIRONMENTAL ADVOCATE FOR FOE. LOVINS BELIEVES THAT THE U.S. ALREADY CAN ACCOMPLISH A TOTAL CONVERSION TO SOFT TECHNOLOGY TO PROVIDE THE COUNTRY'S ENERGY NEEDS. THE ANALYSIS ADVOCATES THE USE OF SOLAR HEATING AND COOLING, WIND AND HYDROELECTRICITY, AND FUELS FROM RENEWABLE BIOLOGICAL MATERIALS. THE CONTROVERSIAL ASPECTS OF LOVINS' WORK HOLDS THAT WIND MILLS, HYDROELECTRICITY, BIOMASS, AND OTHER RENEWABLE RESOURCES ARE ALREADY SUFFICIENT TO MAKE THE SWITCH. ESTABLISHED ENERGY ORGANIZATIONS, SUCH AS ERDA, HAVE SPENT MUCH TIME PICKING APART LOVINS' ATTEMPT TO JUSTIFY THIS

CLAIM.

77-0167 HAND A J
HOME ENERGY HOW-TO.
NEW YORK, HARPER + ROW, 1977. 268P.

THIS IS A COMPLETE GUIDE TO SAVING AND PRODUCING HOME ENERGY. WAYS ARE SUMMARIZED TO CUT HOME OPERATING COSTS; CONSERVE FOSSIL FUELS; REDUCE POLLUTION; AND HEAT, COOL, AND POWER THE HOME. THE BOOK IS DIVIDED INTO TWO PARTS. PART I DEALS WITH WAYS TO CONSERVE ENERGY. PART II CONCENTRATES ON WAYS TO HARNESS THE ENERGIES OF SUN, WIND, WATER, AND BIOFUELS--AND HEAT WITH WOOD. PART I BEGINS WITH THOUGHTS ON ELIMINATING WASTE. MEANS ARE DESCRIBED TO KEEP WARM AND COOL AIR WHERE YOU WANT THEM. PRACTICAL CONCERNS INCLUDE INSULATION, CAULKING, WEATHERSTRIPPING, WINDOWS, DOORS, LANDSCAPING, AND HOUSE DESIGN. THE AUTHOR EXPLAINS HOW TO EVALUATE MATERIALS, COST, AND PAYBACK TIMES, AND PROVIDES CLEARLY ILLUSTRATED STEP-BY-STEP INSTRUCTIONS FOR HANDLING NEARLY ALL OF THE TASKS YOURSELF. MAINTENANCE OF FURNACES AND AIR CONDITIONING SYSTEMS IS DESCRIBED. PART II TELLS HOW TO PRODUCE ENERGY WITH SOLAR COLLECTORS, WIND AND WATER GENERATORS, BIOFUEL PLANTS, AND WOODBURNERS. THE AUTHOR EXPLAINS THE PRINCIPLES OF THE BEST HOT-AIR AND HOT-WATER SYSTEMS, AND THEN TELLS HOW TO DETERMINE WHICH WOULD WORK WELL. OVER 200 EASY-TO-FOLLOW ILLUSTRATIONS AND THE LATEST IN METHODS AND MATERIALS ARE INCLUDED.

77-0168 TILTING WINDMILL AT READING.
ELECTR. POWER 23(9): 685, SEPTEMBER 1977.

A PROTOTYPE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL DEVELOPED BY P. J. MUSGROVE AT THE UNIVERSITY OF READING IS DESCRIBED.

77-0169 HANNERVALL L, VON ZWEYBERGK S
LOW EFFICIENCY OF WIND POWER.
TEK. TIDSKR. 107(13): 27-28, 32-33, SEPTEMBER 9, 1977. (IN SWEDISH)

EXPERIMENTAL SMALL-SCALE WIND POWER PLANTS IN SWEDEN ARE DESCRIBED AND THEIR OPERATIONAL EXPERIENCE IS EVALUATED. THE DATA OBTAINED GIVE NO REASON TO AN EXAGGERATED OPTIMISM AS TO THE WIND POWER PLANT EFFICIENCY; THE INSTALLATION COSTS ARE HIGH AND THE ENERGY PRODUCTION IS LOW. PROBABILITIES FOR AN ECONOMICAL ENERGY PRODUCTION WITH SMALL-SCALE WIND POWER PLANTS ARE SHOWN TO BE SMALL.

77-0170 HARDER E L
SPECIFIC OUTPUT OF WINDMILLS: A DISCOVERY.
IEEE PROC. 65(11): 1623-1625, NOVEMBER 1977.

BECAUSE THE WIND VARIES WIDELY FROM POINT TO POINT ON THE EARTH IT HAS GENERALLY BEEN ASSUMED THAT THE SPECIFIC OUTPUT OF A WIND TURBINE GENERATOR, THE KILOWATTHOURS GENERATED IN A YEAR PER KILOWATT OF RATING, COULD ONLY BE DETERMINED FROM THE PARTICULAR WIND PATTERN INVOLVED. HOWEVER, IT WAS DISCOVERED EMPIRICALLY THAT THE SPECIFIC OUTPUT OF WINDMILLS IS PRACTICALLY INDEPENDENT OF THEIR LOCATION ON THE EARTH, OR OF THE MEAN ANNUAL WIND VELOCITY. IT DEPENDS INSTEAD ON THE RATIO OF THE RATED SPEED V/SUB R/, THE WIND SPEED AT WHICH FULL RATING IS REALIZED, TO THE MEAN ANNUAL WIND VELOCITY V/SUB M/. THIS IS DEMONSTRATED BY DATA FROM MANY DESIGNS AND WIND-POWER SITES. THE RESULTING CURVE OF SPECIFIC OUTPUT VERSUS V/SUB R//V/SUB M/, TOGETHER WITH THE FUNDAMENTAL FORMULA FOR POWER EXTRACTED FROM THE WIND BY A WINDMILL CONSTITUTES A USEFUL APPROXIMATE DESIGN AND OPTIMIZING METHOD.

77-0171 HARDY D M
WIND ENERGY ASSESSMENT.
NTIS, JUNE 1977. P 18-25.
UCRL-52000-77-6

AS PART OF THE FEDERAL WIND ENERGY PROGRAM, WORK ON THE ISLAND OF OAHU, HAWAII, TO DEVELOP GENERAL METHODS OF ASSESSING WIND ENERGY IS REPORTED; THIS WILL BE SUITABLE FOR OTHER MOUNTAINOUS REGIONS OF THE U.S., INCLUDING THE PACIFIC COAST, ROCKY MOUNTAIN, AND NEW ENGLAND AREAS. COMPUTER SIMULATIONS AND METEOROLOGICAL MEASUREMENTS HAVE BEEN MADE TO STUDY HOW WIND ENERGY VARIES IN TIME AND FROM PLACE TO PLACE. ROUGH, MOUNTAINOUS COUNTRY - LIKE OAHU - CAN CAUSE ENORMOUS LOCAL VARIATIONS IN WIND ENERGY. HOWEVER, SEVERAL SUBAREAS OF HIGH WIND-ENERGY POTENTIAL

HAVE BEEN IDENTIFIED, AND WORK IS BEING FOCUSED ON ONE THAT APPEARS ESPECIALLY SUITABLE FOR WIND-POWER DEVELOPMENT.

77-0172 HARDY D M
NUMERICAL AND MEASUREMENT METHODS OF WIND ENERGY ASSESSMENT.
NTIS, AUGUST 1977. 29P. ALSO NTIS, AUGUST 1977. 19P. REV.
UCRL-79896, UCRL-79896 (REV.1)

THIS PAPER WAS GIVEN AT THE 3D. BIENNIAL WIND ENERGY CONVERSION SYSTEMS CONFERENCE, WASHINGTON D.C., SEPTEMBER 19, 1977. THE LAWRENCE LIVERMORE LABORATORY (LLL) IS ENGAGED IN A QUANTITATIVE STUDY OF WIND ENERGY - ITS MAGNITUDE AND ITS VARIATIONS - AS PART OF THE FEDERAL WIND ENERGY PROGRAM. ATTENTION IS GIVEN TO HILLY OR MOUNTAINOUS REGIONS, WHERE TERRAIN STRONGLY EFFECTS THE NEAR-SURFACE AIR-FLOW. MANY PARTS OF THE NATION CAN BE CLASSED AS MOUNTAINOUS, INCLUDING THE PACIFIC COAST, ROCKY MOUNTAIN AND NEW ENGLAND REGIONS. COMPLEX TERRAIN RESULTS IN DRAMATIC INCREASES OR DECREASES IN WIND SPEED THAT MAKE WIND ENERGY ASSESSMENT IN THESE AREAS ESPECIALLY DIFFICULT. THE COMPLETE METHODOLOGY IS SYSTEMATIC AND SHOULD PROVE USEFUL IN ALL MOUNTAINOUS REGIONS IN PROVIDING A COST-EFFECTIVE DOCUMENTATION OF THE WIND RESOURCE.

77-0173 HYDRAULIC WIND TURBINE PATENTED.
WIND POWER DIG. 1(9): 21-22, SUMMER 1977.

A SYSTEM IS DESCRIBED FOR DERIVING USEFUL ENERGY FROM A WINDMILL IN WHICH A LIQUID PUMP IS DRIVEN BY THE WINDMILL. USEFUL ENERGY IS OBTAINED BY EITHER A FLUID DRIVEN GENERATOR OR A FRICTION HEATER. THE OUTPUT OF THE PUMP AND THE SPEED OF THE WINDMILL ARE CONTROLLED BY A CONSTANT VOLUME VALVE IN THE FLUID CIRCUIT.

77-0174 HARDY D M
WIND STUDIES IN COMPLEX TERRAIN.
NTIS, MAY 1977. 39P.
UCRL-79430

THIS PAPER WAS PRESENTED AT THE AMERICAN WIND ENERGY ASSOCIATION MEETING IN BOULDER, COLORADO, MAY 13, 1977. THE DEVELOPMENT AND APPLICATION OF GENERAL METHODS OF WIND ENERGY ASSESSMENT FOR HILLY OR MOUNTAINOUS AREAS IS DESCRIBED. THE ISLAND OF OAHU, HAWAII IS BEING USED AS AN INITIAL STUDY AREA TO DEVELOP PROCEDURES USEFUL THERE AND IN OTHER MOUNTAINOUS REGIONS. NUMERICAL MODEL CALCULATIONS AND FIELD MEASUREMENTS ARE EMPLOYED IN STUDYING THE SPATIAL AND TEMPORAL VARIATIONS OF WIND ENERGY. FIELD MEASUREMENT AND MODEL RESULTS SHOW VERY SIGNIFICANT WIND ENERGY SPATIAL VARIATIONS OCCUR AS A RESULT OF COMPLEX TERRAIN. APPLICATIONS OF THE METHODOLOGY IN IDENTIFYING LOCATIONS OF WIND ENHANCEMENT WITH MULTI-MEGAWATT POWER COLLECTION POTENTIAL ARE DESCRIBED.

77-0175 HARDY D M, WALTON J J
WIND ENERGY ASSESSMENT.
GOLDEN, COLORADO, SOLAR ENERGY RESEARCH INSTITUTE, 1977. 29P.

THIS PAPER WAS PRESENTED AT THE MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, DECEMBER 5-7, 1977. MAJOR ASPECTS OF WIND ENERGY ASSESSMENT ARE DISCUSSED. REPRESENTATIVE EXAMPLES OF MODERN WIND TURBINE GENERATORS ARE BRIEFLY DESCRIBED IN TERMS OF SIZE, POWER, GENERAL DESIGN, AND OPERATING CHARACTERISTICS. SPATIAL AND TEMPORAL SCALES OF WIND VARIATIONS AND METEOROLOGICAL DATA REQUIREMENTS ARE DISCUSSED. METEOROLOGICAL CONDITIONS IN SEVERAL COASTAL AND MOUNTAINOUS AREAS WITH HIGH WIND ENERGY DENSITIES ARE SUMMARIZED. METHODS USED TO MAP WIND ENERGY VARIATIONS OVER THE ISLAND OF OAHU, HAWAII, ARE PRESENTED AS AN EXAMPLE OF WIND ENERGY ASSESSMENT IN COMPLEX TERRAIN. THE STUDY IS PRESENTLY DOCUMENTING WIND RESOURCES BY MEANS OF COORDINATED FIELD DATA COLLECTION AND NUMERICAL MODELING EFFORTS. A NUMERICAL WINDFIELD MODEL IS USED TO CALCULATE THREE-DIMENSIONAL VELOCITIES OVER THE ISLAND. DATA ARE COLLECTED FROM REMOTE FIELD MEASUREMENT STATIONS LOCATED TO IMPROVE MODEL INPUT DATA AND TO PROVIDE LOCAL WIND ENERGY MEASUREMENTS. A STATISTICAL ANALYSIS OF WIND OBSERVATIONS IS USED TO DETERMINE PREDOMINANT WIND PATTERNS. FIELD MEASUREMENT AND NUMERICAL MODEL RESULTS OBTAINED FOR OAHU, HAWAII, ARE GIVEN TO ILLUSTRATE HOW THIS GENERAL METHODOLOGY MIGHT BE APPLIED TO OTHER MOUNTAINOUS OR HILLY REGIONS.

77-0176 HARDY D M, ZALKIN R L, WALTON J J, HILL K L
KAHUKU, OAHU WIND SUMMARY. PERIOD COVERED: AUGUST - NOVEMBER 1976.

NTIS, FEBRUARY 1977. 11P.
UCID-17403

WIND-ENERGY MEASUREMENTS CONDUCTED BY THE LAWRENCE LIVERMORE LABORATORY ON THE ISLAND OF OAHU, HAWAII, ARE DISCUSSED BRIEFLY. MEASUREMENT LOCATIONS IN NORTHERN OAHU ARE IDENTIFIED. THE MEASUREMENT SITE AT KAHUKU, OAHU, IS DESCRIBED. DATA OBTAINED AT THE KAHUKU LOCATION ARE SUMMARIZED AS DAILY AND MONTHLY MEAN VELOCITIES FOR AUGUST THROUGH NOVEMBER, 1976. VELOCITY DURATION CURVES FOR EACH MONTH ARE ALSO GIVEN.

77-0177 PRINCE M, STODDARD W
UNIVERSITY OF MASSACHUSETTS SOLAR WIND HOUSE.
ALTERN. SOURCES ENERGY NO. 26: 26-27, JUNE 1977.

A UNIVERSITY OF MASSACHUSETTS PROJECT IS DESCRIBED WHICH JOINS A WINDMILL AND SOLAR COLLECTORS IN A UNIQUE HEATING SYSTEM.

77-0178 HARRIS G S, ELLIS M J, SCOTT G C, WOOD J R, PHILLIPS P H
ENERGY SCENARIOS FOR NEW ZEALAND.
AUCKLAND, NEW ZEALAND, NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, REPORT NO. 19, MARCH 1977. 140P.

THREE SCENARIOS ARE PRESENTED: (1) IMPLICATIONS FOR ENERGY THROUGH A CONTINUATION OF PAST POLICIES, ATTITUDES AND INSTITUTIONS; (2) SITUATION WHEN SOCIETY PLACES CONSIDERABLE VALUE ON THE QUALITY OF THE PHYSICAL ENVIRONMENT AND IMPOSES RESTRICTIONS ON THE HITHERTO UNMODIFIED GOAL OF A HIGHER MATERIAL STANDARD OF LIVING; AND (3) A "LIMITED GROWTH" SCENARIO.

77-0179 HAYES D
ENERGY: THE SOLAR PROSPECT.
WORLDWATCH INST. REP. NO. 11, MARCH 1977. 79P.

NO COUNTRY USES AS MUCH ENERGY AS THE SUNLIGHT CONTAINED WITHIN ITS BUILDINGS. THE INCREASING SOPHISTICATION OF SOLAR ENERGY TECHNOLOGY AND THE STEADY DECLINE IN THE EARTH'S FOSSIL RESOURCES, THUS, ASSURE A SIGNIFICANT POSITION FOR SOLAR ENERGY AS A WORLDWIDE SUPPLIER OF ENERGY. AT PRESENT THE DESIGN OF A FARSIGHTED ENERGY POLICY WOULD REQUIRE PAYING A PREMIUM FOR AN EARLY SWITCH TO SOLAR ENERGY. THE FEASIBILITY OF DEVELOPING OTHER RENEWABLE ENERGY SOURCES, SUCH AS WIND POWER, ARE REVIEWED.

77-0180 HEIER S
WIND ENERGY CONVERTER AND MECHANICAL ENERGY CONVERTER ADAPTATION AND CONTROL.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 187-222. (IN GERMAN)

THE OPERATING CHARACTERISTICS OF WIND ROTORS WITH HORIZONTAL AXES (WITH SLOW AND FAST SPEED OF ROTATION) ARE BRIEFLY OUTLINED, AND THE MOST IMPORTANT WORKING MACHINES FOR WIND ENERGY CONVERSION WITH TYPES OF CIRCUIT AND METHODS OF OPERATION OF THE WIND ENERGY PLANT WITH MUTUAL ADAPTION AND CONTROL ARE LISTED, AND THEIR OPERATING CONDITIONS ARE INDICATED.

77-0181 HEINEN C J
WATTS FROM THE WIND.
QST 61: 15-19, JULY 1977.

77-0182 HENNESSEY J P
SOME ASPECTS OF WIND POWER STATISTICS.
J. APPL. METEOROL. 16(2): 119-128, FEBRUARY 1977.

SOME OF THE PROBLEMS OF WIND POWER STATISTICS ARE EXAMINED. THE EXACT RELATIONSHIP BETWEEN THE MEAN WIND SPEED AND THE MEAN OF THE CUBE OF THE WIND SPEED IS DISCUSSED. THE WEIBULL PROBABILITY DENSITY FUNCTION, A GOOD MODEL FOR WIND SPEED DISTRIBUTIONS, LEADS TO A WEIBULL MODEL FOR DISTRIBUTION OF THE CUBE OF THE WIND SPEED. THIS MODEL FACILITATES THE COMPUTATION OF THE MEAN AND THE STANDARD DEVIATION OF THE TOTAL WIND POWER DENSITY, THE USABLE WIND POWER DENSITY, AND THE WIND POWER DENSITY DURING THE HOURS WHEN AN AEROGENERATOR IS OPERATING. THE WEIBULL MODEL IS APPLIED TO DATA FROM THREE OREGON WIND POWER SITES LOCATED IN RUGGED TERRAIN. IT IS CONCLUDED THAT THE MEAN AND STANDARD DEVIATION OF THE

WIND SPEED ARE THE MINIMUM STATISTICS NECESSARY FOR WIND POWER ESTIMATES, THAT THE WEIBULL MODEL FOR THE WIND POWER DENSITY HAS MANY COMPUTATIONAL ADVANTAGES, AND THAT THE EXISTING WIND POWER STUDIES BASED SOLELY ON THE TOTAL MEAN WIND POWER DENSITY OMIT MUCH VALUABLE INFORMATION ABOUT THE WIND POWER POTENTIAL OF A SITE.

77-0183 HERRERA G, WEINER H, NELSON D
AN ASSESSMENT OF WIND-POWERED GENERATORS FOR NAVIGATIONAL AIDS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1660-1667.

THIS STUDY EXAMINES ALTERNATIVE POWER SYSTEMS INCLUDING AN ASSESSMENT OF WIND-POWERED GENERATORS FOR USE ON NAVIGATIONAL AIDS. DATA FROM A TOTAL OF TWENTY-THREE SITES ON THE EAST, GULF AND WEST COASTS OF THE UNITED STATES WERE EVALUATED FOR THE ANNUAL WIND VELOCITY DISTRIBUTION. WIND ENERGY DATA FROM THE U.S. NAVAL WEATHER SERVICE COMMAND WERE PROCESSED AND ANALYZED WITH THE AID OF A COMPUTER PROGRAM DEVELOPED AT JPL. COMMERCIALLY AVAILABLE WIND-POWERED GENERATORS WERE ASSESSED TO DETERMINE EXISTING SYSTEMS APPLICABLE FOR MARINE USE. COMPARISONS WERE MADE WITH RESPECT TO INITIAL COST AND LIFETIME, BETWEEN WIND-POWERED GENERATORS AND OTHER POWER SYSTEMS APPLICABLE TO MINOR NAVIGATIONAL AIDS. SERVICE, OPERATION AND MAINTENANCE COSTS WERE NOT INCLUDED IN THIS STUDY. THE POWER SYSTEMS ANALYZED AND EVALUATED WERE: (1) WIND-POWERED GENERATORS, (2) SOLAR PHOTOVOLTAIC ARRAYS, (3) WIND-POWERED GENERATORS AND SOLAR PHOTOVOLTAIC ARRAYS IN COMBINATION, (4) ZINC-AIR PRIMARY BATTERIES, AND (5) A WAVE-MOTION POWERED GENERATOR. POWER SYSTEMS CORRESPONDING TO LIGHTHOUSE APPLICATIONS WERE EVALUATED BUT HAVE NOT BEEN INCLUDED IN THIS PAPER DUE TO SPACE LIMITATIONS.

77-0184 HEWSON E W, WADE J E, BAKER R W
VEGETATION AS AN INDICATOR OF HIGH WIND VELOCITY. PHASE 1.
NTIS, JULY 1977. 68P.
RLO/2227-T24-77/2

THE OBJECTIVE OF THIS STUDY IS TO DEVELOP METHODS OF USING WIND DEFORMED VEGETATION FOR THE SELECTION OF OPTIMUM SITES FOR UTILIZATION OF WIND ENERGY. FIVE DIFFERENT INDICES OF WIND EFFECTS ON TREES HAVE BEEN DEVELOPED AND ARE PRESENTLY BEING CALIBRATED IN TERMS OF VARIOUS WIND CHARACTERISTICS. IN ADDITION WIND SHAPED COASTAL SHRUBS ARE BEING INVESTIGATED AS INDICATORS OF PERSISTENT STRONG WINDS. FIELD STUDIES ARE PRESENTLY BEING CONDUCTED IN THE COLUMBIA GORGE AND IN WESTERN OREGON. CONSIDERABLE EFFORT HAS BEEN DEVOTED TO THE DEVELOPMENT OF A COMPLETE REFERENCE LIST CONCERNED WITH WIND DEFORMED VEGETATION. PARTICULARLY USEFUL REFERENCES HAVE BEEN ABSTRACTED AND PRESENTED IN AN APPENDIX.

77-0185 HEWSON E W, BAKER R W, WADE J E
EXECUTIVE SUMMARY ON RESEARCH ON WIND POWER POTENTIAL IN SELECTED AREAS OF OREGON. FINAL REPORT.
OREGON STATE UNIVERSITY, REPORT NUMBER PUD77-5, JUNE 1977. 31P.

THE RESULTS OF A FIVE YEAR RESEARCH STUDY ARE SUMMARIZED AND THE FIFTH YEAR RESULTS DESCRIBED IN DETAIL. CONCLUSIONS ARE (1) SUFFICIENT WIND POWER IS AVAILABLE IN THE NORTHWEST; (2) THE TECHNOLOGY EXISTS; (3) THE ENVIRONMENTAL IMPACTS ARE MINIMAL IF GENERATORS ARE PLACED IN REMOTE AREAS; (4) WIND POWER PLUS HYDROPOWER CAN BE DEVELOPED MORE CHEAPLY THAN A COMBINATION OF HYDRO AND OIL OR GAS; AND (5) WIND POWER, OF ALL THE ALTERNATE ENERGY SOURCES, HAS THE GREATEST POTENTIAL AS A NEAR TERM SOURCE OF ENERGY.

77-0186 HEWSON E W
ENERGY FROM THE WIND; TESTIMONY BEFORE THE SUBCOMMITTEE ON ENERGY RESEARCH AND WATER RESOURCES OF THE INTERIOR COMMITTEE, U.S. SENATE, 2 MARCH 1976.
AMER. METEOROL. SOC. BULL. 58(1): 33-38, JANUARY 1977.

THE TESTIMONY IS ABOUT WIND ENERGY POTENTIAL IN THE PACIFIC NORTHWEST BASED ON RESEARCH BEGUN IN 1971 SPONSORED BY THE FOUR OREGON PUDS (PEOPLES UTILITY DISTRICTS).

77-0187 HIGHTOWER S J, WATTS A W
A PROPOSED CONCEPTUAL PLAN FOR INTEGRATION OF WIND TURBINE GENERATORS WITH A HYDROELECTRIC SYSTEM.

MISSOURI BASIN SYSTEMS GROUP, ANNUAL MEETING, SIOUX FALLS, S.D., MARCH 9, 1977. PROCEEDINGS. DENVER, COLORADO, BUREAU OF RECLAMATION, LOWER MISSOURI REGION, 1977. 41P.

A COMPREHENSIVE STUDY OF THE PERFORMANCE, COST AND MARKETING ASPECTS OF A LARGE WINDPOWER SYSTEM INTEGRATED WITH AN EXISTING HYDROELECTRIC NETWORK HAS BEEN ACCOMPLISHED FOR A HIGH WIND REGION IN SOUTHERN WYOMING. THE STUDY WAS CARRIED OUT AS A PORTION OF THE WESTERN ENERGY EXPANSION STUDIES WHICH ARE BEING CONDUCTED BY THE BUREAU OF RECLAMATION TO LOOK INTO THE POSSIBILITIES OF UPRATING EXISTING HYDROELECTRIC FACILITIES AND TO PROVIDE OPTIMUM UTILIZATION OF THE HYDROELECTRIC RESOURCES AND THE POWER TRANSMISSION NETWORK IN THE WESTERN UNITED STATES.

77-0188 HILTON D J
SOME WINDPOWER DEVELOPMENTS IN KENYA.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X75-X76.

RELIABLE WIND RESOURCES IN KENYA ARE TO BE FOUND MAINLY IN TWO AREAS, NAMELY THE FLAT, ARID NORTH EASTERN REGION AND IN THE WEST AROUND LAKE VICTORIA. IT HAS BEEN FOUND THAT THE WINDS IN THESE AREAS ARE MORE USEFUL THAN WAS FORMERLY THOUGHT. THE REASON FOR THIS IS THAT PREVIOUS WIND DATA IN THESE AREAS WAS SPARSE AND CONSISTED MAINLY OF DAY-TIME BEAUFORT ESTIMATES. IN AREAS WHERE LARGE TREES ARE ABSENT THIS LED TO AN UNDERESTIMATION OF WIND VELOCITY AND COMPLETELY IGNORED NIGHT WINDS, WHICH PARTICULARLY IN THE NORTH-EAST CAN BE VERY STRONG. CONVENTIONAL WATER-PUMPING MILLS OF THE MULTI-BLADE TYPE HAVE BEEN USED IN KENYA IN THE PAST BUT MAINLY IN THE HIGH-POTENTIAL FARMING AREAS WHERE THE WIND WAS NOT PARTICULARLY RELIABLE. WITH VERY FEW EXCEPTIONS THEY WERE NOT EMPLOYED IN THOSE AREAS OF GREATEST WIND POTENTIAL. ATTENTION IS NOW BEING GIVEN, HOWEVER, TO THE USE OF WINDPUMPS FOR SMALL SCALE IRRIGATION AND IN THE RANCHING AREAS FOR WATERING CATTLE. A THIRD COMMON APPLICATION IS SEEN AS PUMPING WATER FROM AN EARTH DAM OR WELL THROUGH A SAND FILTER FOR HUMAN CONSUMPTION.

77-0189 KALKE S, GJERDING J, GUSTAFSSON F
TVIND POWER WINDMILL.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 323-327. (IN GERMAN)

THE POWER WINDMILL WHICH WAS CONSTRUCTED IN DENMARK DURING THE PERIOD 1975-1977 IS DESCRIBED. IT IS A FAST RUNNING TYPE AND CONSISTS OF A TOWER, A DOME OF A MILL AND THREE BLADES. THE HEIGHT OF THE TOWER IS 53 METRES, AND THE DIAMETER OF THE BLADES 54 METRES.

77-0190 HIRSCHFELD F
WIND POWER: PIPE DREAM OR REALITY?
MECH. ENG. 99(9): 20-28, SEPTEMBER 1977.

ON PAPER, ERDA'S CASE FOR WIND ENERGY CONVERSION SYSTEMS LOOKS GOOD. BUT PRIVATE ENTERPRISE IS TAKING A "SHOW-ME" ATTITUDE. ARE WIND MACHINES RELIABLE, ECONOMICAL, AND COMPATIBLE WITH EXISTING POWER-GENERATING AND DISTRIBUTION FACILITIES? THESE ARE SOME OF THE QUESTIONS THAT A SMALL BUT DEDICATED GROUP OF ENGINEERS AND SCIENTISTS AT THE WIND ENERGY CONVERSION BRANCH OF ERDA ARE TRYING TO ANSWER.

77-0191 HOFFMAN J A
COUPLED DYNAMICS ANALYSIS OF WIND ENERGY SYSTEMS.
NTIS, FEBRUARY 1977. 86P.
NASA-CR-135152, N77-20558

A QUALITATIVE DESCRIPTION OF ALL KEY ELEMENTS OF A COMPLETE WIND ENERGY SYSTEM COMPUTER ANALYSIS CODE IS PRESENTED. THE ANALYSIS SYSTEM ADDRESSES THE COUPLED DYNAMICS CHARACTERISTICS OF WIND ENERGY SYSTEMS, INCLUDING THE INTERACTIONS OF THE ROTOR, TOWER, NACELLE, POWER TRAIN, CONTROL SYSTEM, AND ELECTRICAL NETWORK. THE COUPLED DYNAMICS ARE ANALYZED IN BOTH THE FREQUENCY AND TIME DOMAIN TO PROVIDE THE BASIC MOTIONS AND LOADS DATA REQUIRED FOR DESIGN, PERFORMANCE VERIFICATION AND OPERATIONS ANALYSIS ACTIVITIES. ELEMENTS OF THE COUPLED ANALYSIS CODE WERE USED TO DESIGN AND ANALYZE CANDIDATE ROTOR ARTICULATION CONCEPTS. FUNDAMENTAL RESULTS AND CONCLUSIONS DERIVED FROM THESE STUDIES ARE

PRESENTED.

77-0192 HOHENEMSER K H
ENERGY: A COMMUNITY SOLAR AND WIND ENERGY SYSTEM.
ENVIRONMENT 19(2): 3-4, MARCH 1977.

A SUMMARY OF A THESIS BY A. H. P. SWIFT IS GIVEN PROPOSING AN ENERGY SYSTEM FOR A COMMUNITY OF 40 HOMES IN WHICH SOLAR AND WIND ARE USED FOR ELECTRICITY AND HEATING.

77-0193 HOHENEMSER K H, INGLIS D R
WINDPOWER UPDATE.
ENVIRONMENT 19(1): 5, 37, JANUARY-FEBRUARY 1977. REPLY WITH REJOINDER, D. R. INGLIS: ENVIRONMENT 19(4): 43-44, MAY 1977.

77-0194 HOLDEN C
NCAT: APPROPRIATE TECHNOLOGY WITH A MISSION.
SCIENCE 195(4281): 857-859, MARCH 4, 1977.

APPROPRIATE TECHNOLOGY IS GETTING A SMALL BUT SIGNIFICANT BOOST FROM THE FEDERAL GOVERNMENT, WHICH HAS AWARDED $3 MILLION TO A NEW NATIONAL CENTER FOR APPROPRIATE TECHNOLOGY IN BUTTE, MONTANA. THE MONEY COMES FROM THE COMMUNITY SERVICES ADMINISTRATION, THE AGENCY WITH THE LEFTOVERS OF THE OLD OFFICE OF ECONOMIC OPPORTUNITY. THE PEOPLE BEHIND THE CENTER COME FROM A BACKGROUND OF COMMUNITY ACTIVISM AND BELIEVE THE TIME HAS COME TO BRING APPROPRIATE TECHNOLOGY WHERE IT IS MOST NEEDED. THE BEST AVAILABLE EXAMPLE OF WHAT THE CENTER HOPES TO STIMULATE IS A WINDMILL AND SOLAR COLLECTION SYSTEM ON A DILAPIDATED BUILDING IN A POOR SECTION OF NEW YORK CITY.

77-0195 HOLGATE M J
CROSS FLOW WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. B2.29-B2.38.

A THEORETICAL ANALYSIS IS PRESENTED OF THE OPERATION OF A TYPE OF CROSS FLOW TURBINE THAT DEPENDS FOR ITS ACTION ON ANGULAR MOMENTUM CONVERSION RATHER THAN AERODYNAMIC LIFT. EXPERIMENTAL RESULTS CONFIRM THE THEORETICAL PREDICTIONS TO A SATISFACTORY DEGREE. THESE ARE THAT WHILE THE TURBINE DOES DEVELOP A STARTING TORQUE AND HAS A STABLE TORQUE-SPEED CHARACTERISTIC, IT RUNS AT LOW VELOCITY RATIO AND HAS A LOW EFFICIENCY OF ENERGY CONVERSION.

77-0196 HOLMES J G, BALUSS J E, MIHLMESTER P E, MILLER S G, SUPER T L, THOMASANIAN J B
ENVIRONMENTAL AND SAFETY IMPLICATIONS OF 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. P. 285-289.

A SUMMARY OF AN EIGHT-VOLUME SERIES OF ENVIRONMENTAL REVIEWS (ERDA 77-47/1-8) PREPARED FOR THE ENVIRONMENTAL AND RESOURCE ASSESSMENTS BRANCH OF ERDA'S DIVISION OF SOLAR ENERGY BY ENERGY AND ENVIRONMENTAL ANALYSIS, INC., OF ARLINGTON, VIRGINIA IS PRESENTED. THE SERIES ANALYZED THE WIDE RANGE OF ENVIRONMENTAL IMPACTS EXPECTED TO OCCUR THROUGH THE IMPLEMENTATION OF THE EIGHT SOLAR TECHNOLOGIES CURRENTLY BEING FUNDED BY ERDA: HEATING/COOLING, SOLAR THERMAL ELECTRIC, TOTAL ENERGY SYSTEMS, INDUSTRIAL/AGRICULTURAL APPLICATIONS, PHOTOVOLTAICS, WIND, OCEAN THERMAL ENERGY CONVERSION, AND FUELS FROM BIOMASS.

77-0197 HOLME O
A CONTRIBUTION TO THE AERODYNAMIC THEORY OF THE VERTICAL AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C4-55 TO C4-72.

AN ANALYSIS IS MADE OF THE FLOW IN THE HORIZONTAL PLANE OF SYMMETRY OF A FAST RUNNING VERTICAL-AXIS WIND TURBINE HAVING A GREAT NUMBER OF STRAIGHT, VERY NARROW BLADES AND A HIGH HEIGHT-DIAMETER RATIO. THE ANALYSIS IS RIGOROUSLY VALID FOR ONLY VERY LIGHTLY LOADED TURBINES IN INCOMPRESSIBLE NONVISCOUS FLOW, BUT APPROXIMATIONS FOR HEAVIER LOADING

AND CORRECTIONS FOR VISCOUS EFFECTS ARE DERIVED. IT IS FOUND THAT HALF OF THE FLOW RETARDATION CAUSED BY THE TURBINE TAKES PLACE WITHIN THE TURBINE ITSELF. THUS BLADE INCIDENCE AND AERODYNAMIC LOAD ON THE BLADES ARE MUCH HIGHER ON THE WINDWARD THAN ON THE LEEWARD SIDE OF THE TURBINE. THE MAXIMUM VALUE OF THE POWER COEFFICIENT IN NON-VISCOUS FLOW FOR THIS TYPE OF TURBINE IS 92% OF THE THEORETICAL MAXIMUM FOR AN IDEAL WIND TURBINE.

77-0198 HOSLER C L
EXOTIC ENERGY SOURCES; THE PROMISE AND THE REALITY.
MIN. ENG. 29: 62+, MAY 1977.

77-0199 HOWE J W
ENERGY FOR THE VILLAGES OF AFRICA: RECOMMENDATIONS FOR AFRICAN GOVERNMENTS AND OUTSIDE DONORS.
WASHINGTON, D.C., OVERSEAS DEVELOPMENT COUNCIL, FEBRUARY 25, 1977. 145P.

THE SUBJECT OF VILLAGE SOURCE ENERGY FOR THE VILLAGES AND FARMS OF SUB-SAHARAN AFRICA IS EXAMINED, AND A COURSE OF ACTION FOR AFRICAN POLICYMAKERS AND OUTSIDE DONORS IS RECOMMENDED. VILLAGE SOURCE ENERGY INCLUDES THOSE FORMS OF PRIMARY ENERGY FOUND IN THE VILLAGES AND FARMS (SUN, WIND, FLOWING WATER, ANIMAL AND CROP WASTE, AND WOOD). THE FIRST QUESTION FOR AFRICANS TO RESOLVE IS WHETHER VILLAGE SOURCE ENERGY IS A FEASIBLE APPROACH - OR WHETHER RURAL AFRICANS MUST WAIT THE DECADES THAT WILL ELAPSE BEFORE A POWER GRID BRINGS THEM RELIABLE CENTRALLY GENERATED ELECTRICITY. THIS PAPER OUTLINES A COURSE OF ACTION FOR DEVELOPING THE INFORMATION NEEDED FOR AFRICANS TO MAKE TWO DECISIONS: (1) WHETHER VILLAGE-SOURCE ENERGY WARRANTS USE ON A WIDE SCALE AND, IF SO, (2) WHAT SYSTEM TO USE TO MATCH ENERGY HARDWARE WITH VILLAGE NEEDS AND TO INSTALL IT IN VILLAGES TOGETHER WITH A SUPPORT SYSTEM THAT WILL MAINTAIN IT, PROVIDE REPAIRS AND SPARE PARTS, AND GENERALLY KEEP IT OPERATING. THE COURSE OF ACTION CONSISTS OF THREE PARTS. 1. AFRICAN GOVERNMENTS, PERHAPS WORKING WITH OUTSIDE DONORS, SHOULD CONDUCT CERTAIN RESEARCH CALLED "SOFTWARE." 2. CREATE OR STRENGTHEN ENERGY-RELATED INSTITUTIONS. 3. IN THE FIELD OF HARDWARE RESEARCH, THREE THINGS ARE CALLED FOR: (A) INDUSTRIALIZED COUNTRIES' DOMESTIC ENERGY AND RESEARCH PROGRAMS SHOULD DEVOTE MORE ATTENTION TO SMALL-SCALE RENEWABLE ENERGY; (B) AID PROGRAMS SHOULD STRENGTHEN THEIR HELP TO AFRICAN RESEARCH ON HARDWARE BOTH TO APPLY AND ADAPT ENERGY TECHNOLOGIES DEVELOPED ELSEWHERE AND TO DEVELOP INDIGENOUS TECHNOLOGIES; AND (C) AID PROGRAMS SHOULD PROVIDE MORE HELP TO AFRICAN INSTITUTIONS TO DESIGN AND BUILD CHEAP, RELIABLE TOOLS, IMPLEMENTS AND APPLIANCES THAT CAN BE USED BY HAND OR POWERED BY VILLAGE SOURCE ENERGY TO PERFORM VILLAGE TASKS.

77-0200 HUGOSSON S
SWEDISH WIND ENERGY PROGRAMME.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 27-38. (IN GERMAN)

A SURVEY IS PRESENTED ON THE SWEDISH WIND ENERGY PROGRAM INITIATED IN 1973. AMONG OTHERS, ORGANIZATION OF THE PROGRAM, CHOICE OF APPLICATIONS, CHOICE OF TECHNOLOGY ARE DISCUSSED. IT WAS DECIDED TO DEVOTE MOST OF THE EFFORTS TO DEVELOP LARGE UNITS CONNECTED TO THE NATIONAL ELECTRIC POWER SYSTEM. HORIZONTAL AXIS PROPELLER-TYPE TURBINES ARE THE MAIN TECHNOLOGY CHOSEN FOR THE PROGRAM.

77-0201 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).
NTIS, JUNE 1977. 157P.
NTIS/PS-77/0400/0WE

THE 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.

77-0202 HUNDEMANN A S
WIND POWER (CITATIONS FROM THE NTIS DATA BASE).

NTIS, JUNE 1977. 258P.
NTIS/PS-77/0399/4WE

THIS BIBLIOGRAPHY SUPERCEDES EARLIER ONES BY THE SAME AUTHOR. 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.

77-0203 HUTTER U
OPTIMUM WIND-ENERGY CONVERSION SYSTEMS.
ANN. REV. FLUID MECH. 9: 399-419, 1977.

INFORMATION ON OPTIMUM CHARACTERISTICS OF WIND TURBINES IS PRESENTED CONCERNING THE ADVANTAGES OF HIGH SPECIFIC SPEED, LIMITATIONS FOR SPECIFIC SPEED, ROTOR CHARACTERISTICS AT STALL STATE, THE ROTOR'S DISC-VELOCITY COEFFICIENT, VORTEX-STATE PROBLEMS, THE NEAR CRITICAL OPERATING ROTOR (NCR), REFINEMENTS SIMPLIFICATIONS, AND OPTIMUM RATED POWER.

77-0204 HUTTER U
CHANCES OF WIND POWER.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 3-8, MAY 1977. (IN GERMAN)

THE ARTICLE PRESENTS A SURVEY OF THE POSSIBILITIES TO USE WIND POWER IN WESTERN EUROPE, IN PARTICULAR IN THE FRG. THE WIND POWER POTENTIAL OF THE FRG AMOUNTS TO 220 TWH/A, WHICH REPRESENTS ABOUT 70% OF THE ELECTRIC POWER USED IN 1973. ON A MEDIUM-TERM BASIS (I.E. UNTIL 1990), WIND POWER PLANTS COULD MEAN A NOTICEABLE RELIEF FOR PUBLIC UTILITIES. CONCEPTS OF WIND POWER PLANTS ARE DISCUSSED. IN THIS CONTEXT, A COMPROMISE BETWEEN PLANT CAPACITY AND WIND AVAILABILITY IS TO BE CONSIDERED. FINALLY, THE COSTS OF PLANTS OF THIS KIND ARE DISCUSSED.

77-0205 HUTTER U
WIND POWER.
NTIS, 1977. 4P.
AED-CONF-77-139-004

THIS PAPER WAS GIVEN AT THE ENERGY POLICIES FORUM, STUTTGART, WEST GERMANY, MAY 9, 1977. A SURVEY IS PRESENTED OF THE POSSIBILITIES TO UTILIZE WIND POWER. IN THE FRG, WIND POWER PLANTS COULD MEET ABOUT 70% OF THE ELECTRICITY DEMAND (APPROXIMATELY 200 TWH ON THE BASIS OF FIGURES OF 1973). INTERCONNECTED OPERATION BETWEEN WIND POWER CONVERTERS AND SOLAR ENERGY COLLECTORS FOR SUPPLYING REMOTE PROPERTIES OR VILLAGES SEEMS PARTICULARLY PROMISING.

77-0206 HUTTER U
POSSIBILITIES OF AND FUTURE FOR THE USE OF WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 1-15. (IN GERMAN)

THE POSSIBILITIES OF AND FUTURE FOR THE USE OF WIND ENERGY IN WEST GERMANY ARE DISCUSSED, BASED ON METEROLOGICAL DATA. TAKING INTO ACCOUNT VARIOUS TECHNICAL AND ECONOMIC FACTORS IT IS PROPOSED TO INSTALL WIND-POWERED CONVERTERS IN THE 2 MW TO 5 MW CLASS AT ABOUT 5 TIMES DIAMETRAL SPACING ALONG EXISTING REGIONAL ROADS.

77-0207 HWANG H H, GILBERT L J
RANDOM SYNCHRONIZATION OF THE ERDA-NASA 100 KW WIND TURBINE GENERATORS WITH LARGE UTILITY NETWORKS.
NTIS, JULY 1977. 17P.
NASA-TM-X-73613, N77-19580

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.

77-0208 IGNATIUS N
GUIDE TO DEMONSTRATIONS OF ENERGY CONSERVATION, SOLAR ENERGY AND OTHER NEW TECHNOLOGIES: ENERGY EXTENSION SERVICE.
NTIS, SEPTEMBER 1977. 307P.
TID-28044

THIS GUIDE WAS COMPILED BY THE ENERGY EXTENSION SERVICE (EES) FOR USE BY STATE EES PLANNERS. IT IS INTENDED TO FACILITATE VIEWING OF SOLAR, CONSERVATION, AND OTHER ENERGY TECHNOLOGIES AT WORK. THE DEMONSTRATIONS LISTED IN THIS GUIDE HAVE GENERALLY BEEN LIMITED TO THOSE MOST APPLICABLE TO INDIVIDUAL HOMEOWNERS, SMALL BUSINESSES, SCHOOLS, AND FARMS. IN A FEW STATES, HOWEVER, MUNICIPAL SYSTEMS HAVE ALSO BEEN INCLUDED. MANY OF THESE PROJECTS HAVE RECEIVED FEDERAL FUNDING. THE MAJORITY OF PROJECTS DEMONSTRATE SOME FORM OF SOLAR ENERGY. IN ADDITION TO SOLAR HEATING AND COOLING FOR HOMES AND COMMERCIAL BUILDINGS, A NUMBER OF EXAMPLES OF FARM APPLICATIONS SUCH AS SOLAR CROP DRYING ARE LISTED, AS WELL AS DEMONSTRATIONS OF WIND ENERGY, BIOMASS, PHOTOVOLTAICS, ETC. SINCE ALL SUCCESSFUL SOLAR HEATING AND COOLING SYSTEMS INCORPORATE SENSIBLE ENERGY-CONSERVING DESIGN, EACH SOLAR HEATING AND/OR COOLING PROJECT IS AT THE SAME TIME AN ENERGY-CONSERVATION PROJECT. WHEN THESE CONSERVATION DESIGNS ARE OF SPECIAL INTEREST OR INVENTIVENESS, THIS HAS BEEN NOTED. IN A FEW CASES, PROJECTS DEMONSTRATE ONLY CONSERVATION MEASURES, SUCH AS THE CONSTRUCTION OF BUILDINGS UNDERGROUND.

77-0209 IGRA O
COMPACT SHROUDS FOR WIND TURBINES.
ENERGY CONVERS. 16(4): 149-157, 1977.

AS PART OF A LARGE PROJECT AIMED AT FINDING THE OPTIMAL CONFIGURATION FOR AN AEROGENERATOR TO EXPLOIT WIND POWER, AN INVESTIGATION WAS LAUNCHED TO FIND THE MOST COMPACT SHROUD POSSIBLE. THE DOMINANT CONTRIBUTOR TO THE SHROUD LENGTH IS THE STRUCTURE DOWNSTREAM OF THE TURBINE (THE DIFFUSER). THIS COMPONENT HAS AN EVER INCREASING CROSS-SECTION AS ONE PROGRESSES DOWNSTREAM. HOWEVER, FAST RATE OF AREA DIVERGENCE WILL CAUSE FLOW SEPARATION AND THE SIGNIFICANT REDUCTION IN OUTPUT POWER ASSOCIATED WITH IT. IT IS THE PURPOSE OF THE PRESENT PAPER TO DEMONSTRATE WAYS TO OVERCOME THIS DIFFICULTY. THIS CAN BE ACHIEVED EITHER BY PROPER DIVERSION AND INTRODUCTION OF THE SHROUD'S EXTERNAL FLOW INTO THE DIFFUSER'S INNER BOUNDARY LAYER OR, ALTERNATIVELY, BY THE USAGE OF A RING-FLAP.

77-0210 IGRA O
SHROUDED AEROGENERATOR.
ENERGY 2(4): 429-439, DECEMBER 1977.

EXPERIMENTAL STUDIES HAVE BEEN PERFORMED ON A SHROUDED AEROGENERATOR. THE DEVICE TESTED WILL PRODUCE ABOUT TWICE THE OUTPUT POWER OBTAINABLE FROM AN IDEAL WIND TURBINE WORKING UNDER THE SAME FREESTREAM CONDITIONS BUT WITHOUT A DUCT. THE AEROGENERATOR DOES NOT REQUIRE A DRIVING MECHANISM THAT WILL KEEP IT PARALLEL TO THE FREE-STREAM DIRECTION. A SIMPLE, TWO STAGE TURBINE WITH FIXED BLADE GEOMETRY WILL PROVIDE THE EXPECTED POWER OUTPUT OVER A FAIRLY WIDE RANGE OF FREE-STREAM VELOCITIES AND ROTATIONAL SPEEDS.

77-0211 IN THE WIND (OR SOON TO BE).
SCI. DIG. 82(4): 28-29. OCTOBER 1977.

77-0212 EVANS M
AN INFORMAL DIRECTORY OF U.S. WINDPLANT MANUFACTURERS, DISTRIBUTORS, AND RESOURCE GROUPS.
MOTHER EARTH NEWS 46: 34-35, JULY/AUGUST 1977.

77-0213 INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH.
PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. 1035P.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, WASHINGTON, D.C., AUGUST 28, 1977.

NINETY-SEVEN PAPERS ARE PRESENTED IN VOLUME II ON VARIOUS ASPECTS OF ENERGY CONVERSION. THOSE PAPERS ON WIND ENERGY ARE INDEXED SEPARATELY IN THIS BIBLIOGRAPHY.

77-0214 INTERVIEW WITH JIM MARTIN; BUILDING A WIND MACHINE.
WIND POWER DIG. 1(9): 48-55, SUMMER 1977.

77-0215 JACKSON P S
ASPECTS OF SURFACE WIND BEHAVIOUR.
WIND ENG. 1(1): 1-4, 1977.

THIS PAPER OUTLINES THE CURRENT UNDERSTANDING OF SOME OF THE PROBLEMS FACING THE ENGINEER IN CHOOSING A DESIGN WIND SPEED FOR A PARTICULAR SITE. FOR THE MOST PART THE COMPLEXITY OF THESE PROBLEMS DEFIES ANALYTIC TREATMENT OR COMPREHENSIVE MEASUREMENTS, BUT THERE ARE NOW SUFFICIENT STUDIES OF THE SIMPLER CASES TO MAKE THIS REVIEW WORTHWHILE. MOST OF THE RELEVANT MATERIAL HAS APPEARED SINCE 1970. THE BASIC MEAN WIND PROFILE ADOPTED IS THE LOG-LAW, SINCE IT CAN BE DERIVED FROM THE EQUATIONS OF MOTION UNDER IDEAL (BUT RATHER RESTRICTIVE) CONDITIONS. ALTHOUGH THESE CONDITIONS ARE RARELY MET IN PRACTICE, IT IS SHOWN THAT THE LOG-LAW FORMULATION NEVERTHELESS DESCRIBES A VERY USEFUL REFERENCE STATE OF THE WIND NEAR THE GROUND. THE EFFECTS OF CHANGES IN SURFACE ROUGHNESS AND VARIATIONS IN SURFACE SLOPE ARE DERIVED AS PERTURBATIONS TO THIS IDEAL STATE. TWO METHODS OF DESCRIBING EXTREME WIND GUSTS ARE ALSO DISCUSSED.

77-0216 JACOBS M
FEEDBACK.
WIND POWER DIG. 1(9): 5, SUMMER 1977.

THIS IS A SHARP REBUTTAL TO INFORMATION CONTAINED IN AN EARLIER ARTICLE IN WPD (1, #8, P. 6, SPRING 1977) ABOUT MARTIN JOPP'S WINDPLANT.

77-0217 JACOBS M
MARCELLUS JACOBS ON RAISING A TOWER.
ALTERN. SOURCES ENERGY NO. 29: 11-13, DECEMBER 1977.

77-0218 JANSEN W A M, SMULDERS P T
ROTOR DESIGN FOR HORIZONTAL AXIS WINDMILLS.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE FOR WINDENERGY IN DEVELOPING COUNTRIES, PUBLICATION SWD77-1, MAY 1977.

77-0219 JARASS L
STROMERZEUGUNG AUS WINDKRAFT: EIN ALTER TRAUM KANN WIRKLICHKEIT WERDEN.
ENERGIEWIRTSCH. TAGESFRAGEN 26(6): 357-365, 1978. (IN GERMAN)

77-0220 JOHANSON E E
STATUS OF WIND ENERGY CONVERSION SYSTEMS (WECS) FOR ELECTRIC UTILITY POWER GENERATION.
AM. NUCL. SOC. TRANS 26: 2, JUNE 1977.

77-0221 JOHNSON A W
APPLIED RESEARCH ON ENERGY STORAGE AND CONVERSION FOR PHOTOVOLTAIC AND WIND ENERGY SYSTEMS.
NTIS, 1977. P. 437-446.
CONF-770112

THE OVERALL PURPOSE OF THE PROGRAM, AS ORIGINALLY CONCEIVED, WAS TO OBTAIN SYSTEM-ORIENTED EVALUATIONS OF SELECTED CANDIDATE ENERGY STORAGE CONCEPTS FOR USE IN CONJUNCTION WITH PHOTOVOLTAIC AND WIND ENERGY CONVERSION SYSTEMS. INCLUDED ARE: (1) REVIEW OF ADDITIONAL CANDIDATE ENERGY STORAGE CONCEPTS (11 TOTAL); (2) EVALUATION OF THE INFLUENCE OF SELECTED PARAMETERS SUCH AS GENERATING SYSTEM OUTPUT, STORAGE CAPACITY, LOCATION AND EFFICIENCY ON ENERGY STORAGE COST GOALS; (3) EVALUATION OF THE EFFECT OF MULTIPLE-SOURCE STORAGE SYSTEM CHARGING ON THE WORTH OF PHOTOVOLTAIC AND WIND ENERGY SYSTEMS; AND (4) DETERMINATION OF THE VALUE OF TRANSIENT PHOTOVOLTAIC AND WIND ENERGY SYSTEM OUTPUT SMOOTHING USING ENERGY STORAGE TECHNIQUES.

77-0222 JOHNSON L R, SIMMONS G, PETERSON J
UNCONVENTIONAL ENERGY SOURCES. STUDY MODULE. (FINAL).
NTIS, 1977. 278P.
PB-268301

THIS REPORT REVIEWS AVAILABLE LITERATURE AND CURRENT STATE-OF-THE-ART ON UNCONVENTIONAL ENERGY SOURCES: GEOTHERMAL, BIOMASS, OCEAN, WIND, SOLAR. IT ESTIMATES QUANTITIES OF ENERGY AVAILABLE TO THE PACIFIC NORTHWEST (OREGON, WASHINGTON, IDAHO) AND THE COSTS OF RECOVERING AND UTILIZING ENERGY FROM THESE SOURCES. THE SUMMARY CONTAINS PROJECTIONS OF THE CONTRIBUTION OF UNCONVENTIONAL SOURCES TO NORTHWEST ENERGY NEEDS. AN ANNOTATED BIBLIOGRAPHY IS INCLUDED.

77-0223 JOHNSON L
WIND ENERGY UP-DATE.
RAIN III(9): 16-18, JULY 1977.

77-0224 JOHNSON L
WISE-WIND, DESIGNING FOR JOBS.
WIND POWER DIG. 1(9): 24-26, SUMMER 1977.

THE GEDSER WINDMILL, BUILT IN 1957 IN GERMANY, IS DESCRIBED AS AN EFFICIENT MACHINE WHICH COULD BE BUILT ECONOMICALLY, CREATING JOBS AS WELL AS AN ENERGY PRODUCING DEVICE.

77-0225 JONES B W, MORETTI P M
ECONOMIC ANALYSIS OF WIND GENERATION AND ENERGY STORAGE FOR ELECTRIC UTILITY SYSTEMS.
ANNUAL CONFERENCE ON ENERGY, 3D, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 13, 1976. PROCEEDINGS. NORTH HOLLYWOOD, WESTERN PERIODICAL CO., 1977. P. 255-263.

IF WIND GENERATORS ARE BEING EVALUATED AS PART OF A LARGER ELECTRIC UTILITY GENERATION SYSTEM, THE ECONOMIC ANALYSIS SHOULD CONSIDER ALL OF THEIR EFFECTS UPON THE MAKE-UP AND OPERATION OF THE REST OF THE SYSTEM. THE INTRODUCTION OF WIND GENERATORS CHANGES THE CHARACTERISTICS OF THE EFFECTIVE LOAD SEEN BY THE REST OF THE SYSTEM AND CONSEQUENTLY SHIFTS THE OPTIMAL MIX OF BASE, SWINGING, AND PEAKING CAPACITY AND THEIR OPERATION. STORAGE SYSTEMS USED IN CONJUNCTION WITH WIND GENERATORS MUST ALSO BE EVALUATED. THE STORAGE CAN ALSO BE EVALUATED BY DETERMINING ITS EFFECT UPON LOAD CHARACTERISTICS. IT IS SHOWN THAT THE STORAGE EVALUATION AND WIND-GENERATION EVALUATION CAN BE SEPARATED IN MOST CASES.

77-0226 MAGNIEN M
UTILIZING ALTERNATIVE ENERGY SOURCES IN FRANCE.
J. ENERGY RES. 1: 55-67, JANUARY - MARCH 1977.

THE RELATIVE MERITS OF VARIOUS ALTERNATIVE-ENERGY SOURCES ARE DISCUSSED WITH PARTICULAR REFERENCE TO THEIR SUITABILITY IN THE FRENCH CONTEXT. THE CASE IS PRESENTED FOR DECENTRALIZED SOLAR POWER AS AGAINST CENTRALIZED SOLAR-POWER PRODUCTION, AND SOME TEST INSTALLATIONS IN FRANCE ARE DESCRIBED. THE POTENTIAL FOR GEOTHERMAL POWER IS EXAMINED, AND IT IS SHOWN THAT THE RESOURCE IS ESSENTIALLY NONRENEWABLE. A HISTORY OF WIND GENERATION IN FRANCE IS PRESENTED, AND POWER EXTRACTION FROM THE SEAS IS DISCUSSED, WITH PARTICULAR REFERENCE TO THE RANCE TIDAL-POWER SCHEME. WHILE THE PUBLIC ROMANCE WITH ALTERNATIVE-ENERGY SCHEMES IS ACCEPTED, IT IS POINTED OUT THAT THIS MAY ONLY LAST FOR AS LONG AS THEIR IMPLEMENTATION IS ON A SMALL SCALE.

77-0227 JORDAN P F, GOLDMAN R L
SEGMENTED AND SELF-ADJUSTING WIND TURBINE ROTORS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1676-1683.

AN EXPLORATION HAS BEEN MADE OF THE CONCEPT OF AEROELASTICALLY SELF-ADJUSTING ROTOR BLADES DESIGNED WITH TWO GOALS IN MIND: ONE, TO KEEP (AT CONSTANT ROTOR RPM) THE ROTOR TORQUE OUTPUT ESSENTIALLY CONSTANT AUTOMATICALLY OVER A LARGE RANGE OF WIND SPEEDS; TWO, TO HAVE THE UNSTEADY AERODYNAMIC FORCES ACT AS DAMPING FORCES (RATHER THAN AS FLUTTER-PRODUCING FORCES). PRACTICAL CONSIDERATIONS LEAD TO A SEGMENTED BLADE DESIGN. THE PRELIMINARY RESULTS CONCERNING BOTH PERFORMANCE AND STABILITY OF SUCH BLADES ARE ENCOURAGING.

77-0228 MARIER D
TOWER RAISING WITH A GIN POLE.
ALTERN. SOURCES ENERGY NO. 24: 23, FEBRUARY 1977.

PHOTOGRAPHS AND DESCRIPTIONS SHOW HOW THE AUTHOR RAISED A 60-FOOT WINDMILL TOWER USING A GIN POLE.

77-0229 MARIER D
WIND TOWER.
ALTERN. SOURCES ENERGY NO. 26: 32-34, JUNE 1977.

STEP-BY-STEP ILLUSTRATED INSTRUCTIONS ARE PROVIDED FOR SETTING UP A WIND TOWER.

77-0230 JUSTUS C G
THE POTENTIAL FOR POWER PRODUCTION BY LARGE DISPERSED ARRAYS OF WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A2.23-A2.38

THE PERFORMANCE CHARACTERISTICS HAVE BEEN SIMULATED FOR LARGE DISPERSED ARRAYS OF 500 KW - 1500 KW WIND TURBINES PRODUCING POWER AND FEEDING IT DIRECTLY INTO NEW ENGLAND (U.S.) UTILITY DISTRIBUTION GRID. THESE STUDIES SHOW THAT IN MODERATE-TO-GOOD WIND ENVIRONMENTS THE 500 KW GENERATORS CAN AVERAGE (ON AN ANNUAL BASIS) 190 TO 240 KW MEAN POWER OUTPUT, AND THE 1500 KW GENERATORS (WHICH MUST HAVE HIGHER WINDS TO OPERATE AT FULL CAPACITY) CAN AVERAGE 240 TO 340 KW MEAN POWER OUTPUT. THE BENEFICIAL EFFECT OF OPERATING LARGE DISPERSE ARRAYS OF WIND TURBINES IS THAT RELIABLE POWER OUTPUT CAN BE INCREASED - IF WINDS ARE NOT BLOWING OVER ONE PART OF THE ARRAY, CHANCES ARE THEY WILL OVER SOME OTHER PART OF THE ARRAY. THESE STUDIES INDICATE THAT 100 KW PER 500 KW GENERATOR CAN BE ACHIEVED WITH ABOUT 70% TO 85% RELIABILITY (DEPENDING ON SEASON) WITH NO STORAGE INVOLVED, BY SPREADING THE WIND TURBINES OVER A DISPERSE GRID ABOUT 500 KM SIZE. THE 1500 KW UNITS PRODUCE 100 KW EACH WITH ABOUT 55% TO 75% RELIABILITY FOR THE SAME SIZE ARRAY. RELIABILITY LEVELS OF 200 KW PER 500 KW GENERATOR WERE SIMILARLY FOUND TO BE 45% TO 65%, DEPENDING ON THE SEASON, WITH 200 KW PER 1500 KW GENERATOR HAVING 40% TO 60% RELIABILITY. THE ARRAY STUDIES ALSO SHOW THE LEVELS OF RELIABILITY WHICH CAN BE ACHIEVED WITH STORAGE OF VARIOUS DESIGN DURATION. A STORAGE TIME OF 24 TO 48 HOURS WOULD INCREASE THE 200 KW PER GENERATOR POWER OUTPUT TO ABOUT 95% RELIABILITY. REASONABLY STEADY HIGH WIND POWER IN WINTER AND HIGH AFTERNOON PEAK WIND POWER IN SUMMER (CORRESPONDING TO PEAK AIR CONDITIONING LOAD) MEANS HOWEVER, THAT SIGNIFICANT PEAK LOAD DISPLACEMENT CAN BE ACHIEVED WITHOUT USE OF STORAGE.

77-0231 JUSTUS C G, HARGRAVES W R, MIKHAIL A
REFERENCE WIND SPEED STATISTICS FOR WIND TURBINE DESIGN.
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. 19, P. 11-15.

REFERENCE OR STANDARD WIND SPEED DISTRIBUTION STATISTICS ARE PRESENTED BASED ON REPRESENTATIVE LOW, AVERAGE, AND HIGH VARIANCE CASES OF MEASURED WEIBULL DISTRIBUTION PARAMETERS. RESULTS ARE ALSO PRESENTED OF A SENSITIVITY ANALYSIS OF THE DEPENDENCE OF WIND TURBINE PERFORMANCE ON WIND TURBINE PARAMETERS AND WIND SPEED DISTRIBUTION PARAMETERS.

77-0232 KALS W S
THE RIDDLE OF THE WINDS.
GARDEN CITY, N.Y., DOUBLEDAY, 1977.

CHAPTER 17 IS ENTITLED "POWER FROM THE WIND." THE HISTORY AND CURRENT STATUS OF WIND POWER ARE BRIEFLY COVERED.

77-0233 KAMAN WIND PROJECTS.
WIND POWER DIG. 1(8): 20-21, SPRING 1977.

77-0234 KAMINSKY F C
FOUR PROBABILITY DENSITIES (LOG-NORMAL, GAMMA, WEIBULL, AND RAYLEIGH) AND THEIR APPLICATION TO MODELLING AVERAGE HOURLY WIND SPEED.
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. 19, P. 6-10.

FOUR PROBABILITY DENSITY FUNCTIONS (THE LOG-NORMAL, THE GAMMA, THE WEIBULL, AND THE RAYLEIGH) AND PROCEDURES FOR ESTIMATING THE PARAMATERS OF EACH DENSITY FUNCTION ARE DESCRIBED. THE MODELS ARE THEN USED TO DESCRIBE AVERAGE HOURLY WIND SPEED FOR SELECTED MONTHS AT MT. TOM, HOLYOKE, MASSACHUSETTS. CHI-SQUARE GOODNESS OF FIT TESTS ARE THEN CONDUCTED TO DETERMINE THE APPROPRIATENESS OF EACH MODEL. THE RESULTS INDICATE THAT THE GAMMA AND THE WEIBULL DENSITY FUNCTIONS ARE MORE APPROPRIATE MODELS FOR THE DESCRIPTION OF AVERAGE HOURLY WIND SPEED.

77-0235 KIESSLING F
AEROELASTIC PROBLEMS FOR WIND ENERGY CONVERTERS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 133-164. (IN GERMAN)

A SURVEY IS PRESENTED ON THE AEROELASTIC RELATIONSHIP IN WIND ENERGY CONVERTERS. THE DESIGN IS CONCENTRATED ON UNITS WITH HORIZONTAL AXES. THE BASIC DYNAMIC CONDITIONS ARE EXPLAINED. SUBSEQUENTLY THE NATURAL FREQUENCIES OF OSCILLATION ARE CONSIDERED WHICH PLAY AN IMPORTANT PART IN AEROELASTIC PROCESSES. ONE MUST DISTINGUISH BETWEEN PROBLEMS OF STABILITY AND OF DYNAMIC RESPONSE. THE IMPORTANCE OF AEROELASTIC INVESTIGATION IS UNDERLINED BY EXPERIENCE IN OPERATING WIND ENERGY CONVERTERS AND EXAMPLES OF CALCULATION.

77-0236 KINDEREN W J G J DER, MEEL J J E A VAN, SMULDERS P T
EFFECTS OF WIND FLUCTUATIONS ON WINDMILL BEHAVIOUR.
WIND ENG. 1(2): 126-240, 1977.

A SYSTEM-ANALYTICAL APPROACH IS PROPOSED TO DESCRIBE THE OUTPUT, I.E., POWER AND FORCES, OF A WIND MACHINE FOR THE STOCHASTIC INPUT SIGNAL, THE WIND. A SIMPLE MODEL IS PRESENTED TO DESCRIBE THE FLUCTUATIONS OF WIND SPEED AND DIRECTION BY MEANS OF AVERAGE WIND SPEED AND WIND DIRECTION, THEIR VARIANCES AND TIME CONSTANTS. THESE INPUT SIGNALS ARE USED TO CALCULATE THE INFLUENCE OF WIND FLUCTUATIONS ON WINDMILL PERFORMANCE, INCLUDING THE EFFECTS OF NONUNIFORMITY OF THE FLOW IN THE ROTOR PLANE, ROTOR INERTIA AND YAWING OF THE ROTOR HEAT. EXPERIMENTAL RESULTS FOR A SMALL 2-BLADED WINDGENERATOR (DIAMETER ABOUT 4 M) ARE REPORTED.

77-0237 KLING A
VARIABLE SPEED WIND TURBINES FOR HIGH WIND ENERGY CONVERSIONS.
WIND ENG. 1(2): 141-149, 1977.

THIS STUDY COMPARES VARIABLE SPEED AND CONSTANT SPEED ROTOR GENERATOR SYSTEMS, AND SHOWS THAT UNDER CERTAIN CONDITIONS THE FORMER MAY EXTRACT MORE THAN TWICE AS MUCH USEFUL ENERGY AS THE LATTER. ALSO SUGGESTED ARE A ROTOR CONFIGURATION HAVING LESS VIBRATIONAL PROBLEMS THAN THE PROPELLER AND A HIGH FREQUENCY GENERATOR SPECIALLY ADAPTABLE TO VARIABLE SPEED SYSTEMS.

77-0238 KLING A
WIND POWER PLANT.
GERMAN (FRG) PATENT NO. 2,524,360/A/, JANUARY 13, 1977. 37P. (IN GERMAN)

THE WIND POWER PLANT DESCRIBED HAS AT LEAST ONE ROTOR WHICH IS COUPLED TO AN ELECTRICITY GENERATOR. THE SYSTEMS ARE FIXED TO A SUSPENDED BODY SO THAT IT IS POSSIBLE TO SET UP THE WIND POWER PLANT AT GREATER HEIGHT WHERE ONE CAN EXPECT STRONGER AND MORE UNIFORM WINDS. THE ANCHORING ON THE GROUND OR ON A FLOATING BODY IS DONE BY MOORING CABLES WHICH CAN SIMULTANEOUSLY HAVE THE FUNCTION OF AN ELECTRIC CABLE. THE WHOLE SYSTEM CAN BE STEERED BY FINS. THE ROTOR SYSTEM ITSELF CONSISTS OF AT LEAST ONE PAIR OF CONTRAROTATING, MOMENTUM BALANCED ROTORS.

77-0239 KONIGSBERG A S
HOW WIND VARIABILITY AFFECTS THE POTENTIAL POWER AVAILABLE FROM WIND GENERATORS.
WIND TECHNOL. J. 1(3): 8-10, FALL 1977.

77-0240 KROTH G J
CONTROL SYSTEM FOR WIND POWERED GENERATORS.
NTIS, MAY 1977. 15P.
SAND-77-0287

IN A SYSTEM OF WIND-POWERED GENERATORS, A RELIABLE YET INEXPENSIVE

CONTROL SYSTEM IS DESIRABLE. SUCH A SYSTEM WOULD BE COMPLETELY AUTOMATIC SO IT COULD BE LEFT UNATTENDED FOR LONG PERIODS. IT WOULD RESPOND TO ELECTRICAL REPRESENTATIONS OF DATA SUCH AS BEARING TEMPERATURE, VIBRATION, WIND VELOCITY, TURBINE VELOCITY, TORQUE, OR ANY OTHER PERTINENT DATA. IT WOULD RESPOND BY STARTING OR STOPPING THE TURBINE, CONTROLLING THE LOADING, OR SOUNDING AN ALARM. A MICROPROCESSOR-BASED CONTROLLER CAPABLE OF THESE FUNCTIONS IS DESCRIBED.

77-0241 LANEVILLE A
STUDY OF THE FEASIBILITY OF EXPLOITING THE GALLOPING PHENOMENON AS ENERGY SOURCE.
CAN. SOC. MECH. ENG. TRANS. 4(1): 23-26, 1976-1977. (IN FRENCH)

AEROELASTIC GALLOPING, OR VIBRATIONS OF AN AERODYNAMICALLY UNSTABLE PRISM, IS EXPLORED AS A POTENTIALLY USEFUL CONVERSION MECHANISM FOR EXPLOITING WIND ENERGY. VIBRATIONS ASSOCIATED WITH SHEDDING OF VORTICES ARE ASSUMED PRESENT. THE SHED VORTICES GENERATE OSCILLATIONS OF THE GALLOPING PRISM ONLY WHEN THE STROUHAL FREQUENCY CORRESPONDS TO THE PRISM NATURAL FREQUENCY (AT A SINGLE WIND VELOCITY). THE EFFICIENCY OF THE MECHANISM IS FOUND QUESTIONABLE FOR THE APPLICATION IN MIND. THE ORIENTATION OF THE PRISM IN A WIND FIELD CONSTANTLY CHANGING IN DIRECTION, TURBULENCE SPECTRA, AND CONVERSION OF THE CONSTANT FREQUENCY GENERATED TO 60 HZ BY AN APPROPRIATE SET OF MASSES AND SPRINGS, ARE CONSIDERED.

77-0242 LAPEYSEN E H
WIND POWER SYSTEMS. A SELECT BIBLIOGRAPHY.
NTIS, JANUARY 1977. 58P.
N78-14627

THE LIST INCLUDES 331 REPORTS, ARTICLES, CONFERENCE PAPERS, AND OTHER DOCUMENTS CONCERNING WIND ENERGY POLICY, CONVERSION, TECHNOLOGY, AND TRANSFER. A SUBJECT INDEX IS INCLUDED.

77-0243 LAPIN E E
ECONOMIC COMPETITIVENESS OF WINDMILLS.
ENERGY CONVERS. 16(4): 213-220, 1977.

THE CONDITIONS UNDER WHICH WINDMILLS BECOME COMPETITIVE WITH THE GENERATION OF ELECTRIC POWER FROM FOSSIL FUELS ARE EXAMINED. THE INFLUENCE OF COST OF CONSTRUCTION, FINANCING ARRANGEMENTS, AND THE FUTURE COST OF FUELS IS SHOWN. ENERGY STORAGE AND NETWORK ARRANGEMENTS FOR MILLS ARE CONSIDERED BRIEFLY, AS ARE ALTERNATE USES FOR MILLS, E.G., THE UTILIZATION OF MILL OUTPUT DIRECTLY FOR HEATING OR FOR THE PRODUCTION OF A FUEL.

77-0244 LINSCOTT B S, GLASGOW J, ANDERSON W D, DONHAM R E
EXPERIMENTAL DATA AND THEORETICAL ANALYSIS OF AN OPERATING 100 KW WIND TURBINE.
NTIS, 1977. 22P.
DOE/NASA/1028-78/15

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. THE DEFICIT IN THE AMBIENT WIND FIELD DUE TO THE UPWIND TOWER TURBINE SUPPORT STRUCTURE WAS FOUND TO BE VERY SIGNIFICANT IN EXCITING HIGHER HARMONIC LOADS ASSOCIATED WITH THE FLAPPING RESPONSE OF THE BLADE IN BENDING.

77-0245 LEHNER G
POSSIBILITIES OF OPENING UP NEW NON-NUCLEAR AND NON-FOSSIL ENERGY SOURCES.
TECH. MITT. 70(6/7): 349-354, JUNE 1977. (IN GERMAN)

AS POSSIBLE NONNUCLEAR AND NONFOSSIL NEW ENERGY SOURCES ONE CAN DISCUSS THREE ESSENTIALLY DIFFERENT OPTIONS: TIDAL ENERGY, GEOTHERMAL ENERGY, AND SOLAR ENERGY. THE WORD SOLAR ENERGY IS USED HERE IN A BROAD SENSE INCLUDING THE DIRECT USE OF SOLAR RADIATION AND THE INDIRECT USE OF SECONDARY ENERGIES DERIVED FROM SOLAR RADIATION. A DISCUSSION OF THE NATURAL ENERGY RESOURCES OF THE EARTH LEADS TO AN EVALUATION OF THE FUTURE POSSIBILITIES FOR THE DIFFERENT OPTIONS. THE POTENTIAL OF TIDAL ENERGY IS VERY SMALL. GEOTHERMAL ENERGY HAS A MUCH LARGER POTENTIAL, BUT

ONLY IF ONE CONSIDERS THE HEAT STORED IN "HOT DRY ROCKS". THE TECHNOLOGY FOR ITS USE IS NOT YET AVAILABLE. IT MAY MEET ECONOMIC AND ENVIRONMENTAL DIFFICULTIES. THUS THE FUTURE IMPORTANCE OF GEOTHERMAL ENERGY IS NOT CLEAR NOW. SOLAR ENERGY FINALLY HAS AN EXTREMELY LARGE POTENTIAL. TECHNOLOGIES FOR SEVERAL METHODS OF ITS MORE OR LESS DIRECT USE ARE AVAILABLE. THE MAIN PROBLEMS ARE ECONOMIC ONES. IN THE LONG RUN SOLAR ENERGY SHOULD BE ABLE TO CONTRIBUTE SIGNIFICANTLY TO THE SOLUTION OF THE ENERGY PROBLEM IF THE ECONOMIC PROBLEMS CAN BE SOLVED. IN THE SHORT RUN AN APPRECIABLE CONTRIBUTION IS, HOWEVER, NOT TO BE EXPECTED.

77-0246 LEWIS R I, WILLIAMS J E, ABDELGHAFFAR M A
A THEORY AND EXPERIMENTAL INVESTIGATION OF DUCTED WIND TURBINES.
WIND ENG. 1(2): 104-125, 1977.

PRACTICAL WIND TURBINE DESIGNS ARE EXAMINED AND COMPARED, WITH THE OBJECT OF SELECTING THE ONE BEST SUITED TO DOMESTIC USE IN LOW-LEVEL TECHNOLOGY. ATTENTION IS FOCUSED IN THIS PAPER ON DUCTED (OPEN) WIND TURBINES. WIND TURBINE (WT) IDEAL EFFICIENCY (DUCTED OR UNSHROUDED), TOTAL WIND THRUST ON THE SYSTEM, DESIGN OF A THEORETICAL WT DUCT, DIFFUSER DESIGN AND TURBINE DESIGN (BLADING AND IMPELLER) ARE DESCRIBED. RESULTS SHOW THAT A GAIN IN POWER OUTPUT CAN BE OBTAINED FROM A WT OF SPECIFIED DIAMETER BY USING A SUITABLY SHAPED DUCT. THE OPTIMUM DIFFUSER AREA RATIO IS FOUND TO BE ROUGHLY 10% LARGER THAN THE THEORETICALLY PREDICTED VALUE. POWER OUTPUT IS MAXIMIZED WHEN SOME STALL EXISTS AT THE DIFFUSER OUTLET.

77-0247 LILLEY G M
THE 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. THE MAIN CONCLUSION IS THAT, WHEN FULL ALLOWANCE IS MADE FOR THE DRAG OF THE BLADES, HUB AND TIP LOSSES, AND LOSSES DUE TO INTERFERENCE WITH THE SUPPORT TOWER, THE POWER OUTPUT COEFFICIENT OR EFFICIENCY OF A HORIZONTAL AXIS WINDMILL CANNOT EXCEED 30 TO 35 PER CENT, AS COMPARED TO AN IDEAL EFFICIENCY OF 59 PER CENT.

77-0248 LIMAYE D R
OZARKS REGION ENERGY ALTERNATIVES STUDY. WORKING PAPER XIII.
NONCONVENTIONAL ENERGY SOURCES.
LITTLE ROCK, ARKANSAS, REGIONAL COMMISSION, 1977. 18P.

THE OZARKS REGION ENERGY ALTERNATIVES STUDY FOCUSED ON POLICY OPTIONS AT THE STATE AND REGIONAL LEVELS FOR THE PERIOD 1977 TO 1985. SINCE IT IS UNLIKELY THAT NONCONVENTIONAL ENERGY SOURCES WOULD MAKE SIGNIFICANT CONTRIBUTIONS TO THE STATE OR REGIONAL TOTAL ENERGY SUPPLY, THE STUDY DID NOT DEVOTE A LARGE AMOUNT OF RESOURCES TO THE EVALUATION OF POTENTIAL NONCONVENTIONAL ENERGY SOURCES. NEVERTHELESS, NONCONVENTIONAL ENERGY SOURCES ARE IMPORTANT FROM A POLICY PERSPECTIVE BECAUSE OF THEIR POTENTIAL CONTRIBUTIONS AT A LOCAL LEVEL AND THEIR POTENTIAL FOR THE 1985 TO 2000 TIME FRAME. SINCE SOME POLICY DECISIONS MAY BE FACED NOW TO ACHIEVE A SIGNIFICANT CONTRIBUTION FROM NONCONVENTIONAL ENERGY SOURCES, AN IDENTIFICATION OF THOSE SOURCES WITH PROMISING POTENTIAL WAS MADE. A BRIEF DISCUSSION OF SOLAR, GEOTHERMAL, WIND, AND BIOMASS APPEARS IN THIS PAPER.

77-0249 LINDLEY C A
WIND MACHINES FOR THE CALIFORNIA AQUEDUCT. VOL. 2, FINAL REPORT.
NTIS, FEBRUARY 1977. 204P.
SAN/1101-76/2

A STUDY WAS MADE OF THE FEASIBILITY OF USING WIND MACHINES TO PROVIDE PART OF THE ENERGY REQUIRED TO PUMP WATER IN THE CALIFORNIA AQUEDUCT. THE NEED FOR ADDITIONAL PUMPING POWER FOR THE AQUEDUCT WILL BE ESPECIALLY FELT IN 1983 WHEN EXISTING ARRANGEMENTS WHICH ASSURE DELIVERIES OF LOW-COST ENERGY FROM FOUR CALIFORNIA UTILITIES TERMINATE. THE DEVELOPMENT AND PRODUCTION SCHEDULE FOR THE ERDA/NASA 1500 KW WIND MACHINE DESIGN AS NOW UNDERSTOOD COULD SUPPORT THE INSTALLATION OF A WIND ENERGY SYSTEM TO MEET A SIGNIFICANT PORTION OF THE AQUEDUCT NEEDS BY THAT DATE IF FEW DELAYS ARE ENCOUNTERED. THIS APPLICATION OF WIND ENERGY WAS

FOUND TO BE TECHNICALLY FEASIBLE, BUT WOULD INVOLVE SOME OPERATIONAL PROBLEMS. THE AQUEDUCT APPLICATION MAY BE ATTRACTIVE FOR AN EARLY WIND ENERGY PILOT OR DEMONSTRATION PROJECT BECAUSE OF THE NEAR-TERM ABILITY OF THE AQUEDUCT TO ADAPT ITS DEMAND TO THE VARIABILITY OF THE WIND.

77-0250 LINDLEY C A
WIND MACHINES FOR THE CALIFORNIA AQUEDUCT. VOL 1. EXECUTIVE SUMMARY.
NTIS, MARCH 1977. 22P.
SAN/1101-76/1

THIS REPORT IS AN EXAMINATION OF THE APPLICABILITY OF WIND SYSTEMS TO MEET PART OF THE PUMPING NEEDS OF THE CALIFORNIA AQUEDUCT, A 684-MILE LONG WATER SYSTEM THAT DELIVERS WATER FROM THE MOUNTAINS IN NORTHERN CALIFORNIA TO ARID AREAS OF SOUTHERN CALIFORNIA. RESEARCHERS FOUND THE LOCATION OF THE MAJOR PUMPING LOAD TO BE IN THE MOUNTAINOUS REGIONS WHERE THE TOPOGRAPHY NATURALLY LENDS ITSELF TO POTENTIAL WIND RESOURCES. USING ERDA/NASA DESIGN STUDIES FOR A 1500 KW WIND TURBINE IT WAS FOUND THAT WIND ENERGY COULD BE SUPPLIED TO THE AQUEDUCT AT THE SANDBERG CA STATION FOR A COST OF 1.3 TO 1.7 CENTS PER KWH, APPROXIMATELY EQUAL TO COAL AND NUCLEAR-FUELED BASELOAD PLANTS. IT IS ANTICIPATED THAT ADDITIONAL, FAVORABLE SITES FOR WECS WILL BE DETERMINED AT A LATER DATE. NO SIGNIFICANT ENVIRONMENTAL IMPACT BY WECS IS ANTICIPATED.

77-0251 LINDLEY D
WIND ENERGY RESEARCH IN NEW ZEALAND.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X10-X19.

THOUGH THERE HAS BEEN A LONG STANDING INTEREST BY THE NEW ZEALAND METEOROLOGICAL SERVICE IN THE STRUCTURE OF THE WIND OVER NEW ZEALAND AND A WORKING INTEREST BY THE UNIVERSITIES OF AUCKLAND AND CANTERBURY AND THE MINISTRY OF WORKS IN WIND MODELLING OF STRUCTURES, IT WASN'T UNTIL TWO YEARS AGO THAT A COORDINATED WIND ENERGY RESEARCH PROGRAM WAS ESTABLISHED. AT THAT TIME THE NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE (NZERDC) WAS FORMED UNDER THE CHAIRMANSHIP OF DR. C. J. MAIDEN, TO COORDINATE ENERGY RESEARCH AND DEVELOPMENT. OF THE $918,000 EXPENDED SO FAR, APPROXIMATELY 10% HAS GONE TO SUPPORT WIND ENERGY RESEARCH.

77-0252 LINDLEY D, CHIN S W
WIND ENERGY POTENTIAL IN NEW ZEALAND - ASPECTS OF THE RESOURCE ASSESSMENT AND ITS UTILISATION.
BIENNIAL CONFERENCE AND WORKSHOP ON WIND ENERGY CONVERSION SYSTEMS, 3D, WASHINGTON, D.C., SEPTEMBER 19-21, 1977. 26P.

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. COMPARISIONS 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.

77-0253 LINDSLEY E F
CLARENCE KENNEY: WIND POWER FOR HOME HEATING.
POP. SCI. 211(5): 62, 65, NOVEMBER 1977.

77-0254 LINSCOTT B S, GLASGOW J, 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, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 2, P. 1633-1650.

PART OF THE COOPERATIVE EFFORT BETWEEN NASA AND ERDA HAS BEEN THE DESIGN AND THE ERECTION OF AN EXPERIMENTAL WIND TURBINE BY THE NASA-LEWIS RESEARCH CENTER. 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 100 KW MOD-0 WIND TURBINE GENERATOR OVER A BROAD RANGE OF STEADY STATE CONDITIONS, AS WELL AS DURING TRANSIENT CONDITIONS. THE DEFICIT IN THE AMBIENT WIND FIELD DUE TO THE UPWIND TOWER TURBINE SUPPORT

STRUCTURE WAS FOUND TO BE VERY SIGNIFICANT IN EXCITING HIGHER HARMONIC LOADS ASSOCIATED WITH THE FLAPPING RESPONSE OF THE BLADE IN BENDING.

77-0255 LISSAMAN P B S
GENERAL PERFORMANCE THEORY FOR CROSSWIND AXIS TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C2.21-C2.38

PRINCIPLES OF ENERGY EXTRACTION BY WIND MACHINES ARE REVIEWED, IT IS SHOWN THAT USUALLY THE BETZ LIMIT APPLIES. HOWEVER, POWER COEFFICIENTS (BASED ON FRONTAL SWEPT AREA) EXCEEDING THE BETZ LIMIT ARE POSSIBLE WITH AUGMENTATION SYSTEMS PRODUCING A DUCT-LIKE FLOW. THE INVISCID THEORY WITH THE VISCOUS CORRECTION IS COMPARED WITH EXPERIMENT; FOR LOW C THE CORRELATION IS EXCELLENT FOR A WIDE CLASS OF ROTORS. FOR HIGH C DEVICE, ALTHOUGH THE LIMITED CORRELATION IS GOOD, THE DATA COVER TOO RESTRICTED A RANGE FOR DEFINITIVE VALIDATION. WIND TUNNEL DATA FOR HIGH C REQUIRE CORRECTIONS FOR BOTH DRAG AND LIFT WALL CONSTRAINTS; THE LATTER HAS APPARENTLY BEEN IGNORED TO DATE. THE ANALYSES PROVIDE AN ENGINEERING BASIS FOR PERFORMANCE ESTIMATION OF CROSS-WIND MACHINES, WITH SUFFICIENT STRUCTURE FOR OPTIMIZATION OF BLADE DESIGN. THE CONSEQUENCES OF NEGLECTING UNSTEADY TERMS ARE DISCUSSED, WITH SUGGESTIONS FOR IMPROVED HIGH C ANALYSIS.

77-0256 LJUNGSTROM O
LARGE SCALE WIND ENERGY CONVERSION SYSTEM (WECS) DESIGN AND INSTALLATION AS AFFECTED BY SITE WIND ENERGY CHARACTERISTICS, GROUPING ARRANGEMENT AND SOCIAL ACCEPTANCE.
WIND ENG. 1(1): 36-59, 1977.

77-0257 LJUNGSTROM O
LARGE SCALE WIND ENERGY CONVERSION SYSTEM (WECS) DESIGN AND INSTALLATION AS AFFECTED BY SITE WIND ENERGY CHARACTERISTICS, GROUPING ARRANGEMENT AND SOCIAL ACCEPTANCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A1-1 TO A1-22.

THE SWEDISH WIND ENERGY PROSPECTING PROGRAM INCLUDES SPECIAL FEATURES OF DETERMINING SITE WIND CHARACTERISTICS AND DESIGN OF WECS GROUP STATIONS, WHICH ARE DESCRIBED BRIEFLY, SUCH AS APPLICATIONS OF NORMALIZED WDP - WIND DURATION PROFILES, WHP - WIND HEIGHT PROFILES AND HOW THESE ARE AFFECTED BY SITE LOCATION AND TERRAIN ROUGHNESS. A SET OF WEC - WIND ENERGY CLASSES (1-4) IS INTRODUCED AS AN AID IN TERRITORIAL WIND ENERGY SURVEYS. A SURVEY OF SWEDEN'S WEPA - WIND ENERGY PRODUCING AREAS - WITH ASSOCIATED DISTRIBUTION OVER WEC - 2-4 IS PRESENTED. IN ORDER TO DETERMINE THE CORRESPONDING WIND ENERGY PRODUCTION CAPACITY, THE PROBLEM OF OPTIMIZING WECS GROUP STATION DESIGN FOR COST EFFECTIVE ENERGY PRODUCTION PER LAND USAGE MUST BE SOLVED. THIS PRELIMINARY STUDY INDICATES THAT THE LIKELY MAGNITUDE OF COST EFFECTIVE, SOCIALLY ACCEPTABLE (NON-CRITICAL) INSTALLATIONS OF LARGE SCALE WECS IN SWEDEN WILL RANGE FROM 5 000 - 10 000 MW, PRODUCING 15-25 TWH OF ELECTRIC ENERGY PER YEAR, IN THE 1990'S, UTILIZING ONLY 0,2 - 0,5% OF THE COUNTRY'S LAND AREA. FINALLY, ASPECTS OF TECHNOLOGY ASSESSMENT AS AN AID IN SELECTING VIABLE WECS SYSTEM ALTERNATIVES FOR THE FUTURE AND IN PRESENTING THESE TO THE DECISION MAKERS ARE DISCUSSED.

77-0258 LJUNGSTROM O
NEW DEVELOPMENTS IN WIND TURBINES.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 165-186. (IN GERMAN)

A SHORT SURVEY IS PRESENTED OF THE CONDITIONS FOR THE CHOICE OF TYPES OF UNITS AND THE SIZE OF WIND TURBINES. THEN THE DESIGN OF A WIND TURBINE OF THE AXIAL FLOW TYPE WITH OUTPUTS OF 1 TO 10 MW, USING VARIOUS

MATERIALS, IS CONSIDERED. THE INFLUENCE OF SIZE ON WEIGHT AND COSTS IS DISCUSSED. SOME EXAMPLES OF ACTUAL WIND TURBINE PROJECTS IN SWEDEN ARE BRIEFLY DESCRIBED.

77-0259 LOCKHEED PLANS WIND PLANTS.
WIND POWER DIG. 1(8): 20, SPRING 1977.

LOCKHEED PLANNERS PROPOSE USING ON-SITE, WIND GENERATED ELECTRICITY TO EXTRACT HYDROGEN AND NITROGEN FROM WATER AND AIR, AND ULTIMATELY RECOMBINING THOSE TWO CHEMICALS TO PRODUCE NITROGEN BASED FERTILIZERS.

77-0260 LOCKHEED STUDY PROPOSES WECS FERTILIZER PRODUCTION UNITS.
AMERICAN WIND ENERGY ASSOCIATION NEWSLETTER, P. 12, SPRING 1977.

77-0261 LOTH J L
WVU WIND ENERGY CONCENTRATORS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. E2.17-E2.30.

THREE WIND TURBINE CONFIGURATIONS WHOSE PERFORMANCE IS NOT RESTRICTED BY THE BETZ LIMIT ARE DESCRIBED. ALL ARE PLACED PARTIALLY OR ENTIRELY INSIDE A REGION OF LOW PRESSURE AND HIGH VELOCITY. IT IS THE CONFIGURATION OF THE TURBINE OR ITS ASSOCIATED NONROTATING DEVICE WHICH CREATES A LOW PRESSURE REGION AROUND THE TURBINE. THIS CAUSES A CONCENTRATION OF THE WIND ENERGY BY ACCELERATING IT TO HIGHER THAN FREE STREAM VELOCITIES. THREE TYPES OF CONCENTRATORS ARE DESCRIBED: THE CYLINDRICAL OBSTRUCTION, THE CYLINDRICAL DARRIEUS ROTOR, AND THE WING TIP VORTEX TYPE. THE VENTURI OR SHROUDED WIND TURBINE IS NOT INCLUDED.

77-0262 LOTH J L
BETZ TYPE LIMITATION OF VORTEX WIND MACHINES.
WEST VIRGINIA. UNIVERSITY. DEPT. AEROSP. ENG. TR-54, MAY 1977.

77-0263 LYSEN E H
WIND ENERGY FOR THE DEVELOPING COUNTRIES.
INGENIEUR 89(2): 233-239, MARCH 24, 1977. (IN DUTCH)

THE ECONOMIC PROGRESS OF MANY THIRD WORLD COUNTRIES DEPENDS ON THEIR AGRICULTURAL DEVELOPMENT, NOW HIT BY THE OIL CRISIS. WIND ENERGY IS THUS OF GREAT POTENTIAL IMPORTANCE. APPLICATIONS CAN BE DIVIDED INTO TWO GROUPS; POWER LESS THAN 1 KW, WATER PUMPING AND SMALL SCALE LIGHTING; AND POWER 1-10 KW DRIVING MACHINERY, GENERATING ELECTRICITY AND GRINDING GRAIN. THE DUTCH R + D PROGRAMME, "WIND ENERGY IN THE DEVELOPING COUNTRIES", EMBRACES R AND D INTO WIND ENERGY SYSTEMS UP TO THE PROTOTYPE STAGE; THE HANDING OVER OF INFORMATION; AND THE ESTABLISHMENT AND GUIDANCE OF NATIONAL PROJECTS.

77-0264 PERSPECTIVES: VIEWS ON THE FUTURE OF WIND ENERGY.
WIND POWER DIG. 1(9): 36-41, SUMMER 1977.

A SERIES OF INTERVIEWS ARE PRESENTED WITH PARTICIPANTS OF THE AMERICAN WIND ENERGY CONFERENCE IN BOULDER IN 1977. THOSE INTERVIEWED ARE ROBERT MERONEY, BOB THRESHER, FRANK ELDRIDGE, MICHAEL DUBEY AND DON MAYER.

77-0265 MCGEORGE J
PROGRESS ON THE KING SCHOOL WINDMILL.
ALTERN. SOURCES ENERGY NO. 29: 24-28, DECEMBER 1977.

77-0266 MCGEORGE J
TRANSFORMATION OF AN 1880'S WIND PUMP TO A WIND GENERATOR AT KING SCHOOL.
ALTERN. SOURCES ENERGY NO. 24: 18-22, FEBRUARY 1977.

A PROJECT CONDUCTED BY JOHN CARLSON, A PHYSICS AND CHEMISTRY TEACHER AT A PRIVATE SCHOOL IN CONNECTICUT, IS DESCRIBED IN WHICH AN OLD WATER PUMPING MILL IS CONVERTED TO A WIND GENERATOR.

77-0267 MCGILL R A, IANNUCILLI M, MARSHAL J, SUNUNU J H, ESCHBACH J E, ANSON J, WARK D, STOCK D E
1976 ENERGY RESOURCE ALTERNATIVES II COMPETITION. FINAL REPORT.
NTIS, OCTOBER 1977. 260P.
COO/2698-2

DESCRIPTIONS OF ALL THE ENTRIES IN THE COMPETITION ARE PRESENTED. COMPETITION RULES AND JUDGING PROCEDURES ARE DESCRIBED. ENTRIES CONSISTED OF TEAM EFFORTS FROM COLLEGES AND UNIVERSITIES. THE COMPETITION CALLED FOR THE STUDENT TEAMS TO DEVELOP MEANS FOR PRODUCING ELECTRICAL POWER SUFFICIENT TO MEET THE NEEDS OF A SINGLE FAMILY HOME, USING AN ENERGY SOURCE OTHER THAN OIL OR NATURAL GAS. THE ELECTRIC POWER PRODUCED HAD TO BE ECONOMICALLY REALISTIC WHEN COMPARED TO PRESENT ENERGY

SOURCES.

77-0268 MCGUIGAN D
HARNESSING THE WIND FOR HOME ENERGY.
CHARLOTTE, VERMONT, GARDEN WAY PUBLISHING, 1977. 128P.

WIND POWER OFFERS AN INCREASINGLY POPULAR HOME ENERGY OPTION. THIS BOOK SHOWS HOW, WHERE, WHEN, WHY.

77-0269 MCLAIN L
WIND POWER INTO HYDROGEN TO LIGHT ISLAND.
ENGINEER 244: 6, MARCH 3, 1977.

A SCHEME TO PROVIDE ELECTRICITY FOR THE HEBRIDEAN ISLAND OF COLONSAY USING WIND POWER IS DESCRIBED. THE WINDMILL WILL TURN GENERATORS WHOSE OUTPUT WILL BE USED TO ELECTROLYSE WATER, PRODUCING HYDROGEN GAS. THIS WILL BE STORED AND WILL DRIVE MODIFIED INTERNAL COMBUSTION ENGINES LINKED TO ALTERNATING CURRENT GENERATORS. ENOUGH HYDROGEN WILL BE STORED TO PROVIDE POWER FOR SEVERAL WINDLESS DAYS.

77-0270 SHARP D J
AERODYNAMIC PERFORMANCE THEORY FOR THE DARRIEUS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. X46-X53.

THE BLADE ELEMENT AND MOMENTUM THEORIES ARE EMPLOYED TO PREDICT THE FORM OF THE INDUCED VELOCITY DISTRIBUTION OVER THE VERTICAL HEIGHT OF THE TURBINE. THE AEROFOIL DATA FOR A WIDE RANGE OF REYNOLDS NUMBERS HAS BEEN USED AND THEREFORE THE CHANGES IN RELATIVE WIND VELOCITY FROM POINT TO POINT ON THE BLADES ARE ACCOUNTED FOR.

77-0271 SHEPHERD D G
WHAT PRICE WIND POWER.
AWARE, P. 11-15, MAY 1977.

BASIC CONSIDERATIONS IN ADAPTING WIND POWER SYSTEMS FOR DIFFERENT USES AND LOCATIONS ARE DISCUSSED. THE ROLE OF SUCH FACTORS AS AVERAGE WIND VELOCITY AND WIND VARIATION IN THE SELECTION OF A WIND SYSTEM DESIGN IS EXAMINED. THE ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF WIND POWER SYSTEMS, INCLUDING LIFT OR DRAG TYPES AND HORIZONTAL OR VERTICAL AXIS TYPES, ARE DISCUSSED AND COMPARED. WIND CONCENTRATION DEVICES ARE BRIEFLY DESCRIBED. APPLICATIONS OF SMALL WIND ENERGY SYSTEMS ARE DISCUSSED, AND PROPOSALS FOR LARGE-SCALE WIND-BASED POWER SYSTEMS ARE CONSIDERED.

77-0272 SIMMS D
GO DIRECTLY TO WINDMILL. DO NOT ENTER PUBLIC UTILITIES. DO NOT COLLECT MONTHLY WINDBILL.
HARROWSMITH 1(6): 28-33, 93, MARCH/APRIL 1977.

THE AUTHOR DESCRIBES HIS EXPERIENCE, AND COSTS, IN RECYCLING AN OLD JACOBS WIND PLANT FOR USE IN PROVIDING ELECTRICITY TO HIS HOME.

77-0273 MARRS R W, MARVITZ J
LOCATING AREAS OF HIGH WIND ENERGY POTENTIAL BY REMOTE OBSERVATION OF EOLIAN GEOMORPHOLOGY AND TOPOGRAPHY.
NTIS 1977. 23P.
RLO/2343-5

THE PURPOSE OF RESEARCH UNDER ERDA CONTRACT EY-76-S-06-2343 IS TO DEVELOP AN EFFICIENT PROCEDURE FOR INFERRING WIND CHARACTERISTICS THROUGH INTERPRETATION OF EOLIAN LANDFORMS. AN AREA IN CENTRAL WYOMING WAS CHOSEN AS THE TEST SITE. THE SITE CONTAINS MANY WELL-DEVELOPED EOLIAN LANDFORMS AND IS NOTED FOR ITS HIGH WINDS. WHILE SOME MEMBERS OF THE RESEARCH TEAM INTERPRETED SATELLITE IMAGERY AND AERIAL PHOTOS AND GATHERED FIELD DATA IN REGIONS OF DUNES AND BLOWOUTS, OTHERS COMPILED ALL AVAILABLE CLIMATIC INFORMATION AND COLLECTED ADDITIONAL DATA VIA LOW-ALTITUDE FLIGHTS WITH A SPECIALLY INSTRUMENTED AIRCRAFT. OBSERVED CHARACTERISTICS OF EOLIAN FEATURES WERE THEN CORRELATED WITH THE WIND DATA. CAUSE-AND-EFFECT INTERRELATIONSHIPS WERE IDENTIFIED AND THEORETICAL MODELS WERE TESTED AS POSSIBLE EXPLANATIONS TO THE OBSERVED RELATIONSHIPS. RELATIONSHIPS WHICH PROVED USEFUL IN THE WYOMING TEST

AREA WERE THEN APPLIED OVER A BROADER REGION AND IN OTHER AREAS OF THE COUNTRY TO TEST FOR REGIONAL APPLICABILITY OF EACH PREDICTOR.

77-0274 MAYER-SCHWINNING W
MAXIMUM USE OF WIND ENERGY BY UNIT WIND TURBINES EWT (DBPA).
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 341-344. (IN GERMAN)

THE CONSTRUCTIONAL PRINCIPLE OF UNIT WIND TURBINES, WHICH MAKES OPTIMUM USE OF WIND ENERGY POSSIBLE IS DESCRIBED. USING A COMBINATION OF UNIT WIND TURBINES, A PLANT OF ANY REQUIRED SIZE CAN BE ASSEMBLED. THE ARRANGEMENT OF THESE WIND TURBINES TAKES PLACE ON SWIVEL ARMS FOR LARGE UNITS, WHICH CAN BE TURNED IN THE DIRECTION OF THE WIND.

77-0275 MAYO L H
LEGAL INSTITUTIONAL IMPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS). EXECUTIVE SUMMARY REPORT.
NTIS, SEPTEMBER 1977. 39P.
PB-273006

THE LEGAL ISSUES PRESENTED BY WIND ENERGY CONVERSION SYSTEMS (WECS) UTILIZATION ARE OFTEN CLOSELY RELATED TO ITS STRUCTURAL AND TECHNOLOGICAL FEATURES, AS WELL AS TO ITS ECONOMIC AND SOCIAL IMPLICATIONS. SOME INFORMATION ABOUT WIND SYSTEMS, THEIR LIKELY APPLICATIONS AND PROBLEMS, ARE BRIEFLY STATED. THE FEATURES OF THE EXISTING LEGAL STRUCTURE WHICH MAY FACILITATE THE IMPLEMENTATION OF SUCH SYSTEMS ARE NOTED. THE AUTHORS SUMMARIZE THE WAYS IN WHICH THE LEGAL SITUATION VARIES WITH PARTICULAR APPLICATIONS AND WHICH APPLICATIONS POSE THE GREATEST LEGAL DIFFICULTIES. THE COMPLEX SUBJECT OF OFFSHORE WIND SYSTEMS IS DISCUSSED.

77-0276 MAYO L H
LEGAL-INSTITUTIONAL IMPLICATIONS OF WIND ENRGY CONVERSION SYSTEMS. FINAL REPORT.
NTIS, SEPTEMBER 1977. 332P.
NSF/RA-77-0204

A STATEMENT OF THE PRINCIPAL OVERALL CONCLUSIONS OF THE REPORT IS PRESENTED. BECAUSE OF THE INTERPLAY BETWEEN TECHNICAL, ECONOMIC, SOCIAL, AND LEGAL FACTORS, SOME INFORMATION ABOUT WIND SYSTEMS, THEIR LIKELY APPLICATIONS, AND THE PROBLEMS RAISED THEREBY IS PRESENTED. THE MOST SIGNIFICANT LEGAL OBSTACLES TO THE UTILIZATION OF LAND-BASED WECS ARE DESCRIBED. THE FEATURES OF THE EXISTING LEGAL STRUCTURE WHICH MAY FACILITATE THE IMPLEMENTATION OF SUCH SYSTEMS ARE DISCUSSED. THE WAYS IN WHICH THE LEGAL SITUATION VARIES WITH PARTICULAR APPLICATIONS, AND WHICH APPLICATIONS POSE THE GREATEST AND FEWEST LEGAL DIFFICULTIES ARE SUMMARIZED. A SEPARATE SECTION IS DEVOTED TO THE COMPLEX SUBJECT OF OFFSHORE WIND SYSTEMS.

77-0277 MAYO L H
LEGAL-INSTITUTIONAL ARRANGEMENTS FACILITATING OFFSHORE WIND ENERGY CONVERSION SYSTEMS (WECS) UTILIZATION. FINAL REPORT.
NTIS, SEPTEMBER 1977. 93P.
DOE/NSF/19137-77/3

CONCERN FOR THE CONTINUING SUFFICIENCY OF ENERGY SUPPLIES IN THE U.S. HAS TENDED TO DIRECT INCREASING ATTENTION TO UNCONVENTIONAL SOURCES OF SUPPLY, INCLUDING WIND ENERGY. SOME OF THE MORE STRIKING PROPOSALS FOR THE UTILIZATION OF WIND ENERGY RELATE TO OFFSHORE CONFIGURATIONS. THIS PAPER EXAMINES LEGAL-INSTITUTIONAL ARRANGEMENTS FOR FACILITATING THE UTILIZATION OF OFFSHORE WIND ENERGY CONVERSION SYSTEMS (WECS) BY POSITING THREE PROGRAM ALTERNATIVES AND ANALYZING THE INSTITUTIONAL SUPPORT REQUIRED FOR THE IMPLEMENTATION OF EACH.

77-0278 MELARAGNO M
WINDPOWER.
ENGINEERING 217(1): 38-39, JANUARY 1977.

A 100 KW WIND GENERATOR HAS BEEN BUILT AND INSTALLED AT THE PLUM BROOK STATION NEAR SANDUSKY, OHIO, BY THE NASA LEWIS LAB., AS PART OF A U.S. PROGRAM TO DEVELOP WIND ENERGY SYSTEMS. THE GENERAL ELECTRIC CO. AND KAMAN AEROSPACE CORP. HAVE COMPLETED STUDIES FOR SELECTING APPROPRIATE WIND GENERATOR SYSTEMS. WIND ENERGY COULD PROVIDE ONLY A RELATIVELY

SMALL PERCENTAGE OF THE TOTAL AMOUNT OF ENERGY NEEDED IN COUNTRIES WITH HIGH ENERGY DEMAND, SUCH AS THE U.S. HOWEVER, IT COULD BE A MAJOR RESOURCE FOR OTHER COUNTRIES WITH SMALLER NEEDS AND DIFFERENT ECONOMIC STRUCTURE. THE THEORETICAL AMOUNT OF KINETIC ENERGY PER UNIT OF TIME CONTAINED IN A COLUMN OF AIR STRIKING A WIND TURBINE IS CALCULATED. THE HISTORY OF AMERICAN RESEARCH INTO WIND POWER IS SURVEYED.

77-0279 MELISS M
REGENERATIVE ENERGIEQUELLEN. (REGENERATIVE ENERGY RESOURCES).
BRENNST WAERME KRAFT 29(4): 136-142, APRIL 1977. (IN GERMAN)

AN OUTLINE OF THE SOLAR AND GEOTHERMAL RESOURCES, UTILIZATION AND PROSPECTS FOR LARGER EXPLOITATION IS GIVEN. TRENDS IN DESIGN AND CONSTRUCTION OF WIND-DRIVEN POWER PLANTS ARE ALSO PRESENTED.

77-0280 MELISS M
RESULTS OF GERMAN WIND ENERGY STUDIES.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 47-69. (IN GERMAN)

THE RESULTS ARE PRESENTED OF AN INVESTIGATION OF THE POSSIBILITY OF UTILIZING WIND ENERGY IN WEST GERMANY. THE INVESTIGATION IS BASED ON THE FOLLOWING CATEGORIES: PHYSICAL BASIS AND THEORETICAL POTENTIAL OF WIND ENERGY, WIND ENERGY PLANT AND THEORETICALLY/TECHNICALLY FEASIBLE POTENTIAL, ASPECTS OF UTILIZATION AND ECONOMIC POTENTIAL, RECOMMENDATIONS FOR RESEARCH AND DEVELOPMENT WORK.

77-0281 MERONEY R N, SANDBORN V A, BOUWMEESTER R, RIDER M
WIND TUNNEL SIMULATION OF THE INFLUENCE OF TWO DIMENSIONAL RIDGES ON WIND SPEED AND TURBULENCE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A6.89-A6.104.

THE OBJECTIVE OF THIS RESEARCH WAS TO INCREASE TECHNICAL CAPACITY TO LOCATE FAVORABLE WIND SYSTEM SITES, REDUCE UNCERTAINTY IN THE PREDICTION OR VALIDATION OF THE CHARACTERISTICS OF SITES, AND THUS ASSIST IN THE SIZING AND PERFORMANCE PREDICTION OF WIND SYSTEMS. THE RESEARCH INCLUDED EVALUATION OF LOW SPEED AERODYNAMICS OVER TERRAIN AND BOUNDARY FLOW CONDITIONS OVER RIDGES BY MEANS OF MODELLING AND ANALYTIC TECHNIQUES. PAST EXPERIENCE WITH LARGE POWER MILLS INDICATES THAT PERHAPS THE SINGLE MOST IMPORTANT FACTOR CONTROLLING SUCCESS OR FAILURE OF THESE SYSTEMS IS SITE SELECTION. MEASUREMENTS HAVE BEEN COMPLETED OVER TRIANGULAR AND SINUSOIDAL SHAPE HILLS OF WIND SPEED, STATIC PRESSURE VARIATION, TURBULENCE INTENSITY, WALL SHEAR, AND WIND DEFLECTION. HILL ASPECT RATIOS STUDIED RANGE FROM 1/2 TO 1/6 WITH SOME DATA AVAILABLE AT 1/20. MEASUREMENTS OF WIND OVERSPEED, STREAMLINE PATTERNS, AND TURBULENCE CHANGES OVER THE TOPOGRAPHY ARE COMPARED WITH RESULTS FROM BOUNDARY LAYER THEORY AND RAPID DISTORTION THEORIES. LARGE OVERSPEED EFFECTS OVER THE HILLS ARE FOUND FOR THE SHEAR LAYERS INVESTIGATED.

77-0282 MERONEY R N
RURAL ENERGY NEEDS COULD AGAIN BE MET BY WIND.
ENERGY SOURCES 77/78, DENVER, COLORADO, ENERCOM, 1977. P. 131-135.

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. PROGRAMS HAVE BEEN DEVELOPED BY GOVERNMENT AGENCIES TO EXPLOIT WIND MACHINES IN RURAL AND REMOTE AREAS. THE PROGRAMS WILL HOPEFULLY GUIDE AND ACCELERATE THE RE-USE OF THE ANCIENT ART OF MANUFACTURING POWER FROM THE WIND.

77-0283 MERRIAM M F
WIND ENERGY USE IN THE UNITED STATES TO THE YEAR 2000.
WASHINGTON, D.C., FEDERAL ENERGY ADMINISTRATION, OCTOBER 1977. 58P.

THE OBJECT OF THIS STUDY IS TO DEVELOP A SET OF PROJECTIONS FOR THE USE OF WIND ENERGY IN THE UNITED STATES DURING THE YEARS 1985, 1990, AND 2000. THESE PROJECTIONS ARE TO BE USED, ALONG WITH OTHER STUDIES, IN DELINEATING THE POLICY OPTIONS AVAILABLE TO THE UNITED STATES AS IT ENDEAVORS TO AVOID ENERGY IMBALANCES IN THE NEXT QUARTER CENTURY.

UNCERTAINTIES IN PREDICTING THE FUTURE USE OF WIND ENERGY IN THE UNITED STATES ARE LARGE, AND THE RELIABILITY OF PREDICTIONS IS LOW. TO SAY WHAT CAN BE DONE (GIVEN THE RIGHT GOVERNMENT ACTIONS AND OVERLOOKING COST PROBLEMS) IS RELATIVELY EASY, BUT TO SAY WHAT WILL OCCUR IS ANOTHER MATTER.

77-0284 MERRIAM M F
WIND ENERGY FOR HUMAN NEEDS.
TECHNOL. REV. 79(3): 28-39, JANUARY 1977.

FOLLOWING A DESCRIPTION OF ANCIENT WINDMILLS, THE PAPER PRESENTS AN ECONOMIC AND TECHNOLOGICAL OUTLOOK INTO WIND ENERGY EXTRACTION POSSIBILITIES. THE DIFFICULTIES IN THE UTILIZATION OF THE WIND ENERGY, LIKE THE LOW AIR DENSITY AND THE IMPOSSIBILITY OF EFFECTIVE CHANNELIZATION OF THE AIR STREAM, ARE POINTED OUT AND THE PHYSICS AND TECHNOLOGY OF WIND MACHINES ARE DISCUSSED TOGETHER WITH THE THEORY, WHICH SHOWS THAT THE WINDPOWER IS PROPORTIONAL TO THE CUBE OF THE VELOCITY OF THE WIND. THE POSSIBILITY OF SUPPORTING THE WINDMILLS IN THE AIR STREAM IS PROPOSED AND THE WIDELY USED VERTICAL-AXIS WINDMILLS ARE DESCRIBED TOGETHER WITH THE LARGE WIND GENERATORS FOR ELECTRIC POWER INCLUDING THE SMITH-PUTMAN WIND TURBINE WITH A TWO-BLADE PROPELLER DRIVING A 1,250 KW SYNCHRONOUS GENERATOR, AND 175 FT. DIAMETER. THE URGENT NEEDS FOR POWER WINDMILLS, AND A SYSTEMATIC SEARCH FOR GOOD SITES WHERE THE WINDMILLS WILL BE COST-EFFECTIVE, ARE STRESSED. THE POSSIBILITY OF OBTAINING 300-350 MILLION MEGAWATT-HOURS PER YEAR, FROM WELL-ENGINEERED WIND GENERATORS, IS PREDICTED.

77-0285 MERRITT B T
AN ASYNCHRONOUS AC/DC/AC LINK FOR WIND POWER APPLICATION. PH.D. THESIS.
ANN ARBOR, UNIVERSITY MICROFILMS, ORDER NO. 77-17842, 1977. 311P.

IT IS PROVEN THAT AN ASYNCHRONOUS AC/DC/AC ELECTRIC LINK IS A PRACTICAL WAY OF CONVERTING THE KINETIC ENERGY IN THE WIND TO ELECTRICAL ENERGY. THE AC/DC/AC LINK TERMED A WIND ENERGY CONVERSION SYSTEM (WECS) CONSISTS OF A WIND DRIVEN POLYPHASE ALTERNATOR, RECTIFIER, INDUCTOR, AND AN INVERTER TIED TO THE EXISTING UTILITY GRID. THE LABORATORY INVESTIGATIONS STUDIED VARIOUS ALTERNATOR TYPES, TYPES OF INVERTERS, AND TYPES OF INVERTER CONTROL. BASED ON THESE LABORATORY TESTS, A WECS CONSISTING OF A MODIFIED COMMERCIAL AEROGENERATOR, A THREE PHASE, SIX PULSE BRIDGE RECTIFIER, A BUS STABILIZER, AND A SINGLE PHASE, FOUR PULSE, BRIDGE INVERTER WAS DESIGNED, BUILT AND INSTALLED.

77-0286 METZ W D
WIND ENERGY - LARGE AND SMALL SYSTEMS COMPETING.
SCIENCE 197: 971-973, SEPTEMBER I, 1977.

WINDPOWER, WHICH IS AVAILABLE ON AN ANNUAL BASIS IN AMOUNTS COMPARABLE TO THE AVERAGE ENERGY FLUX OF SUNLIGHT IN MANY AREAS, OFFERS ONE OF THE MOST INEXPENSIVE MEANS OF PRODUCING ENERGY. THE POSSIBILITIES ARE INVESTIGATED FOR UTILIZING FEATURES AVAILABLE IN MANY WINDY REGIONS, SUCH AS HYDROELECTRIC SYSTEMS, CAPABLE OF PRODUCING ENERGY STORAGE BY HOLDING BACK WATER WHILE THE WIND IS BLOWING, AND UNDERGROUND GAS FORMATIONS, SUITABLE FOR COMPRESSED AIR STORAGE. POSSIBLE INTERFERENCE WITH TELEVISION RECEPTION CONSTITUTES ONE OF THE MAJOR OBJECTIONS TO WIND INSTALLATIONS, AS TELEVISION'S SYNCHRONIZATION SPEED, 30 CYCLES PER SECOND, IS NEAR THE ROTATION SPEED OF LARGE WIND SYSTEMS. THE USE OF FIBER-GLASS BLADES IS SUGGESTED AS A PARTIAL REMEDY FOR THE PROBLEM. SEVERAL EXISTING WIND MACHINE PROGRAMS ARE DISCUSSED WITH REGARD TO CONSTRUCTION, COST EVALUATION, EFFECTIVENESS, AND STORAGE CAPACITIES. IT IS CONCLUDED THAT BOTH LARGE AND SMALL WIND SYSTEMS HAVE THE POTENTIAL TO COMPETE WITH CONVENTIONAL ELECTRIC SYSTEMS.

77-0287 MIRANDY L P
ROTOR/GENERATOR ISOLATION FOR WIND TURBINES.
STRUCTURES, STRUCTURAL DYNAMICS AND MATERIALS CONFERENCE, 18TH, MARCH 21-23, 1977, AND DYNAMICS SPECIALIST CONFERENCE, SAN DIEGO, MARCH 24-25, 1977. TECHNICAL PAPERS. VOL. B. NEW YORK, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 1977. P. 25-37.

THIS PAPER ANALYZES THE INTERFACE DYNAMICS BETWEEN THE ROTOR AND ELECTRICAL GENERATOR FOR HORIZONTAL-AXIS CONSTANT-RPM WIND TURBINE SYSTEMS. COUPLED EQUATIONS OF MOTION FOR THE ROTOR, DRIVE SHAFT, AND GENERATOR ARE DEVELOPED AND SOLVED TO OBTAIN THE SYSTEM'S NATURAL

FREQUENCY AND FORCED-RESPONSE CHARACTERISTICS. IT IS CONCLUDED THAT ISOLATION VIA A SOFT DRIVE SHAFT SHOULD BE USED TO KEEP VIBRATORY TORQUE INPUTS TO THE GENERATOR WITHIN ACCEPTABLE LEVELS. IT IS ALSO SHOWN THAT THIS ISOLATION CAN BE ACCOMPLISHED WITH REALISTIC DESIGNS. SAMPLE CALCULATIONS ARE CARRIED THROUGH FOR A TWO-BLADED 265-FOOT-DIAMETER 1,000-KW SYSTEM.

77-0288 MIRANDY L
ROTOR/GENERATOR ISOLATION FOR WIND TURBINES.
J. ENERGY 1(3): 180-188, MAY-JUNE 1977.

THIS PAPER ANALYZES THE INTERFACE DYNAMICS BETWEEN THE ROTOR AND ELECTRICAL GENERATOR FOR HORIZONTAL-AXIS CONSTANT-RPM WIND TURBINE SYSTEMS. COUPLED EQUATIONS OF MOTION FOR THE ROTOR, DRIVE SHAFT, AND GENERATOR ARE DEVELOPED AND SOLVED TO OBTAIN THE SYSTEM'S NATURAL FREQUENCY AND FORCED-RESPONSE CHARACTERISTICS. IT IS CONCLUDED THAT ISOLATION VIA A SOFT DRIVE SHAFT SHOULD BE USED TO KEEP VIBRATORY TORQUE INPUTS TO THE GENERATOR WITHIN ACCEPTABLE LEVELS. IT IS ALSO SHOWN THAT THIS ISOLATION CAN BE ACCOMPLISHED WITH REALISTIC DESIGNS. SAMPLE CALCULATIONS ARE CARRIED THROUGH FOR A TWO-BLADED, 265-FT-DIAM, 1000-KW SYSTEM.

77-0289 MIRUS G L
FULLY AUTOMATIC 125/220 V 4KVA WINDPOWER PLANT.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 335-339. (IN GERMAN)

THE PAPER DESCRIBES A FULLY AUTOMATIC WIND POWER PLANT IN NORTHERN GERMANY WHICH IS USED FOR SPACE HEATING. THE FUNCTIONING OF THE ADJUSTABLE PROPELLER, THE GENERATOR, THE SWITCHBOARD, THE CONTROL AUTOMATIC, AND THE STORM PROTECTION SYSTEM ARE DESCRIBED.

77-0290 A MODEST WINDFALL.
NAT. WILDL. 16(1): 46, DECEMBER 1977 - JANUARY 1978.

OWNERS OF A N.Y.C. APARTMENT BUILDING EQUIPPED WITH WIND AND SOLAR ENERGY SYSTEMS WON A RULING FROM THE STATE'S PUBLIC SERVICE COMMISSION ORDERING CON ED TO BUY THE WINDMILL'S SURPLUS POWER.

77-0291 MOLLY J P
BALANCING POWER SUPPLY FROM WIND ENERGY CONVERTING SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F1-1 TO F1-12.

THE RANDOM POWER FLUCTUATION OF A WIND ENERGY CONVERTER CAN BE DECREASED BY ELECTRICAL CONNECTION OF SEVERAL WECS LOCATED AT LARGE DISPERSED SITES. IT IS SHOWN THE EFFECT ON ZERO OUTPUT TIME PER YEAR, THE VARIATION OF STORAGE CAPACITY AND THE INFLUENCE OF THE WEC COMPOUND ON SMALLER MEAN POWER FLUCTUATIONS COMPARED WITH STORAGE CAPACITIES OF THE SAME SMOOTHING EFFECT. IN ADDITION, IT IS INVESTIGATED, IN WHICH WAY MEAN POWER FLUCTUATION VARIES IF MOMENTARY DEMAND IS CHOSEN FOR REFERENCE.

77-0292 MOLLY J P
BALANCING POWER SUPPLY FROM WIND ENERGY CONVERTING SYSTEMS.
WIND ENG. 1(1): 57-66, 1977.

THE RANDOM POWER FLUCTUATION OF A WIND ENERGY CONVERTER CAN BE DECREASED BY THE ELECTRICAL CONNECTION OF SEVERAL WECS LOCATED AT LARGE DISPERSED SITES. IT IS SHOWN THAT SUCH A COMBINATION REDUCES THE ZERO OUTPUT TIME PER YEAR AND LEADS TO SMALLER MEAN POWER FLUCTUATIONS THAN THOSE OF A SINGLE WEC WITH AN EQUIVALENT STORAGE SYSTEM. IN ADDITION, THE WAY IN WHICH MEAN POWER FLUCTUATION VARIES IF MOMENTARY DEMAND IS CHOSEN FOR REFERENCE IS INVESTIGATED.

77-0293 MOLLY J P
POSSIBILITY OF DEMAND-ORIENTED GENERATION FROM WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 223-250. (IN GERMAN)

THE ENERGY YIELD OF A POWER STATION CONSISTING OF A WIND ENERGY CONVERTER AND STORE IS CONSIDERABLY AFFECTED BY THE CHOICE OF SPECIFIC CHARACTERISTICS OF BOTH COMPONENTS. BOUNDARY CONDITIONS OF THE OPTIMISATION PROCESS INCLUDE SITE, CONSUMER CHARACTERISTICS AND A MINIMUM REQUIREMENT OF SECURITY OF SUPPLY. IF THE COSTS OF THE POWER STATION COMPONENTS ARE KNOWN, THEN TAKING INTO ACCOUNT THE BOUNDARY CONDITIONS, THE WIND POWER STATION SHOWING THE MOST FAVOURABLE COSTS CAN BE DETERMINED. THE CONDITIONS AND THE METHOD OF CALCULATING THE OPTIMUM ROTOR SPEED, THE BEST SPECIFIC ROTOR SURFACE OUTPUT AND THE STORAGE CAPACITY REQUIRED FOR A CERTAIN SECURITY OF SUPPLY ARE SHOWN IN THE PAPER.

77-0294 MONTANA RENEWABLE ENERGY HANDBOOK. ALTERNATIVE ENERGY RESOURCES ORGANIZATION.
HELENA, MONTANA, MONTANA ENERGY ADVISING COUNCIL, CAPITOL STATION, 1977.

THIS HANDBOOK IS AVAILABLE FREE ON REQUEST. IT CONTAINS INFORMATION SPECIFIC TO MONTANA ON SOLAR, WIND, BIOGAS, SMALL-SCALE HYDROPOWER, WIND AND GEOTHERMAL ENERGY. IT ALSO CONTAINS A REFERENCE SECTION LISTING BOOKS, PERIODICALS, PEOPLE, AS WELL AS OTHER GOOD SOURCES OF INFORMATION.

77-0295 MORAN K E
ROTOR FOR WIND-DRIVEN MACHINE.
U.S. PATENT NO. 4,025,233, MAY 24, 1977. 6P.

IN THE ROTOR OF A WINDMILL ELECTRIC GENERATOR, BLADES ARE SECURED TO A HUB BY MEANS OF INDIVIDUAL TAB-RECEIVING SLOTS AND A COMMON "KNOCK-OFF" HUBCAP, THIS MOUNTING MEANS PROVIDING FOR RAPID ASSEMBLY AND DISASSEMBLY. THE MOUNTING STRUCTURE ITSELF ESTABLISHES A PREDETERMINED PITCH AT THE BLADE ROOT, THUS PERMITTING THE ADVANTAGES OF AN OPTIMUM TWISTED BLADE TO BE OBTAINED WITHOUT THE NEED FOR AN EXCESSIVELY COMPLEX BLADE CONFIGURATION. THE RESULT IS A COMPACT GENERATOR UNIT THAT CAN BE USED EASILY IN REMOTE AREAS AND STOWED WITH CAMPING EQUIPMENT.

77-0296 MORAN W A
GIROMILL WIND TUNNEL TEST AND ANALYSIS. FINAL REPORT FOR THE PERIOD JUNE 1976 - OCTOBER 1977. VOLUME I, EXECUTIVE SUMMARY. VOLUME II, TECHNICAL DISCUSSION.
NTIS, OCTOBER 1977. VOLUME I, 19P. VOLUME II, 96P.
COO/2617-4/1, COO/2617-4/2

A WIND TUNNEL TEST OF A GIROMILL ROTOR WAS CONDUCTED. THE OBJECTIVE OF THIS TEST WAS TO SUBSTANTIATE THE PERFORMANCE COMPUTED BY THE LARSEN CYCLOGIRO VORTEX THEORY. ADDITIONAL OBJECTIVES WERE TO OBTAIN PERFORMANCE COMPARISON DATA BETWEEN THE GIROMILL, A SINUSOIDAL BLADE MODULATION GIROMILL, A DARRIEUS ROTOR, AND A MODIFIED DARRIEUS ROTOR THAT FLIPS THE BLADES A FEW DEGREES. A THREE BLADED GIROMILL ROTOR HAVING A DIAMETER OF 2.13 M (7 FT) AND A SPAN OF 1.52 M (5 FT) WAS TESTED IN THE MCDONNEL AIRCRAFT COMPANY 15 X 20 FT. MINI SPEED WIND TUNNEL. THE BLADE MODULATIONS WERE ACCOMPLISHED THROUGH USE OF A CAM AND PUSH ROD ARRANGEMENT. REPLACEABLE CAMS PROVIDED THE DESIRED BLADE MODULATION AT THE VARIOUS OPERATING POINTS. VARIOUS OPERATING CONDITIONS WERE ACHIEVED BY ADJUSTING THE ROTOR RPM AND TUNNEL SPEED. A TOTAL OF 36 DATA RUNS WERE CONDUCTED AT THREE NOMINAL ROTOR RPM VALUES; 80 AND 100 RPM WERE USED FOR THE GIROMILL TEST MODE, AND 120 RPM FOR THE DARRIEUS TEST MODE. A TORQUE METER MEASURED THE ROTOR TORQUE AND TOGETHER WITH THE MEASURED RPM PROVIDED THE ROTOR POWER. THE RESULTS SHOW THAT THE GIROMILL HAS GOOD PERFORMANCE, EQUAL TO OR MUCH BETTER THAN THAT PREDICTED BY THEORY, AND OUTPERFORMS THE OTHER TYPES OF VERTICAL AXIS WIND TURBINES TESTED. CONTINUED USE OF THE THEORETICALLY COMPUTED PERFORMANCE APPEARS WARRANTED.

77-0297 MORASH R T
EXACT 60 CYCLE POWER GENERATION AT ANY SPEED.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 1, P. 498-504.

A NEW ELECTRICAL POWER GENERATOR PRODUCES ANY EXACT FREQUENCY, AT ANY SHAFT RPM. THE SPEED CAN VARY OVER A WIDE RANGE WITHOUT AFFECTING THE OUTPUT FREQUENCY OR VOLTAGE. THIS CAPABILITY HAS BEEN DEVELOPED ON OPERATING UNITS FOR PRECISE FREQUENCY CONVERTERS AND FLYWHEEL ENERGY STORAGE UNITS IN UNINTERRUPTABLE POWER SYSTEMS. OTHER USEFUL

APPLICATIONS ARE: 60 CYCLE POWER DIRECTLY FROM A VARYING SPEED WINDMILL SHAFT; AUXILIARY POWER TAKE-OFF FROM A MOBILE UNIT VARIABLE SPEED PRIME MOVER; UP-RATING DIESEL-GENERATOR SETS BY ALLOWING THE DIESEL TO RUN AT OPTIMUM DESIGN SPEEDS; ENERGY CONSERVATION IN ON-SITE OR SMALL POWER SYSTEMS BY USING VARIABLE SPEED TO MATCH LOAD REQUIREMENT; PRECISE POWER FOR PORTABLE OR REMOTE LOCATIONS SUCH AS GEODETIC SURVEY WORK OR VIDEO APPLICATIONS, UNUSUAL FREQUENCY REQUIREMENTS, AND SIMPLE PARALLEL OPERATION OF NUMEROUS GENERATORS PRODUCING IDENTICAL FREQUENCY. A TYPICAL UNIT IS DESCRIBED. UNITS FROM KILOWATT TO MEGAWATT SIZES CAN BE BUILT.

77-0298 MOTHER PUTS UP A 2-KW WINDPLANT IN TWO HOURS.
MOTHER EARTH NEWS NO. 43: 86-87, JANUARY - FEBRUARY 1977.

THE INSTALLATION OF A 2-KW DUNLITE ON A 50-FOOT TOWER IN TWO HOURS IS DESCRIBED.

77-0299 MURPHY J M, BAUMGARTNER F W
WIND POWERED DRIVE AGGREGATE.
GERMAN (FRG) PATENT NO. 2,639,886/A/, MARCH 10, 1977. 15P. (IN GERMAN)

THE PATENT APPLICATION CONCERNS A WIND DRIVE AGGREGATE WITH VERTICAL ROTATION AXIS. THE DRUM-SHAPED ROTOR CARRIES A NUMBER OF VERTICALLY POSITIONED PARTS ON ITS CIRCUMFERENCE, WHICH HAVE A WING-SHAPED PROFILE IN THEIR HORIZONTAL CROSS-SECTION, THE CHORD OF WHICH FORMS AN ANGLE OF ATTACK WITH THE TANGENT ON THE PERIPHERY. THE ROTOR IS SURROUNDED BY AN EQUALLY CYLINDRICAL STATOR LIKE A CAGE WHICH HAS SEVERAL VERTICAL ROD-SHAPED PARTS OF SUITABLE CROSS-SECTION. BY THESE MEANS THE SPEED OF THE RADIALLY ENTERING WIND CURRENT IS INCREASED ON CONTACT WITH THE ROTOR WING AND MOVES IT DIAGONALLY TO THE AIR CURRENT, SO THAT THE ROTOR IS SET IN MOTION. IN ANOTHER DESIGN, THE ROTOR AND THE STATOR ARE OF SPHERICAL DESIGN, ALSO WITH VERTICAL AXIS.

77-0300 MUSGROVE P J
ENERGY FROM THE WIND. POTENTIAL FOR POWER.
NTIS, JANUARY 1977. P. 4.1-4.9.
CONF-770155

AN ASSESSMENT IS MADE OF THE AMOUNT OF POWER/ENERGY IN THE WIND WITH EMPHASIS ON CALCULATIONS FOR THE UNITED KINGDOM. WINDMILLS MUST BE DEPLOYED OVER A GIVEN AREA IN A PATTERN THAT TAKES ACCOUNT OF THE DISTRIBUTION OF DIRECTIONS FROM WHICH THE WIND CAN BE EXPECTED. IN THE U.K., ONE SUCH ARRAY CAN BE PROVIDED IN THE WESTERN ISLES. THE AUTHOR RECOMMENDS DEPLOYING SUCH AN ARRAY IN THE SHALLOW WATERS OF THE SOUTHERN NORTH SEA. HE CONCLUDES THAT DEPLOYING SUCH AN ARRAY IN THE SHALLOW OFFSHORE REGION WOULD HAVE THE POTENTIAL FOR PROVIDING A VERY SIGNIFICANT PART OF THE TOTAL ELECTRICITY REQUIREMENTS. HE ALSO CONCLUDES THAT SUCH A WIND-POWER SYSTEM APPEARS COMPETITIVE WITH NUCLEAR POWER SYSTEMS.

77-0301 MUSGROVE P J
THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. C7-87 TO C7-100.

THE DARRIEUS VERTICAL AXIS WINDMILL DEVELOPED IN RECENT YEARS BY RANGI, SOUTH AND TEMPLIN AT THE N.R.C., OTTAWA, HAS BEEN SHOWN TO HAVE AN EFFICIENCY COMPARABLE WITH THE BEST CONVENTIONAL, HORIZONTAL-AXIS. VERTICAL AXIS WINDMILLS DO NOT REQUIRE ORIENTATION INTO THE WIND AND THEIR LOAD CAN BE LOCATED AT GROUND LEVEL, DIRECTLY BENEATH THE ROTATING VERTICAL AXIS OF THE MACHINE. NRC CALCULATIONS INDICATE THAT THESE FEATURES LEAD TO AN OVERALL WINDMILL DESIGN THAT IS SIGNIFICANTLY LIGHTER AND CHEAPER THAN CONVENTIONAL WINDMILLS. TO AVOID EXCESSIVE BLADE STRESSES THE DARRIEUS/NRC WINDMILL HAS TROPOSKIEN SHAPED BLADES, FITTED WITH AIR BRAKES, BUT THESE ARE DIFFICULT AND EXPENSIVE TO MAKE. ALSO THE TOWER HEIGHT OF THIS WINDMILL IS APPRECIABLY GREATER THAN THAT OF CONVENTIONAL WINDMILLS. THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL (VGVAW), RECENTLY DEVELOPED AT READING UNIVERSITY, USES STRAIGHT BLADES WHICH ARE HINGED TO A HORIZONTAL CROSS-ARM. IN LOW WIND SPEEDS THE BLADES REMAIN UPRIGHT, GIVING MAXIMUM EFFICIENCY WHEN IT IS MOST NEEDED. IN HIGH WIND SPEEDS CENTRIFUGAL FORCES, REACTED BY A CENTRAL SPRING WHICH IS ATTACHED VIA TIE-WIRES TO THE BLADES, MAKE THE BLADES INCLINE OUTWARDS. THE BLADE INCLINATION PROGRESSIVELY INCREASES WITH INCREASING

WIND SPEED; THIS PREVENTS EXCESSIVE BLADE STRESSES, REGARDLESS OF THE WIND SPEED, AND LIMITS THE MAXIMUM POWER OUTPUT TO A SMALL MULTIPLE OF THE AVERAGE POWER OUTPUT. THESE FEATURES FURTHER SIMPLIFY THE VERTICAL AXIS WINDMILL DESIGN AND SHOULD LEAD TO A FURTHER REDUCTION IN COST. THIS PAPER DESCRIBES IN SOME DETAIL THE DESIGN OF THE VGVAW AND INDICATES HOW ITS PREDICTED PERFORMANCE VARIES WITH WIND SPEED AND LOAD. A 3 METRE DIAMETER PROTOTYPE VGVAW HAS RECENTLY BEEN CONSTRUCTED AT READING, AND INITIAL OBSERVATIONS OF ITS PERFORMANCE ARE REPORTED.

77-0302 MUSGROVE P J
THE VARIABLE GEOMETRY WINDMILL.
WIND POWER DIG. 1(8): 27-29, SPRING 1977.

THE DARRIEUS ROTOR, VERTICAL AXIS DESIGN HAS INTRIGUED RESEARCHERS AND DESIGNERS FOR DECADES EVEN THOUGH IT HAS EXHIBITED AN INABILITY TO SELF-START UNDER MOST WIND CONDITIONS. IN THIS ARTICLE THE AUTHOR DESCRIBES HIS WORK TO OVERCOME THE SELF-STARTING AND OTHER AERODYNAMIC PROBLEMS USUALLY ASSOCIATED WITH THE DARRIEUS DESIGN. HIS CHOICE OF A STRAIGHT-BLADE CONFIGURATION PARALLELS THE THINKING OF HERMAN DREES, DESIGNER OF THE CYCLOTURBINE.

77-0303 MUSGROVE P J
WIND POWER ENGINE.
GERMAN (FRG) PATENT NO. 2,632,697/A/, FEBRUARY 10, 1977. 17P. (IN GERMAN)

THE DEVICE IS A WIND-POWER ENGINE WITH VERTICAL AXIS AND WITH ONE OR SEVERAL WINGS WITH AIRFOIL PROFILE FIXED ON A FRAME WHICH IS PIVOTED AT THE VERTICAL AXIS. EACH WING FORMS AT LEAST ON ONE PART OF ITS LENGTH AN ANGLE OF INCLINATION WITH THE VERTICAL. THE ANGLE INCREASES UNDER THE INFLUENCE OF THE CENTRIFUGAL FORCE WHEN THE RPM EXCEED A NORMAL OPERATION RANGE. THIS METHOD HELPS TO REDUCE MECHANICAL LOADS OCCURRING WITH HIGH WIND SPEEDS WITHOUT REQUIRING A COMPLICATED CONSTRUCTION.

77-0304 NATHAN G K, RAJASOORIA G P D
STUDY ON THE USE OF WINDMILLS IN SINGAPORE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. A5.75-A5.88.

THE PURPOSE OF THIS STUDY IS TO INVESTIGATE THE PROSPECT OF USING WIND POWER IN THE NUMEROUS ISLANDS IN THE REGION OF SINGAPORE AND TO DESIGN A SUITABLE WINDMILL. THE WIND DATA FURNISHED BY THE METEOROLOGICAL SERVICES OF SINGAPORE FOR THE MAINLAND AND THE PORT OF SINGAPORE AUTHORITY FOR THE OFF-SHORE ISLANDS ARE ANALYZED. THE ANALYSIS OF WIND DATA IS BASED ON HOURLY MEAN SPEED AND A STATISTICAL ANALYSIS OF THE DATA IS REPORTED. ALSO, OVERALL ESTIMATE OF THE TOTAL AND THE DISTRIBUTION PATTERN OF AVAILABLE ENERGY IS MADE. A NEW CONCEPT IS PROPOSED TO DESIGN WINDMILLS AND EXPERIMENTAL STUDIES HAVE BEEN CONDUCTED IN THE WIND TUNNEL TO VERIFY THE EFFECTIVENESS OF THE DESIGN METHOD. ALSO, THE FEASIBILITY OF APPROXIMATING THE "IDEAL" BLADE DESIGN BY FLEXIBLE "SAILWING" TYPE BLADE IS INVESTIGATED. RESULTS OF THE STUDIES ARE REPORTED.

77-0305 NELSON V, GILMORE E, BARIEAU R E
MODEL OF WIND IRRIGATION PUMPING SYSTEMS.
WIND TECHNOL. J. 1(2): 17-23, SUMMER 1977.

TWO WIND POWERED IRRIGATION SYSTEMS, ROTARY PUMP AND AIRLIFT PUMP, WERE INVESTIGATED BY CALCULATING THE TIME CORRELATION OF WIND ENERGY AND WATER PUMPED. THE ANNUAL EFFICIENCIES OF THE ROTARY AND AIRLIFT SYSTEMS WERE 24% AND 6%, RESPECTIVELY. THE COST-BENEFIT ANALYSIS OF THE ROTARY SYSTEM INDICATES A THIRTEEN YEAR PAYOUT. A POSSIBLE SOLUTION TO THE TECHNICAL AND ECONOMICAL PROBLEMS OF WIND IRRIGATION SYSTEMS IS TO OPERATE WIND UNIT CONNECTED IN PARALLEL WITH AN ELECTRIC MOTOR OR INTERNAL COMBUSTION ENGINE.

77-0306 NELSON V
ANOTHER WINDMILL LANE.
WIND POWER DIG. 1(9): 4, SUMMER 1977.

J. B. BUCHANAN'S COLLECTION OF RESTORED OLD WINDMILLS IS DESCRIBED.

77-0307 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.

77-0308 NEWMAN B G
SPACING OF WIND TURBINES IN LARGE ARRAYS.
ENERGY CONVERS. 16(4): 169-171, 1977.

THE EFFECT OF SPACING ON THE POWER OUTPUT OF WIND TURBINES IN LARGE ARRAYS HAS BEEN DETERMINED THEORETICALLY. FOLLOWING TEMPLIN, THE EFFECT IS ASSESSED BY DETERMINING THE INCREASE IN ROUGHNESS OF THE EARTH'S BOUNDARY LAYER DUE TO THE DRAG OF THE TURBINES. THE THICKNESS OF THE BOUNDARY LAYER IS ASSUMED TO CHANGE IN PROPORTION TO THE SQUARE ROOT OF THE SKIN FRICTION, WHICH IS APPROPRIATE FOR A TURBULENT EKMAN LAYER, AND DIFFERS FROM THE ASSUMPTIONS MADE BY TEMPLIN. THE LOSS OF POWER FOR BOTH FLAT-OPEN COUNTRY AND ROUGH-WOODED COUNTRY IS DETERMINED AS A FUNCTION OF THE AREA DENSITY OF THE TURBINES, AND IT IS FOUND THAT QUITE LARGE SPACINGS ARE REQUIRED TO AVOID A SIGNIFICANT LOSS OF POWER.

77-0309 NICHOLS L
WIND-DRIVEN ALTERNATORS.
WIND POWER DIG. 1(8): 34-36, SPRING 1977.

77-0310 NIGHTINGALE D, RAMSEY R, ROWE L
HOW TO MAXIMIZE YOUR WIND GENERATOR'S OUTPUT.
ALTERN. SOURCES ENERGY 24:15-17, FEBRUARY 1977.

THE AUTHORS DESCRIBE A CIRCUIT THEY DESIGNED TO CONTROL THE OUTPUT FROM A WINDMILL.

77-0311 PIEPERS G G
NETHERLAND'S NATIONAL RESEARCH PROGRAMME ON WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 17-22. (IN GERMAN)

A SURVEY IS PRESENTED ON THE NETHERLAND'S NATIONAL RESEARCH PROGRAM ON WIND ENERGY APPROVED IN FEBRUARY 1976 BY THE DUTCH GOVERNMENT. THE OBJECTIVE OF THE PROGRAM IS TO STUDY THE TECHNICAL AND ECONOMICAL FEASIBILITY OF LARGE-SCALE UTILIZATION OF WIND ENERGY IN THE NETHERLANDS.

77-0312 NITSCH J
CONCEPTS ON THE INTERMEDIATE STORAGE OF WIND-GENERATED SECONDARY ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 251-274. (IN GERMAN)

THE STORAGE OF WIND ENERGY IS SUBSTANTIALLY INDENTICAL TO THE PROBLEM OF ELECTRICITY STORAGE. POSSIBILITIES OF STORAGE FOR THIS SECONDARY ENERGY CARRIER ARE LISTED. THE ADDITIONAL BOUNDARY CONDITIONS ASSOCIATED WITH THE USE OF WIND ENERGY LEAD TO PARTICULARLY CLOSE COUPLING OF WIND POWER PLANT AND STORAGE SYSTEM. THIS IS ILLUSTRATED BY EXAMPLES. FOR ONE OR SEVERAL LARGE UNITS, STORAGE CONCEPTS ARE INTRODUCED WHICH PERMIT THE OPERATION OF PEAK LOAD POWER STATION WITH 300 MW OUTPUT. OF THE STORAGE POSSIBILITIES IN QUESTION, INCLUDING HYDRAULIC PUMPED STORAGE, COMPRESSED AIR STORAGE, FLYWHEEL STORAGE AND THE PRODUCTION OF HYDROGEN, FLYWHEEL STORAGE IS PARTICULARLY ATTRACTIVE ON CONDITION THAT AN APPROXIMATION TO THE THEORETICAL STORAGE CHARACTERISTICS IS POSSIBLE, WHICH IS REALIZED WITH SOLID SOLUTIONS TO THE FLYWHEEL PROBLEM.

77-0313 NOBLE H

THE NOBLE WINDGENERATOR.
ALTERN. SOURCES ENERGY NO. 24: 4-10, FEBRUARY 1977.

A DESCRIPTION IS GIVEN OF HOW THE AUTHOR BUILT HIS WIND GENERATOR. DRAWINGS AND SPECIFICATIONS ARE INCLUDED.

77-0314 NOYES R
OFFSHORE AND UNDERGROUND POWER PLANTS.
PARK RIDGE, N.J., NOYES DATA CORP., 1977. 318P.

INFORMATION IS PRESENTED ON THE DESIGN, SITING, CONSTRUCTION, ECONOMICS, SAFETY, AND ENVIRONMENTAL EFFECTS OF UNDERGROUND PUMPED STORAGE HYDROELECTRIC POWER PLANTS; UNDERGROUND NUCLEAR POWER PLANTS; FLOATING, SEABED, AND ISLAND-SITUATED NUCLEAR POWER PLANTS; OFFSHORE FOSSIL-FUEL POWER PLANTS; WAVE POWER, OCEANIC WIND POWER; TIDAL POWER; AND SYSTEMS OF RECOVERING ENERGY FROM SALINITY GRADIENTS OR THERMAL GRADIENTS IN THE OCEANS.

77-0315 OLSSON L E
APPLICATIONS OF METEOROLOGY TO THE DEVELOPMENT OF ATMOSPHERIC ENERGY SOURCES. REPORT TO COSAMC VII BY RAPPORTEUR ACC. TO RES. 13 COSAMC VI AND LETTER FROM WMO (NO. 1382/M/CL.MB.2) 16 JANUARY 1974.
NORRKOPING, SWEDEN, MARCH 1977. 57P.

77-0316 OMAN R A, FOREMAN K M, GILBERT B L
INVESTIGATION OF DIFFUSER-AUGMENTED WIND TURBINES. PART I. EXECUTIVE SUMMARY.
NTIS, JANUARY 1977. 21P.
COO/2616-2 (PART I)

THE DIFFUSER AUGMENTED WIND TURBINE (DAWT) IS ONE OF THE ADVANCED CONCEPTS BEING INVESTIGATED TO IMPROVE THE ECONOMICS OF WIND ENERGY CONVERSION. THE PROJECT IS AIMED AT INCREASING THE OUTPUT AND REDUCING THE COST, THE OFF-DUTY TIME, AND THE TECHNICAL RISK OF WIND ENERGY CONVERSION SYSTEMS (WECS). THE DAWT APPEARS TO BE BEST SUITED TO LARGE WECS FOR COMMERCIAL POWER PRODUCTION BECAUSE IT PERMITS A SIGNIFICANT INCREASE IN THE UNIT POWER OUTPUT WITHOUT EXTENDING THE SIZE OF ROTATING MACHINERY INTO THE RANGE WHERE ROTOR DYNAMICS CAUSE EXCESSIVE COSTS.

77-0317 OMAN R A, FOREMAN K M, GILBERT B L
INVESTIGATION OF DIFFUSER-AUGMENTED WIND TURBINES. PART II. TECHNICAL REPORT.
NTIS, JANUARY 1977. 105P.
COO/2616-2 (PART II)

INFORMATION ON DIFFUSER-AUGMENTED WIND TURBINES IS PRESENTED CONCERNING THE DEVELOPMENT OF EFFICIENT AND COMPACT DIFFUSERS, ECONOMIC ANALYSIS, AND ANALYTICAL DEMONSTRATION OF TWO-STAGE CONSTANT SPEED ROTOR CONCEPTS.

77-0318 OPPOLZER G
NEW TYPE OF WIND TURBINE -- THE INVENTION OF A VIENNESE ENGINEER. THE FAN PRINCIPLE GIVES SEVERAL TIMES THE PREVIOUS USEFUL OUTPUT.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 228. (IN GERMAN)

THE CONSTRUCTION OF A NEW TYPE OF WIND TURBINE IS DESCRIBED, WHICH HAS TWO HORIZONTALLY POSITIONED PROPELLERS. THE PROPELLERS ARE AT AN ANGLE TO EACH OTHER AND OPERATE ON THE "FAN" PRINCIPLE, FOR WHICH A PATENT HAS BEEN APPLIED. THIS PRODUCES APPRECIABLY HIGHER OUTPUTS THAN WITH PREVIOUS WIND TURBINES. AT A WIND SPEED OF 15 METRES/SEC, AN OUTPUT OF 55.4 KW WAS ACHIEVED. THIS WIND TURBINE WAS INTRODUCED BY MEANS OF A DEMONSTRATION MODEL.

77-0319 ORGILL M M
SURVEY OF WIND MEASUREMENT FIELD PROGRAMS.
NTIS, MAY 1977. 53P.
BNWL/WIND-03

ONE OF THE TASKS IN THE SITE SELECTION PROGRAM AREA OF THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) IS TO IDENTIFY AND CATALOG EXISTING METEOROLOGICAL DATA SETS WHICH MIGHT BE USED FOR MODEL VALIDATION AND FOR OTHER WCPE STUDIES. THIS REPORT IDENTIFIES AND

BRIEFLY SUMMARIZES 139 FIELD PROGRAMS THAT HAVE USED WIND NETWORKS (2 TO 60 WIND MEASUREMENT SITES). IN GENERAL THESE STUDIES WERE MESOSCALE IN AREAL EXTENT; HOWEVER, THERE IS REFERENCE TO SOME MICRO- AND SUBSYNOPTIC SCALE STUDIES. THE SURVEY COVERED THE TIME PERIOD FROM 1940 TO PRESENT.

77-0320 OUTLOOK. THE ARK; HOW TO BIOENGINEER HUMAN HABITATS.
ENV. SCI. TECHNOL. 11(8): 744-746, AUGUST 1977.

A CANADIAN SOLAR HOME, WITH A WINDMILL, IS DESCRIBED.

77-0321 PANTALONE D K
EFFECTS OF LARGE INTERCONNECTED WIND GENERATORS ON THE ELECTRIC POWER SYSTEM. PH.D. THESIS.
ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, ORDER NO. 78-05966, 1977.
135P.

WHEN ONE CONSIDERS THE DIRECT INTERFACING OF WIND GENERATOR SYSTEMS (WGSS) WITH THE ELECTRIC POWER SYSTEM, THERE IS AN INTEREST IN WGS DYNAMICS AND COMPATIBILITY WITH THE POWER SYSTEM. TWO GENERAL EFFECTS THAT MAY OCCUR AS A RESULT OF THE PRESENCE OF MANY LARGE WGSS IN THE SYSTEM WERE CONSIDERED. THE FIRST EFFECT DEALS WITH THE POSSIBILITY OF CONTRIBUTING TO DYNAMIC INSTABILITY IN THE LARGE INTERCONNECTED POWER SYSTEM. A MODAL ANALYSIS OF A SET OF WGSS ON A RADIAL LINE WAS USED TO EXAMINE THIS POSSIBILITY. THE EFFECT OF CERTAIN COMPONENTS, PARAMETERS, AND CONDITIONS ON THE EIGENVALUES WAS STUDIED. THE SECOND EFFECT DEALS WITH A LOAD TRACKING CONSTRAINT IN AUTOMATIC GENERATION CONTROL AS AFFECTED BY THE POWER SPECTRUM OF THE WIND. A FREQUENCY RESPONSE ANALYSIS WAS USED TO DETERMINE THE FREQUENCY CONTENT OF THE WGS OUTPUT.

77-0322 PLANNING A WIND-POWERED GENERATING SYSTEM.
NORWICH, VERMONT, ENERTECH CORPORATION, 1977.

THIS IS A SHORT PRIMER IN THE BASIC PRINCIPLES OF WIND MACHINES, THEIR COMPONENTS, AND SITING REQUIREMENTS. IT INCLUDES ESTIMATIONS OF POWER REQUIREMENTS AND DETAILS OF SITE, TOWER, AND BATTERY STORAGE SELECTIONS. IT IS A COOKBOOK FOR THE HANDYMAN.

77-0323 PARKER N, WALTON H
WIND ENERGY CONVERSION SYSTEMS MANUFACTURING AND SALES ACTIVITY, 1975 AND 1976.
NTIS, APRIL 1977. 11P.
PB-265823

THIS REPORT CONTAINS THE RESULTS OF AN ANNUAL SURVEY OF PRIVATE FIRMS ENGAGED IN THE MANUFACTURING AND DISTRIBUTION OF WIND ENERGY CONVERSION SYSTEMS IN THE UNITED STATES DURING THE YEARS 1975 AND 1976. IMPORTS OF SYSTEMS MANUFACTURED ABROAD FOR DISTRIBUTION IN THE UNITED STATES ARE ALSO INCLUDED.

77-0324 PARKES M E, VAN DE LAAK F J M
WIND POWER INSTALLATIONS FOR WATER PUMPING IN DEVELOPING COUNTRIES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. F3.31-F3.40.

IN DEVELOPING COUNTRIES WINDMILLS MAY BE USED FOR PUMPING IN RURAL WATER SUPPLIES, SMALLHOLDER IRRIGATION OR CATTLE WATERING. POSSIBLE APPLICATIONS ARE EXAMINED BY CONSIDERING WIND POWER POTENTIAL AND DESIGN CRITERIA IN ONE COUNTRY, TANZANIA. WIND ROTORS AND ASSOCIATED PUMPS ARE REVIEWED WITH REFERENCE TO LOW COST IRRIGATION PURPOSES. A TECHNIQUE IS PRESENTED FOR ASSESSING THE MINIMUM STORAGE REQUIREMENTS TO PROVIDE UNIFORM WATER SUPPLIES FROM WIND-POWERED INSTALLATIONS. AN ECONOMIC COMPARISON OF WIND AND ENGINE-POWERED WATER SUPPLIES IS GIVEN.

77-0325 POTENTIAL FOR POWER. SYMPOSIUM ON THE PROSPECTS FOR POWER FROM CURRENTLY UNCONVENTIONAL ENERGY SOURCES.
NTIS, 1977. 94 P.
SYMPOSIUM ON THE PROSPECTS FOR POWER FROM CURRENTLY UNCONVENTIONAL ENERGY SOURCES, SOUTHAMPTON, ENGLAND, JANUARY 6, 1977.
CONF-770155

77-0326 PAYNE P R
AEOLIAN WINDMILL.

U.S. PATENT NO. 4,024,409, MAY 17, 1977. 8P.

A SYSTEM IS DISCLOSED WHICH UTILIZES A MEMBER WHICH OSCILLATES IN RESPONSE TO MOVEMENT OF A FLUID PAST IT AND A MEANS FOR UTILIZING THE ENERGY GENERATED BY THE OSCILLATION. IN ONE EMBODIMENT THE OSCILLATING MEMBER IS A CABLE UTILIZING WIND OR WATER AS GENERATOR OR PUMP. IN A SECOND EMBODIMENT, THE OSCILLATING MEMBER IS AN AIRFOIL HAVING EITHER PITCH CONTROL OR ACTIVE CIRCULATION CONTROL.

77-0327 PEA SOUP MILL IN OPERATION.
WIND POWER DIG. 1(9): 22, SUMMER 1977.

A RESTAURANT IN CALIFORNIA HAS AN OLD DUTCH STYLE WINDMILL WHICH MAKES ELECTRICITY AS WELL AS PROVIDING DECOR.

77-0328 PEDERSEN N F
PRACTICAL APPROACH TO VORTEX AUGMENTATION OF WIND TURBINES.
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. 19. P. 20-24.

THE CASE FOR VORTEX AUGMENTATION IS BUILT BY REVIEWING THE LIMITATIONS IMPOSED ON THE EXTRACTION OF ENERGY FROM THE WIND BY MEANS OF A CONVENTIONAL IMPULSE TURBINE. THE VORTEX AUGMENTED REACTION WIND TURBINE IS ANALYZED BY MEANS OF THE IDEAL GAS LAWS AND CONVENTIONAL EMPIRICAL FLOW COEFFICIENTS. THE RESULTS ARE PLOTTED TO SHOW THE RELATIONS BETWEEN TURBINE SIZE AND TURBINE OUTPUT AS A FUNCTION OF WIND VELOCITY. COSTS OF CONSTRUCTION ARE ESTIMATED AND THE RELATION TO TURBINE OUTPUT SHOWN.

77-0329 PEDERSEN N F, ELLIS G O
WIND TURBINE.
U.S. PATENT NO. 4,021,135, MAY 3, 1977. 4P.

A WIND TURBINE IS DESCRIBED WHICH INCLUDES A REACTION TYPE TURBINE WHEEL INSTEAD OF AN IMPULSE TYPE TURBINE. AN AUGMENTER PROVIDES A VORTEX DOWNSTREAM OF THE TURBINE AT THE EXIT OF THE TURBINE TO INCREASE THE PRESSURE DIFFERENTIAL ACROSS THE TURBINE THEREBY INCREASING THE POWER THAT MAY BE EXTRACTED FROM THE WIND.

77-0330 PEED P V
WIND DRIVEN ELECTRICAL GENERATOR.
U.S. PATENT NO. 4,061,926, DECEMBER 6, 1977. 4P.

AN ELECTRIC GENERATING SYSTEM IS DESCRIBED IN WHICH OPPOSITELY ROTATING WIND DRIVEN WHEELS ARE USED, ONE TO DRIVE THE ROTOR AND ONE TO DRIVE THE STATOR OF AN ELECTRIC GENERATOR.

77-0331 PENNY M M, BOURGEOIS S V
DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS. FINAL REPORT DECEMBER 1975 - FEBRUARY 1976.
NTIS, JUNE 1977. 111P.
PB-272759

THE REPORT GIVES A REVIEW OF THE DEVELOPMENT STATUS OF SEVERAL ADVANCED ENERGY CONCEPTS AND DISCUSSES THE PRIMARY ENVIRONMENTAL HAZARDS OF EACH SYSTEM. SYSTEMS REVIEWED INCLUDE POTENTIAL NEW SOURCES OF ENERGY AND IMPROVED ENERGY CONVERSION. EACH SYSTEM IS EVALUATED WITH RESPECT TO ITS DEVELOPMENT STATUS, AND ESTIMATES MADE AS TO WHEN EACH WILL BEGIN TO CONTRIBUTE SIGNIFICANTLY TO U.S. ENERGY NEEDS. APPRAISALS WERE MADE OF THE ENVIRONMENTAL IMPACT OF EACH SYSTEM INCLUDING ASSESSMENT OF THE ADEQUACY OF POLLUTION CONTROL TECHNOLOGY AND POTENTIAL GROSS ECOLOGICAL IMPACT. CONSIDERING BOTH THE EXPECTED ENVIRONMENTAL IMPACT AND PERIOD OF TECHNOLOGY BREAK THROUGH/COMMERCIALIZATION, THE FOLLOWING ORDER OF R AND D PRIORITIES ON THE CANDIDATE ENERGY SYSTEMS HAS BEEN DEVELOPED: HIGH TEMPERATURE TURBINES, OCEAN THERMAL GRADIENTS, WINDMILLS, MAGNETOHYDRODYNAMICS, METAL VAPOR (POTASSIUM) RANKINE TOPPING CYCLES, HYDROGEN FUEL CELLS, THERMIONICS, ELECTROGASDYNAMICS, AND THERMOELECTRIC CONVERSION.

77-0332 PENNY M M, BOURGEOIS S V, CAIN W C
DEVELOPMENT STATUS AND ENVIRONMENTAL HAZARDS OF SEVERAL CANDIDATE ADVANCED ENERGY SYSTEMS.

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL. 1, P. 646-654.

A REVIEW OF THE DEVELOPMENT STATUS AND ANTICIPATED PRIMARY ENVIRONMENTAL HAZARDS OF NINE ADVANCED ENERGY SYSTEMS IS PRESENTED. A SUMMARY OF FEDERALLY-FUNDED R AND D FOR THESE ENERGY SYSTEMS IS ALSO PRESENTED. EACH OF THESE ENERGY SYSTEMS HAS A NEGLIGIBLE OR MILD DIRECT ENVIRONMENTAL IMPACT WHEN COMPARED WITH CONVENTIONAL FOSSIL FUEL AND NUCLEAR SYSTEMS. INDIRECT IMPACTS FOR SOME OF THE ENERGY SYSTEMS COULD BE SEVERE, HOWEVER, AND THESE SYSTEMS NEED FURTHER STUDY TO QUANTIFY THEIR IMPACTS. CONSIDERING BOTH EXPECTED ENVIRONMENTAL IMPACT AND PERIOD OF TECHNOLOGY BREAKTHROUGH/COMMERCIALIZATION, THE SYSTEMS ARE RANKED IN ORDER OF DECREASING RESEARCH PRIORITY AS FOLLOWS: HIGH TEMPERATURE TURBINES, OCEAN THERMAL GRADIENTS, WINDMILLS, MAGNETOHYDRODYNAMICS, METAL VAPOR RANKINE TOPPING CYCLES, HYDROGEN FUEL CELLS, THERMIONICS, ELECTROGASDYNAMICS AND THERMOELECTRIC CONVERSION.

77-0333 PUBLIC REACTIONS TO WIND ENERGY DEVICES. FINAL REPORT.
NTIS, OCTOBER 1977. 215P.
NSF/RA-77-0026

THIS STUDY WAS UNDERTAKEN BY THE SURVEY RESEARCH LABORATORY OF THE UNIVERSITY OF ILLINOIS 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 TWOFOLD: TO PROVIDE SUBSTANTIVE INFORMATION ON PUBLIC ACCEPTANCE OF DIFFERENT TYPES OF WIND ENERGY DEVICES IN DIFFERENT SETTINGS; AND TO FURNISH A METHODOLOGICAL BASE FOR MORE INTENSIVE STUDIES OF PUBLIC ACCEPTANCE OF SUCH DEVICES. THE STUDY WAS CARRIED OUT BY CONDUCTING PERSONAL INTERVIEWS WITH STATISTICAL RANDOM SAMPLES OF ADULTS IN SIX DIFFERENT PARTS OF THE COUNTRY, WITH PRIMARY EMPHASIS ON RURAL AND SMALLER URBAN AREAS. THE LOCATIONS SELECTED WERE WESTERN MICHIGAN, SOUTHEASTERN WYOMING, WESTERN WASHINGTON, EASTERN RHODE ISLAND, THE CHICAGO AREA, AND THE SANDY HOOK UNIT OF THE GATEWAY NATIONAL RECREATION AREA IN NEW JERSEY. THOSE INTERVIEWED WERE QUESTIONED ON A NUMBER OF TOPICS, INCLUDING THEIR ATTITUDES TOWARD SOURCES OF ENERGY, THEIR KNOWLEDGE OF WIND ENERGY DEVICES, AND THEIR OPINIONS ON PAYING EXTRA FOR POLLUTION-FREE SOURCES OF ENERGY. IN ADDITION, THEY WERE SHOWN SLIDES OF DIFFERENT WIND ENERGY MACHINES IN VARIOUS SETTINGS AND WERE ASKED TO INDICATE THEIR PREFERENCES FROM AN AESTHETIC POINT OF VIEW.

77-0334 POWE R E
WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE AIRFOIL CONCEPT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. B3.39-B3.54.

A UNIQUE MOMENTUM INTERCHANGE DEVICE FOR EXTRACTION OF ENERGY FROM THE WIND IS DESCRIBED. 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. THIS PROGRAM IS WRITTEN SO THAT WIND SPECTRUM DATA FOR ANY GEOGRAPHIC LOCATION CAN BE USED TO DETERMINE THE MONTHLY ENERGY OUTPUT FOR THAT LOCATION. RESULTS FROM THIS PROGRAM INDICATE 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 15,000 PEOPLE. THESE 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.

77-0335 PRELIMINARY OFFICE REPORT. ROMERO OVERLOOK. WIND ENERGY SURVEY.
SACRAMENTO, CALIFORNIA, CALIFORNIA DEPARTMENT OF WATER RESOURCES, DECEMBER 1977. 91P.

THE WIND MEASUREMENTS RECORDED FOR THREE YEARS AT THE ROMERO OVERLOOK NEAR THE SAN LUIS RESERVOIR WERE EVALUATED TO DETERMINE THE WIND ENERGY POTENTIAL OF THE AREA. THE EVALUATION SHOWED THAT DURING THESE THREE YEARS THE OVERALL AVERAGE WIND VELOCITY WAS 5.9 METERS PER SECOND (13.3

MPH) WITH MAXIMUM WIND VELOCITIES OCCURRING DURING THE SUMMER MONTHS. ALSO, THE MEASUREMENTS INDICATE THAT A WIND TURBINE-GENERATOR SYSTEM ASSUMED TO BE DESIGNED TO DELIVER FULL RATED POWER AT 11.2 M/S (25 MPH) WIND COULD OPERATE AT AN AVERAGE ANNUAL OUTPUT OF 30 PERCENT OF ITS RATED CAPACITY. THE PACHECO PASS ABOVE THE SAN LUIS RESERVOIR WAS SELECTED AS A POTENTIAL SITE FOR DEVELOPING A WIND ENERGY SYSTEM. RECOMMENDATION WAS MADE THAT FURTHER WIND MEASUREMENTS BE MADE AT PACHECO PASS TO DETERMINE THE WIND ENERGY POTENTIAL AND THE CRITERIA FOR OPTIMIZING A WIND TURBINE SYSTEM FOR THE AREA.

77-0336 PRENIS J
ENERGYBOOK 2: MORE NATURAL SOURCES AND BACKYARD APPLICATIONS.
PHILADELPHIA, RUNNING PRESS, 1977. 125P.

THIS IS A CONTINUATION OF ENERGYBOOK, PROVIDING A SURVEY OF SOME ALTERNATIVES TO CONVENTIONAL SOURCES OF ENERGY. IT IS DESIGNED FOR BOTH THE CASUAL READER AND THE SERIOUS PRACTITIONER, SCIENCE STUDENTS, AND BACKYARD TINKERERS. USING A FORMAT SIMILAR TO THAT OF THE WHOLE EARTH CATALOG, IT PROVIDES A SURVEY OF PRESENT APPLICATIONS; FUTURE POSSIBILITIES; A REVIEW OF SCIENTIFIC AND TECHNICAL VOCABULARY, CONCEPTS, AND DATA; AND A SAMPLING OF EXPLORATIONS IN LOW TECHNOLOGY. THE SECTION ON SOLAR ENERGY INCLUDES USEFUL INFORMATION ON FLAT PLATE AND PLASTIC PIPE COLLECTORS, AND AN EXCELLENT SURVEY OF SOLAR-HOUSE DESIGN. LESS CONVENTIONAL ENERGY SOURCES, SUCH AS METHANE GENERATORS, METHANE AS AN AUTO FUEL, OCEAN KELP FARMING, AND TRASH POWER, ARE TREATED BRIEFLY. A GLOSSARY OF TERMS IS INCLUDED, ALTHOUGH UNFORTUNATELY NOT ALL OF THE SCIENTIFIC TERMS ARE CORRECTLY DEFINED. THE BRIEF BIBLIOGRAPHY COVERS ONLY PRACTICAL APPLICATIONS.

77-0337 PREUSS R D, SUCIU E O, MORINO L
TWO GENERAL METHODS FOR THE UNSTEADY AERODYNAMIC ANALYSIS OF HORIZONTAL-AXIS WINDMILLS.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS. LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2, P. 1618-1623.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL EMBEDDED IN INCOMPRESSIBLE, INVISCID FLOW IS CONSIDERED. THE VORTICITY FIELD PRESENT IN THE UNDISTURBED FLOW IS ASSUMED TO BE UNPERTURBED BY THE PRESENCE OF THE WINDMILL, ENABLING THE USE OF A POTENTIAL FORMULATION. TWO INTEGRAL EQUATION METHODS (FOR FINITE THICKNESS AND ZERO THICKNESS BLADES) ARE PRESENTED. BOTH METHODS ARE FORMULATED IN A FRAME OF REFERENCE RIGIDLY ROTATING AT CONSTANT ANGULAR VELOCITY RELATIVE TO THE GROUND. FULLY UNSTEADY TRANSIENT ANALYSIS IS PERFORMED BY NUMERICAL SOLUTION OF THE EQUATIONS AT DISCRETE TIME STEPS WHILE A SIMPLER OSCILLATORY UNSTEADY ANALYSIS IS PERFORMED BY EXPRESSING THE POTENTIAL AND ITS NORMAL DERIVATIVE AS COMPLEX SERIES IN TIME. THE WAKE, TREATED AS A DOUBLET LAYER, IS OF PRESCRIBED GEOMETRY. NUMERICAL RESULTS ARE PRESENTED SHOWING A GOOD COMPARISON OF THE METHODS.

77-0338 QAZI A Q
TRANSIENT BEHAVIOR OF WIND DRIVEN SYNCHRONOUS MACHINES. PH.D. THESIS. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERISTY. ANN ARBOR, MICHIGAN, UNIVERSITY MICROFILMS, 1977. 156P. U.M. ORDER NO. 78-11064.

THE TRANSIENT BEHAVIOR OF WIND DRIVEN SYNCHRONOUS MACHINES UNDER CONDITIONS OF WIND GUSTS AND FAULTS FOR VARIOUS SYSTEM CONFIGURATIONS WERE INVESTIGATED AND DESIGN RECOMMENDATIONS FROM THE VIEW POINT OF ELECTRICAL STABILITY AND ENERGY DELIVERED TO THE UTILITY GRID WERE MADE. THIS TASK WAS PERFORMED IN THE FOLLOWING STEPS: (1) FORMULATE THE MATHEMATICAL MODEL FOR EACH IDENTIFIED AND SELECTED SYSTEM CONFIGURATION, (2) SOLVE THE SETS OF NON-LINEAR DIFFERENTIAL EQUATIONS BY EMPLOYING AN APPROPRIATE NUMERICAL TECHNIQUE AND DIGITAL SIMULATION, (3) PRESENT THE RESULTS IN THE FORM OF CURVES, (4) INTERPRET THESE CURVES, (5) DRAW SOME USEFUL CONCLUSIONS AND (6) SUGGEST AREAS FOR FUTURE RESEARCH WORK.

77-0339 QAZI A Q, RAMAKUMAR R
BEHAVIOR OF WIND DRIVEN SYNCHRONOUS GENERATORS UNDER WIND GUSTS.
CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, COLLEGE STATION, TEXAS A + M UNIVERSITY, MARCH 14-16, 1977. CONFERENCE RECORD. NEW YORK, IEEE, NO. 77CH1168-4REG5, 1977. P.20-25.

THIS PAPER PRESENTS THE RESULTS OF A COMPUTER SIMULATION CONDUCTED FOR AN

AEROTURBINE-DRIVE SYNCHRONOUS GENERATOR OPERATING IN PARALLEL WITH A LARGE UTILITY GRID. COUPLED NONLINEAR DIFFERENTIAL EQUATIONS DESCRIBING THE DYNAMIC BEHAVIOR OF SUCH A SYSTEM ARE SOLVED NUMERICALLY BY EMPLOYING FOURTH ORDER RUNGE-KUTTA TECHNIQUE. THE SIMULATION TAKES INTO ACCOUNT INSTANTANEOUS VARIATIONS IN THE COEFFICIENT OF PERFORMANCE OF THE AEROTURBINE DUE TO CHANGES IN THE TIP SPEED TO WIND SPEED RATIO. INFLUENCE OF PARAMETERS SUCH AS SYSTEM INERTIA, DAMPING COEFFICIENT, EXTERNAL REACTANCE, MACHINE REACTANCE AND GENERATOR EXCITATION ARE EXAMINED UNDER CONDITIONS OF SHORT AND LONG DURATION WIND GUSTS BY SIMULATING A GENERATOR TORQUE ANGLE, AS A FUNCTION OF TIME.

77-0340 RANN: RESEARCH APPLIED TO NATIONAL NEEDS. WIND ENERGY CONVERSION RESEARCH.
NTIS, MARCH 1977. 23P.
PB-271942

THE NSF/RANN WIND ENERGY RESEARCH REPORTS LISTED IN THIS BULLETIN ARE AVAILABLE FOR READING BY THE GENERAL PUBLIC. FOURTEEN REPORTS, LISTED SEPARATELY, ARE INDICATED BY RANN NUMBER, TITLE, PERFORMING ORGANIZATION, AUTHOR, DATE, GRANT NUMBER, ABSTRACT, DESCRIPTORS, AND AVAILABILITY. ALSO INCLUDED IN THIS BULLETIN IS A LIST OF 14 SANDIA LABORATORY REPORTS WHICH ADDRESS PRIMARILY THE DARRIEUS VERTICAL AXIS SYSTEM AND WIND DATA. AUTHOR, TITLE, REPORT NUMBER, DATE, LENGTH, AND PRICE ARE INDICATED FOR EACH. NINE OTHER SOLAR ENERGY PUBLICATIONS WITH WIND ENERGY SECTIONS ALSO ARE INDICATED BY TITLE, PERFORMING ORGANIZATION, GRANT NUMBER, DATE AND AVAILABILITY.

77-0341 RAHMER B A
ALTERNATIVE ENERGY: MAJOR NEW EFFORTS AT DEVELOPMENT.
PET. ECON. 44(2): 56-57, FEBRUARY 1977.

EUROPEAN COUNTRIES HAVE SO FAR BEEN RATHER MORE CONSERVATIVE IN THEIR APPROACH TOWARDS ALTERNATIVE ENERGY DEVELOPMENT THAN THE U.S. AND JAPAN HAVE. CONSTRUCTION OF FLAT PLATE SOLAR COLLECTORS FOR WATER AND SPACE HEATING HAS BECOME A GROWTH INDUSTRY. WIND POWER RESEARCH HAS BEEN MAINLY A U.S. PREROGATIVE, BUT THE U.K. COULD PROVIDE MORE THAN ONE-FIFTH OF ITS ELECTRICITY REQUIREMENTS BY DEPLOYING MILLS OVER JUST 2% OF THE AREA OF THE SOUTHERN NORTH SEA. WAVE POWER IS BEING STUDIED WITH GOVERNMENTAL SUPPORT IN THE U.K., WHERE CONDITIONS ARE FAVORABLE OFF THE NORTHWESTERN COAST. EXPLOITATION OF GEOTHERMAL ENERGY IS PROGRESSING TENTATIVELY, AND ENERGY OF THE TIDES REPRESENTS A COMPARATIVELY SMALL, IF USEFUL, ADDITIONAL POWER RESERVE.

77-0342 RAILLY J W
A POSSIBLE SATURATION CRITERION FOR WIND ENERGY EXTRACTION.
WIND ENG. 1(1): 23-35, 1977.

TWO HYPOTHESES ARE ADVANCED FOR PREDICTING THE POSSIBLE POWER OUTPUT FROM A DISTRIBUTION OF WIND TURBINES OVER A LARGE GROUND AREA. WHEN THE TURBINE HEIGHT IS SMALL COMPARED WITH THE HEIGHT OF THE PLANETARY BOUNDARY LAYER, THE ROLE OF SHEAR STRESS IN DETERMINING THE POWER LEVEL IS DEMONSTRATED AND THE MODIFICATION TO THE WIND STRUCTURE IS PREDICTED. ON THIS BASIS, REALISTIC VALUES OF THE RATIO OF DISK AREA TO GROUND AREA ARE CALCULATED. THE IMPORTANCE OF THE STABILITY OF THE PBL AS IT EFFECTS THE POWER LEVEL IS DEMONSTRATED.

77-0343 SMEDMAN-HOEGSTROEM A S, HOEGSTROEUM U
PRACTICAL METHOD FOR DETERMINING WIND FREQUENCY DISTRIBUTIONS FOR THE LOWEST 200 METERS FROM ROUTINE METEOROLOGICAL DATA.
NTIS, 1977. 27P.
UUIM-47

A METHOD IS DESCRIBED FOR DETERMINING WIND SPEED FREQUENCY DISTRIBUTIONS AT ANY HEIGHT UP TO CA. 200 M ABOVE GROUND FOR A METEOROLOGICAL STATION WHERE WIND SPEED AND DIRECTION ARE MEASURED AT A LOW REFERENCE LEVEL (USUALLY 10 M) AND WHICH REPORTS ROUTINE METEOROLOGICAL DATA AT LEAST ONCE EVERY 3D HOUR. 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 RATE OF GROWTH OF THE INTERNAL BOUNDARY LAYERS HAS BEEN DETERMINED FROM A WORK BY PASQUILL (1972). 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 HIGH MASTS. THE METHOD IS SUCCESSFULLY TESTED AGAINST AN INDEPENDENT SET OF DATA FROM A 100 M MAST. ALSO GIVEN ARE SOME RESULTS FROM APPLICATION OF THE METHOD TO SWEDISH DATA. THE METHOD HAS BEEN DEVELOPED FOR RURAL CONDITIONS AND IS NOT VALID FOR URBAN CONDITIONS.

77-0344 SMOLUK G R
DESIGN IDEA INSPIRES DO-IT-YOURSELF WINDMILL.
DESIGN NEWS 33: 68-69, APRIL 4, 1977.

77-0345 RANDOLPH W
FINDING AND RECYCLING BATTERIES.
WIND POWER DIG. 1(8): 17-19, SPRING 1977.

77-0346 RANDOLPH W
POWER TO THE PEOPLE. (WINCHARGER STYLE).
WIND POWER DIG. 1(8): 10-14, SPRING 1977.

77-0347 RAO D M
POTENTIAL APPLICATION OF RADIAL SPLITTER DIFFUSER TO SHROUDED WIND TURBINES.
J. ENERGY 1(2): 134-136, MARCH-APRIL 1977.

A SHORT DIFFUSER UTILIZING RADIAL SPLITTERS IS PROPOSED AS A MEANS OF ACHIEVING A COMPACT AND EFFICIENT WIND-TURBINE SHROUD, SIMPLE IN DESIGN AND HAVING UNIQUE PRACTICAL FEATURES FAVORABLE TO COST-EFFECTIVENESS. CONSERVATIVE PROJECTS OF THE SHROUD PERFORMANCE BASED ON DATA RELATING SEPARATELY TO THE INTERNAL AND EXTERNAL FLOW CHARACTERISTICS APPEAR SUFFICIENTLY ATTRACTIVE TO WARRANT TESTING OF SHROUD MODELS DESIGNED ON THE PRINCIPLES HEREIN DISCUSSED.

77-0348 REBUILDING A TOWER.
ALTERN. SOURCES ENERGY NO. 26: 35, JUNE 1977.

THE WIND TOWER AT MARTIN JOPP'S FARM WAS KNOCKED OVER DURING A TORNADO IN 1973. PHOTOS SHOW THE DESTROYED TOWER AND THE REPAIRED TOWER BEING RERAISED.

77-0349 REED J W
ENERGY STORAGE NEEDS FOR WIND POWER SYSTEMS.
NTIS, 1977. 20P.
SAND-76-9058

WIND VARIES ON ALL TIME SCALES, BUT HOURLY AND LONGER TERM OSCILLATIONS ARE MOST IMPORTANT TO ECONOMICAL WIND ENERGY EXTRACTION SCHEMES. PERIODIC VARIATIONS IN AVAILABLE WIND ENERGY, OF DIURNAL, SYNOPTIC, ANNUAL, AND LARGER SCALES, ARE NOT OFTEN CORRELATED WITH DEMAND SO THAT SOME FORM OF ENERGY STORAGE IS NEEDED. MOST CURRENT ERDA-SPONSORED RESEARCH IN WIND ENERGY ASSUMES CONNECTION TO AN EXISTING POWER NETWORK AND RESOURCE STORAGE IN THE FORM OF SAVED FOSSIL FUELS. LONG TERM HOURLY WIND OBSERVATIONS AT SEVERAL REPRESENTATIVE U.S. LOCATIONS HAVE BEEN USED TO SHOW THAT A TOTALLY INDEPENDENT AND PERFECTLY RELIABLE WIND ENERGY SYSTEM WOULD REQUIRE AN IMPRACTICALLY LARGE STORAGE CAPACITY, PRIMARILY TO COVER YEAR-TO-YEAR AND ANNUAL CYCLES OF AVAILABLE WIND ENERGY. AS RELIABILITY IS ALLOWED TO DECREASE, A CONSIDERABLE REDUCTION IN STORAGE CAPACITY IS POSSIBLE. THIS IS DEMONSTRATED BY STATISTICAL RESULTS FOR SEVERAL CLIMATIC REGIMES.

77-0350 REED J W
NEW DETAILS ON WIND POWER CLIMATOLOGY.
NTIS, 1977. 26P.
SAND-77-6960

THE NATIONAL ISODYN MAP OF AVERAGE AVAILABLE WIND POWER WAS USED TO HELP SELECT FIFTEEN STATIONS, REPRESENTATIVE OF INTERESTING WIND POWER CLIMATIC REGIMES, FOR DETAILED ANALYSES OF TEN-YEAR RECORDS OF HOURLY WIND SPEED OBSERVATIONS. THESE LONG TIME SERIES HAVE BEEN CORRECTED FOR OBSERVER BIAS, HOMOGENIZED TO CONSTANT ANEMOMETER EXPOSURES, AND EXTRAPOLATED TO SELECT HEIGHTS 10M, 20M, AND 50M ABOVE FLAT TERRAIN. VARIOUS ANALYSES HAVE SHOWN THAT CORRECTION GENERALLY GAVE RESULTS IN EXCELLENT AGREEMENT WITH THE NATIONAL ISODYN CONTOURS, TURBINE CUT-IN AND CUT-OFF SPEED SELECTIONS WERE NOT CRITICAL TO POWER RECOVERY EFFICIENCY, TURBINE RATED SPEED NEEDS TO BE TAILORED TO THE REGIONAL WIND CLIMATE,

STAND-ALONE SYSTEMS REQUIRE HUGE STORAGE FILTERS TO SMOOTH ANNUAL AND INTER-ANNUAL VARIATIONS IN SUPPLY, AND MODEST STORAGE WILL EFFECTIVELY FILTER PERIODICITIES OF A FEW DAYS IN BOTH SUPPLY AND DEMAND.

77-0351 REED J W
METEOROLOGICAL STUDIES FOR WIND POWER: A PROGRESS REPORT.
NTIS, AUGUST 5, 1977. 13P.
SAND-77-1255

THIS PAPER WAS PRESENTED AT THE THIRD BIENNIAL WIND ENERGY CONVERSION SYSTEMS CONFERENCE, WASHINGTON D.C., SEPTEMBER 19, 1977. 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 PRCVIDE RELIABLE SERVICE.

77-0352 RENNER-SMITH S
VERTICAL WINDMILL GENERATES KILOWATTS FROM MONSOONS.
POP. SCI. 210(6): 99, JUNE 1977.

A DARRIEUS WINDMILL IN BANGALORE, INDIA, IS DESCRIBED.

77-0353 REPORT ON THE WESTERN ENERGY EXPANSION STUDY.
WASHINGTON, D.C., BUREAU OF RECLAMATION, FEBRUARY 1977.

THIS REPORT CONTAINS THE RESULTS OF AN ASSESSMENT BY THE BUREAU OF RECLAMATION OF OPPORTUNITIES TO RESPOND TO URGENT NEEDS FOR ADDITIONAL ELECTRICAL POWER AND ENERGY IN THE WEST WHICH CAN MAKE AN EFFECTIVE CONTRIBUTION TO CONSERVATION OF DWINDLING OIL AND NATURAL GAS RESOURCES. THE WEES WAS CONDUCTED TO IDENTIFY AND EVALUATE OPPORTUNITIES FOR INCREASED ELECTRICAL POWER AND ENERGY GENERATION IN THE 17 WESTERN STATES WHICH WARRANT FURTHER, MORE DETAILED STUDY IN THE IMMEDIATE FUTURE. FOCUS OF THE STUDY WAS PRIMARILY ON DEVELOPMENT OF HYDROELECTRIC POWER, INCLUDING PUMPED STORAGE, AT BOTH NEW SITES AND EXISTING FACILITIES. OTHER OPPORTUNITIES RELATE TO DEVELOPMENT OF ELECTRICAL ENERGY USING SOLAR (DIRECT RADIATION AND WIND) AND GEOTHERMAL RESOURCES. IN ADDITION TO DEVELOPMENTAL OPPORTUNITIES, SEVERAL MATTERS OF A POLICY NATURE ARE DISCUSSED AND EVALUATED.

77-0354 REUTER R C, SHELDAHL R E
SANDIA VERTICAL AXIS WIND TURBINE PROJECT. TECHNICAL QJARTERLY REPORT.
APRIL - JUNE 1976.
NTIS, JANUARY 1977. 79P.
SAND-76-0581

THIS REPORT SUMMARIZES ACTIVITIES WITHIN THE SANDIA LABORATORIES VERTICAL-AXIS WIND TURBINE PROJECT THAT OCCURRED DURING THE FOURTH QUARTER OF FISCAL YEAR 1976. INCLUDED ARE HIGHLIGHTS FOR THE QUARTER AND STATUS REPORTS ON ACTIVITIES IN AREAS OF SYSTEMS STUDIES AERODYNAMICS, ELECTRICAL SYSTEMS, STRUCTURES, AND MECHANICAL DESIGN. SUBHEADINGS IN EACH SECTION COVER GENERAL DEVELOPMENT ACTIVITIES AND ACTIVITIES RELATED TO THE 17-METER TURBINE AND THE 5-METER TURBINE. ALSO INCLUDED IN THIS REPORT IS THE PROGRAM OF THE SANDIA VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, A LIST OF WORKSHOP ATTENDEES, AND A LIST OF PROJECT-RELATED SANDIA PUBLICATIONS.

77-0355 REUTER R C
VERTICAL AXIS WIND TURBINE TIE-DOWN DESIGN WITH AN EXAMPLE.
NTIS, DECEMBER 1977. 35P.
SAND-77-1919

DESIGN OF CABLE TIE-DOWN SYSTEMS FOR VERTICAL AXIS WIND TURBINES IS DISCUSSED AND GUIDELINES ARE FURNISHED. TOPICS SUCH AS THE NUMBER, SIZE AND MATERIAL OF THE CABLES, CABLE ELEVATION ANGLE, TENSIONING, AND THERMOELASTIC EFFECTS ARE DISCUSSED IN DETAIL. THE TIE-DOWN SYSTEM OF THE EXISTING SANDIA 17 METER VAWT IS USED THROUGHOUT AS A NUMERICAL EXAMPLE.

77-0356 REUTER R C
TIE-DOWN CABLE SELECTION AND INITIAL TENSIONING FOR THE SANDIA 17 METER

VERTICAL AXIS WIND TURBINE.
NTIS, FEBRUARY 1977. 18P.
SAND-76-0616

THE RATIONALE USED FOR SELECTION OF TIE-DOWN CABLES FOR THE SANDIA 17-METER TURBINE IS PRESENTED, DISCUSSED AND IMPLEMENTED. THE EFFECT OF INITIAL CABLE TENSION ON THE RESPONSE OF THE TIE-DOWN SYSTEM IS EVALUATED AND DISCUSSED IN TERMS OF RESULTING SAG, BLADE INTERFERENCE AND RESPONSE LINEARITY.

77-0357 ROGERS P
WIND ROTOR IMPROVES HYPERBOLIC COOLING TOWER EFFICIENCY.
POWER ENG. 81(3): 48-50, MARCH 1977.

A RECENTLY DEVELOPED SYSTEM FOR IMPROVING THE EFFICIENCY OF A HYPERBOLIC COOLING TOWER USES A WIND ROTOR WHICH HAS BEEN INSTALLED ON THE OUTSIDE OF THE STRUCTURE TO PRODUCE A FORCED UPDRAFT AROUND THE INSIDE PERIMETER OF THE COOLING TOWER. THIS UPDRAFT ELIMINATES THE POSSIBLE DOWNDRAFT AND, IN GENERAL, INCREASES AIR FLOW. THE INCREASED EFFICIENCY PERMITS A CLOSER APPROACH, AND/OR ALLOWS A SMALLER SIZED TOWER TO BE USED BECAUSE THE EFFECT OF THE PERIPHERAL JETS IS SIMILAR TO THE MECHANICAL INDUCED-DRAFT TYPE OF COOLING TOWER.

77-0358 RIEDER W G
WIND POWERED ARTIFICIAL AERATION OF NORTHERN PRAIRIE LAKES. RESEARCH REPORT.
NTIS, DECEMBER 1977. 121P.
PB-281562

MOST NORTHERN PRAIRIE LAKES SUFFER FROM REOCCURRING OXYGEN DEPLETION, AND, ALTHOUGH ARTIFICIAL AERATION SEEMS TO HELP, OPERATING COSTS ARE BECOMING HIGH BECAUSE OF INCREASING ENERGY COSTS. AN ALTERNATE SOURCE OF COMPRESSED AIR FOR OPERATING THE AERATION SYSTEMS IS WIND-POWERED COMPRESSORS. A DETAILED ASSESSMENT OF THE FEASIBILITY OF THIS APPROACH IN NORTH DAKOTA SETTINGS WAS COMPLETED. A LARGE NUMBER OF WIND-TURBINE AND COMPRESSOR COMBINATIONS WAS INVESTIGATED. METHODOLOGY FOR MATCHING COMMERCIAL COMPRESSORS TO VARIOUS WIND TURBINES AND PREDICTING OUTPUT RATES BASED ON WIND SPECTRUM INPUTS WAS DEVELOPED AND VERIFIED. OPTIMUM GEAR-UP RATIOS EXIST FOR MAXIMUM AIR OUTPUT RATES. A SMALL EXPERIMENTAL WIND-POWERED COMPRESSED-AIR SYSTEM WAS BUILT AND OPERATED SUCCESSFULLY AT A NON-LAKE SITE. ECONOMIC ANALYSES WERE COMPLETED. FINDINGS INDICATE THAT THE USE OF WIND TO POWER SMALL COMPRESSORS (LESS THAN ABOUT 15 SCFM) FOR ARTIFICIAL AERATION IN NORTH DAKOTA IS TECHNICALLY AND ECONOMICALLY FEASIBLE WITHIN CERTAIN CONSTRAINTS. RECOMMENDATIONS INCLUDE PROCEEDING INTO PROTOTYPE SYSTEM INSTALLATIONS AT LAKE SITES IN NORTH DAKOTA FOR PERFORMANCE AND COST MONITORING OVER SEVERAL YEARS.

77-0359 ROTH R
METEOROLOGY AND UTILIZATION OF WIND ENERGY.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 71-79. (IN GERMAN)

ECONOMIC UTILIZATION OF WIND ENERGY BY WECS (WIND ENERGY CONVERTING SYSTEMS) PRESUPPOSES AS EXACT A KNOWLEDGE OF THE WIND FIELD AS POSSIBLE. THE TASK OF PROVIDING THIS BELONGS TO THE SUBJECT OF METEOROLOGY. THE REQUIRED INFORMATION IS EXPLAINED AND THE PRESENT DAY STATE OF KNOWLEDGE IS DISCUSSED. THIS APPLIES ABOVE ALL TO LARGE PLANT (GREATER THAN 1 MW (ELEC) RATED OUTPUT) AS GREAT METEOROLOGICAL PROBLEMS OCCUR HERE.

77-0360 ROTHMAN E A, DEABLER H E
MATERIALS AND PROCESSING APPROACHES TO COST COMPETITIVE WIND TURBINE ROTOR BLADES.
SAMPE Q. 8(2): 13-21, JANUARY 1977.

A STUDY WAS MADE OF MATERIALS AND PROCESSES USING METALLICS AND COMPOSITES OR COMBINATION OF BOTH FOR THE FABRICATION OF LOW COST WIND TURBINE BLADES. AS A RESULT OF THESE STUDIES THE FILAMENT WINDING PROCESS WAS SELECTED AS OFFERING THE POTENTIAL FOR LOW COST FABRICATION WHILE REQUIRING THE MINIMUM COMPROMISES IN AERODYNAMIC SHAPE, OPTIMUM STRUCTURE, AND WEIGHT. THE PROCESS IS DESCRIBED WHICH IS COMPATIBLE WITH EXISTING WINDING FACILITIES AND EQUIPMENT AND WHICH RESULTS IN NEAR OPTIMUM STRUCTURAL FIBER ORIENTATION. FIBERGLASS MATERIAL IS USED WITH A

RESIN SYSTEM APPROPRIATE FOR THE PROCESS AND REQUIRING MINIMUM CURING TIME AND EQUIPMENT.

77-0361 RYLE M
ECONOMICS OF ALTERNATIVE ENERGY SOURCES.
NATURE 267(5607): 111-117, MAY 12, 1977.

AN IMPORTANT PART OF THE OIL AND NATURAL GAS AT PRESENT CONSUMED IN THE UK IS USED FOR THE HEATING OF BUILDINGS, A DEMAND WHICH SHOWS LARGE DIURNAL, DAY-TO-DAY AND ANNUAL FLUCTUATIONS. THE REPLACEMENT OF THIS ENERGY BY NUCLEAR-GENERATED ELECTRICITY, AS AT PRESENT ENVISAGED, WOULD REQUIRE THE CONSTRUCTION OF SOME 250 GW OR ADDITIONAL CAPACITY BY THE END OF THE CENTURY, A PROGRAMME WHICH DOES NOT SEEM FEASIBLE. BY INCORPORATING RELATIVELY CHEAP, SHORT TERM STORAGE IN THE FORM OF LOW-GRADE HEAT, THE GENERATING CAPACITY REQUIRED TO FULFIL PEAK DEMAND COULD BE REDUCED BY MORE THAN 50%. AS SOON AS SUCH STORAGE IS PROVIDED, HOWEVER, OTHER SOURCES OF ENERGY BECOME VIABLE AND ATTRACTIVE ALTERNATIVES, AND THE UK IS WELL SITUATED TO MAKE USE OF WIND, WAVE, AND TIDAL POWER.

77-0362 SAAB-SCANIA HEADS SWEDISH WIND PROGRAM.
WIND POWER DIG. NO. 10: 22, FALL 1977.

A SWEDISH PROJECT ON LARGE-SCALE WIND TURBINE DESIGN IS DESCRIBED.

77-0363 SALIEVA R B
SIMULATION ALGORITHMS AND THEIR REALIZATION BY DIGITAL COMPUTER FOR CALCULATION OF WIND- AND SOLAR-PLANT STORAGE-SERVICE CAPACITY.
GELIOTEKHNIKA, NO. 2: 75-83, 1977. TRANSLATION: APPL. SOLAR ENERGY 13(2): 53-58, 1977.

A METHOD OF CALCULATING THE CAPACITY OF STORAGE DEVICES IS DISCUSSED. THE MATHEMATICAL MODEL IS BASED ON A STATISTICAL MODEL. FOR DIGITAL-COMPUTER MODELING, APPROPRIATE SIMULATION ALGORITHMS HAVE BEEN WRITTEN THAT MAKE IT POSSIBLE TO DETERMINE STORAGE-DEVICE CAPACITY, TOTAL THROUGHPUT, DISPOSAL OF IDLE UNUSED OUTPUT, ENERGY DEFICIT, AND OTHER CHARACTERISTICS.

77-0364 SANDBORN V A
ATMOSPHERIC BOUNDARY LAYER MODELING FOR WIND POWER SITES.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, COLLEGE OF ENGINEERING, CEP77-78VAS25, 1977.

THIS DISCUSSION COVERS MAINLY THE EVALUATION OF WIND POWER SITES DETERMINED FROM WIND TUNNEL EXPERIMENTS.

77-0365 SANDBORN V A
PLACEMENT OF WIND-POWER SYSTEMS.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, COLLEGE OF ENGINEERING, CEP77-78VAS14, 1977. 13P.

A BRIEF REVIEW OF THE EFFECT OF WIND SPEED-VARIATION OVER RIDGES, ISOLATED MOUNTAINS AND HILLS IS GIVEN. FROM WIND-TUNNEL TESTS IT IS FOUND THAT LONG RIDGES WITH SHARP CRESTS PRODUCE THE MOST SPEEDUP OF THE WIND. FLATTOPPED AND STEEP OR BLUFF RIDGES DO NOT PRODUCE AS LARGE AN INCREASE IN WIND SPEED. WIND POWER SITES DOWNWIND OF HILLS, BUILDINGS AND TOWERS SHOULD BE AVOIDED.

77-0366 SANDBORN V A
SITES FOR WIND-POWER INSTALLATION.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, COLLEGE OF ENGINEERING, CEP77-78VAS15, 1977. 7P.

AN EXPERIMENTAL STUDY OF AIR FLOW OVER TWO-DIMENSIONAL RIDGES HAS BEEN MADE IN AN ATMOSPHERIC SIMULATION WIND TUNNEL. THE RESULTS INDICATE THAT SHARP OR ROUND CRESTED RIDGES ARE PREFERRED TO FLAT TOPPED RIDGES AS A MEANS OF INCREASING LOCAL WIND SPEED. THE FLOW OVER THE SHARP CRESTED RIDGES CAN BE PREDICTED REASONABLY ACCURATELY WITH INVISCID FLOW RELATIONS. THE UPSTREAM REGION OF THE SHARP CRESTED RIDGE DOES NOT AMPLIFY THE APPROACH TURBULENCE.

77-0367 SARIN R K, NAIR K
SOLAR ELECTRIC-ENERGY MARKET PENETRATION.

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. 19. P. 20-24.

A BAYESIAN APPROACH WAS EMPLOYED TO FORECAST THE SOLAR ELECTRIC MARKET PENETRATION BY THE YEARS 1990 AND 2000. THE STUDY IDENTIFIED A MULTITUDE OF FACTORS, INCLUDING RELATIVE COST OF COMPETITIVE ENERGY SYSTEMS, GOVERNMENT INCENTIVES, FUTURE ENVIRONMENTAL REGULATIONS, AND NEW TECHNOLOGIES, THAT WOULD AFFECT THE SOLAR MARKET SHARE. THE JUDGMENTS OF SEVERAL EXPERTS FROM UTILITY COMPANIES, GOVERNMENT AGENCIES, AND RESEARCH LABORATORIES WERE UTILIZED IN A SYSTEMATIC MANNER TO QUANTIFY THE PROBABILITY DISTRIBUTIONS OF FUTURE SOLAR MARKET SHARE AS A FUNCTION OF THE VARIOUS FACTORS. THE LIKELIHOOD OF THE OCCURRENCE OF THESE FACTORS WAS ALSO ASSESSED, AND THE SOLAR MARKET SHARE WAS FORECASTED FOR THE MOST-LIKELY FUTURE SCENARIOS.

77-0368 SAVINO J M
BRIEF SUMMARY OF THE ATTEMPTS TO DEVELOP LARGE WIND-ELECTRIC GENERATING SYSTEMS IN THE U.S.
NTIS, 1977. 18P.
DOE/NASA/1004-77/7

INTEREST IN DEVELOPING LARGE WIND-ELECTRIC GENERATING SYSTEMS IN THE UNITED STATES WAS STIMULATED PRIMARILY BY ONE MAN, PALMER C. PUTNAM. HE WAS RESPONSIBLE FOR THE CONSTRUCTION OF THE LARGEST WIND-POWER SYSTEM EVER BUILT - THE 1250 KILOWATT SMITH-PUTNAM WIND-ELECTRIC PLANT. THE EXISTENCE OF THIS SYSTEM PROMPTED THE U.S. FEDERAL POWER COMMISSION TO INVESTIGATE THE POTENTIAL OF USING THE WINDS AS A SOURCE OF ENERGY. ALSO, IN 1933 PRIOR TO PUTNAM'S EFFORT, THERE WAS AN ABORTIVE ATTEMPT BY J D MADARAS TO DEVELOP A WIND SYSTEM BASED ON THE MAGNUS EFFECT. THESE THREE PROJECTS COMPRISE THE ONLY SERIOUS EFFORTS IN AMERICA TO DEVELOP LARGE WIND DRIVEN PLANTS. IN THIS PAPER THE HISTORY OF EACH PROJECT IS BRIEFLY DESCRIBED. ALSO DISCUSSED ARE SOME OF THE REASONS WHY WIND ENERGY WAS NOT SERIOUSLY CONSIDERED AS A MAJOR SOURCE OF ENERGY FOR THE U.S.

77-0369 SCHMIDT-KUESTER W J, WAGNER H F
DEVELOPMENT OF NEW TECHNOLOGIES FOR ENERGY PRODUCTION IN THE FEDERAL REPUBLIC OF GERMANY.
BRENNST.-WARME-KRAFT 29(9): 377-383, SEPTEMBER 1977. (IN GERMAN)

IN THE INTRODUCTION, THIS SURVEY OF THE DEVELOPMENT OF NEW ENERGY TECHNOLOGIES EMPHASIZES THE IMPORTANCE OF THE NUCLEAR ENERGY IN VIEW OF ITS SHORT-TERM AVAILABILITY. THEN THE RELEVANT DEVELOPMENTS FOR THE MEDIUM- AND LONG-TERM AVAILABILITY FOR COVERING THE ENERGY DEMAND ARE PRESENTED, AND ESPECIALLY THE THERMAL APPLICATION OF SOLAR ENERGY IS DEALT WITH. R AND D WORK FOR THE ELECTRICAL USE OF WIND AND WAVE ENERGY, OF SEA CURRENTS AND HYDRO POWER, AND OTHERS ARE DESCRIBED. IN THE AREA OF DEVELOPING THE RATIONAL USE OF ENERGY, THE AUTHORS REFER PARTICULARLY TO THE PRACTICAL TECHNIQUES OF APPLICATION IN HOUSEHOLDS AND OTHER SMALL USERS, AS WELL AS TO THE POWER AND HEATING COUPLING IN CONNECTION WITH DISTRICT HEATING. A SURVEY OF THE PRESENT STAGE AND ACTIVITIES IN RESPECT OF DEVELOPMENT OF CONTROLLED NUCLEAR FUSION CONCLUDES THE ARTICLE.

77-0370 SELZER H, COHRT C
METHOD OF OPERATION AND CHARACTERISTICS OF DARRIEUS ROTORS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P.111-124. (IN GERMAN)

SOME OF THE PROBLEMS ARE DESCRIBED WHICH ARE CONNECTED WITH THE WIND ROTOR WITH VERTICAL AXIS (DARRIEUS-ROTOR). THE ADVANTAGE OF THIS ROTOR COMPARED WITH UNITS WITH HORIZONTAL AXES LIES IN THE FACT THAT THEY ARE INDEPENDENT OF THE WIND DIRECTIONS. THE FOLLOWING ASPECTS ARE CONSIDERED: LOAD FACTOR, BEHAVIOUR ON STARTING, METHOD OF CONSTRUCTION, ENERGY CONVERSION, OUTPUT OF WIND ENERGY AND DURATION OF UTILIZATION, EXAMPLES OF DESIGN.

77-0371 SENIOR T B A, SENGUPTA D L, FERRIS J E
TV AND FM INTERFERENCE BY WINDMILLS. FINAL REPORT, JANUARY 1, 1976 - DECEMBER 21, 1976.

NTIS, FEBRUARY 1977. 159P.
COO/2846-76/1

THIS REPORT DESCRIBES A PRELIMINARY BUT WIDE RANGING INVESTIGATION OF THE EFFECTS OF A HORIZONTAL AXIS WINDMILL ON THE RECEPTION OF TV AND FM SIGNALS IN ITS VICINITY. IT IS SHOWN THAT THE ROTATING BLADES PRODUCE A TIME VARYING AMPLITUDE MODULATION OF THE OTTAL SIGNAL RECEIVED, AND THAT FOR AN ANTENNA SO LOCATED AS TO PICK UP THE SPECULAR OR FORWARD SCATTERING OFF THE BLADES, THE MODULATION CAN PRODUCE SEVERE DISTORTION OF THE VIDEO PORTION OF A TV SIGNAL REPRODUCTION. THE DISTORTION IS WORST AT THE HIGHER FREQUENCIES, AND THEREFORE POSES MORE OF A PROBLEM AT UHF THAN VHF. NO INTERFERENCE TO THE AUDIO SIGNAL NOR TO ANY FM TRANSMISSION HAS BEEN OBSERVED. BASED ON LABORATORY STUDIES AS WELL AS FIELD TESTS, A MODULATION LEVEL HAS BEEN ESTABLISHED AT WHICH THE VIDEO INTERFERENCE IS JUDGED SEVERE OR OBJECTIONABLE, AND THIS THRESHOLD OF INTERFERENCE IS SUBSTANTIALLY INDEPENDENT OF THE PRIMARY FIELD STRENGTH. A THEORY HAS BEEN DEVELOPED TO COMPUTE THE INTERFERENCE ZONE ABOUT A WINDMILL FOR ANY GIVEN TV TRANSMITTER, AND THE RESULTS ARE IN GOOD AGREEMENT WITH THOSE OBTAINED FROM FIELD TESTS USING THE OPERATIONAL WINDMILL AT THE NASA PLUM BROOK FACILITY.

77-0372 TETRA-HELIX INTRODUCED.
WIND POWER DIG. 1(8): 24-25, SPRING 1977.

ZEPHYR WINDS' NEW PROTOTYPE IS A STARTLINGLY SIMPLE, LOW TECH DESIGN.

77-0373 SFORZA P M
VORTEX AUGMENTORS FOR WIND ENERGY CONVERSION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.E1-1 TO E1-76.

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 (VAC).

77-0374 SHELDAHL R E, BLACKWELL B F
FREE-AIR PERFORMANCE TESTS OF A 5 METRE-DIAMETER DARRIEUS TURBINE.
NTIS, DECEMBER 1977. 37P.
SAND-77-1063

A 5-METRE-DIAMETER VERTICAL-AXIS WIND TURBINE HAS BEEN TESTED AT THE SANDIA LABORATORIES WIND TURBINE SITE. THE RESULTS OF THESE TESTS AND SOME OF THE PROBLEMS ASSOCIATED WITH FREE-AIR TESTING OF WIND TURBINES ARE PRESENTED. THE PERFORMANCE DATA OBTAINED FOLLOW THE GENERAL TREND OF DATA OBTAINED IN EXTENSIVE WIND TUNNEL TESTS OF A 2-METRE-DIAMETER TURBINE. HOWEVER, THE POWER COEFFICIENT DATA ARE SLIGHTLY LOWER THAN ANTICIPATED. THE REASONS FOR THIS DISCREPANCY ARE EXPLORED IN THE PAPER, ALONG WITH COMPARISONS BETWEEN EXPERIMENTAL DATA AND A COMPUTERIZED AERODYNAMIC PREDICTION MODEL.

77-0375 SHEPERDSON W
W.T.G. ENERGY SYSTEMS: 200 KW FOR CUTTYHUNK ISLAND.
WIND POWER DIG. NO. 10: 6-11, FALL 1977.

A 200 KW WIND TURBINE GENERATOR BUILT BY W.T.G. ENERGY SYSTEMS, INC., IS DESCRIBED. IT IS LOCATED ON CUTTYHUNK ISLAND, NEAR NEW BEDFORD, MASSACHUSETTS, AND IS EXPECTED TO MEET THE ELECTRIC POWER NEEDS OF THE ENTIRE ISLAND COMMUNITY THREE QUARTERS OF THE YEAR.

77-0376 SISTERSON D L
A NOTE ON THE POWER-LAW WIND PROFILE AND ITS USE BY THE WIND-ENERGY COMMUNITY. RADIOLOGICAL AND ENVIRONMENTAL RESEARCH DIVISION ANNUAL REPORT, JANUARY-DECEMBER 1976. ARGONNE NATIONAL LABORATORY.
NTIS, 1977. P.158-159.
ANL-76-88

77-0377 SUCIU E O, PREUSS R D, MORINO L

POTENTIAL AERODYNAMIC ANALYSIS OF HORIZONTAL-AXIS WINDMILLS.
AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AEROSPACE SCIENCES MEETING, 15TH, LOS ANGELES, CALIFORNIA, JANUARY 24-26, 1977. PAPER 77-132. 11P.

THE PROBLEM OF A HORIZONTAL-AXIS WINDMILL IN STEADY, INCOMPRESSIBLE, POTENTIAL FLOW IS CONSIDERED. THE PROBLEM IS FORMULATED IN A FRAME OF REFERENCE RIGIDLY CONNECTED WITH THE ROTOR. TWO DIFFERENT INTEGRAL EQUATIONS 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. 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 AND THE CORRESPONDING NUMERICAL FORMULATION ARE OBTAINED AS THE LIMIT OF THE FINITE-THICKNESS ONE. NUMERICAL RESULTS ARE PRESENTED. DATA SUMMARY: PERTURBATION VELOCITY POTENTIAL DIFFERENCE DISTRIBUTIONS ARE PLOTTED FOR ONE-BLADE WINDMILLS FOR DIFFERENT RADIAL DISTANCES IN THE RANGE 0-70; VARIABLES ARE PERTURBATION VELOCITY POTENTIAL DIFFERENCE, RADIAL DISTANCE, POWER COEFFICIENT, AND BLADE ANGULAR VELOCITY-ROTOR RADIUS/FIXED FRAME WIND VELOCITY RATIO; SIX FIGURES INCLUDE NUMERIC DATA.

77-0378 SOLAR PROGRAM ASSESSMENT; ENVIRONMENTAL FACTORS, WIND ENERGY CONVERSION.
NTIS, MARCH 1977. 42P.
ERDA-77-47/6

THE PURPOSE OF THIS REPORT IS TO PRESENT AND PRIORITIZE THE MAJOR ENVIRONMENTAL ISSUES ASSOCIATED WITH THE FURTHER DEVELOPMENT OF WIND ELECTRIC CONVERSION (WEC) SYSTEMS, ONE OF THE EIGHT FEDERALLY-FUNDED SOLAR TECHNOLOGIES. TO PROVIDE A BACKGROUND FOR THIS ENVIRONMENTAL ANALYSIS, THE BASIC CONCEPTS OF THE TECHNOLOGY ARE REVIEWED, AS ARE ITS RESOURCE REQUIREMENTS. THE POTENTIAL EFFECTS OF THIS NEW TECHNOLOGY ON THE FULL RANGE OF ENVIRONMENTAL CONCERNS (I.E., AIR AND WATER QUALITY, BIOSYSTEMS, SAFETY, SOCIAL/INSTITUTIONAL STRUCTURES, ETC.) ARE THEN DISCUSSED IN TERMS OF BOTH THEIR RELATIVE SIGNIFICANCE AND POSSIBLE SOLUTIONS. ALTHOUGH THE DEVELOPMENT OF WEC WILL IN SOME WAYS CONTRIBUTE TO ENVIRONMENTAL PROBLEMS COMMON TO ANY CONSTRUCTION PROJECT OR ENERGY PRODUCING TECHNOLOGY, ONLY THOSE IMPACTS UNIQUE TO THE SOLAR/WIND PORTION OF THE TECHNOLOGY WILL BE DISCUSSED IN DEPTH.

77-0379 SOLAR ENERGY: UNSUNG POTENTIAL FOR WIND AND BIOMASS.
SCIENCE 200(4342): 636-637, MAY 12, 1978.

A BRIEF REVIEW OF DOE-SPONSORED RESEARCH IN SOLAR ENERGY IS GIVEN.

77-0380 SORENSEN B
DIRECT AND INDIRECT ECONOMICS OF WIND ENERGY SYSTEMS RELATIVE TO FUEL BASED SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.D2-7 TO D2-14.

IT IS SHOWN THAT THE ADDITION OF AN ENERGY STORAGE SYSTEM OF MODEST CAPACITY, TO A WIND ENERGY GENERATOR, PROVIDES A TOTAL WIND ENERGY ELECTRICITY GENERATING SYSTEM AS DEPENDABLE AS CURRENT ALTERNATIVE MEANS OF PRODUCING ELECTRICITY. IT IS FURTHER SHOWN, BASED ON PROJECTIONS OF THE MASS PRODUCTION COSTS OF WIND ENERGY GENERATORS AND ENERGY STORAGE SYSTEMS, THAT SUCH COMBINED SYSTEMS, AS WELL AS FUEL SAVING GENERATORS WITHOUT STORAGE, APPEAR ECONOMICALLY COMPETITIVE TO THE ALTERNATIVES, PROVIDED THE COMPARISON IS MADE OVER THE ENTIRE LIFE CYCLE OF THE SYSTEMS. FINALLY, A NUMBER OF ECONOMICALLY LESS TANGIBLE ASPECTS ARE TOUCHED UPON, ALL OF WHICH SEEM TO FAVOR THE USE OF FUEL-LESS ENERGY SYSTEMS.

77-0381 SORENSEN B
DIRECT AND INDIRECT ECONOMICS OF WIND ENERGY SYSTEMS RELATIVE TO FUEL BASED SYSTEMS.
WIND ENG. 1(1): 15-22, 1977.

SEE 77-0380

77-0382 SOULES C
WIND DRIVEN PRIME MOVER.
U.S. PATENT NO. 4,004,861, JANUARY 25, 1977. 4P.

A WIND DRIVEN PRIME MOVER IS DESCRIBED WHICH IS DRIVEN BY A PLURALITY OF ARCUATELY SHAPED WIND VANES PIVOTALLY MOUNTED ON A ROTATABLE TURNTABLE. THE WIND VANES ARE PIVOTALLY MOUNTED ON THE TURNTABLE WITH THEIR PIVOT AXLE DISPOSED IN A VERTICAL PLANE. THE PIVOTS ARE POSITIONED ADJACENT THE PERIPHERY OF THE TURNTABLE, WITH THE PIVOTS BEING SPACED EQUI-DISTANT FROM EACH OTHER AND EQUI-DISTANT FROM THE AXIS OF ROTATION OF THE TURNTABLE. THE BOTTOMS OF THE VANES ARE ARCUATELY SHAPED, WITH THE LENGTH OF THE ARC BEING SLIGHTLY LONGER THAN THE SPACE BETWEEN THE PIVOTS SO THAT THERE IS AN OVERLAP BETWEEN ADJACENT VANES. THE CONVEX SURFACE OF THE VANES FACE OUTWARDLY TO PROVIDE A CONCAVE INNER SURFACE.

77-0383 SPERA D A, JANETZKE D C, RICHARDS T R
DYNAMIC BLADE LOADING IN THE ERDA/NASA 100KW AND 200KW WIND TURBINES.
NTIS, 1977. 14P.
N77-31599, ERDA/NASA/1004-77/2

DYNAMIC BLADE LOADS, INCLUDING AERODYNAMIC, GRAVITATIONAL, AND INERTIAL EFFECTS, ARE PRESENTED FOR TWO LARGE HORIZONTAL-AXIS WIND TURBINES: THE ERDA-NASA 100 KW MOD-0 AND 200 KW MOD-0A WIND POWER SYSTEMS. CALCULATED AND MEASURED LOADS ARE COMPARED FOR AN EXPERIMENTAL MOD-0 MACHINE IN OPERATION. PREDICTED BLADE LOADS ARE ALSO GIVEN FOR THE HIGHER POWER MOD-0A WIND TURBINE NOW BEING ASSEMBLED FOR OPERATION AS PART OF A MUNICIPAL POWER PLANT. TWO MAJOR STRUCTURAL MODIFICATIONS HAVE BEEN MADE TO THE MOD-0 WIND TURBINE FOR THE PURPOSE OF REDUCING BLADE LOADS. A STAIRWAY WITHIN THE TRUSS TOWER WAS REMOVED TO REDUCE THE IMPULSIVE AERODYNAMIC LOADING CAUSED BY THE TOWER WAKE ON THE DOWNWIND ROTOR BLADES. ALSO, THE TORSIONAL STIFFNESS OF THE YAW DRIVE MECHANISM CONNECTING THE TURBINE NACELLE TO THE TOWER WAS DOUBLED TO REDUCE ROTOR-TOWER INTERACTION LOADS. MEASURED REDUCTIONS IN LOAD OBTAINED BY MEANS OF THESE TWO MODIFICATIONS EQUALED OR EXCEEDED PREDICTIONS.

77-0384 SPERA D A
COMPARISON OF COMPUTER CODES FOR CALCULATING DYNAMIC LOADS IN WIND TURBINES.
NTIS, 1977. 40P.
DOE/NASA/1028-78/16, NASA-TM-73773, CONF-770921-7

SEVEN COMPUTER CODES FOR ANALYZING PERFORMANCE AND LOADS IN LARGE, HORIZONTAL-AXIS WIND TURBINES WERE USED TO CALCULATE BLADE BENDING MOMENT LOADS FOR TWO OPERATIONAL CONDITIONS OF THE 100 KW MOD-0 WIND TURBINE. RESULTS ARE COMPARED WITH TEST DATA ON THE BASIS OF CYCLIC LOADS, PEAK LOADS, AND HARMONIC CONTENTS. FOUR OF THE SEVEN CODES INCLUDE ROTOR-TOWER INTERACTION AND THREE ARE LIMITED TO ROTOR ANALYSIS. WITH A FEW EXCEPTIONS, ALL CALCULATED LOADS WERE WITHIN 25 PERCENT OF NOMINAL TEST DATA.

77-0385 SPERA D A, JANETZKE D C
EFFECTS OF ROTOR LOCATION, CONING, AND TILT ON CRITICAL LOADS IN LARGE WIND TURBINES.
WIND TECHNOL. J. 1(20): 5-10, SUMMER 1977.

THREE LARGE (1500 KW) HORIZONTAL ROTOR CONFIGURATIONS WERE ANALYZED TO DETERMINE THE EFFECTS ON DYNAMIC LOADS OF UPWIND AND DOWNWIND ROTOR LOCATIONS, CONED AND RADIAL BLADE POSITIONS, AND TILTED AND HORIZONTAL ROTOR AXIS POSITIONS. LOADS WERE CALCULATED FOR A RANGE OF WIND VELOCITIES AT THREE LOCATIONS IN THE STRUCTURE: THE BLADE SHANK, THE HUB SHAFT, AND THE YAW DRIVE. BLADE AXIS CONING AND ROTOR AXIS TILT WERE FOUND TO HAVE LITTLE EFFECT ON LOADS. HOWEVER, LOCATING THE ROTOR UPWIND OF THE TOWER SIGNIFICANTLY REDUCED LOADS AT ALL LOCATIONS ANALYZED.

77-0386 SPURGEON D
SUPPORT FOR ALTERNATIVES.
NATURE 266(5598): 110-111, MARCH 10, 1977.

TIDAL ENERGY FROM THE BAY OF FUNDY, BIOMASS FROM CROP RESIDUES, AND WIND AND SOLAR POWER ARE BEING ASSESSED BY CANADIAN SCIENTISTS AS POSSIBLE SOURCES OF RENEWABLE ENERGY. BY 1990, TIDAL ENERGY FROM THE BAY OF FUNDY

COULD DISPLACE ABOUT 4000 GWH OF OIL-FIRED ELECTRICITY GENERATION AND 500 GWH OF COAL-FIRED ELECTRICITY GENERATION. THIS WOULD MEAN AN ANNUAL SAVINGS OF SOME 6 MILLION BBL OF OIL AND 300,000 TONS OF COAL. THE SCHEME HAS CONSIDERABLE APPEAL FOR NOVA SCOTIANS, WHO HAVE BEEN HIT HARD BY RECENT OIL INCREASES. IN OTHER AREAS OF RESEARCH, BIOMASS HOLDS A COMBINED ENERGY POTENTIAL FOR SUPPLYING 18.92 PERCENT OF CANADA'S NATIONAL ENERGY REQUIREMENT.

77-0387 STAMPA U
WIND ENERGY TECHNIQUES ONCE AND NOW.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 12-15, MAY 1977. (IN GERMAN)

THE ARTICLE IS ARRANGED IN TWO PARTS. THE FIRST PART DEALS WITH THE HISTORY OF THE WINDMILLS. VARIOUS TYPES OF WINDMILLS ARE DESCRIBED. THE SECOND PART IS CONCERNED WITH MODERN WIND POWER PLANTS. THE ADVANTAGES AND DISADVANTAGES OF THE VARIOUS SYSTEMS ARE DISCUSSED. FINALLY, ECONOMIC ASPECTS OF WIND POWER PLANTS ARE DEALT WITH.

77-0388 STANLEY D
THE ARUSHA WINDMILL: A CONSTRUCTION MANUAL.
STANFORD, CALIFORNIA, VOLUNTEERS IN ASIA, DECEMBER 1977. 58P.

THIS IS A MANUAL FOR THE CONSTRUCTION AND MAINTENANCE OF AN INNOVATIVE DEEP-BOREHOLE, WATER-PUMPING WINDMILL. THE WINDMILL IS MADE OF STANDARD WATER PIPE AND GALVANIZED SHEET METAL; IT CAN BE MADE AND REPAIRED IN ANY SMALL METAL-WORKING SHOP. COST OF THE COMPLETED WINDMILL IN TANZANIA IS ESTIMATED AT $275, INCLUDING ABOUT $150-175 IN MATERIALS. THIS COMPARES VERY FAVORABLY WITH THE $4000 PRICE TAG OF AN IMPORTED AMERICAN WINDMILL OF COMPARABLE CAPACITY. RECOMMENDED FOR CIRCUMSTANCES OF DEEP WELLS WHERE A LOW-COST BUT DURABLE WINDMILL IS PRACTICAL. NOT RECOMMENDED FOR TYPHOON OR HURRICANE REGIONS.

77-0389 STEPHENS H S, PATEL M P, COLES N G
WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. 496P.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976.
CONF-760909

TWENTY-SIX PAPERS ON WIND POWER AVAILABILITY AND WIND TURBINE SYSTEMS ARE INCLUDED.

77-0390 STOLT S, KIRLAN R L
EMPIRICAL AND THEORETICAL STATISTICS OF WINDCHARGER HOME HEATING POTENTIAL.
WIND TECHNOL. J. 1(2): 21-25, FALL 1977.

APPLICATION OF WIND ENERGY TO HOME HEATING HAS DRAWN CONSIDERABLE INTEREST RECENTLY AND SEVERAL WINDCHARGERS ARE CURRENTLY AVAILABLE AT A SMALL FRACTION OF THE AVERAGE COST OF A NEW HOME. THE PERFORMANCE AND ECONOMICS OF ONE OF THESE IS STUDIED BY USING WEATHER AND HOME HEATING STATISTICS AT TWO GEOGRAPHICAL LOCATIONS. IT IS SHOWN THAT FOR THE EXAMPLE CHOSEN, WIND ENERGY IS NOT QUITE ECONOMICAL. DUE TO THE COOLING EFFECT OF THE WIND, A STATISTICAL CORRELATION BETWEEN POWER AVAILABILITY AND POWER DEMAND WAS SOUGHT. HOWEVER, THIS WAS NOT SHOWN TO BE THE CASE. THE IMPLICATION IS THAT HEAT STORAGE CAPABILITY IS NECESSARY FOR HIGH EFFICIENCY.

77-0391 STRICKLAND J H
PERFORMANCE PREDICTION MODEL FOR THE DARRIEUS TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.C3.39-C3.54.

AN ANALYTICAL PERFORMANCE PREDICTION MODEL IS DESCRIBED FOR THE DARRIEUS TURBINE. THIS MODEL IS SHOWN TO PREDICT THE PERFORMANCE OF SMALL SCALE ROTORS, FOR WHICH TEST DATA IS AVAILABLE, WITH REASONABLE ACCURACY. IT DISPLAYS A MARKED IMPROVEMENT OVER OLDER METHODS IN WHICH THE "INDUCED VELOCITY" THROUGH THE ROTOR IS CONSIDERED TO BE CONSTANT. THE MODEL IS CAPABLE OF PREDICTING THE OVERALL ROTOR POWER OUTPUT AND THE DISTRIBUTION

OF AERODYNAMIC FORCES ALONG THE ROTOR BLADES. THE MODEL CAN BE USED TO STUDY THE EFFECTS OF ROTOR GEOMETRY VARIATIONS SUCH AS BLADE SOLIDARITY, BLADE TAPER, AND VARIATIONS IN ROTOR HEIGHT TO DIAMETER RATIOS. IN ADDITION, SPACIAL VARIATIONS IN FREESTREAM VELOCITY SUCH AS THAT PRODUCED BY ATMOSPHERIC WIND SHEAR CAN BE HANDLED BY THE MODEL. THIS MODEL SHOULD BE PARTICULARLY USEFUL IN THE DESIGN AND OPTIMIZATION OF LARGE SCALE ROTORS FOR WHICH TEST DATA IS NOT AVAILABLE. SCALE EFFECTS CAN BE PREDICTED BASED UPON HIGH REYNOLDS NUMBER AIRFOIL DATA.

77-0392 SULLIVAN T L, CAHILL T P, GRIFFEE D G, GEWEHR H W
WIND TURBINE GENERATOR ROTOR BLADE CONCEPTS WITH LOW COST POTENTIAL.
NTIS, DECEMBER 1977. 40P.
DOE/NASA/1028-77/13, CONF-780502-1

THIS PAPER WAS PRESENTED AT THE 23RD NATIONAL SAMPE SYMPOSIUM, ANAHEIM, CALIFORNIA, MAY 2, 1978. FOUR PROCESSES FOR PRODUCING BLADES ARE EXAMINED. TWO USE FILAMENT WINDING TECHNIQUES AND TWO INVOLVE FILLING A MOLD OR FORM TO PRODUCE ALL OR PART OF A BLADE. THE PROCESSES ARE DESCRIBED AND A COMPARISION IS MADE OF COSTS, MATERIAL PROPERTIES, DESIGNS AND FREE VIBRATION CHARACTERISTICS. CONCLUSIONS ARE MADE REGARDING THE FEASIBILITY OF EACH PROCESS TO PRODUCE LOW COST, STRUCTURALLY ADEQUATE BLADES.

77-0393 SULLIVAN T L, MILLER D R, SPERA D A
DRIVE TRAIN NORMAL MODES ANALYSIS FOR THE ERDA/NASA 100 KILOWATT WIND TURBINE GENERATOR.
NTIS, JULY 1977. 32P.
N77-30611, ERDA/NASA/1028-77/1

NATURAL FREQUENCIES AS A FUNCTION OF POWER WERE DETERMINED USING A FINITE ELEMENT MODEL. OPERATING CONDITIONS INVESTIGATED WERE OPERATION WITH A RESISTIVE ELECTRICAL LOAD AND OPERATION SYNCHRONIZED TO AN ELECTRICAL UTILITY GRID. THE INFLUENCE OF CERTAIN DRIVE TRAIN COMPONENTS ON FREQUENCIES AND MODE SHAPES IS SHOWN. AN APPROXIMATE METHOD FOR OBTAINING DRIVE TRAIN NATURAL FREQUENCIES IS PRESENTED.

77-0394 SULLIVAN W N
PRELIMINARY BLADE STRAIN GAGE DATA ON THE SANDIA 17 METER VERTICAL AXIS WIND TURBINE.
NTIS, 1977. 20P.
SAND-77-1176

RESULTS ARE SUMMARIZED FROM BLADE STRAIN MEASUREMENTS MADE DURING THE INITIAL OPERATING PERIOD OF THE SANDIA 17 METER VERTICAL AXIS WIND TURBINE. THE MEASUREMENTS INDICATE THAT THE BLADE STRUCTURE IS OPERATING ADEQUATELY, WITHOUT ANY APPARENT FATIGUE, LIFE CONSUMPTION OR EXCESSIVE VIBRATION. THE TEST RESULTS COVER A RANGE OF TURBINE SPEEDS (FROM 29.6-59.3 RPM) AND WIND SPEEDS (FROM NEGLIGIBLE TO 50MPH.)

77-0395 SUMMARY OF CURRENT COST ESTIMATES OF LARGE WIND ENERGY SYSTEMS.
NTIS, FEBRUARY 1977. 64P.
DSE/2521-1

THE FEDERAL WIND ENERGY PROGRAM HAS, OVER THE PAST TWO YEARS, SUBSTANTIALLY EXTENDED THE STATE OF KNOWLEDGE ABOUT THE COSTS AND PERFORMANCE OF LARGE WIND ENERGY CONVERSION SYSTEMS (WECS). MUCH OF THIS PROGRESS HAS BEEN ACHIEVED AS A RESULT OF A SERIES OF ERDA-SPONSORED STUDIES DEALING WITH THE SYSTEM DESIGN, MISSION ANALYSIS, AND REGIONAL APPLICABILITY OF WECS. THIS REPORT REVIEWS THESE STUDIES, SUMMARIZES THE MOST PERTINENT RESULTS, AND PROVIDES A VIEW OF THE CURRENT STATUS AND UNCERTAINTIES SURROUNDING THE ECONOMICS OF GENERATING ENERGY FROM THE WIND FOR ELECTRIC UTILITY APPLICATIONS.

77-0396 SUMMARY OF INTERNATIONAL ENERGY RESEARCH AND DEVELOPMENT ACTIVITIES, 1974-1976.
NTIS, NOVEMBER 1977.
HCP/U2639

THIS DIRECTORY INCLUDES INFORMATION COVERING 3017 ONGOING AND RECENTLY COMPLETED ENERGY RESEARCH PROJECTS CONDUCTED IN CANADA, ITALY, THE FEDERAL REPUBLIC OF GERMANY, FRANCE, THE NETHERLANDS, THE UNITED KINGDOM, DENMARK, SWEDEN, ISRAEL, AND 18 OTHER COUNTRIES. THIS INFORMATION WAS REGISTERED WITH THE SMITHSONIAN SCIENCE INFORMATION EXCHANGE (SSIE) BY

SUPPORTING ORGANIZATIONS IN THE NINE COUNTRIES LISTED AND BY INTERNATIONAL ORGANIZATIONS SUCH AS THE INTERNATIONAL ATOMIC ENERGY AGENCY.

77-0397 SURVEY OF HISTORICAL AND CURRENT SITE SELECTION TECHNIQUES FOR THE PLACEMENT OF SMALL WIND ENERGY CONVERSION SYSTEMS.
NTIS, DECEMBER 1977. 80P.
BNWL/WIND-09

INDIVIDUALS AND GROUPS WHO PURCHASE AND INSTALL WIND ENERGY CONVERSION SYSTEMS (WECS) FOR EITHER GENERATION OF ELECTRICITY OR PUMPING WATER HAVE TO GO THROUGH A PROCESS BY WHICH A SPECIFIC LOCATION IS SELECTED FOR EACH WECS. THE PURPOSE OF THIS STUDY WAS TO IDENTIFY AND DOCUMENT METHODS AND PRACTICES USED IN SITING OF WECS. THE STUDY COVERS THE PERIOD FROM EARLY 1900S TO THE PRESENT DAY.

77-0398 SWAMY N V C, FRITZSCHE A A
AERODYNAMIC STUDIES ON VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.C5.73-C5.80.

SOME STUDIES ON DARRIEUS TYPE ROTORS UNDERTAKEN AT DORNIER SYSTEM, FRIEDRICHSHAFEN, GERMANY AND I.I.T., MADRAS ARE DESCRIBED. AS A FIRST STEP, THE ACTUAL SHAPE OF THE ROTOR BLADES IN A CENTRIFUGAL FORCE FIELD IS COMPARED WITH A QUADRATIC PARABOLA AND A CATENARY FOR DIFFERENT ROTOR HEIGHT-DIAMETER RATIOS. THE OPTIMUM RATIO OF ARC LENGTH AND SWEPT AREA IS CONSIDERED. FOR A QUADRATIC PARABOLA, THE CONTRIBUTION TO THE TORQUE FROM THE VARIOUS SEGMENTS OF THE ROTOR HAS BEEN DETERMINED. IT IS FOUND THAT THE CENTRAL 60 PERCENT OF THE ROTOR CONTRIBUTES MORE THAN 95 PERCENT OF THE TOTAL TORQUE. A COMPARISON WITH A CORRESPONDING CYLINDRICAL ROTOR SHOWS THAT THE LATTER OF IDENTICAL MAXIMUM DIAMETER GENERATES ABOUT 2 TO 3 TIMES AS MUCH TORQUE AS THE BEND ROTOR. PRELIMINARY CALCULATIONS SHOW THAT USING A SMALL SEGMENT OF THE CENTRAL PART OF THE ROTOR AS A SPOILER REGULATES THE CIRCUMFERENTIAL SPEED OF THE ROTOR AT HIGH WIND SPEEDS. FURTHER STUDIES IN THIS DIRECTION ARE UNDER PROGRESS.

77-0399 SWIFT A H P
COMPUTER-AIDED DESIGN OF A CONTINUOUS DUTY ENERGY SYSTEM.
ANNUAL CONFERENCE ON ENERGY, 3RD, UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 13, 1976. PROCEEDINGS. NORTH HOLLYWOOD, WESTERN PERIODICAL COMPANY, 1977. P.81-90.

IN MANY AREAS OF THE UNITED STATES, THE AVERAGE MONTHLY SOLAR AND WIND ENERGY DENSITY PROFILES COMPLEMENT EACH OTHER, WHICH SUGGESTS UTILIZATION OF A POWER SYSTEM THAT EMPLOYS BOTH SOLAR AND WIND ENERGY. THE PROBLEMS OF IDENTIFYING THESE AREAS FROM WEATHER DATA, AND DEVELOPING A COMPUTER-AIDED METHOD FOR THE DESIGN OF SUCH COMBINED SOLAR AND WIND SYSTEMS ARE STUDIED. THE ECONOMICS OF COMBINED SYSTEMS AS COMPARED TO SOLAR OR WIND ONLY SYSTEMS IS EXAMINED.

77-0400 TAYLOR F J, PRIES T H, HUANG C H
OPTIMAL WIND VELOCITY ESTIMATION.
AUTOMATICA 13(1): 3-10, JANUARY 1977.

A NEW APPROACH TO REMOTE WIND VELOCITY SENSING IS PROPOSED, DEVELOPED AND TESTED. WIND ESTIMATES WERE OBTAINED FROM THE SPECTRAL SIGNATURE OF AN OPTICAL SIGNAL SOURCE. THE SIGNAL WAS DERIVED FROM THE RANDOM SCATTERING OF A LASER BEAM IN THE LOWER ATMOSPHERE. A QUASI-SUPERVISED LEARNING MACHINE, USING A MINIMAL VARIANCE LINEAR ESTIMATOR, WAS USED TO PRODUCE THE WIND VELOCITY ESTIMATE. NEW STOPPING RULES, USED TO GUARANTEE THE CONVERGENCE OF THE LEARNING PROCESS, WERE ALSO DEVELOPED. FIELD EXPERIMENTATION INDICATES THAT THE NEW SYSTEM WILL PERFORM WELL, EVEN UNDER EXTREME OPTICAL NONLINEAR CONDITIONS DUE TO SEVERE TURBULENCE.

77-0401 TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF WIND SYSTEMS FOR FARM, REMOTE AND RURAL USE.
ROCKY FLATS, COLORADO, ROCKWELL INTERNATIONAL, OCTOBER 1977. 123P.

THIS ANNUAL REPORT DETAILS PROGRESS DURING FY1977, THE FIRST FULL YEAR OF THE ROCKY FLATS PROGRAM ENTITLED "TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF WIND SYSTEMS FOR FARM, REMOTE AND RURAL USE". THE PRIMARY GOAL IS TO STIMULATE THE MANUFACTURE AND SALE OF SMALL WIND

ENERGY CONVERSION SYSTEMS (SWECS) BY PRIVATE SECTOR INDUSTRY TO INCREASE USE OF SWECS BY THE GENERAL PUBLIC. THIS GOAL WILL BE MET BY REDUCING THE COST OF ENERGY PRODUCED BY WIND TURBINE GENERATORS (WTG'S). ENERGY COSTS CAN BE REDUCED BY DECREASING SYSTEM CAPITAL COST, BY IMPROVING PERFORMANCE AND/OR BY IMPROVING SYSTEM RELIABILITY AND LIFETIME.

77-0402 TEMPLIN R J, SOUTH P
SOME DESIGN ASPECTS OF HIGH-SPEED VERTICAL-AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.C1.1-C1.20.

THE AERODYNAMIC, MECHANICAL AND ECONOMIC REASONS ARE DISCUSSED FOR THE CHOICE OF THE VARIOUS DESIGN PARAMETERS (ROTOR HEIGHT TO DIAMETER RATIO, SOLIDITY, NUMBER OF BLADES, ETC.) FOR HIGH-SPEED VERTICAL-AXIS WIND TURBINES FROM KILOWATT TO MEGAWATT SIZES. IT IS SHOWN THAT VERY LARGE TURBINES ARE THEORETICALLY FEASIBLE. VARIOUS METHODS TO PREVENT OVERSPEEDING, TO IMPROVE THE STARTING CHARACTERISTICS, AND TO ALLEVIATE THE EFFECTS OF CYCLIC TORQUE AND DRAG LOADS ARE DESCRIBED. THE OPERATION OF THE TURBINE AT CONSTANT EFFICIENCY IS COMPARED WITH OPERATION AT CONSTANT SPEED TO SHOW THAT AS LONG AS THE ROTOR SPEED IS PROPERLY SELECTED THE CONSTANT SPEED MODE PRODUCES NEARLY AS MUCH AVERAGE POWER AS THE CONSTANT EFFICIENCY MODE. FINALLY, THE ECONOMICS OF A LARGE TURBINE FEEDING ELECTRICAL ENERGY INTO AN EXISTING THERMAL SYSTEM ARE CONSIDERED TO SHOW THAT UNDER THE RIGHT CIRCUMSTANCES THE USE OF WIND ENERGY MAKES CONSIDERABLE FINANCIAL SAVINGS POSSIBLE.

77-0403 TEWARI S K
WIND POWER FOR INDIA.
SUNWORLD NO. 4: 7-9, MAY 1977.

THE TECHNICAL AND ECONOMIC FEASIBILITY OF WIND POWER FOR RURAL CONDITIONS IN INDIA IS ASSESSED. EARLY AND CURRENT WIND POWER AND WINDMILL DEVELOPMENT ARE SURVEYED, AND WIND MEASUREMENTS ON RECORD ARE MENTIONED. THE RELATIVE ECONOMICS OF WIND POWER AND POWER TAKEN FROM THE GRID (FOR AREAS WHERE SUCH POWER IS ACCESSIBLE) ARE COMPARED FOR RURAL ELECTRIFICATION, WITH BASE PRICES FOR POWER AND DISTANCE (OF VILLAGE) FROM GRID CONNECTIONS TAKEN INTO ACCOUNT. WIND DATA ARE PROVIDED FOR VARIOUS LOCATIONS IN INDIA (DESIGN WIND SPEED FOR ENERGY MAXIMUM; POWER DENSITY FOR DESIGN WIND SPEED; WINDMILL HOURS OF OPERATION BASED ON DESIGN SPEED).

77-0404 THEORY PREDICTS PERFORMANCE OF DARRIEUS WINDMILL.
NEW SCI. 73(1044): 700, MARCH 24, 1977.

WIND TUNNEL TESTS ON DARRIEUS TURBINES AT KINGSTON POLYTECHNIC, ENGLAND, ARE DESCRIBED.

77-0405 THOMAS R L, RICHARDS T R
ERDA/NASA 100-KILOWATT MOD-0 WIND TURBINE OPERATIONS AND PERFORMANCE.
NTIS, SEPTEMBER 1977. 18P.
NASA-TM-73825, N78-15563, ERDA/NASA/1028-77/9

THIS PAPER WAS PRESENTED AT THE CONFERENCE ON WIND ENERGY CONVERSION SYSTEMS, WASHINGTON, D.C., SEPTEMBER 19-21, 1977. THE ERDA/NASA 100 KW MOD-0 WIND TURBINE BECAME OPERATIONAL IN SEPTEMBER 1975 AT THE NASA PLUM BROOK STATION NEAR SANDUSKY, OHIO. THE OPERATION OF THE WIND TURBINE HAS BEEN FULLY DEMONSTRATED AND INCLUDES START-UP, SYNCHRONIZATION TO THE UTILITY NETWORK, BLADE PITCH CONTROL FOR CONTROL OF POWER AND SPEED, AND SHUT-DOWN. 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 LOADS, ELECTRICAL POWER AND AERODYNAMIC PERFORMANCE OBTAINED FROM TESTING.

77-0406 VERHOLEK M G
SUMMARY OF WIND DATA FROM NUCLEAR POWER PLANT SITES.
NTIS, MARCH 1977. 342P.
BNWL/WIND-04

OUR COUNTRY'S URGENT NEED TO DEVELOP ALTERNATE ENERGY SOURCES HAS SPAWNED FEDERAL SUPPORT FOR A NATIONAL WIND ENERGY CONVERSION PROGRAM (WECP). THIS PROGRAM IS SPONSORED BY THE U.S. ENERGY RESEARCH AND DEVELOPMENT

ADMINISTRATION (ERDA) THROUGH THE WIND SYSTEM BRANCH OF THE DEPARTMENT OF SOLAR ENERGY. THE PRIMARY GOAL OF THE WECP IS THE DEVELOPMENT AND COMMERCIALIZATION OF DURABLE AND ECONOMICALLY VIABLE WIND ENERGY CONVERSION SYSTEMS (WECS). IN ORDER TO DETERMINE WHERE WECS TURBINES COULD BE EFFECTIVELY USED AND HOW MUCH ENERGY IS AVAILABLE FOR EXPLOITATION, SPECIAL WIND CLIMATOLOGY STUDIES ARE REQUIRED. WHILE SEVERAL SUCH STUDIES HAVE BEEN CONDUCTED ALREADY, FURTHER WORK IS NEEDED TO EXPAND AND IMPROVE OUR EXISTING DATA BASE. THIS STUDY IS INTENDED TO PROVIDE ADDITIONAL DATA FOR INCLUSION IN ASSESSMENTS OF AVAILABLE WIND ENERGY.

77-0407 TODD C J, EDDY R L, JAMES R C, HOWELL W E
COST-EFFECTIVE ELECTRIC POWER GENERATION FROM THE WIND.
NTIS, AUGUST 1977. 34P.
PB-273582

THE IDEA OF GENERATING WINDPOWER AT THE WINDIEST AVAILABLE SITES (WIND FARMS) IS EXAMINED FOR ITS EFFECT ON FEASIBILITY OF LARGE-SCALE WINDPOWER INPUT TO THE NATIONWIDE ELECTRIC POWER NETWORK. WINDPOWER 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 IN ARTIC 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 COST 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 POWERPLANTS. WINDPOWER APPEARS ENVIRONMENTALLY ACCEPTABLE AND AVOIDS MANY OF THE ENVIRONMENTAL LIABILITIES OF CONVENTIONAL SOURCES. LARGE-SCALE WINDPOWER IMPLEMENTATION WILL REQUIRE MAJOR ADVANCE COMMITMENT OF CAPITAL, ABOUT $1 BILLION, TO LOWER BUS BAR COSTS TO 4.4 MILLS/MJ (16 MILLS/KWH). THE TIMETABLE WILL THEREFORE LIKELY DEPEND ON FEDERAL INCENTIVES.

77-0408 TODD R W
USE OF THERMAL STORAGE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.X73-X74.

THE USE OF WIND POWER FOR GENERATING HEAT FOR SPACE HEATING THROUGH HYDRAULIC RESISTANCE IS DESCRIBED. THE USE OF WIND POWER FOR ELECTRIC RESISTANCE HEATING AND HEATED WATER STORAGE SYSTEMS IS ALSO DESCRIBED.

77-0409 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, 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. 19, SESSION B.2. 5P.

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 POWERPLANTS. 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.

77-0410 TODD F
HAVING TO LOOK AT COAL, TIDES, STEAM, WIND.
ALASKA IND. 9(6): 34-40, JUNE 1977.

ALASKA NOT ONLY HAS THE GREATEST PETROLEUM RESERVES OF ALL 50 STATES, BUT ALSO HAS THE GREATEST POTENTIAL FOR GENERATING ENERGY FROM SEVERAL ALTERNATIVE AND AS YET BARELY EXPLOITED SOURCES SUCH AS COAL,

HYDROELECTRICITY, TIDAL CURRENTS, AND THE POWERFUL AND CONSISTENT WINDS THAT BLOW ALONG THE ALASKAN COAST. AT PRESENT, THE STATE'S LARGEST SOURCE OF NONCONVENTIONALLY GENERATED ELECTRICITY IS BEING PRODUCED AT TWO SOUTHEASTERN ALASKAN PULP MILLS THAT BURN A COMBINATION OF SAWDUST, BARK, OIL, AND A BY-PRODUCT OF PULP MANUFACTURING CALLED RED LIQUOR. OF PARTICULAR PROMISE ARE THE STATE'S ABUNDANT COAL RESOURCES. COAL MAY ONE DAY BE EXPORTED FROM ALASKA TO JAPAN OR EVEN TO SOUTHERN CALIFORNIA. THE POTENTIAL OF WIND POWER IS DISCUSSED ALSO.

77-0411 TOMPKINS L L
TEMPERATURE CONTROL SYSTEM UTILIZING NATURALLY OCCURRING ENERGY SOURCES.
U.S. PATENT NO. 4,015,962, APRIL 5, 1977. 10P.

A TEMPERATURE CONTROL SYSTEM FOR AN ENCLOSED STRUCTURE IS DISCLOSED WHICH UTILIZES TWO CIRCUITS, ONE FOR HEATING AND ONE FOR COOLING THE STRUCTURE. THE SYSTEM MAKES MAXIMUM USE OF NATURALLY OCCURRING SOURCES OF ENERGY, SUCH AS WIND AND SOLAR HEAT TO PROVIDE THE REQUISITE HEATING OR COOLING. WIND DRIVEN COMPRESSORS, ONE IN EACH CIRCUIT, PROVIDE THE MOTIVE FORCE FOR THE HEATING AND COOLING FLUID IN THE CLOSED LOOP CIRCUITS. THE COOLING CIRCUIT TRANSFERS HEAT TO THE HEATING CIRCUIT TO MINIMIZE UNUTILIZED ENERGY. A STORAGE UNIT IS PROVIDED TO STORE HEAT OR LOW TEMPERATURE FLUID WHEN HEATING OR COOLING OF THE STRUCTURE IS NOT IMMEDIATELY REQUIRED.

77-0412 VUKOVICH F M, CLAYTON C A
ON A TECHNIQUE TO DETERMINE WIND STATISTICS IN REMOTE LOCATIONS, FINAL REPORT.
NTIS, DECEMBER 1977. 124P.
RLO-2445-78/1

A TECHNIQUE HAS BEEN DEVELOPED TO PREDICT WIND STATISTICS IN REMOTE LOCATIONS WHERE WIND DATA ARE USUALLY NOT AVAILABLE. THE TECHNIQUE USES HISTORICAL WIND DATA FROM A SYNOPTIC WEATHER STATION TOGETHER WITH A STATISTICAL PREDICTION MODEL TO OBTAIN DATA FROM WHICH WIND STATISTICS CAN BE DEVELOPED. THE FORM OF THE STATISTICAL MODEL AND ITS PARAMETER ESTIMATES WERE DEVELOPED FROM SIMULATIONS FOR THE REGION OF INTEREST THAT, IN TURN, WERE BASED ON A HYDRODYNAMIC MODEL. PREDICTIONS AND EVALUATIONS WERE MADE IN AND AROUND THE CITY OF ST. LOUIS. THE BEST PREDICTIONS OF WIND STATISTICS WERE MADE AT LOCATIONS NEAR THE CENTER OF THE CITY WHERE THE SIMULATIONS WERE THE BEST. THE ACCURACY OF THE SIMULATIONS DEPENDED ON THE PARAMETERS USED TO DESCRIBE THE FORCING FUNCTIONS. CONSIDERABLY MORE INFORMATION WAS AVAILABLE ON THESE PARAMETERS FOR THE CENTRAL CITY THAN FOR THE SURROUNDING AREAS.

77-0413 200 KW TURBINES SITES SELECTED.
WIND POWER DIG. 1(9): 20, SUMMER 1977.

TWO 200 KW TURBINES WILL BE INSTALLED AS PART OF ERDA'S WIND POWER RESEARCH ACTIVITIES. THEY WILL BE ON BLOCK ISLAND (RHODE ISLAND) AND CULEBRA ISLAND (PUERTO RICO).

77-0414 TRACI R M, PHILLIPS G T, PATNAIK P C, FREEMAN B E
DEVELOPMENT OF A WIND ENERGY SITE SELECTION METHODOLOGY. FINAL REPORT, MAY 3, 1976--JUNE 3, 1977.
NTIS, JUNE 1977. 206P.
RLO-2440-11

THIS REPORT DESCRIBES PROGRESS ACHIEVED DURING THE SECOND PHASE OF A PLANNED THREE-PHASE PROGRAM TO DEVELOP AN IMPROVED WIND ENERGY CONVERSION SYSTEM (WECS) SITING METHODOLOGY. THE GOAL OF THE PROGRAM IS THE DEVELOPMENT OF A PRACTICAL AND WORKABLE WIND ENERGY PROSPECTING AND SURVEYING TOOL. THE METHODOLOGICAL APPROACH CONSISTS OF COMBINING DATA ANALYSIS PROCEDURES FOR ANALYZING AND COMPACTING HISTORICAL METEOROLOGICAL DATA FOR A MESOCALE (APPROXIMATELY 100 KM) REGION OF INTEREST WITH MATHEMATICAL WINDFIELD MODELING TO DEFINE THE WIND CHARACTERISTICS OF POTENTIAL WIND ENERGY SITES WITHIN THE REGION. THE SECOND PHASE, DISCUSSED HEREIN, INVOLVES MODEL IMPROVEMENT, DEVELOPMENT OF THE METHODOLOGY AND A PRELIMINARY SITE SURVEY DEMONSTRATION STUDY.

77-0415 UPMALIS A
WIND-POWER ELECTRICITY FOR HIGH-RISE FLATS.
ELEKTROTECH. Z. (ETZ) B. 29(11): 355-357, MAY 20, 1977. (IN GERMAN)

THE TECHNICAL AND ECONOMICAL FEASIBILITY OF SUPPLYING THE ELECTRICITY REQUIREMENTS OF A HIGH RISE BLOCK OF FLATS FROM AC GENERATORS CONNECTED TO THE GRID AND DRIVEN BY VARIABLE-PITCH PROPELLERS MOUNTED ON THE ROOF OF THE BUILDING AT A HEIGHT OF ABOUT 120 M ABOVE GROUND LEVEL IS INVESTIGATED FOR CERTAIN LOCATIONS ON THE BELGIAN, GERMAN AND ENGLISH COASTAL BELT. IT IS CONCLUDED THAT DEMAND COULD BE MET COMPETITIVELY BUT THAT PEAK DEMAND WOULD NEED SUPPLEMENTATION FROM THE GRID.

77-0416 URBANEK A
GOOD OUTLOOK FOR WIND ENERGY CONVERTERS.
ELEKTROTECHNIK 59(17): 24, SEPTEMBER 9, 1977. (IN GERMAN)

BRIEF PARTICULARS ARE GIVEN OF SOME OF THE LARGE WIND ENERGY CONVERTER PROJECTS DESCRIBED AT THE JUNE 1977 CONFERENCE OF THE GERMAN SOLAR ENERGY SOCIETY IN BREMEN.

77-0417 VAN HOLTEN T
MODERN RESEARCH IN THE FIELD OF WIND ENERGY.
INGENIEUR 89(7): 129-136, FEBRUARY 17, 1977. (IN DUTCH)

THIS ARTICLE CONSIDERS THE FACTORS WHICH LED TO THE SETTING UP IN MARCH 1976 OF THE NETHERLANDS FIVE YEAR NATIONAL WIND ENERGY RESEARCH PROGRAMME. PROBLEMS FOR STUDY INCLUDE NOT ONLY PURE WINDMILL TECHNOLOGY BUT ALSO METEOROLOGICAL QUESTIONS AND THE COUPLING TO THE ELECTRICITY NETWORK OF A FLUCTUATING ENERGY SOURCE. AN HISTORICAL SURVEY FROM CIRCA 1900 IS FOLLOWED BY A DISCUSSION OF THE POTENTIAL CONTRIBUTION OF WIND ENERGY IN THE LIGHT OF RECENT INVESTIGATIONS.

77-0418 VAN HOLTEN T
WINDMILLS WITH DIFFUSER EFFECT INDUCED BY SMALL TIPVANES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P.E3.31-E3.46.

BETZ'S FORMULA FOR THE MAXIMUM POWER OUTPUT OF WINDMILLS IS VALID ONLY FOR WINDMILL TYPES EXERTING A STEADY, AXIAL FORCE ON THE AIR. TYPES NOT COVERED BY BETZ'S ANALYSIS, SUCH AS WINDMILLS APPLYING RADIAL AS WELL AS AXIAL FORCES TO THE AIR, MAY HAVE A MUCH LARGER POWER OUTPUT. THIS REPORT DEALS WITH A TYPE OF WINDMILL WHERE RELATIVELY SMALL VANES, ATTACHED TO THE TIPS OF THE MILLBLADES, DEFLECT THE AIR RADIALLY OUTWARDS. THE DIFFUSER EFFECT CAUSED BY THE TIPVANES DOWNSTREAM OF THE WINDMILL IS ASSOCIATED WITH A GENERAL TYPE OF FLOW RESEMBLING A VENTURI-FLOW, WHERE THE WINDMILL IS PLACED NEAR THE NARROWEST PART OF THE STREAMTUBE. THE RESULTING INCREASED MASS FLOW THROUGH THE DISC PLANE OF THE WINDMILL CAUSES A LARGER POWER OUTPUT PER UNIT AREA SWEPT BY THE MILLBLADES.

77-0419 VANDERPLAATS G, FUHS A E
AERODYNAMIC DESIGN OF A CONVENTIONAL WINDMILL USING NUMERICAL OPTIMIZATION.
J. ENERGY 1(2): 132-134, MARCH-APRIL 1977.

THE PURPOSE OF THIS TECHNICAL NOTE IS TO IDENTIFY NUMERICAL OPTIMIZATION TECHNIQUES AS AN EFFECTIVE TOOL FOR AUTOMATED SYNTHESIS OF WINDMILL DESIGN. SEVERAL SIMPLE DESIGN EXAMPLES ARE PRESENTED TO SHOW THE EFFICIENCY AND GENERALITY OF THESE METHODS. THE EXTENSION TO MORE SOPHISTICATED DESIGN PROBLEMS IS DISCUSSED, AND THE ADVANTAGES AND LIMITATIONS OF THESE TECHNIQUES ARE IDENTIFIED.

77-0420 VENDOLSKY I
POSSIBILITIES OF USING WIND ENERGY IN THE COUNTRIES OF THE THIRD WORLD.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 305-322. (IN GERMAN)

THE FIELDS OF APPLICATION FOR THE USE OF WIND POWER IN COUNTRIES OF THE THIRD WORLD DO NOT NECESSARILY COINCIDE WITH THOSE OF THE INDUSTRIAL COUNTRIES. IN THE INDUSTRIAL COUNTRIES ONE IS CONCERNED WITH PRODUCING MORE ENERGY ECONOMICALLY, BUT IT IS THE AIM OF THE THIRD WORLD COUNTRIES SIMPLY TO OBTAIN ENERGY, BECAUSE OF THE LOW STAGE OF DEVELOPMENT OF THE INFRA-STRUCTURE, WHERE FOR IRRIGATION AND DRINKING WATER PROJECTS, SECURE OUTPUT IS NOT OF SUCH IMPORTANCE AS THE PROVISION OF A CERTAIN AMOUNT OF WORK (ENERGY) IN A CERTAIN SPACE OF TIME. A POSSIBILITY IS SHOWN WHERE IN

CONDITIONS OF LACK OF FOSSIL FUELS ON AN ISLAND WITH RELATIVELY GOOD INFRA-STRUCTURE THE USE OF WIND ENERGY FOR ELECTRICITY GENERATION APPEARS TO BE VERY SUITABLE.

77-0421 SEVEN-STORY-HIGH EGGBEATER DELIVERS 65 KW.
MECH. ENG. 99: 45, AUGUST 1977.

A LARGE VERTICAL AXIS WIND TURBINE BEING TESTED AT SANDIA LABORATORIES IS DESCRIBED.

77-0422 HARNESSING THE WIND: A WAY OF LIFE.
ORG. GARD. FARM. 24: 36+, OCTOBER 1977.

MARTIN JOPP'S LIFE-LONG INVOLVEMENT WITH WIND ENERGY IS DESCRIBED.

77-0423 1930S WIND-POWERED PLANT RE-EVALUATED.
MECH. ENG. 99: 56, JANUARY 1977.

THE MADARAS ROTOR POWER PLANT, DEVELOPED IN THE 1930'S BY J. D. MADARAS, IS BEING INVESTIGATED BY THE UNIVERSITY OF DAYTON RESEARCH INSTITUTE ON A GRANT FROM ERDA. THE POWER PLANT CONSISTED OF A CIRCULAR TRACK, AN ENDLESS TRAIN OF VERTICAL, CYLINDRICAL ROTOR UNITS MOUNTED ON STREAMLINED FLAT CARS, A POWER COLLECTION AND DISTRIBUTION SYSTEM, AND A CONTROL AND MAINTENANCE BUILDING, ALL LOCATED ON AN 80-ACRE SITE. THE UNIVERSITY OF DAYTON INVESTIGATION WILL INCLUDE WIND TUNNEL TESTS, AN EVALUATION OF STRUCTURAL, ELECTRICAL, AND MECHANICAL COMPONENTS, COMPUTERIZED SIMULATIONS OF THE UPDATED MADARAS PLANT'S PERFORMANCE, AND ECONOMIC EVALUATION OF THE PLANT AND THE WAY IT COULD BE USED AS PART OF A LARGE PUBLIC SYSTEM.

77-0424 MCCONNELL R D, VAN SANT J H, FORTIN M, PICHE B
EOLIENNES POUR LES ILES-DE-LA-MADELEINE.
ENG. J. 60(1): 20-22, JANUARY 1977. (IN FRENCH)

77-0425 WALTERS R E
INNOVATIVE WIND TURBINES.
ANNUAL CONFERENCE ON ENERGY, 3D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 13, 1976. PROCEEDINGS. NORTH HOLLYWOOD, WESTERN PERIODICAL COMPANY, 1977. P. 268-275.

THE INITIAL INVESTIGATION OF TWO INNOVATIVE CONCEPTS IN WIND ENERGY CONVERSION TURBINES IS PRESENTED. THE FIRST CONCEPT IS A VORTEX CONCENTRATOR, A DEVICE WHICH CREATES A STRONG VORTEX IN THE AMBIENT WIND. THE ENERGY PER UNIT AREA IN THE VORTEX REGION IS MUCH HIGHER THAN FOR THE UNDISTURBED WIND, ALLOWING THE ENERGY TO BE MORE EFFICIENTLY CONVERTED TO MORE USEFUL FORMS. THE SECOND CONCEPT IS A VERTICAL AXIS WIND TURBINE WHICH USES STRAIGHT BLADES COMPOSED OF AIRFOIL SHAPES HAVING HIGH EFFICIENCY. THIS WOULD BE ATTAINED BY USING CIRCULATION CONTROLLED (C.C.) AIRFOILS FOR THE BLADES; THESE AIRFOILS CONTAIN SLOTS NEAR THE ROUNDED TRAILING EDGES THROUGH WHICH A SMALL AMOUNT OF COMPRESSED AIR IS BLOWN TO OBTAIN HIGH LIFT FORCES. STRAIGHT BLADES ALLOW CYCLIC PITCH CONTROL, AS WELL AS LOCATING EACH BLADE ELEMENT AT A LARGER RADIUS FROM THE SHAFT SO THAT MAXIMUM ROTOR TORQUE IS PRODUCED.

77-0426 WARNER W L, KOSSA M M
UPDATING AN ANCIENT ART: RESEARCH AND DEVELOPMENT TOWARD MODERN WIND POWERED CARGO SHIPS.
SHIP TECHNOLOGY AND RESEARCH (STAR) SYMPOSIUM, 2D, SAN FRANCISCO, CALIFORNIA, MAY 25, 1977. PROCEEDINGS. NEW YORK, SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS, 1977. P.1-20.

THE DRAMATIC INCREASE OF FUEL COSTS DURING THE LAST FEW YEARS HAS RENEWED INTEREST IN SAIL POWERED COMMERCIAL SHIPS. THIS PAPER REVIEWS RESEARCH AND DEVELOPMENT EFFORTS, SINCE THE 1950'S, APPLICABLE TO THE DESIGN OF LARGE EFFICIENT SAILING VESSELS. DATA APPLICABLE TO SHIPS IN THE 15,000 TO 25,000 DEADWEIGHT TON RANGE IS EMPHASIZED SINCE A "UNIVERSAL BULKER" OF THIS SIZE IS THE MOST PROMISING APPLICATION FOR A MODERN SAILING SHIP. AERODYNAMIC, HYDRODYNAMIC AND PRACTICAL CONSIDERATIONS FOR SUCH A SHIP ARE DISCUSSED.

77-0427 WARREN A W, EDSINGER R W, CHAN Y K
A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS. VOLUME 1: TECHNICAL REPORT. FINAL REPORT.

NTIS, AUGUST 1977. 101P.
N78-20802

A COMPREHENSIVE COMPUTER PROGRAM FOR THE MODELING OF WIND ENERGY AND STORAGE SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL AND PNEUMATIC) WAS DEVELOPED. THE LEVEL OF DETAIL OF SIMULATION MODEL FOR WIND ENERGY STORAGE (SIMWEST) IS CONSISTENT WITH A ROLE OF EVALUATING THE ECONOMIC FEASIBILITY AS WELL AS THE GENERAL PERFORMANCE OF WIND 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 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 SYSTEMS DYNAMICS, AND THE ITERATION FOR CONVEYANCE OF VARIABLES. SIMWEST PROGRAM, AS DESCRIBED, RUNS ON THE UNIVAC 1100 SERIES COMPUTERS.

77-0428 WARREN A W, EDSINGER R W, CHAN Y K
A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS. VOLUME 2: OPERATION MANUAL. FINAL REPORT.
NTIS, AUGUST 1977. 421P.
N78-20803

A COMPREHENSIVE COMPUTER PROGRAM (SIMWEST) DEVELOPED FOR THE MODELING OF WIND ENERGY/STORAGE SYSTEMS UTILIZING ANY COMBINATION OF FIVE TYPES OF STORAGE (PUMPED HYDRO, BATTERY, THERMAL, FLYWHEEL, AND PNEUMATIC) IS DESCRIBED. FEATURES OF THE PROGRAM INCLUDE: A PRECOMPILER WHICH GENERATES COMPUTER MODELS (IN FORTRAN) OF COMPLEX WIND SOURCE/STORAGE/APPLICATION SYSTEMS, FROM USER SPECIFICATIONS USING THE RESPECTIVE LIBRARY COMPONENTS; A PROGRAM WHICH PROVIDES THE TECHNO-ECONOMIC SYSTEM ANALYSIS WITH THE RESPECTIVE I/O THE INTEGRATION OF SYSTEM DYNAMICS, AND THE ITERATION FOR CONVEYANCE OF VARIABLES; AND CAPABILITY TO EVALUATE ECONOMIC FEASIBILITY AS WELL AS GENERAL PERFORMANCE OF WIND ENERGY SYSTEMS. THE SIMWEST OPERATION MANUAL IS PRESENTED AND THE USAGE OF THE SIMWEST PROGRAM AND THE DESIGN OF THE LIBRARY COMPONENTS ARE DESCRIBED. A NUMBER OF EXAMPLE SIMULATIONS INTENDED TO FAMILIARIZE THE USER WITH THE PROGRAM'S OPERATION IS GIVEN ALONG WITH A LISTING OF EACH SIMWEST LIBRARY SUBROUTINE.

77-0429 WARREN A W, EDSINGER R W, BURROUGHS J D
A SIMULATION MODEL FOR WIND ENERGY STORAGE SYSTEMS. VOLUME 3: PROGRAM DESCRIPTIONS. FINAL REPORT.
NITS, AUGUST 1977. 234P.
N78-20804

PROGRAM DESCRIPTIONS, FLOW CHARTS, AND PROGRAM LISTINGS FOR THE SIMWEST MODEL GENERATION PROGRAM, THE SIMULATION PROGRAM, THE FILE MAINTENANCE PROGRAM, AND THE PRINTER PLOTTER PROGRAM ARE GIVEN.

77-0430 WASSERMAN H
ENERGY'S POINT OF NO RETURN; INDUSTRY HIDES FROM THE SUN.
NATION 224(9): 263-266, MARCH 5, 1977.

THE TECHNOLOGY TO HARNESS SOLAR ENERGY ON A MASS SCALE ALREADY EXISTS. POLITICAL AND SOCIAL BARRIERS, HOWEVER, STAND IN THE WAY OF THE DEVELOPMENT OF ANY COMPREHENSIVE PROGRAM. ANY MAJOR SHIFT TO SOLAR POWER WOULD COMPROMISE ENERGY CORPORATION'S INVESTMENTS IN NUCLEAR ENERGY. MOREOVER, PRIVATE HOMES AND SMALL INDUSTRIES EQUIPPED WITH SOLAR HEATERS WOULD MEAN LESS DEPENDENCE ON LARGE UTILITIES TO MEET ENERGY NEEDS. SOLAR POWER INSTALLATION WOULD ALSO PROVIDE MORE, NOT LESS, JOBS AS MANY UNION LEADERS BELIEVE.

77-0431 WEBER W
INFLUENTIAL FACTORS IN COST ANALYSIS OF WIND ENERGY CONVERTERS WITH HORIZONTAL AXES.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 99-110. (IN GERMAN)

A CAPITAL INVESTMENT CALCULATION IS CARRIED OUT WITH REGARD TO POSSIBLE ELECTRICAL POWER GENERATION, WHICH IS PRODUCED BY THE OPERATION OF WIND ENERGY CONVERTERS (WEK) WITH HORIZONTAL AXES, WHICH EXAMINES THE

OPERATION OF WEK'S SO AS TO COVER COSTS. THE IMPORTANT PARAMETERS ARE VARIED AND THEIR EFFECT ON THE PRODUCTION AND COST SITUATION IS SHOWN.

77-0432 WEBER W
THE OPTIMUM CONFIGURATION OF ROTOR BLADES FOR HORIZONTAL WIND ENERGY CONVERTERS.
Z. FLUGWISS. 23(12): 443-447, FEBRUARY 1977. TRANSLATION: NTIS, 1977. 17P.
NASA-TT-F-17379

CONSIDERATIONS, PROCEDURES AND SOME RESULTS RELATING TO THE PROBLEM OF THE AERODYNAMIC CONFIGURATION OF ROTOR BLADES FOR WIND ENERGY CONVERTERS ARE PRESENTED.

77-0433 WEIMER G A
ANOTHER ENERGY SOURCE IS BLOWING IN THE WIND.
IRON AGE 220: 27-29, JULY 4, 1977.

DOZENS OF WIND ENERGY R+D EFFORTS, LARGELY FEDERALLY FINANCED, ARE UNDERWAY THROUGHOUT THE U.S., EUROPE, JAPAN, AND EVEN THE USSR. MOST PROJECTS HAVE A COMMON OBJECTIVE: MAKING WIND ENERGY CONVERSION SYSTEMS FINANCIALLY COMPETITIVE WITH OTHER ELECTRIC POWER GENERATING PLANTS. BY FAR THE LARGEST WIND TURBINE PROGRAM INVOLVES CONSTRUCTION OF GIGANTIC WINDMILLS THAT ARE INTENDED TO PRODUCE ENOUGH POWER TO DRIVE A 3000 KW TURBINE.

77-0434 WEISBRICH A L
TOROIDAL ACCELERATOR ROTOR PLATFORMS FOR WIND ENERGY CONVERSION.
WIND TECHNOL. J. 1(3): 11-20, FALL 1977.

PRESENTED IS A TOROIDAL ACCELERATOR ROTOR PLATFORM (TARP) DESIGN FOR WIND ENERGY CONVERSION SYSTEMS (WECS) APPLICATION. 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. AS AN OBSTRUCTION TYPE FLOW CONCENTRATOR AND ACCELERATOR, A TARP GENERATES LOW PRESSURE, HIGH KINETIC WIND ENERGY REGIONS AT ITS ROTOR DISK SITES. ROTOR PERFORMANCE IS THUS ENHANCED VIA FLOW AUGMENTATION WHICH IS CALCULATED TO YIELD POWER OUTPUT LEVELS PER UNIT DISC AREA AT LEAST THREE TIMES THAT OF A CONVENTIONAL WECS. AUGMENTATION OF FLOW ALSO PERMITS HIGHER ROTOR RPM, REDUCING DRIVE SYSTEM COST, AND EXTENDS POWER GENERATION CAPABILITY TO LOWER AMBIENT WIND VELOCITIES. DUE TO A TARP'S UNIQUE DESIGN FEATURES, IT MAY BE ADAPTABLE FOR INTERFACE WITH MANY COMMON STRUCTURES AND ENVIRONMENTS FOR MULTI-PURPOSE USE. THE ABOVE MAY INCLUDE BUILDINGS IN AN URBAN ENVIRONMENT, FARM SILOS, COMMUNICATION TOWERS, POLLUTION CONTROL STACKS, WATER TOWERS, ETC. ALSO, SUBSYSTEM PROTECTION FROM THE ELEMENTS AND EASE OF SERVICEABILITY ARE INHERENT IN A TARP WECS DESIGN. THE ABOVE FEATURES ARE PROJECTED TO YIELD SIGNIFICANT IMPROVEMENT IN ENERGY COST.

77-0435 WEISBRICH A L
VARIABLE GEOMETRY WINDTURBINE.
U.S. PATENT NO. 4,021,140, MAY 3, 1977. 4P.

AN OMNIDIRECTIONAL TURBINE IS DESCRIBED WHICH PROVIDES A ROTATIONAL OUTPUT OF ONE SENSE IN RESPONSE TO FLUID FLOW APPROACHING THE TURBINE FROM ANY DIRECTION PARALLEL TO ITS PLANE OF ROTATION. THE INVENTION IS CONTEMPLATED FOR USE IN CONJUNCTION WITH ELECTRIC GENERATORS OR POWER GENERATING SYSTEMS IN GENERAL CAPABLE OF UTILIZING POWER OUTPUT FROM THE TURBINE.

77-0436 WHERE THERE'S A WIND THERE COULD BE A WALL.
NEW SCI. 76(1077): 348, NOVEMBER 10, 1977.

A "WINDWALL", SAID TO BE CHEAPER AND VISUALLY LESS OBTRUSIVE THAN A WINDMILL, IS DESCRIBED IN CONNECTION WITH A HOUSING DEVELOPMENT IN PEACEHAVEN, SUSSEX, ENGLAND.

77-0437 WIEDERHOLD H
DO-IT-YOURSELF WIND POWER PLANT. REPORT OF THE ASSOCIATION FOR WIND

ENERGY RESEARCH AND APPLICATIONS.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. MUNCHEN, DGS, 1977. P. 329-334. (IN GERMAN)

A FULLY AUTOMATIC WIND ENERGY PLANT IN NORTH GERMANY, WHICH IS USED FOR SPACE HEATING IS DESCRIBED. THE FOLLOWING DETAILS ARE TREATED IN THE REPORT: THE FUNCTION OF THE ADJUSTABLE PROPELLER, THE FUNCTION OF THE GENERATOR AND THE ELECTRICAL CIRCUIT, THE FUNCTION OF THE AUTOMATIC CONTROL WITH PROTECTION AGAINST STORMS.

77-0438 WILLEM R A
CYLINDRICAL ARRAYS OF VERTICAL-AXIS WIND TURBINES.
WIND TECHNOL. J. 1(2): 11-16, SUMMER 1977.

THIS PAPER PRESENTS THE CONCEPT OF WIND ENERGY CONVERSION USING TALL CYLINDRICAL ARRAYS OF VERTICAL-AXIS TURBINES. THIS CONCEPT PROVIDES AN ALTERNATIVE TO THE LARGE SINGLE TURBINE APPROACH FOR ECONOMICAL WIND POWER CONVERSION. VARIOUS ASPECTS OF THE CONCEPTS ARE CONSIDERED AND A COMPARISON IS MADE WITH RESPECT TO GROUND-MOUNTED TURBINE SYSTEMS.

77-0439 WILLIAMS J R, CHRISTIANSON F, HUDSON W T
DEVELOPMENT OF A TOTAL ENERGY SYSTEM FOR THE CEDAR GAP CHRISTIAN RETREAT CENTER.
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. 38, P. 27.

THE CEDAR GAP CHRISTIAN CENTER INCLUDES 2 LODGES OF 25 ROOMS EACH, A 5,300 SQ. FT. DINING HALL, 6 COTTAGES OF 1,200 SQ. FT. EACH, 6 COTTAGES OF 800 SQ. FT. EACH, A SHOWER AND LAUNDRY FACILITY OF ABOUT 800 SQ. FT., A 5,500 SQ. FT. RECREATIONAL BUILDING, AND A 1,200 SQ. FT. CHAPEL. THE DECISION WAS MADE TO PROVIDE ALL THE ENERGY NEEDS OF THE CHRISTIAN RETREAT WITH ON-SITE RENEWABLE SOURCES OF ENERGY. THE AVERAGE ELECTRIC POWER REQUIREMENTS OF THE RETREAT ARE PROJECTED TO BE AROUND 35 KW WITH PEAK POWER REQUIREMENTS IN EXCESS OF 100 KW. MUCH OF THIS POWER WILL BE PROVIDED BY HYDROELECTRIC UNITS ON STREAMS RUNNING ACROSS THE PROPERTY. THE REMAINDER WILL BE SUPPLIED BY WIND GENERATORS AND A SOLAR POWER PLANT OPERATED BY EXCESS HEAT FROM THE SOLAR COLLECTORS ON THE LODGES AND DINING HALL. AS A FINAL BACKUP, A WOOD BURNING BOILER IN THE SUBSTATION AT THE LODGE AND DINING HALL CAN SUPPLY ADDITIONAL HOT WATER FOR THIS FACILITY AS WELL AS HOT WATER TO RUN THE TURBINE-GENERATOR.

77-0440 WILSON R E, WALKER S N
PERFORMANCE-OPTIMIZED HORIZONTAL-AXIS WIND TURBINES.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. B1.1-B1.28.

DESIGN PROCEDURES FOR OPTIMUM WIND TURBINES ARE SHOWN TO BE DIFFERENT FROM THOSE USED FOR PROPELLERS. AN OPTIMUM DESIGN GENERATION APPROACH FOR WIND TURBINES IS DEVELOPED FROM A MODIFIED STRIP THEORY THAT INCLUDES TIP-LOSS. THE APPROACH ENTAILS A LOCAL OPTIMIZATION OF BLADE ELEMENT PARAMETERS TO MAXIMIZE POWER OUTPUT. EXAMPLES ARE PRESENTED THAT ILLUSTRATE THE OPTIMUM DESIGN GENERATION PROCEDURE AND OFF-DESIGN PERFORMANCE.

77-0441 WIND CHARACTERISTICS WORKSHOP, BOSTON, JUNE 2-4.
AM. METEOROL. SOC. BULL. 58: 45-51, JANUARY 1977.

77-0442 WIND ENERGY DIRECTORY.
ROCKVILLE CENTRE, N.Y., WIND ENERGY WORKSHOP OF LONG ISLAND, 1977. 48P.

INCLUDED ARE NAMES AND ADDRESSES OF MANUFACTURERS AND DISTRIBUTORS OF WIND ENERGY SYSTEMS AND ADDRESSES OF ORGANIZATIONS, PUBLICATIONS, CONSULTANTS, SCIENTISTS, RESEARCHERS, AND PUBLIC OFFICIALS IN THE WIND ENERGY FIELD.

77-0443 WIND ENERGY FOR RURAL HEATING, AN INTERVIEW WITH DR. LEO SODERHOLM.
WIND POWER DIG. 1(9): 6-10, SUMMER 1977.

77-0444 WIND ENERGY MISSION ANALYSIS. EXECUTIVE SUMMARY.

NTIS, FEBRUARY 18, 1977. 28P.
COO/2578-1/1

THE PRINCIPAL OBJECTIVES OF THIS STUDY WERE (1) TO ASSESS THE POTENTIAL FOR WIND ENERGY CONVERSION SYSTEMS ON A NATIONAL SCALE, (2) IDENTIFY HIGH-POTENTIAL APPLICATIONS FOR WECS, (3)DEFINE FUNCTIONAL, PERFORMANCE, OPERATIONAL, AND COST GOALS FOR WECS, (4) EVALUATE THE IMPACT OF THE WIDE-SCALE DEPLOYMENT OF WECS ON ENERGY USERS, AND (5) IDENTIFY THE INSTITUTIONAL AND NON-TECHNICAL PROBLEMS ASSOCIATED WITH THE ACCEPTANCE OF WIND ENERGY SYSTEMS. THE STUDY CONCENTRATED ON BROAD APPLICATIONS OF WECS OVER LARGE GEOGRAPHIC AREAS ENCOMPASSING THE ENTIRE 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.

77-0445 WIND ENERGY MISSION ANALYSIS. FINAL REPORT.
NTIS, FEBRUARY 18, 1977. 252P.
COO/2578-1/2

THE DEVELOPMENT OF WIND ENERGY SYSTEMS IN THE U.S. IS DISCUSSED UNDER THE FOLLOWING HEADINGS: BASELINE POWER SYSTEMS; ASSESSMENT OF WIND POTENTIAL; IDENTIFICATION OF HIGH POTENTIAL APPLICATIONS; ELECTRIC UTILITIES; RESIDENTIAL APPLICATION; PAPER INDUSTRY APPLICATION; AGRICULTURE APPLICATION; AND REMOTE COMMUNITY APPLICATIONS.

77-0446 WIND ENERGY MISSION ANALYSIS. FINAL REPORT, APPENDICES A-J.
NTIS, FEBRUARY 18, 1977. 504P.
COO/2578-1/3

INFORMATION IS PRESENTED CONCERNING METEOROLOGICAL DATA AND SUPPORTING ANALYSES, GROSS ENERGY CONSUMPTION PATTERNS AND END-USE ANALYSIS, ANALYSIS FOR INDUSTRIAL APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS (WECS), ANALYSIS FOR RESIDENTIAL APPLICATIONS OF WECS, ANALYSIS FOR APPLICATION OF WECS TO COMMUNITIES REMOTE FROM UTILITY GRIDS, ANALYSIS FOR AGRICULTURAL APPLICATIONS OF WECS, REGIONAL EVALUATION OF THE ECONOMICS OF WIND TURBINE GENERATION TO THE U.S. ELECTRIC UTILITY DISTRICT, IMPACT OF STORAGE ON WECS, FINANCIAL ANALYSIS TECHNIQUES, AND SYSTEM SPACING.

77-0447 WIND POWER ACCESS CATALOG. NO.1
WIND POWER DIG. NO. 10: C1-C40, FALL 1977.

THIS IS A COMPREHENSIVE CATALOG OF WIND MACHINES AND ACCESSORIES, INCLUDING SPECIFICATIONS AND MANUFACTURERS' NAMES AND ADDRESSES.

77-0448 JONES W J, RUANE M
ALTERNATIVE ELECTRICAL ENERGY SOURCES FOR MAINE.
NTIS, DECEMBER 1977. 554P.
PB-287909

INCLUDED IS AN EVALUATION OF ELEVEN TECHNOLOGIES AS POSSIBLE ALTERNATIVES TO THE CONSTRUCTION OF A BASE-LOAD TYPE 600 MWE COAL-FIRED GENERATING PLANT, CENTRAL MAINE SEARS ISLAND NO. 1, IN 1986. 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.

77-0449 WIND POWER ON A COMMERCIAL BASIS?
ELECTR. TIMES NO. 4412: 2, JANUARY 21, 1977.

THE HIGHLANDS AND ISLANDS DEVELOPMENT BOARD HAS TAKEN STEPS TO INSTALL TWO 10 KW WINDMILLS TO PROVIDE FOR HALF OF THE ISLAND OF COLONSAY. WIND PROFILES SUGGEST THERE IS SUFFICIENT WIND TO JUSTIFY THE SCHEME, WHICH WILL PROVIDE HYDROGEN, BY ELECTROLYSIS, FOR STORAGE AND POWERING A PETROL GENERATOR.

77-0450 WIND POWER PLANTS. A VARIETY OF PLANTS OFFERED IN THE POWER RANGE BETWEEN 30W AND 30KW.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 17, MAY 1977. (IN GERMAN)

A BRIEF SURVEY OF POSSIBLE USES FOR WIND POWER PLANTS IN POWER GENERATION IS FOLLOWED BY THE RANGE OF PLANTS THE VARIOUS FIRMS HAVE TO OFFER. THE

SUPPLY ENCOMPASSES 50 M PLANTS AS WELL AS 20 KW CONVERTERS.

77-0451 FRAENKEL P
WIND RESEARCH IN GREAT BRITAIN.
WIND POWER DIG. 1(8): 30-31, SPRING 1977.

REPORTED ARE A NUMBER OF PROJECTS CURRENTLY UNDER WAY IN GREAT BRITAIN.

77-0452 ZIMMERMAN J S
WIND ENERGY: A RENEWABLE ENERGY OPTION.
ASPE/MSFC SYMPOSIUM ON ENGINEERING AND PRODUCTIVITY GAINS FROM SPACE TECHNOLOGY, PROCEEDINGS. NASA, MAY 1977. P. 19-31. NTIS 1977. N77-30275

WIND TURBINE GENERATOR RESEARCH PROGRAMS ADMINISTERED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION ARE EXAMINED. THE DESIGN AND OPERATION OF TURBINE DEMONSTRATION MODELS ARE DESCRIBED. WIND ASSESSMENTS WERE MADE TO DETERMINE THE FEASIBILITY OF USING WIND GENERATED POWER FOR VARIOUS PARTS OF THE COUNTRY.

77-0453 WIND-GENNI UNVEILED.
WIND POWER DIG. 1(8): 21-22, SPRING 1977.

THE WIND-GENNI, A HORIZONTAL-TO-VERTICAL AXIS DRIVE WIND GENERATOR IS DESCRIBED. DEVELOPED BY THE PRODUCT DEVELOPMENT INSTITUTE OF TOLEDO, OHIO, IT CAN BE PLUGGED DIRECTLY INTO THE CIRCUITRY OF MOST HOMES BY MEANS OF A 3-PRONG STOVE TYPE PLUG. A UNIQUE FEATURE OF THE TOTAL WIND-GENNI SYSTEM IS THE INCLUSION OF A "BASE LOAD INJECTOR" THAT ALLOWS THE OWNER TO USE THE UTILITY POWER GRID AS A SOURCE OF BACK-UP OR SUPPLEMENTARY POWER DURING PERIODS OF LOW WIND.

77-0454 ZIEGLER A
WIND POWER RESEARCH.
MITTEILUNGSBL. DTSCH. GES. SONNENENERG. 2(3): 8-12, MAY 1977. (IN GERMAN)

ON THE BASIS OF THE METEOROLOGICAL CONDITIONS A SURVEY IS PRESENTED OF THE REGIONS IN THE FRG, WHICH ARE SUITABLE FOR WIND POWER UTILIZATION. HOWEVER, IN ORDER TO DETERMINE THE POTENTIAL TECHNICALLY FEASIBLE, IT HAS TO BE DECIDED FIRST WITH WHICH TYPE OF PLANT WIND POWER IS TO BE CONVERTED INTO ELECTRIC POWER. OF ALL THE CONCEPTS PROPOSED SO FAR, THE "HUETTER" CONCEPT SEEMS TO BE THE MOST PROMISING AT THE MOMENT. IN ORDER TO MAKE A SUBSTANTIAL CONTRIBUTION TO THE ENERGY SUPPLY, ABOUT 400 WIND POWER PLANTS WITH A CAPACITY OF 3 MW EACH WOULD HAVE TO BE TAKEN INTO OPERATION BY 1985, SOMETHING WHICH CANNOT BE ACHIEVED AT THE PRESENT STATE OF THE MANUFACTURING CAPACITIES. UNSOLVED PROBLEMS OF WIND POWER CONVERSION ARE INVESTIGATED BY A NUMBER OF RESEARCH GROUPS AT THE MOMENT. THE VARIOUS PROJECTS ARE LISTED IN TABULAR FORM.

77-0455 WINDERL W R
WIND OPERATED GENERATOR.
U.S. PATENT NO. 4,039,848, AUGUST 2, 1977. 8P.

A WIND OPERATED GENERATOR IS DESCRIBED WHICH HAS COUNTERROTATING PROPELLERS WITH AN ALTERNATING CURRENT GENERATOR POSITIONED BETWEEN THE BLADES OF THE PROPELLERS AND SPACING THE SAME. THE PROPELLERS AND GENERATOR PARTS ARE MOUNTED ON CONCENTRIC SHAFTS SUPPORTED IN A POSITIVE DRIVE STRUCTURE IN WHICH THE SHAFTS ARE TIED TOGETHER THROUGH GEARING TO INSURE POSITIVE STARTING AND COUNTERROTATION OF THE PROPELLERS IN A POSITIVE EQUAL DRIVE SYSTEM. A GOVERNOR ASSOCIATED WITH ONE OF THE SHAFTS GOVERNS THE OPERATIONAL SPEED OF ROTATION OF BOTH PROPELLERS TO PROTECT THE PROPELLERS AND GENERATOR.

77-0456 WINDHEIM R
PROGRAMME FOR THE USE OF WIND ENERGY IN THE CONTEXT OF NON-NUCLEAR ENERGY RESEARCH.
ENERGIE VOM WIND. CONFERENCE ON WIND POWER WITH EXHIBITION, BREMEN, GERMANY, F.R., JUNE 7-8, 1977. PROCEEDINGS. MUNCHEN, DGS, 1977. P. 39-46. (IN GERMAN)

THE OUTLINE PROGRAMME ON ENERGY RESEARCH OF THE WEST GERMANY GOVERNMENT INCLUDES WIND POWER. A SURVEY IS PRESENTED ON THE PROGRAMME FOR THE USE OF WIND POWER. IN THE CONTEXT OF THIS PROGRAMME, THE CONSTRUCTION OF THE

GROWIAN (LARGE WIND POWER PLANT) PROTOTYPE EQUIPMENT WITH AN OUTPUT OF 2-3 MW IS TO BE CARRIED OUT.

77-0457 WINDMILL POWER FOR CITY PEOPLE: A DOCUMENTATION OF THE FIRST URBAN WIND ENERGY SYSTEM.
WASHINGTON, D.C., U.S. GOV. PRINT. OFFICE, SEPTEMBER 1977.

COVERED ARE ZONING, STRUCTURAL CALCULATIONS, PUBLIC UTILITY COMMISSION REGULATIONS AND TARIFFS, AS WELL AS BASIC WINDPOWER THEORY AND PRACTICE FOR ANYONE CONSIDERING A CITY OR SUBURBAN WIND ENERGY SYSTEM. THIS WAS WRITTEN BY THE PEOPLE WHO INSTALLED A 2 KW JACOBS WIND-ELECTRIC SYSTEM ATOP THE HOUSING COOPERATIVE AT 519 E. 11TH. STREET IN N.Y.C.

77-0458 YEN J T
TORNADO-TYPE WIND ENERGY SYSTEM: BASIC CONSIDERATION.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, SEPTEMBER 7-9, 1976. PROCEEDINGS. CRANFIELD, BEDFORD, ENGLAND, BRITISH HYDROMECHANICS RESEARCH ASSOCIATION, 1977. P. E4-47 TO E4-64.

A NEW CONCEPT IN WIND TURBINES IS DESCRIBED: THE TORNADO-TYPE WIND ENERGY SYSTEM. A BASIC THEROMODYNAMIC CONSIDERATION IS PRESENTED TO GAIN A PROPER PERSPECTIVE OF THE OVER-ALL PERFORMANCE OF THIS NEW DESIGN. SOME DETAILS OF WIND TUNNEL DATA, DERIVATION OF THE SCALING LAWS, AND SOME RECENT RESULTS IN FLOW VISUALIZATION ARE ALSO PRESENTED.

77-0459 WINDMILLS POSE THREAT TO TV PICTURE RECEPTION.
CHEM. ENG. NEWS 55(29): 40, JULY 18, 1977.

77-0460 WINDMILLS SPIN INTO ACTION.
NEW SCI. 73(1042): 574, MARCH 10, 1977.

ERDA'S ACTIVITIES IN WIND ENERGY RESEARCH ARE DESCRIBED, INCLUDING THEIR LARGEST PROJECT, A 100 KW WINDMILL IN SANDUSKY, OHIO, AND THEIR SMALLEST PROJECT, A 4 KW MACHINE AT THE ROCKY FLATS PLANT NEAR DENVER, COLORADO.

77-0461 WINDWORKS AWARDED CONTRACT.
WIND POWER DIG. NO. 10: 23, FALL 1977.

WINDWORKS, INC., HAS BEEN SELECTED BY DOE FOR NEGOTIATION OF A CONTRACT TO DEVELOP A HIGH-RELIABILITY 8 KW CAPACITY WIND GENERATOR FOR FARMS, RURAL HOMES AND OTHER USES.

77-0462 WISE C E
WIND ENERGY--BOUNTY IN THE BREEZE.
MACH. DES. 49: 20-22, 24-26, AUGUST 11, 1977.

WIND-GENERATED POWER IS DISCUSSED, AND DEVELOPMENT PROGRAMS FOR SEVERAL GENERATOR SYSTEMS ARE REVIEWED. LIMITATIONS ON THE WIDE-SCALE USE OF WIND-GENERATED POWER, INCLUDING THE VARIABLE AVAILABILITY OF THE ENERGY SOURCE AND THE INHERENTLY LOW POWER-CONVERSION COEFFICIENT OF WIND-ENERGY SYSTEMS, ARE CONSIDERED: ESTIMATES OF THE ROLE OF WIND-ENERGY IN FUTURE U.S. ENERGY CONSUMPTION ARE GIVEN. A NUMBER OF WIND-OPERATED ELECTRICAL GENERATORS HAVING POWER RATINGS OF 100 KW TO 2.5 MW ARE DESCRIBED. IT IS NOTED THAT THE HIGH CAPITAL COSTS OF LARGE SYSTEMS MAY RESTRICT THEIR DEVELOPMENT.

77-0463 WOLFF B
THE FEDERAL WIND ENERGY PROGRAM.
AMER. WIND ENERGY ASSOC. NEWSL., P. 8-11, SPRING 1977.

77-0464 WOLFF B
THE FEDERAL WIND PROGRAM.
WIND POWER DIG. 1(8): 42-44, SPRING 1977.

77-0465 WOOD J R
WIND UTILIZATION IN NEW ZEALAND.
N.Z.E.R.D.C., CONTRACT 3036, DRAFT FINAL REPORT. MARCH 1977.

77-0466 YAMAGIWA A
EXPERIMENTAL EVALUATION OF A SOLAR/WIND-POWERED SPACE HEATING AND HOT WATER HEATING SYSTEM IN THE PACIFIC NORTHWEST.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 12TH, PROCEEDINGS.
LA GRANGE PARK, ILLINOIS, AMERICAN NUCLEAR SOCIETY, 1977. VOL.2,

P.1243-1249.

A REVIEW OF THE EXPERIMENTAL WORK CONDUCTED WITH A SOLAR/WIND-POWERED/HEAT PUMP HEATING SYSTEM ON A RESIDENCE LOCATED IN SEATTLE, WASHINGTON IS PRESENTED. THE SYSTEM WAS DESIGNED AND CONSTRUCTED BY THE DEPARTMENT OF LIGHTING, SEATTLE, WASHINGTON, TO OBTAIN ACTUAL TEST DATA ON THE OPERATION OF SOLAR/WIND-POWERED/HEAT PUMP SYSTEMS TO DETERMINE THE AMOUNT OF USEFUL ENERGY THAT COULD BE OBTAINED FROM THESE SOURCES. THE SYSTEM UTILIZES A CONVENTIONAL SOLAR SYSTEM INTEGRATED WITH HYDRONIC HEATING, A WATER-TO-AIR HEAT PUMP, AND A THERMAL ENERGY STORAGE SYSTEM FOR LEVELIZING THE DEMAND AND A WIND-GENERATOR. DATA ARE PRESENTED ILLUSTRATING THE PERFORMANCE AND COST EFFECTIVENESS OF THE SYSTEM. DATA WAS COLLECTED OVER ONE YEAR OF OPERATING THE SYSTEM AT A RESIDENCE UNDER ACTUAL LIVING CONDITIONS TO DETERMINE HOW SUCH A SOLAR/WIND-POWERED/HEAT PUMP SYSTEM WOULD ACTUALLY PERFORM.

77-0467 YEE S T, YUNG T, CHANGE P, SCAVUZZO R J, TIMMERMAN D H, FENTON J W
VIBRATION CHARACTERISTICS OF A LARGE WIND TURBINE TOWER ON NON-RIGID FOUNDATIONS.
NTIS, MAY 1977. 34P.
ERDA/NASA/1004-77/1

VIBRATION CHARACTERISTICS OF THE MOD-OA WIND TURBINE SUPPORTED BY NONRIGID FOUNDATIONS WERE INVESTIGATED FOR A RANGE OF SOIL RIGIDITIES. THE STUDY SHOWS THAT THE INFLUENCE OF FOUNDATION ROTATION ON THE FUNDAMENTAL FREQUENCY OF THE WIND TURBINE IS QUITE SIGNIFICANT FOR COHESIVE SOILS OR LOOSE SAND. THE REDUCTION IN NATURAL FREQUENCY CAN BE GREATER THAN 20 PERCENT. HOWEVER, FOR A FOUNDATION RESTING ON WELL GRADED, DENSE GRANULAR MATERIALS OR BEDROCK, SUCH EFFECT IS SMALL AND THE FOUNDATION CAN BE TREATED AS A FIXED BASE.

77-0468 TORREY V
THE WINDMILL RENAISSANCE.
SIERRA CLUB BULL. 62(3): 41-43, MARCH 1977.

77-0469 BURR N
THE WIND OF CHANGE IN POWER PRODUCTION. DEVELOPING THE NEW.
NEW CIVIL ENG. NO. 266: 27,28, OCTOBER 27, 1977.

JUXTAPOSED TO AN ARTICLE BY G. RIDGWAY ON THE RESTORATION OF AN OLD GRINDING MILL, BURR DESCRIBES CURRENT RESEARCH ON THE DEVELOPMENT OF MODERN TURBINES FOR ELECTRICITY PRODUCTION.

77-0470 RIDGWAY G
THE WIND OF CHANGE IN POWER PRODUCTION. RESTORING THE OLD.
NEW CIVIL ENG. NO. 266: 26,28, OCTOBER 27, 1977.

A PROJECT IS DESCRIBED WHERE BRITAIN'S TALLEST WINDMILL IS BEING RESTORED FOR GRINDING OF CORN AND FLOUR.

77-0471 WINDMILL WILL HAVE 300-FT.-DIA. BLADES.
DESIGN NEWS 33: 20, AUGUST 22, 1977.

ERDA HAS AWARDED A CONTRACT TO BOEING TO DESIGN, BUILD AND TEST A 2.5 MW WINDPOWER ELECTRICAL GENERATING STATION. SCHEDULED TO BE BUILT IN LATE 1979, THE WIND TURBINE WILL REPORTEDLY BE THE LARGEST IN HISTORY WITH BLADES SPANNING 300 FEET IN DIAMETER.

77-0472 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 24: 47, FEBRUARY 1977; NO. 25: 43-45, APRIL 1977; NO. 26: 42-43, JUNE 1977; NO. 27 37-38, AUGUST 1977; NO. 28: 46-47 OCTOBER 1977; NO. 29: 36-37, DECEMBER 1977.

THIS REGULAR COLUMN IN A.S.E. FEATURES MARTIN JOPP RESPONDING TO LETTERS FROM READERS CONCERNING PROBLEMS WITH WINDMILLS.

77-0473 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES. ANNUAL PROGRESS REPORT, MAY 1, 1976 - DECEMBER 31, 1976.
NTIS, JANUARY 1977. 36P.
RLO/2439-77-1

IN A MANNER SIMILAR TO THE ANALYSIS OF ARRAYS OF WIND TURBINES IN NEW ENGLAND AND THE CENTRAL U.S., ARRAY ANALYSES ARE BEING DONE FOR THE GREAT LAKES AREA, AND FOR THE PACIFIC COAST. IN ADDITION TO THE TYPES OF DATA COMPUTED FOR THE NEW ENGLAND AND CENTRAL U.S. ARRAYS (TIME AUTOCORRELATIONS, SPATIAL CROSS CORRELATIONS, MEAN WIND TURBINE POWER BY SEASON, OUTPUT POWER PROBABILITY DISTRIBUTIONS, AND SPEED AND POWER RUN TIME PROBABILITIES), ADDITIONAL ANALYSES OF WIND SPEED AND POWER BY TIME OF DAY AND WIND SPEED VERSUS HEATING OR COOLING DEGREE DAYS ARE ALSO BEING DONE. ALSO POWER OUTPUT CORRECTIONS FOR DENSITY MEAN WIND SPEED GUSTS, RMS DIRECTION FLUCTUATIONS AND FOR VERTICAL SHEAR ARE BEING INCORPORATED, AS DESCRIBED IN SUBSEQUENT SECTIONS OF THIS REPORT. AS EXAMPLES OF THE ARRAY ANALYSIS, RESULTS FROM THE GREAT LAKES ARRAY FOR 1971 ARE PRESENTED.

77-0474 JUSTUS C G, HARGRAVES W R
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (GREAT LAKES AND PACIFIC COAST REGIONS). ANNUAL PROGRESS REPORT, MAY 1976 - APRIL 30, 1977.
NTIS, MAY 1977. 117P.
RLO/2439-77-2

ARRAYS OF SIMULATED 0.5 MW, 1.5 MW AND 2.0 MW WIND TURBINES IN THE GREAT LAKES AND PACIFIC COAST REGIONS ARE STUDIED. THE PARAMETERS ANALYZED ARE: BASIC WIND STATISTICS, TIME AND SPATIAL CORRELATIONS, MEAN WIND POWER OUTPUT, WIND POWER FREQUENCY (AVAILABILITY WITHOUT STORAGE), AND RUN DURATION OF WIND SPEED AND ARRAY POWER (PROBABILITIES OF WIND AND POWER LULLS OF VARIOUS DURATION, WITHOUT STORAGE). NEW ASPECTS OF THE PRESENT STUDY INCLUDE EVALUATION OF DIURNAL AS WELL AS SEASONAL VARIATIONS OF WIND AND WIND POWER, INCLUSION OF DENSITY, WIND SHEAR, WIND GUSTS AND OTHER FACTORS IN THE MODEL POWER OUTPUT CURVE SIMULATION, STUDY OF THE POSSIBLE RELATION BETWEEN WIND SPEED AND DEGREE DAYS (KNOWN TO AFFECT A PORTION OF UTILITY DEMAND), AND DEVELOPMENT AND VERIFICATION OF A SIMPLIFIED ARRAY SIMULATION MODEL.

77-0475 RAMSDELL J V
SEMI-ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT, APRIL 1976 - DECEMBER 1976.
NTIS, JANUARY 1977. 92P.
BNWL/WIND-02

THE WIND CHARACTERISTICS PROGRAM ELEMENT (WCPE) PROVIDES WIND INFORMATION, THROUGH THE WIND ENERGY CONVERSION PROGRAM (WECP), FOR THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR WECS INSTALLATION, AND WECS OPERATIONS. CURRENTLY THE TECHNICAL WORK WITHIN THE WCPE IS DIVIDED AMONG FOUR PROGRAM AREAS. THESE AREAS ARE TO PROVIDE WIND CHARACTERISTICS FOR DESIGN AND PERFORMANCE EVALUATION; SITE SELECTION; RESOURCE ASSESSMENT; AND OPERATIONS. WORK IS BEING UNDERTAKEN IN THE FIRST THREE AREAS.

77-0476 RAMSDELL J V
ANNUAL REPORT OF THE WIND CHARACTERISTICS PROGRAM ELEMENT, APRIL 1976 - JUNE 1977.
NTIS, JULY 1977. 138P.
BNWL/WIND-10

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. THIS FIRST ANNUAL REPORT TO THE WIND SYSTEMS BRANCH (WSB) OF ERDA'S DIVISION OF SOLAR ENERGY DESCRIBES THE TECHNICAL PROGRESS WITHIN THE PROGRAM ELEMENT FROM APRIL 1976 THROUGH JUNE 1977. WITHIN THE WIND ENERGY CONVERSION PROGRAM, THE WCPE IS A SERVICE ELEMENT TO PROVIDE INFORMATION ON WIND CHARACTERISTICS TO THOSE INVOLVED IN ENERGY PROGRAM PLANNING, DESIGN AND EVALUATION OF PERFORMANCE OF WIND ENERGY CONVERSION SYSTEMS (WECS), SELECTION OF SITES FOR INSTALLATION OF WECS, AND OPERATION OF WECS. TO IDENTIFY PERTINENT WIND CHARACTERISTICS AND COLLECT AND PRESENT THAT INFORMATION IN FORMATS THAT ARE USEABLE, THE WCPE HAS BEEN DIVIDED INTO FOUR TECHNICAL AREAS: DESIGN AND PERFORMANCE EVALUATIONS; SITE SELECTION; PRESITING EVALUATION; AND PLANNING AND OPERATION.

77-0477 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. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 667-668.

WE CONCLUDE THAT HYDROGEN CAN BE PRODUCED BY WEC TECHNOLOGY AT A COST THAT IS LESS THAN THE CURRENT GASOLINE PRICE IN MOST PARTS OF THE WORLD, AT THE VERY PREVALENT WIND SITES WHERE THE MEAN WIND SPEED EXCEEDS ABOUT 5 M/S.

77-0478 CAMPBELL J S
THE CAMPBELL CHINESE-TYPE WINDMILL.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORILA, CORAL GABLES, FLORIDA, 1977. P. 863-864.

A NEW VERTICAL-AXIS WINDMILL USING THE SAME BASIC PRINCIPLE AS THE OVER-300-YEARS-OLD CHINESE WINDMILL HAS BEEN DEVELOPED. THE BASIC PRINCIPLE OF CHINESE WINDMILLS IS THE USE OF SAILS IN A MANNER SIMILAR TO SAILING. THESE SAILS, TRAVELING A HORIZONTAL CIRCULAR COURSE, ROTATE A CENTRAL VERTICAL SHAFT.

77-0479 DEVINE W D
AN ENERGY ANALYSIS OF A WIND ENERGY CONVERSION SYSTEM FOR FUEL DISPLACEMENT.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 669-680. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1901-1924.

ENERGY CONVERSION MACHINES WHICH UTILIZE RENEWABLE SUPPLIES OF ENERGY AS FUEL MAY DELIVER CONSIDERABLY MORE ENERGY TO ULTIMATE USERS THAN IS CONSUMED DURING MANUFACTURE, DEPLOYMENT, AND OPERATION OF THE MACHINE. AN INPUT/OUTPUT APPROACH IS EMPLOYED TO ESTIMATE THE ENERGY EMBODIED IN A 1,500 KW(E) HORIZONTAL-AXIS WIND ELECTRIC GENERATING STATION USED TO DISPLACE FOSSIL FUEL IN AN ELECTRIC UTILITY SYSTEM. FIVE RATIOS COMPARING DELIVERED ELECTRICAL ENERGY TO THE ENERGY REQUIREMENT OF THE WIND MACHINE ARE DISPLAYED. THE RESULTS INDICATE THAT THE SYSTEM CONSIDERED COULD BE A LARGE NET PRODUCER OF ENERGY AND SHOULD DISPLACE A QUANTITY OF FOSSIL ENERGY EQUIVALENT TO THAT EMBODIED IN THE MACHINE IN CONSIDERABLY LESS THAN ONE YEAR.

77-0480 DUBEY M
HYDROGEN FROM THE WIND - A CLEAN ENERGY SYSTEM.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 663-666. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.8, P.3551-3562.

THE WIND IS A REGENERATIVE NON-POLLUTING ENERGY RESOURCE WHICH CAN BE CONVERTED TO HYDROGEN FUEL FOR REASONABLE COST. SUCH HYDROGEN SOURCES, INDEPENDENT OF FOSSIL FUELS, WILL HASTEN THE ADVENT OF THE HYDROGEN POWERED ECONOMY.

77-0481 FROST W
ANALYSIS OF WIND TURBINE GENERATOR ROTOR RESPONSE TO ONE-DIMENSIONAL TURBULENCE.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 683-690.

THREE TURBULENCE MODELS ARE CONSIDERED FOR ANALYZING THE RESPONSE OF A WIND TURBINE GENERATOR, WTG, TO THE TURBULENT ATMOSPHERE. THE BEHAVIOR OF THE ROTOR UNDER TURBULENCE IS IMPORTANT TO DESIGN PROCEDURES FOR STRUCTURAL STRENGTH OF THE ROTOR, FOR SELECTING THE OPTIMUM CONSTRUCTION MATERIALS, FOR CONTROLS TO MAINTAINING SYNCHRONIZATION OF THE GENERATOR, AS WELL AS MANY OTHER DESIGN REQUIREMENTS. THE PAPER DESCRIBES THREE COMPARABLE METHODS OF ANALYZING THE ROTATIONAL FLUCTUATIONS OF A SIMPLE RIGID ROTOR TO ONE-DIMENSIONAL TURBULENCE.

77-0482 HARDY D M, WALTON J J
WIND ENERGY ASSESSMENT.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES. MIAMI

BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 669-672. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1835-1863.

A FRACTION OF OUR INCIDENT SOLAR RADIATION IS CONVERTED BY THE ATMOSPHERE INTO KINETIC ENERGY OF OUR WINDS. THIS NATURAL CONVERSION OF THE SOLAR FLUX PROVIDES A FORM OF MECHANICAL ENERGY WHICH HAS LONG SERVED MANKIND--PROVIDING POWER FOR TRANSPORTATION AT SEA FROM THE BEGINNING OF CIVILIZATION AND FOR AGRICULTURAL PURPOSES IN WESTERN EUROPE AS EARLY AS THE ELEVENTH CENTURY. PRESENT ESTIMATES OF WIND ENERGY AVAILABLE FOR MODERN USES VARY SIGNIFICANTLY BUT EVEN THE LOWEST REPRESENTS A SUBSTANTIAL ENERGY POTENTIAL.

77-0483 KENTFIELD J A C, NORRIE D H
AN AXIAL-FLOW WIND-TURBINE WITH DELTA-WING BLADES
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 695-697. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1615-1645.

RESULTS ARE REPORTED OF WIND-TUNNEL TESTS OF A SMALL SCALE, DYNAMOMETER EQUIPPED, MODEL WIND TURBINE REPRESENTING WHAT IS BELIEVED TO BE A UNIQUE CONCEPT FEATURING DELTA-WING BLADES (OR SAILS). IT IS SHOWN THAT THE INHERENT ADVANTAGES OF THIS BLADE FORM DERIVE FROM BOTH THE LOW SPEED AERODYNAMIC CHARACTERISTICS OF DELTA WINGS AND, FOR THE WIND-TURBINE APPLICATION, THE EASE WITH WHICH SUCH BLADES CAN BE CONSTRUCTED. EASE, AND CHEAPNESS, OF CONSTRUCTION ARE PARTICULARLY IMPORTANT FOR APPLICATIONS IN DEVELOPING NATIONS WHERE IT IS VERY DESIRABLE TO COMBINE LOCAL CONSTRUCTION WITH THE USE OF ONLY INDIGENOUS MATERIALS.

77-0484 KORNREICH T R
WIND ENERGY CONVERSION SYSTEMS (WECS) FOR CENTRAL STATION AND DISPERSED POWER APPLICATIONS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 845-846. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1865-1886.

A DISCUSSION OF THE PRESENT STATUS AND POTENTIAL FUTURE USE OF WIND ENERGY SYSTEMS FOR CENTRAL STATION AND DISPERSED POWER APPLICATIONS IS PRESENTED. AN ECONOMIC EVALUATION OF LARGE (MEGAWATT-SCALE) SYSTEMS FOR UTILITY USE IS DEVELOPED. THE EFFECTS OF UNCERTAINTIES IN WECS CAPITAL COST, THE PRODUCTION LEARNING CURVE, AND THE COST OF MONEY ARE DISCUSSED. THE ROLE OF WECS AS A FUEL SAVER IS DESCRIBED AND THE ECONOMIC BENEFITS ACCRUING FROM WECS CAPACITY CREDIT ARE EXPLORED.

77-0485 PYTLINSKI J T, ECKHOFF N D
ASSESSMENT OF ENERGY CONSERVATION BY USING ALTERNATE ENERGY SOURCES IN KANSAS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 779-784. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.9, P.4311-4321.

ESTIMATED ENERGY CONSERVATION DUE TO THE USE OF ALTERNATIVE ENERGY SOURCES, INCLUDING THE USE OF WINDMILLS FOR ELECTRICITY GENERATION, IS PRESENTED.

77-0486 RAMAKUMAR R
A REVIEW OF WIND-ELECTRIC CONVERSION TECHNOLOGY.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 841-844. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1811-1834.

THE EASE WITH WHICH AEROTURBINES TRANSFORM ENERGY IN MOVING AIR TO ROTARY MECHANICAL ENERGY SUGGESTS THE USE OF ELECTRICAL DEVICES TO CONVERT WIND ENERGY TO ELECTRICAL FORM FOR A VARIETY OF END USES. THE PURPOSE OF THIS PAPER IS TO PROVIDE A STATE-OF-THE-ART REVIEW OF WIND-ELECTRIC CONVERSION TECHNOLOGY.

77-0487 SMITH M C
WIND SITE SELECTION FOR OPTIMUM WIND POWER SYSTEMS.

MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 673-676. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL. 4, P.1787-1808.

SITE SELECTION FOR WIND POWER SYSTEMS MUST BE MADE WITH REGARD FOR MANY VARIABLES INCLUDING SOCIAL AND ENVIRONMENTAL IMPACT, DISTANCES FROM USER AND FROM POINT OF MANUFACTURE AND WIND ENERGY POTENTIAL. THE DISCUSSION IN THIS PAPER IS CONCERNED, HOWEVER, ONLY WITH SELECTION OF TECHNICALLY OPTIMUM SITES; SITES WHICH WILL PRODUCE POWER AT A MINIMUM COST PER ANNUAL AVERAGE KILOWATT HOUR. THE DISCUSSION INCLUDES THE EFFECTS OF MINIMUM AND MAXIMUM USEABLE POWER OUTPUT AND EXAMPLES OF SITE SELECTION FOR REAL WIND DISTRIBUTIONS AND SPECIFIC WIND POWER SYSTEMS CHARACTERISTICS.

77-0488 TSAI S C, LUI C Y, TAN T H, TAY S L
FLAP-CONE CONTROL OF WINDMILL SPEED.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 681-682. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1681-1692.

ALTHOUGH THE WINDMILL HAS BEEN WITH US FOR QUITE SOME TIME, ITS APPLICATION IS YET RATHER LIMITED DUE MAINLY TO THE LACK OF AN EFFICIENT MEANS OF "COLLECTING" THE VARIABLE WIND ENERGY AND THE DIFFICULTY IN PROVIDING A STEADY POWER OUTPUT. IN ORDER THAT THE WINDMILL CAN BE EFFECTIVELY USED AS A POWER GENERATOR, ITS ROTATIONAL SPEED MUST BE PROPERLY CONTROLLED AND THE EFFICIENCY IN TRANSFORMING WIND ENERGY INTO USEFUL WORKING POWER INCREASED. THIS WORK IS AN ATTEMPT TRYING TO CONTROL THE ROTATIONAL SPEED OF THE WINDMILL WITH INCREASED POWER OUTPUT.

77-0489 VAN BUSSEL G J W
WINDMILLS WITH INCREASED POWER OUTPUT DUE TO TIPVANES.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 691-694. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1647-1661.

BETZ'S FORMULA, YIELDING THE MAXIMUM POWER OUTPUT OF WINDMILLS, IS ONLY VALID UNDER THE ASSUMPTION THAT THE WINDMILL CAUSES A STEADY AXIAL FORCE ACTING ON THE AIR IN A DIRECTIN OPPOSITE TO THE UNDISTURBED STREAM VELOCITY. WHEN RADIAL AS WELL AS AXIAL FORCES ARE APPLIED TO THE AIR, THIS THEOREM IS NO LONGER VALID AND LARGER POWER OUTPUT MAY BE OBTAINED.

77-0490 WEISBRICH A L
FEATURE REVIEW OF SOME ADVANCED AND INNOVATIVE DESIGN CONCEPTS IN WIND ENERGY CONVERSION SYSTEMS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 847-860. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1663-1679.

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.

77-0491 WEISBRICH A L
TOROIDAL ACCELERATOR ROTOR PLATFORMS FOR WIND ENERGY CONVERSION.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 799-806. ALSO: WASHINGTON, D.C., HEMISPHERE PUBL. CORP., 1978. VOL.4, P.1735-1754.

TARP IS AN OBSTRUCTION TYPE FLOW CONCENTRATOR AND ACCELERATOR WHICH GENERATES LOW PRESSURE, HIGH KINETIC ENERGY REGIONS AT THE SITE OF THE ROTOR DISKS. THE TARP STRUCTURE IS SUBSTANTIALLY THE SHAPE OF AN INNER SECTION OF A HOLLOW TOROID. A TWIN ROTOR SYSTEM IS MOUNTED WITHIN THE PERIPHERAL CHANNEL ABOUT A TARP STRUCTURE SUCH THAT EACH ROTOR IS SITUATED IN THE OPTIMUM VELOCITY REGION OF THE SYMMETRICAL FLOW FIELDS ESTABLISHED WITHIN THIS CHANNEL AND ABOUT THE TARP STRUCTURE FOR BEST ENERGY RECOVERY. FLOW APPROACHING A TARP IS DIVERTED SYMMETRICALLY ABOUT IT WITHIN ITS PERIPHERAL CHANNEL AND IS, THEREBY, ACCELERATED ABOVE

AMBIENT VELOCITY.

77-0492 WIND-HYDRO SYSTEM PROPOSED.
WIND POWER DIG. 1(9): 23, SUMMER 1977.

77-0493 ZELBY L W
WIND SYSTEM WITH OFF-THE-SHELF COMPONENTS.
MIAMI INTERNATIONAL CONFERENCE ON ALTERNATIVE ENERGY SOURCES, MIAMI BEACH, FLORIDA, DECEMBER 5-7, 1977. PROCEEDINGS. UNIVERSITY OF FLORIDA, CORAL GABLES, FLORIDA, 1977. P. 861-862.

A SELF-CONTAINED WIND SYSTEM WAS DESCRIBED SEVERAL YEARS AGO. SUCH A SYSTEM CAN BE BUILT WITH OFF-THE-SHELF COMPONENTS AND WOULD BE SUITABLE IN REGIONS OF THE U.S.A. IN WHICH THE AVERAGE WIND VELOCITY EXCEEDS 10 KM/H. THE SYSTEM CONSISTS OF THE FOLLOWING COMPONENTS: A WINDMILL, TOWER AND GENERATOR COMPRISING THE FRONT END OF THE SYSTEM; AND ELECTROLYTIC CELLS, A COMPRESSOR, A MODIFIED IC ENGINE AND POWER SPLITTERS COMPRISING THE STORAGE. THE ENTIRE SYSTEM IS DESIGNED TO PROVIDE ABOUT 30,000 KWH ANNUALLY FOR A 200 M2 LIVING AREA HOME, WITH 15 KW PEAK CAPACITY.

77-0494 PERRY A M, DEVINE W D, CAMERON A E, MARLAND G, PLAZA H, REISTER D B, TREAT N L, WHITTLE C E
NET ENERGY ANALYSIS OF FIVE ENERGY SYSTEMS.
NTIS, SEPTEMBER 1977. 156P.
ORAU/1EA(R)-77-12

A NET ENERGY ANALYSIS IS PERFORMED FOR EACH OF FIVE DEVELOPING ENERGY TECHNOLOGIES: OCEAN THERMAL ENERGY CONVERSION, WIND ENERGY CONVERSION, IN SITU OIL SHALE PROCESSING, FLUIDIZED-BED COAL COMBUSTION, AND MUNICIPAL SOLID WASTE UTILIZATION. ENERGY EXPENDITURES REQUIRED DURING CONSTRUCTION AND LIFE LONG OPERATION AND MAINTENANCE ARE ESTIMATED USING INPUT-OUTPUT AND PROCESS ANALYSES. THESE EXPENDITURES, INCLUDING BOTH DIRECT AND INDIRECT CONSUMPTION, ARE CLASSIFIED AS CAPITAL OR OPERATING EXPENDITURES AND AS EXPENDITURES FOR ELECTRIC OR NONELECTIRC INPUTS TO THE SYSTEMS. VARIOUS RATIOS THAT COMPARE THE ANTICIPATED ENERGY PRODUCT OF A SYSTEM TO ITS ESTIMATED ENERGY SUBSIDY ARE DEFINED. IT IS NOT, IN GENERAL, POSSIBLE TO COMPARE DISSIMILAR TECHNOLOGIES ON THE BASIS OT THESE PERFORMANCE INDICES. HOWEVER, THE INDICES DO INDICATE ALL OF THE SYSTEMS CONSIDERED HERE ARE NET PRODUCERS OF ENERGY AND DECISIONS TO PROCEED WITH DEVELOPMENT AND DEPLOYMENT SHOULD BE BASED ON OTHER CONSIDERATIONS.

77-0495 HIRSCH R L, MARVIN H H, BLASY J A
ERDA'S SOLAR ENERGY RESEARCH AND DEVELOPMENT PROGRAM.
ENERGY TECHNOLOGY CONFERENCE, 4TH, WASHINGTON, D.C., MARCH 14-16, 1977.
P. 112-133.

A DESCRIPTION OF THE CHARACTERISTICS OF SOLAR ENERGY CONVERSION AND AN OUTLINE OF ERDA SOLAR RESEARCH AND DEVELOPMENT EFFORTS IS ILLUSTRATED WITH DIAGRAMS AND PHOTOGRAPHS OF SEVERAL PROJECTS. WHILE TECHNICALLY FEASIBLE, THE COST OF COLLECTING SIGNIFICANT AMOUNTS OF SOLAR ENERGY REMAINS THE MAJOR PROBLEM. ERDA, OPTIMISTIC THAT HEATING AND COOLING ARE CLOSE TO COMMERCIALIZATION, IS MAKING CONTINUING PROGRESS IN THE IDENTIFICATION OF SOLAR ENERGY APPLICATIONS AND POTENTIAL FUEL SUBSTITUTIONS. RESEARCH PROGRAMS INCLUDE DIRECT THERMAL, THERMAL POWER, PHOTOVOLTAIC, BIOMASS-DERIVED FUELS, WIND POWER, AND OCEAN TEMPERATURE GRADIENT SYSTEMS.

76-0215 ABDEL-HAMEED M F, EL-DEFRAWI A A
NEW FRONTIERS IN SOLAR AND OTHER ENERGY OPTIONS.
INTERNATIONAL CONFERENCE ON HELIOTECHNIQUE AND DEVELOPMENT, DHAHRAN, SAUDI ARABIA, NOVEMBER 2, 1975. CAMBRIDGE, MASSACHUSETTS, DEVELOPMENT ANALYSIS ASSOCIATES, INC., 1976. P. 525-540.

THE USE OF COAL MAY CONTINUE FOR A FEW HUNDRED YEARS, AND NUCLEAR POWER MAY SEEM AN ATTRACTIVE ALTERNATIVE, BUT THERE ARE SERIOUS PROBLEMS ESPECIALLY WITH NUCLEAR WASTE DISPOSAL. NON-POLLUTING OPTIONS SUCH AS SOLAR ENERGY AND RELATED APPROACHES ARE THE MOST LOGICAL CANDIDATES FOR FUTURE ENERGY SUPPLY. SEVERAL NEW FRONTIERS IN SOLAR TECHNOLOGY ARE QUITE PROMISING AND THESE INCLUDE: PHOTOSYNTHESIS, SYNTHETIC LEAF, HYDROGEN ENERGY, WIND POWER, ARTIFICIAL TORNADOS, SPACE COLONIZATION, AND COLONIZATION OF MARGINAL HABITATS ON EARTH.

76-0216 THE AIR-ELECTRIC CO.
WIND POWER DIG. 1(7): 46-47, DECEMBER 1976.

THIS ILLUSTRATED ARTICLE TRACES THE EVOLUTION OF THE AIR ELECTRIC WIND GENERATOR.

76-0217 ALEXANDER C K, LATIF F A
DESIGN AND STABILITY OF MASTER CONTROL SYSTEMS FOR ENERGY INDEPENDENT HOMES.
SOLAR COOLING AND HEATING; A NATIONAL FORUM. SOLAR COOLING AND HEATING FORUM, MIAMI BEACH, FLORIDA, DECEMBER 13, 1976. NTIS, 1976. P. 325-328. CONF-761220

A SYSTEM IS PRESENTED THAT WILL BE ABLE TO CONTROL MOST OF THE POSSIBLE INPUTS AND OUTPUTS OF A HOME USING SOLAR ENERGY TO MEET ANY COMBINATION OF THE FOLLOWING FUNCTIONS: SPACE HEAT, DOMESTIC HOT WATER, SPACE COOLING, AND ELECTRICITY. THE SYSTEM IS DISCUSSED FOR EITHER A WATER-BASED OR AN AIR-BASED TYPE. THE USE OF WIND ENERGY OR A PHOTOVOLTAIC CIRCUIT IS MENTIONED.

76-0218 ALLISON H J, SOUTHERLAND S R, GORDON C E
AN ENERGY CENTER IN SRI LANKA.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 11TH, PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, 1976. VOL.1. SAE PAPER 769011, P. 58-63.

IN APRIL, 1975, THE GOVERNING COUNCIL OF THE UNITED NATIONS ENVIRONMENT PROGRAM ISSUED A DECISION WHICH ADDRESSED THE PROBLEM OF PROVIDING ENERGY TO REMOTE VILLAGES IN THE DEVELOPING WORLD. THE DECISION EXPRESSED THE BELIEF THAT EXISTING TECHNOLOGY COULD BE USED TO HARNESS RENEWABLE RESOURCES SUCH AS SOLAR AND WIND ENERGY, AND THE ENERGY WHICH CAN BE DERIVED FROM PLANT AND ANIMAL MATTER AS INPUTS TO AN ENERGY SYSTEM WHICH COULD PROVIDE RELIABLE POWER TO SUCH VILLAGES. AS A RESULT OF THAT DECISION, OKLAHOMA STATE UNIVERSITY WAS CHOSEN TO DEVELOP PLANS FOR A RURAL ENERGY CENTER, TO BE INSTALLED IN SRI LANKA, WHICH WOULD BE A MODEL FOR FUTURE CENTERS IN ASIAN VILLAGES. THIS PAPER DESCRIBES THE SYSTEM WHICH HAS BEEN DEVISED, THE CONSTRAINTS AND ECONOMICS ASSOCIATED WITH ITS DEVELOPMENT, AND THE POSSIBLE IMPACT IT MIGHT HAVE IN THE FUTURE IN DEVELOPING NATIONS OF THE WORLD.

76-0219 AMERICAN POWER CONFERENCE 1.
COMBUSTION 48(1): 8-24, JULY 1976.

ABSTRACTS OF SOME PAPERS GIVEN AT THE AMERICAN POWER CONFERENCE ARE INCLUDED. ONE PAPER IS ON WIND POWER POTENTIAL USING OFFSHORE SITES IN NEW JERSEY.

76-0220 ANTOGINI E
DEVICE FOR CONVERTING FLUID FLOW INTO KINETIC ENERGY.
U.S. PATENT NO. 3,976,396 AUGUST 24, 1976. 8P.

THE PRESENT INVENTION RELATES TO A DEVICE FOR CONVERTING FLUID FLOW KINETIC ENERGY INTO ROTATIONAL KINETIC ENERGY COMPRISING A BODY MOUNTED FOR VERTICAL ROTATION ABOUT A LONGITUDINAL AXIS THEREOF, A PLURALITY OF HORIZONTALLY SPACED VERTICALLY EXTENDING VANES PIVOTABLY MOUNTED ON THE BODY AND ROTATABLE BETWEEN AN OPEN POSITION IN WHICH THE VANE EXTENDS OUTWARDLY FROM THE BODY AND A CLOSED POSITION IN WHICH THE VANE LIES WITH ONE SURFACE THEREOF ADJACENT THE SURFACE OF THE BODY. THE PLURALITY OF

FEATHER MEMBERS ARE SPACEDLY MOUNTED LONGITUDINALLY OF EACH FRAME AND EXTEND OUTWARDLY AND TRANSVERSELY OF THE SURFACE OPPOSITE TO THE ONE SURFACE OF THE VANE. THE FEATHERS ARE DIMENSIONED TO ABUT THE BODY WHEN THE VANE IS IN THE OPEN POSITION TO PROVIDE STOP MEANS FOR EACH VANE.

76-0221 ARMBRUST S, KUSSMANN A, MOLLY J P
POSSIBILITIES OF UTILIZING WIND POWER.
DTSCH. FORSCH. VERSUCHSANST. LUFT-RAUMFAHRT NACHR. NO. 19: 765-770, NOVEMBER 1976. (IN GERMAN)

AN OUTLINE ON THE TECHNICAL POSSIBILITIES OF BUILDING WIND POWER PLANTS AND A REPORT ON COMPLETED AND PLANNED PLANTS ARE GIVEN. THE ECONOMIC UTILISATION OF WIND POWER IS DISCUSSED. SMALL PLANTS OF 10 TO 50 KW AND LARGE PLANTS INTEGRATED IN A SUPPLY NETWORK ARE DISTINGUISHED BETWEEN AS REGARDS THE MEGAWATT PERFORMANCE.

76-0222 AWANO S, MURAYAMA M, TAKEUCHI S
WIND ELECTRIC GENERATOR NU-101 DRIVEN BY AXIAL-FLOW AIR TURBINE WITH STATOR.
JAPAN. NAT. INST. POLAR RES. MEMOIRS, SER. F, LOGISTICS, NO. 2, JULY 1976. 47P.

GENERATORS DRIVEN BY AN AXIAL-FLOW AIR TURBINE WITH A STATOR ARE RELATIVELY SMALL IN SIZE AND CAN BE ADAPTED TO WITHSTAND VIOLENT BLIZZARDS. THEY ARE SUITABLE FOR ANTARCTIC USE, ESPECIALLY AS ENERGY SOURCES FOR UNMANNED OBSERVATION UNITS. AN ANALYSIS IS GIVEN OF THE PERFORMANCE OF AN AXIAL-FLOW AIR TURBINE CONSISTING OF A STATOR WITH STATIONARY BLADES AND A ROTOR WITH MOVING BLADES. CHANGES IN THE VELOCITY AND THERMODYNAMIC PROPERTIES OF THE AIRFLOW IN PASSING THROUGH THE TURBINE ARE DISCUSSED QUANTITATIVELY, AND THE EXPRESSION FOR THE OUTPUT POWER AND EFFICIENCIES OF THE TURBINE ARE GIVEN.

76-0223 BADE P
WIND AS A POWER SOURCE FOR OCEANOGRAPHIC PLATFORMS.
INTERNATIONAL CONFERENCE AND EXHIBITION, RESEARCH-TECHNOLOGY-ECONOMICS, 3RD, (INTEROCEAN 76). DUESSELDORF, F.R. GERMANY, 1976. NTIS, 1976. 10P. (IN GERMAN)
AED-CONF-76-203-005

THE ENERGY DEMAND OF PLATFORMS IN OCEAN ENGINEERING CAN BE SATISFIED BY WIND ENERGY CONVERTING SYSTEMS. THE RELATIVELY LOW AND CONTINUOUS POWER DEMAND OF SUCH STATIONS, AND THE GREAT AVERAGE WIND VELOCITIES IN THE OCEAN MAKES THE USE OF WIND ENERGY CONVERTERS ECONOMIC. ALTHOUGH THERE ARE SATISFACTORY RESULTS WITH NEW VERTICAL AXIS WIND ROTORS (DARRIEUS-ROTOR), THE WIND TURBINE WITH HORIZONTAL AXIS OF ROTATION AND HIGH TIP-SPEED RATIO OF THE ROTOR BLADES SEEMS TO BE THE MOST EFFECTIVE AND ECONOMIC SYSTEM. TO ENSURE THE POWER SUPPLY OF THE STATION ALSO DURING LONGER PERIODS OF NO WIND, THE WIND CONVERTER HAS TO WORK IN CONNECTION WITH STORAGE BATTERY BANKS. BOTH PARTS, WIND CONVERTER WITH ALTERNATOR AND THE STORAGE BATTERIES, HAVE TO BE AN INTEGRATED SYSTEM.

76-0224 BAILEY W
CAPTURING HYDRO POWER, EARTH POWER AND WIND POWER WITH MEANS AND METHODS OF STORING SAME.
U.S. PATENT NO. 3,974,394 AUGUST 10, 1976. 4P.

IN AREAS WHERE WIND POWER, HYDRO POWER AND EARTH HEAT POWER ARE ALL AVAILABLE AND ARE TO BE DEVELOPED, A COMMON MEANS AND METHOD OF STORING SUCH POWER DURING OFF PEAK PERIODS OF POWER USE ARE FREQUENTLY REQUIRED. HERE POWER STORAGE IS ACCOMPLISHED BY THE LIFTING OF UNDERGROUND WEIGHTS. EARTH POWER MAY BE GEOTHERMAL HEATS, VOLCANIC HEATS, HEATS FROM HOT SPRINGS, DEEP HOLES IN THE EARTH, OR HEATS FROM DEEP OIL OR GAS WELLS, SUCH AS COME TO THE SURFACE WHEN THEY BRING UP OIL OR NATURAL GAS. THESE ARE ALL HERE COMBINED AS A COMMON SOURCE OF POWER. ANY OR ALL MAY CONTRIBUTE POWER TO THE POWER STORAGE.

76-0225 BALANCED PROGRAM PLAN. VOL. 8. ANALYSIS FOR BIOMEDICAL AND ENVIRONMENTAL RESEARCH.
NTIS, OCTOBER 1976. 77P.
ERDA-116(VOL.8)

THE BALANCED PROGRAM PLANNING (BPP) EFFORT WAS INITIATED BY THE DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH (DBER) OF ERDA TO IDENTIFY AND

DEVELOP A RESEARCH PLAN FOR INVESTIGATING THE ENVIRONMENTAL IMPACTS ASSOCIATED WITH ENERGY TECHNOLOGIES BEING DEVELOPED BY ERDA. "ENVIRONMENTAL IMPACTS" IS TAKEN HERE TO REFER TO POLLUTANTS, HEALTH EFFECTS, ECOLOGICAL EFFECTS, SOCIOECONOMIC AND LONG-TERM IMPACTS. AS DEFINED FOR THE BPP EFFORT, SOLAR ENERGY INCLUDES TIDAL AND HYDROELECTRIC AS WELL AS THE MORE USUAL CATEGORIES OF SOLAR THERMAL CONVERSION, PHOTOVOLTAIC CONVERSION, WIND ENERGY CONVERSION, OCEAN THERMAL CONVERSION, BIOCONVERSION, AND HEATING AND COOLING OF BUILDINGS.

76-0226 BANAS J
PERFORMANCE PREDICTION FOR THE 17-M TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.118 -- II.125.
SAND-76-5586

THE UTILIZATION OF AERODYNAMIC DATA IS DESCRIBED ALONG WITH MODELS FOR THE OTHER SYSTEM COMPONENTS TO ESTIMATE THE PERFORMANCE OF THE 17-M TURBINE SYSTEM, LEADING TO SELECTION OF THE GENERATOR CAPACITY AND THE GEAR RATIOS FOR THE SPEED INCREASER. INPUT/OUTPUT RELATIONSHIPS FOR THE COMPONENTS ARE COMBINED TO ESTIMATE MAXIMUM SYSTEM OUTPUT POWER AS A FUNCTION OF TURBINE ROTATIONAL SPEED. IN ADDITION, THE PERCENTAGES OF TIME THAT WIND SPEED WOULD BE EXPECTED TO EXCEED THE WIND SPEEDS REQUIRED FOR POSITIVE AND MAXIMUM POWER ARE CALCULATED. THE BASIC SYSTEM COMPONENTS ARE THE SYNCHRONOUS GENERATOR, THE SPEED INCREASER, AND THE WIND TURBINE. GENERATOR CAPACITIES OF 30 KW AND 60 KW ARE CONSIDERED FOR COMPARATIVE PURPOSES.

76-0227 BANAS J
ECONOMIC CONSIDERATINS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.19 --II.28.
SAND-76-5586

THE OBJECTIVES OF ECONOMIC STUDIES ARE TWOFOLD. FIRST, TO IDENTIFY TRADEOFFS AND TRENDS AMONG SYSTEM DESIGN PARAMETERS WHICH LEAD TO THE DEFINITION OF SCALE-UP SYSTEMS. SECOND, TO IDENTIFY THE COST OF OPTIMUM SYSTEMS IN ORDER TO DETERMINE THE ROLE OF THE VERTICAL-AXIS WINDTURBINE IN WIND POWER. SINCE THE VAWT IS IN EARLY STAGES OF DEVELOPMENT, AN ITERATIVE PROCESS IS VISUALIZED TO MEET THE ABOVE OBJECTIVES WHEREIN THE ECONOMICS OF VAWT SYSTEMS ARE CONTINUOUSLY UPDATED AS NEW PERFORMANCE AND COST DATA BECOMES AVAILABLE. ECONOMIC STUDIES PERFORMED TO DATE ARE SUMMARIZED WITH EMPHASIS ON TRENDS RELATED TO SYSTEM DESIGN, FOR EXAMPLE, IN THE AREAS OF AERODYNAMICS AND STRUCTURES. THE EFFECTS OF POTENTIAL COMPONENT COST SAVINGS ARE ALSO INDICATED.

76-0228 BANKWITZ H, FRITZSCHE A, SCHMELZLE J, WELTE D, SWAMY C N N
ENTWICKLUNG EINER WINDKRAFTANLAGE MIT VERTIKALER ACHSE (PHASE 1).
(DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE. PHASE 1).
BUNDESMINIST. FORSCH. TECHNOL. FORSCHUNGSBER. TECHNOL. FORSCH. ENTWICKL. T76-55, OCTOBER 1976. 123P. NTIS, 1976. (IN GERMAN)
N77-17112, BMFT-FB-T-76-55

THE AERODYNAMIC, MECHANICAL, OPERATIONAL, AND MANUFACTURING ASPECTS OF A VERTICAL AXIS WIND ENERGY CONVERTER (DARRIEUS ROTOR) ARE DEALT WITH. DESIGN TECHNIQUES AND DESIGN STUDIES ARE DESCRIBED. A PROSPECTIVE, BASED ON THE SYSTEM'S ADVANTAGES (INDEPENDENCE FROM WIND DIRECTION, SIMPLICITY OF MANUFACTURE, INSTALLATION, AND MAINTENANCE), IS MADE TO CONTINUE THE DEVELOPMENT WITH THE AIM OF A SERIES PRODUCTION OF THIS VERTICAL-AXIS WIND TURBINE IN A PERFORMANCE RANGE UP TO APPROXIMATELY 20 KW. FOR GREATER POWER RANGES THE DISADVANTAGES OF THIS DESIGN BECOME PREDOMINANT (COMPARATIVELY LOW ROTATING SPEED, LARGE AMOUNT OF MATERIAL FOR THE ROTOR BLADES). THE HORIZONTAL ROTOR AXIS DESIGN WITH A CONSIDERABLY MORE ADVANCED STATE OF DEVELOPMENT HAS TO BE PREFERRED IN A POWER RANGE ABOVE 20 KW FOR IRRIGATION PURPOSES AND POWER SUPPLY.

76-0229 BARZDA J J
BLADE DESIGN AND FABRICATION: 17-METER VAWT.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.205--II.221.
SAND-76-5586

SANDIA LABORATORIES IS PLANNING TO ERECT AND OPERATE AN EXPERIMENTAL 17-METER VERTICAL AXIS WIND TURBINE (VAWT) POWER GENERATION SYSTEM. THE SUBSYSTEMS ARE BEING DESIGNED FOR FABRICATION. THE DESIGN AND FABRICATION OF ROTOR BLADES FOR THE TURBINE ARE DESCRIBED. THE ROTOR WILL HAVE THREE BLADES WITH 0012 AIRFOIL AND 21-INCH CHORD. THE BLADES WILL BE STIFFENED WITH SUPPORT STRUTS. THE DESIGN CRITERIA, STRUCTURAL DESIGN, SUPPORTING ENGINEERING ANALYSIS AND FABRICATION METHODS ARE DISCUSSED.

76-0230 BECKER M, WICKS F, YERAZUNIS S
AN APPRAISAL OF ELECTRICAL ENERGY ALTERNATIVES AVAILABLE TO THE STATE OF NEW YORK. REPORT FOR SEPTEMBER 1, 1975--AUGUST 31, 1976.
NTIS, OCTOBER 1976. 210P.
PB-262573

THE DEVELOPMENT AND APPLICATION OF A MODEL FOR THE APPRAISAL OF ELECTRICAL ENERGY ALTERNATIVES AVAILABLE TO THE STATE OF NEW YORK IS DESCRIBED. PRIOR WORK RELATED TO THE ACQUISITION OF A DATA BASE REPRESENTATIVE OF THE CURRENT AND FUTURE SYSTEMS FOR ELECTRIC POWER GENERATION IS SUMMARIZED. THE IMPLICATIONS OF NEW STUDIES IN THE AREAS OF WIND TURBINES AS A MODE OF GENERATION, SOLID WASTES AS AN ALTERNATIVE FUEL, AND SOLAR ENERGY FOR RESIDENTIAL HEATING AND PASSIVE ENERGY CONSERVATION TO ELECTRICAL ENERGY GENERATION IN NEW YORK STATE ARE EVALUATED. A CALCULATIONAL SYSTEM THAT PERMITS THE APPRAISAL OF A BROAD RANGE OF SCENARIOS IN A CONSISTENT MANNER IS DEVELOPED.

76-0231 BERTOIA V
ELEKTROS: ANOTHER VIEW.
WIND POWER DIG. 1(6): 18, SEPTEMBER 1976.

76-0232 BIFFLE J H
SYSTEM STRUCTURAL RESPONSE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976.
P.II.168--II.179.
SAND-76-5586

THE 17 METER VERTICAL AXIS WIND TURBINE (VAWT) SYSTEM WAS ANALYZED TO DETERMINE THE MODE SHAPE AND FREQUENCIES OF THE STRUCTURE. CHANGES IN THE DESIGN SUCH AS TOWER STIFFNESS, 2 AND 3 BLADE CONFIGURATION, WITH AND WITHOUT STRUTS AND BEARING DESIGNS FOR THE TOWER ARE TO BE CONSIDERED. THE SIGNIFICANCE OF THE VARIOUS NATURAL MODES AND FREQUENCIES ARE TO BE DETERMINED BY COMPARISON TO THE FREQUENCY CONTENT OF THE APPLIED FORCES.

76-0233 BLACKWELL B F, REIS G E
SOME GEOMETRICAL ASPECTS OF TROPOSKIENS AS APPLIED TO VERTICAL-AXIS WIND TURBINES.
ASME PAPER 75-DET-42, SEPTEMBER 1976.

76-0234 BLACKWELL B F
STATUS OF THE ERDA/SANDIA 17-METER DARRIEUS TURBINE DESIGN.
ENERGY DIG. 5(6): 6, DECEMBER 1976.

THIS ARTICLE IS AN EXCEPTIONAL PAPER FROM AN INTERNATIONAL SYMPOSIUM: "WIND ENERGY SYSTEMS" HELD AT ST JOHN'S COLLEGE, CAMBRIDGE, ENGLAND. UNDER SPONSORSHIP OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) WIND ENERGY PROGRAM, SANDIA LABORATORIES HAS BEEN INVESTIGATING THE DARRIEUS WIND TURBINE AS AN ALTERNATIVE TO THE CONVENTIONAL HORIZONTAL AXIS WIND TURBINE. THE CURRENT EFFORT AT SANDIA LABORATORIES HAS BEEN DIRECTED TOWARD THE DESIGN AND FABRICATION OF A 17-METER DIAMETER DARRIEUS TURBINE. THE BASIC ROTOR CONFIGURATION CONSISTS OF THREE NACA 0012 BLADES, EACH BLADE BEING SUPPORTED BY TWO STRUTS THAT EXTEND FROM THE VERTICAL ROTATING SHAFT TO THE BLADES. THE ROTATING SHAFT, WHICH WILL BE FABRICATED FROM STEEL, HAS AN OUTER DIAMETER OF 0.508M (20-IN.) WITH 2.54CM (1-IN.) WALL THICKNESS. THE BLADES ARE REQUIRED TO OPERATE UP TO 75 RPM IN A 26.8 M/S (60 MPH) WIND WITHOUT PERMANENT DEFORMATION AND TO WITHSTAND 53.6 M/S (120MPH) WIND AT ZERO RPM. THE TURBINE BASE CONTAINS THE MEANS OF AXIAL SUPPORT OF THE TURBINE, THE POWER TRAIN (CONSISTING OF A SPEED INCREASER, SYNCHRONOUS GENERATOR, AND AN INDUCTIVE STARTER), AND A BRAKING SYSTEM. THE DESIGN ROTATIONAL SPEED IS 45.4 RPM AND MAXIMUM POWER IS 70 KW. DUE TO TURBINE COMPONENT INEFFICIENCIES, THE ELECTRICAL GENERATOR WILL SEE APPROXIMATELY

60 KW, WHICH IS ITS RATED CAPACITY.

76-0235 BLACKWELL B F, FELTZ L V, SHELDAHL R E
SELECTED WIND TUNNEL TEST RESULTS FOR THE DARRIEUS WIND TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.59 -- II.71.
SAND-76-5586

IN ORDER TO VERIFY SOME EARLIER FINDINGS, EXPAND THE RANGE OF SOME OF THE PERTINENT PARAMETERS, AND PROVIDE A COMPREHENSIVE DATA BASE FOR THE DEVELOPMENT OF COMPUTER MODELS IN THE PREDICTION OF AERODYNAMIC PERFORMANCE AND LOADS, SANDIA LABORATORIES UNDERTOOK AN EXTENSIVE WIND TUNNEL TEST PROGRAM. THE PRIMARY RESULTS FROM THE TEST PROGRAM CONDUCTED ON THE DARRIEUS TURBINE AT THE VOUGHT CORPORATION, VOUGHT SYSTEMS DIVISION LOW SPEED WIND TUNNEL ARE SUMMARIZED.

76-0236 BLACKWELL B F, FELTZ L V, MAYDEW R C
WIND TURBINE.
GERMAN (FRG) PATENT 2,540,757/A/, APRIL 8, 1976. 23P. (IN GERMAN)

A VERTICAL-AXIS WIND TURBINE IS DESCRIBED. THE DRIVE ROTOR OF THE TURBINE HAS A NUMBER OF OBLONG BLADES, THE CENTRAL BENT PORTIONS OF WHICH ARE OF STREAMLINE SHAPE. THE PARTICULAR CURVED SHAPE OF THE BLADES ENSURES THAT MAINLY TENSILE STRESS WILL OCCUR IN THE BLADE. THE TURBINE IS OF THE SELF-STARTING TYPE. THIS IS ATTAINED BY STARTER ROTORS. EACH OF THESE ROTORS HAS A NUMBER OF HOLLOW BLADES WHICH ARE ARRANGED IN OPPOSITE DIRECTIONS, THE BLADES PARTLY OVERLAPPING EACH OTHER IN S SHAPE. THE SPEED RATIO OF THE TURBINE HAS A VALUE OF APPROXIMATELY 5 TO 7. IN PRACTICE, TURBINE PLANTS MAY BE BUILT WHICH CONSIST OF A NUMBER OF DRIVE ROTORS ARRANGED ONE ABOVE THE OTHER ON THE SHAFT. EACH FOLLOWING DRIVE ROTOR HAS A GREATER DIAMETER THAN THE ADJACENT LOWER ROTOR.

76-0237 BLAKE S
SAVONIUS ROTOR WIND TURBINES.
WIND POWER DIG. 1(6): 25-27, SEPTEMBER 1976.

THE SAVONIUS ROTOR (S-ROTOR) WAS INVENTED BY CAPTAIN SIGURD SAVONIUS, A FINN, IN 1924. SINCE THAT TIME, NO LESS THAN FOURTEEN RESEARCH GROUPS HAVE INVESTIGATED AND EVALUATED S-ROTORS OF VARIOUS SIZES AND CONFIGURATIONS BOTH IN FREE WIND AND IN WIND TUNNELS. THIS ARTICLE DISTILLS THE EXPERIENCES AND FINDINGS REPORTED BY THESE GROUPS AND OUR OWN EXPERIENCES AND FINDINGS. IT CONSIDERS IMPORTANT DESIGN PARAMETERS, ADVANTAGES AND DISADVANTAGES OF THE DESIGN, CERTAIN TECHNIQUES AND MATERIALS FOR SIMPLE ROTOR CONSTRUCTION, AND ROTOR OUTPUTS WHEN COUPLED WITH WATER PUMPS AND ELECTRICAL GENERATORS.

76-0238 BOCKRIS J O'M
ENERGY: THE SOLAR-HYDROGEN ALTERNATIVE.
LONDON, ARCHITECTURAL PRESS, 1976.

76-0239 BOGIE T
WINDMILL.
U.S. PATENT NO. 3,994,621, NOVEMBER 30, 1976. 6P.

A WINDMILL IS DESCRIBED WHICH COMPRISES A GENERALLY CYLINDRICALLY SHAPED HOUSING HAVING A VERTICAL AXIS, A VERTICAL SHAFT CONCENTRICALLY DISPOSED IN THE HOUSING AND A ROTOR FIXEDLY ATTACHED TO THE SHAFT AND COMPRISING A PLURALITY OF EQUALLY PERIPHERALLY SPACED, VERTICALLY EXTENDING TROUGH-SHAPED WIND SCOOPS. EACH SCOOP HAS A CLOSED BACK SURFACE WITH VERTICALLY EXTENDING LEADING AND FOLLOWING EDGES AND A VERTICALLY EXTENDING OPEN FRONT EXPOSED TO THE WIND. EACH SCOOP IS ATTACHED AT ITS EDGES TO THE ADJACENT SCOOPS TO FORM A GENERALLY CYLINDRICAL SCOOP ASSEMBLY. THE HOUSING COMPRISES A PLURALITY OF EQUALLY PERIPHERALLY SPACED APART STATIONARY WIND-DIRECTING AND CONCENTRATING VANES.

76-0240 BONNEFILLE R
LES PROGRAMMES ET LE DEVELOPPEMENT ACTUELS DE L'ENERGIE EOLIENNE DANS LE MUNDE. (THE CURRENT PROGRAMMES AND DEVELOPMENT OF WIND ENERGY IN THE WORLD).
ELECTRICITE DE FRANCE, REP. NO. E30/76/04, APRIL 1976. 18P. (IN FRENCH)

THIS REPORT REVIEWS THE WIND ENERGY RESEARCH PROGRAMS OF THE U.S.A.,

SWEDEN, DENMARK AND FRANCE. A LIST WITH THE MOST IMPORTANT MANUFACTURERS IS INCLUDED.

76-0241 BOS P B
SOLAR ENERGY: PERSPECTIVE AND PROSPECTS.
AM. POWER CONF. PROC. 38: 447-457, 1976.

WITH SOLAR ENERGY PROMISING TO SUPPLEMENT THE NATION'S ENERGY RESOURCES, ITS PROSPECTS ARE REVIEWED. THE FEDERAL GOVERNMENT THROUGH NSF AND SUBSEQUENTLY THROUGH ERDA, HAS BEEN SUPPORTING SOLAR RESEARCH. ALSO, THE UTILITY INDUSTRY HAS BEEN SUPPORTING RESEARCH THROUGH EPRI. THE PROGRAM AT EPRI IS SUMMARIZED BRIEFLY. TECHNOLOGY REVIEWS AND ASSESSMENTS OF SOLAR HEATING AND COOLING, SOLAR ELECTRIC POWER GENERATION, WIND ENERGY CONVERSION, OCEAN THERMAL ENERGY CONVERSION, PHOTOSYNTHESIS OF BIOMASS, AND ENVIRONMENTAL IMPACTS ARE INCLUDED. IT IS CONCLUDED THAT LARGE-SCALE UTILIZATION OF SOLAR APPLICATIONS FOR ELECTRIC POWER PRODUCTION IS NOT ANTICIPATED BEFORE THE YEAR 2000. COMPETITIVE ENERGY COSTS MUST BE DEMONSTRATED, REQUIRING MAJOR COST REDUCTIONS IN COLLECTORS, REFLECTORS, OR PHOTOVOLTAIC ARRAYS, AS WELL AS LONG SYSTEM LIFETIMES OF 15 TO 30 YEARS. SOLAR ENERGY SYSTEMS MUST BE ASSESSED UNDER THE SAME CONDITIONS OF RELIABILITY AS CONVENTIONAL POWER SYSTEMS.

76-0242 BOSSEL U
EUROPE'S LARGEST SOLAR THERMAL POWER PLANT.
MITTEILINGSBL. DTSCH. GES. SONNENENERGIE 1(2): 12-13, MARCH 1976. (IN GERMAN)

AN OVERVIEW IS GIVEN OF THE SOLAR HEATING PLANT WHICH HAS RECENTLY BEEN COMMISSIONED IN THE CAMARGUE (FRANCE). THIS IS THE LARGEST PLANT IN EUROPE, WITH A MEAN HEAT OUTPUT OF ABOUT 200 KW, FOR THE PRODUCTION OF THERMAL ENERGY FROM SOLAR ENERGY. THE PLANT CONSISTS OF 108 PARABOLIC COLLECTORS (200 SQ. METRES) AND 48 FLAT COLLECTORS (110 SQ. METRES). TWO WINDMILLS WITH OUTPUTS OF 10 KW EACH COMPLETE THE SYSTEM. THE HEAT ENERGY PRODUCED BY THE SOLAR COLLECTORS IS GIVEN UP TO 3 DIFFERENT STORES, WHICH IN TURN ARE CONNECTED TO VARIOUS CONSUMERS.

76-0243 BRAASCH R H
VERTICAL-AXIS WIND TURBINE PROGRAM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.I.33--I.53.
SAND-76-5586

AN OVERVIEW OF THE DARRIEUS VERTICAL AXIS WIND TURBINE PROGRAM BEING CONDUCTED AT SANDIA LABORATORIES FOR ERDA IS PRESENTED.

76-0244 BRIGHT C
POWER GENERATING APPARATUS.
U.S. PATENT NO. 3,974,395, AUGUST 10, 1976. 10P.

A CONTROL SYSTEM FOR OBTAINING MAXIMUM POWER OUTPUT FROM ELECTRICAL GENERATING WATER PUMPING, FLYWHEEL STORAGE AND LIKE SYSTEMS COMPRISING A WIND-DRIVEN PRIME MOVER COUPLED TO AN ELECTRICAL GENERATOR OVER AN EXTENDED RANGE OF WIND VELOCITIES IS DESCRIBED. THE MAXIMUM ELECTRICAL OUTPUT POWER IS OBTAINED BY SYNCHRONIZING THE SPEED OF THE GENERATOR, AND HENCE THE SPEED OF THE PRIME MOVER, WITH THE MAXIMUM POWER OUTPUT OF THE PRIME MOVER. SINCE THE MAXIMUM OUTPUT POWER OF A WIND-DRIVEN PRIME MOVER IS PROPORTIONAL TO THE THIRD POWER OF THE WIND VELOCITY, AND IS A FUNCTION OF AN ANGULAR VELOCITY-DEPENDENT POWER COEFFICIENT, MEANS ARE PROVIDED FOR DETECTING THE ANGULAR VELOCITY OF THE PRIME MOVER AND GENERATING A SIGNAL PROPORTIONAL TO THE CUBE OF THE WIND VELOCITY. THE SIGNAL THUS GENERATED IS USED FOR CONTROLLING THE MAGNITUDE OF THE EXCITATION FIELD CURRENT IN THE ELECTRICAL GENERATING APPARATUS WHEREBY THE ELECTRICAL OUTPUT VARIES APPROXIMATELY AS A CUBIC FUNCTION OF THE WIND VELOCITY AND, CONSEQUENTLY, AS A LINEAR FUNCTION OF THE OUTPUT POWER OF THE PRIME MOVER. FOR THIS PURPOSE THE CONTROL-SIGNAL GENERATING MEANS EMPLOYS A SOLID STATE DEVICE OR THE LIKE WHICH IS BIASED TO OPERATE ALONG THE THIRD POWER PORTION OF ITS CHARACTERISTIC OPERATING CURVE.

76-0245 BROUNS R J
ENVIRONMENTAL IMPACTS OF NONFUSION POWER SYSTEMS.
NTIS, SEPTEMBER 1976. 130P.
BNWL-2027

DATA WERE COLLECTED ON THE ENVIRONMENTAL EFFECTS OF POWER SOURCES THAT MAY BE COMPETITIVE WITH FUTURE FUSION REACTOR POWER PLANTS. DATA ARE INCLUDED ON NUCLEAR POWER PLANTS USING HTGR, LMBR, GCFR, LMFBR, AND MOLTEN SALT REACTORS; FOSSIL-FUEL ELECTRIC POWER PLANTS; GEOTHERMAL POWER PLANTS; SOLAR ENERGY POWER PLANTS, INCLUDING SATELLITE-BASED SOLAR SYSTEMS; WIND ENERGY POWER PLANTS; OCEAN THERMAL GRADIENT POWER PLANTS; TIDAL ENERGY POWER PLANTS; AND POWER PLANTS USING HYDROGEN AND OTHER SYNTHETIC FUELS AS ENERGY SOURCES.

76-0246 BROWN R J
WINDMILLS OF ENGLAND.
LONDON, R. HALE, 1976. 256P.

76-0247 BRULLE R V
FEASIBILITY INVESTIGATION OF THE GIROMILL.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.39--III.60.
SAND-76-5586

TWENTY-ONE DIFFERENT GIROMILL CONFIGURATIONS COVERING THREE SIZES OF GIROMILL SYSTEMS WERE ANALYZED, VARYING SUCH PARAMETERS AS ROTOR SOLIDITY, ROTOR ASPECT RATIO, RATED WIND VELOCITY, AND NUMBER OF ROTOR BLADES. THE PERFORMANCE, DESIGN, AND COST EFFECTIVENESS OF THESE 21 CONFIGURATIONS WERE DETERMINED. THE RESULTS OF THIS ANALYSIS FORMED THE BASE FOR SELECTING A CONFIGURATION THAT WAS OPTIMIZED FOR THE LEAST COST OF ENERGY.

76-0248 BUCK J A
WIND POWERED IRRIGATION IN KANSAS. A SYSTEMS DYNAMICS APPROACH.
NTIS, 1976. 138P.
AD-A052630

MANY OPTIONS HAVE BEEN PROPOSED FOR HARNESSING WIND POWER FOR IRRIGATION. HERE, TWO OPTIONS ARE INVESTIGATED USING A SYSTEM DYNAMICS APPROACH. THE FIRST OPTION USES MECHANICAL ENERGY EXTRACTED FROM THE WIND AS INPUT TO A MECHANICAL PUMP. A FLYWHEEL SERVES AS A BUFFER AND AS STORAGE FOR LOW WIND PERIODS. THE SECOND OPTION USES THE MECHANICAL OUTPUT FROM THE WINDMILL TO GENERATE ELECTRICITY. THIS ELECTRICITY IS THEN FED INTO AN ELECTROLYSIS CELL TO PRODUCE HYDROGEN GAS. THIS GAS IS THEN BURNED IN AN INTERNAL COMBUSTION ENGINE WHICH DRIVES THE PUMP. SURPLUS HYDROGEN IS STORED IN DEPLETED NATURAL GAS WELLS FOR USE DURING LOW WIND PERIODS. A BACK UP SYSTEM IS PROVIDED IN BOTH OPTIONS FOR WHEN THE WIND IS NOT BLOWING AND THE STORED ENERGY HAS BEEN EXHAUSTED. (THE DOCUMENT'S PARTIALLY ILLEGIBLE.)

76-0249 BURNSIDE D
SOUND OF THE WIND.
WIND POWER DIG. 1(6): 29-308 SEPTEMBER 1976.

THE ONLY WIND-POWERED RADIO STATION IN THE WORLD IS DESCRIBED: KFMU-FM IN OAK CREEK, COLORADO.

76-0250 BUTLER B L, BLACKWELL B F
APPLICATION OF LAMINATED WOODEN BLADES TO A TWO-METER DARRIEUS TYPE VERTICAL AXIS WIND TURBINE.
NTIS, DECEMBER 1976. 21P.
SAND-75-0284

THE USE OF LAMINATED LAUAN PLYWOOD IN A 2-METER-DIAMETER, 3-BLADE DARRIEUS WIND TURBINE IS DESCRIBED. THE MANUFACTURE, TESTING AND TENSILE STRESS ANALYSIS OF LAMINATED WOODEN BLADES ARE DESCRIBED. ALTHOUGH THE TENSILE STRENGTHS OF ALL CANDIDATE UNIDIRECTIONAL LAMINATES (LAUAN, MONALAVA, POPLAR AND MAPLE) EXCEEDED THE INDUCED BLADE STRESSES, LAUAN WAS CHOSEN FOR WIND TUNNEL TESTING BASED ON COST AND DIMENSIONAL STABILITY. TWO AIRFOIL SECTIONS, NACA 0012 AND NACA 0025, OF 7.39 CM CHORD LENGTH (I.E., LEADING TO TRAILING EDGE DIMENSION) WERE SHAPED FROM CURVED LAMINATED LAUAN BLANKS WHICH HAD THE GRAIN ORIENTED ALONG THE BLADE ARC. THE THICKER NACA 0025 AIRFOIL, WHERE THE THICKNESS IS 25 PERCENT OF THE CHORD LENGTH, PERFORMED NORMALLY IN THE WIND TUNNEL TEST. THE THIN NACA 0012 BLADE WAS EXCITED INTO RESONANCE WELL BELOW THE PEAK POWER RPM AND CONSTRAINED THE TURBINE TO LOW POWER OUTPUT. THE 2-METER

WIND TURBINE MODEL TESTS INDICATED THAT, WITH APPROPRIATE BLADE DESIGN, WOOD HAS POTENTIAL FOR SMALL VERTICAL AXIS WIND TURBINES.

76-0251 CAR POWERED BY THE WIND.
MECH. ILLUS. 72: 132, NOVEMBER 1976.

76-0252 CARTER E A
BASIC RELATIONSHIPS TO DETERMINE WIND POWER AND SOLAR RADIATION AVAILABLE FROM THE ATMOSPHERE.
SOUTHEASTERN CONFERENCE ON APPLICATION OF SOLAR ENERGY, BATON ROUGE, LA., APRIL 19, 1976. PROCEEDINGS. CONF-760423, P. 381-389.

THE NATIONAL WEATHER SERVICE HAS MANY YEARS OF RECORDS OF WIND SPEED AND SOLAR RADIATION FROM NUMEROUS LOCATIONS THROUGHOUT THE NATION. THE OPTIMUM AMOUNT OF ENERGY CONTAINED IN THE WIND AND SOLAR RADIATION AT THESE LOCATIONS CAN EASILY BE CALCULATED FROM THESE PAST WEATHER RECORDS. ONE SQUARE METER WAS ARBITRARILY SELECTED AS THE UNIT FOR COLLECTION OF THE ENERGY. A METHOD IS SHOWN TO CONVERT THE SUMMARIZED RECORDS TO POWER UNITS OF WATTS PER SQUARE METER. THIS WILL PROVIDE A MEASURE OF THE BASIC SUN AND WIND ENERGY IN FAMILIAR TERMS. THIS INFORMATION AND PROCEDURE MAY BE APPLIED TO OTHER SITUATIONS SUCH AS VARIATIONS IN LOCATION, SIZE, AND EFFICIENCY.

76-0253 CARTER J
EARLE RICH'S BIG WINDMILL: WIND POWER IN N.H.
WIND POWER DIG. 1(7): 27-30, DECEMBER 1976.

76-0254 CARTER J
ON THE ROAD.
WIND POWER DIG. 1(7): 21, DECEMBER 1976.

SEVERAL SMALL-SCALE APPLICATIONS OF WIND ENERGY ARE DESCRIBED.

76-0255 CARTER J
TESTING AN ELEKTRO-GEMINI WIND SUSTEM.
WIND POWER DIG. 1(6): 13-17, SEPTEMBER 1976.

76-0256 CARTER J
THE TRAVIS "NATURAL HOUSE."
WIND POWER DIG. 1(7): 24-25, DECEMBER 1976.

STEVE TRAVIS'S HOME INTEGRATES SOLAR AND WIND WITH OTHER UNIQUE LIVING AND SHELTER IDEAS.

76-0257 CARTER J
A VISIT WITH ZEPHYR WIND DYNAMO.
WIND POWER DIG. 1(7): 14-17, DECEMBER 1976.

76-0258 CHATEL B
SOLAR ENERGY PROGRAMMES OF THE UNITED NATIONS 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. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 30-36.

THE UNITED NATIONS SYSTEM IS CONDUCTING PROGRAMS FOR THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT. SOLAR ENERGY APPLICATIONS ARE OF PARTICULAR RELEVANCE TO THE ECONOMIC AND SOCIAL PROGRESS OF THE DEVELOPING COUNTRIES. SOME OF THE PROGRAMS CURRENTLY UNDERTAKEN IN THE UNITED NATIONS SYSTEM ARE REVIEWED, PARTICULARLY IN THE UNITED NATIONS, UNESCO, WMO, UNIDO, THE REGIONAL ECONOMIC COMMISSIONS, THE GLOBAL PROJECTS, UNEP, THE OFFICE FOR TECHNICAL CO-OPERATION, AND THE FINANCIAL INSTITUTIONS.

76-0259 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE. FINAL REPORT JUNE 3, 1975--JUNE 2, 1976.
NTIS, SEPTEMBER 1976. 62P.
COO/2614-76/1

THE COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT HAS BEEN SHOWN TO HAVE CHARACTERISTICS IDEALLY SUITED FOR WIND TURBINE APPLICATIONS. THIS ROTOR CONCEPT PROVIDES A FULLY SELF-REGULATING AND SELF-ALIGNING WIND TURBINE.

SUCH A SYSTEM WAS ACHIEVED WITHOUT THE NEED FOR AUXILIARY CONTROLS OR SENSORS. THESE 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 OF A 4.5 FT DYNAMICALLY SCALED WIND TURBINE MODEL AND THE TESTING OF THIS MODEL IN THE UNITED TECHNOLOGIES LOW SPEED WIND TUNNEL. SEVERAL CONCEPTS WERE INVESTIGATED WHICH WERE DESIGNED TO ACHIEVE SELF-REGULATION. OF THESE, A SYSTEM WHICH CONSISTED OF A HUB SUPPORTED PENDULUM INTEGRATED WITH THE CBR BLADE PROVIDED THE FEATURES DESIRED. TESTING OF THIS CONFIGURATION CONSISTED OF STARTUPS FROM ANY WIND DIRECTION WITH WIND SPEEDS UP TO 30 MPH. STRESS AND STABILITY CHARACTERISTICS WERE INVESTIGATED DURING THE TEST PROGRAM AND THE CBR WIND TURBINE DEMONSTRATED LOW STRESS LEVELS AND HIGHLY STABLE RESPONSE CHARACTERISTICS UNDER ALL CONDITIONS TESTED.

76-0260 CHENEY M C, SPIERINGS P A M
SELF-REGULATING COMPOSITE BEARINGLESS WIND TURBINE. EXECUTIVE SUMMARY, JUNE 3, 1975--JUNE 2, 1976.
NTIS, SEPTEMBER 1976. 13P.
COO/2614-76/2

AN INVESTIGATION WAS CONDUCTED INTO THE FEASIBILITY OF APPLYING THE COMPOSITE BEARINGLESS ROTOR (CBR) CONCEPT TO WIND TURBINES. THE CBR BLADE IS COMPRISED OF A CONVENTIONAL BLADE CONSTRUCTION OVER THE OUTBOARD SPAN, BUT INBOARD IS MADE UP SIMPLY FROM A FINITE LENGTH (ABOUT 15 PERCENT OF THE RADIUS) OF UNIDIRECTIONAL COMPOSITE MATERIAL. THIS MEMBER, CALLED THE FLEXBEAM, REPLACES THE HINGES AND BEARINGS NORMALLY LOCATED AT THE BLADE ROOT AND PROVIDES THE NECESSARY FLATWISE AND EDGEWISE STIFFNESS, BUT DUE TO THE UNIDIRECTIONAL FIBER ALIGNMENT, HAS LOW TORSIONAL STIFFNESS. BLADE PITCH CONTROL IS ACHIEVED BY APPLYING A MOMENT AT THE OUTBOARD END OF THE FLEXBEAM AND ELASTICALLY TWISTING IT. THE WORK DESCRIBED IN THE FINAL REPORT WAS CONDUCTED UNDER CONTRACT WITH ERDA AND CONSISTED OF THE DESIGN AND FABRICATION OF A DYNAMICALLY SCALED WIND TURBINE MODEL, THE WIND TUNNEL TESTING OF THIS MODEL, AND THE EVALUATION OF SEVERAL CONTROL CONCEPTS IN AN ATTEMPT TO ACHIEVE A SELF-REGULATING SYSTEM. SUCH A SYSTEM WAS ACHIEVED AND EXPERIMENTALLY DEMONSTRATED IN THE WIND TUNNEL. OPERATING CHARACTERISTICS AT WIND SPEEDS EXCEEDING 30 MPH WERE INVESTIGATED AND SIMULATED START UPS AND WIND DIRECTION CHANGES WERE SUCCESSFULLY EXECUTED.

76-0261 CHERRY N J
PRELIMINARY ANALYSIS OF METEOROLOGICAL DATA, WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND, REPORT NO.8.
UNIV. OF AUCKLAND, NEW ZEALAND, NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, 1976. 31P.

76-0262 CHERRY N J
WIND ENERGY RESOURCE ASSESSMENT.
NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE REPORT, APRIL 1976.

76-0263 CHERRY N J
WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND. PRELIMINARY ANALYSIS OF METEOROLOGICAL DATA.
NEW ZEALAND METEOROLOGICAL SERVICE FOR THE WIND ENERGY RESOURCE SURVEY OF NEW ZEALAND, PROJECT FUNDED BY NZER AND DC, NEW ZEALAND, 1976. NEW ZEALAND, LINCOLN COLLEGE, APRIL 1976. 32P.

METEOROLOGICAL DATA ARE SUPPLIED IN THE FORM OF WIND SPEED FREQUENCY DISTRIBUTIONS AND TABLES OF AVERAGE WIND SPEED. THE MEASUREMENT NETWORK IS DESCRIBED. THIS ANALYSIS INDUCED THE CONCLUSION THAT IN LARGE PARTS OF NEW ZEALAND THE MEAN WIND ENERGY IS GREATER THAN 200 W/M2.

76-0264 CHERRY N J, EDWARDS P J, ROXBURGH A J
LOW COST INSTRUMENTATION FOR A WIND ENERGY SURVEY.
INTERNATIONAL INSTRUMENTATION SYMPOSIUM, 22D, SAN DIEGO, CAL., MAY 25-27, 1976. PROCEEDINGS. PITTSBURGH, PA., ISA, 1976. P. 109-115.

WIND-RUN, OR MEAN WIND SPEED, IS OBTAINED BY COUNTING ONE PULSE PER REVOLUTION OF THE ANEMOMETER ON A MODIFIED POCKET CALCULATOR. POWER REQUIREMENTS ARE REDUCED TO AN AVERAGE OF LESS THAN MA BY TURNING THE DISPLAY OFF WHEN IT IS NOT BEING READ. MEAN WIND SPEEDS OVER AVERAGING PERIODS OF AN HOUR OR SUBMULTIPLES OF AN HOUR DOWN TO A MINUTE OR LESS ARE RECORDED ELECTRONICALLY. ONE SYSTEM RECORDS A FREQUENCY PROPORTIONAL

TO THE WIND SPEED ON CHANNEL ONE AND A CLOCK PULSE TRAIN ON CHANNEL TWO. MEAN WIND SPEEDS OVER THE TIME INTERVALS AS SHORT AS THREE TO FIVE SECONDS OR AS LONG AS ONE MONTH CAN BE RETRIEVED. A SECOND SYSTEM USES A STANDARD CASSETTE TAPE TO RECORD DATA IN AN INCREMENTAL DIGITAL FORM, USING 12 BIT BINARY NUMBERS IN BIPHASE AUDIO TONES. AVERAGING PERIODS OF 1, 2, 5, 15, 30 OR 60 MINUTES MAY BE SELECTED.

76-0265 CHILCOTT R E
FOCUS ON RENEWABLE ENERGY IN NEW ZEALAND.
NEW ZEALAND ENERGY J. 49: 48-53, APRIL 25, 1976.

FOLLOWING A DISCUSSION OF THE FLOW OF RADIANT ENERGY IN THE BIOSPHERE, MEANS OF USING SOLAR ENERGY AND OTHER RENEWABLE ENERGY SOURCES TO SUPPLY THE ENERGY NEEDS OF ADVANCED COUNTRIES ARE CONSIDERED, WITH PARTICULAR REFERENCE TO THE AVAILABILITY OF THESE POTENTIAL ENERGY SOURCES IN NEW ZEALAND. IT IS ESTIMATED THAT ABOUT HALF OF THE TOTAL DOMESTIC HOT WATER CONSUMED IN NEW ZEALAND SHOULD BE HEATED BY SOLAR ENERGY. SOME RESULTS INDICATE THAT PRODUCTION OF ETHYL ALCOHOL FROM VEGETABLE SOURCES MAY BE FEASIBLE; HOWEVER, THE EXTENSIVE LAND AREA REQUIRED MUST BE CONSIDERED. THE AVERAGE ANNUAL WIND ELECTRIC ENERGY AVAILABLE IN NEW ZEALAND IS ABOUT 0.1 PERCENT OF THE ANNUAL AVERAGE SOLAR ENERGY INCIDENT ON THE HORIZONTAL PLANE. SMALL WINDMILLS HAVE BEEN IN WIDESPREAD USE FOR STOCK WATERING. A NATIONAL WIND ENERGY RESOURCE SURVEY IS UNDER WAY.

76-0266 COENE R
"CYCLOGYRO" ALS WINDTURBINE KAN LAAG BIJ DE GRUND FUNCTIONEREN.
("CYCLOGYRO" AS WIND TURBINE CAN OPERATE NEAR THE GROUND).
TECHNO-MAGAZINE, THD NIEUWS, DELFT UNIVERSITY OF TECHNOLOGY, DELFT, THE NETHERLANDS, JANUARY 1976. P. 6-8. (IN DUTCH)

76-0267 COLIN R
(A POWER PLANT OF THE AEROSOLEC TYPE).
INTERNATIONAL CONFERENCE ON SOLAR ELECTRICITY, TOULOUSE, FRANCE, MARCH 1-5, 1976. REPORTS. TOULOUSE, CENTRE NATIONAL D'ETUDES SPATIALES, 1976. P. 775-781. (IN FRENCH)

THE AEROSOLEC ELECTRIC POWER PLANT HAS BEEN DEVELOPED TO SUPPLY ISOLATED TELECOMMUNICATION CENTERS. POWER IS GENERATED BY WIND AND/OR SUN. THE PLANT COMPRISES A SOLAR GENERATOR, AN AEROGENERATOR, A STORAGE BATTERY AND CHEMICAL DRY BATTERIES, BOTH GENERATORS BEING IN PARALLEL AND SHARING IN PRODUCING POWER DEPENDING UPON WIND AND SUN CONDITIONS PREVAILING ON THE SITE. THE STORAGE BATTERY CATERS FOR THE STORAGE, REGULARITY AND CONTINUITY OF POWER SUPPLY. THE DRY BATTERIES ARE USED AS ULTIMATE STANDBY, WARRANTING PERMANENT SUPPLY EVEN IN CASE OF OUTAGE OF THE OTHER SOURCES. POWER RATINGS ANTICIPATED TODAY RANGE FROM 100 TO 400 WATTS FOR CONTINUED ROUND THE CLOCK SERVICE. WITH LACKING WIND AND/OR SUN, INDEPENDENT OPERATION FOR A FORTNIGHT IS FORESEEN ON STORAGE BATTERIES AND DRY BATTERIES.

76-0268 COMPARISON OF DIFFERENT WIND ENERGY CONVERSION SYSTEMS. PART 1. THE NOAH SYSTEM COMPARED WITH THE ULRICH HUTTER SYSTEM. TRANSLATION OF GERMAN REPORT.
NTIS, 1976. 10P.
RFP-TRANS-204

THE ANALYSIS IS BEING MADE WITHIN THE FRAMEWORK OF STRUCTURAL COMPONENTS WHICH ARE GENERALLY IMPORTANT FOR WIND ENERGY SYSTEMS. ADVANTAGES AND DISADVANTAGES ARE EVALUATED FROM TECHNICAL VIEWPOINTS (TYPE OF CONSTRUCTION, NOVELTY, SUSCEPTIBILTY TO FAILURE, EASE OF REPAIRS, MAINTENANCE REQUIREMENTS), AS WELL AS IN TERMS OF EXPECTED POWER, PERFORMANCE, MANUFACTURING COST AND ECONOMY.

76-0269 CONGRESSIONAL SEMINAR ON THE POTENTIAL FOR SOLAR AND WIND ELECTRIC POWER GENERATION.
NEW YORK, SCIENTIST'S INSTITUTE FOR PUBLIC INFORMATION, 1976. 53P.
CONGRESSIONAL SEMINAR ON THE POTENTIAL FOR SOLAR AND WIND ELECTRIC POWER GENERATION, WASHINGTON D.C., FEBRUARY 9, 1976.

REPRESENTATIVE RICHARD L. OTTINGER, THE MODERATOR OF THE SEMINAR, INITIALLY STATED THAT "IF SOLAR ENERGY IS TO ATTAIN COMMERCIAL STATUS BY THE YEAR 2000, SOLAR RESEARCH AND DEVELOPMENT SHOULD BE FUNDED AT A LEVEL CLOSER TO NUCLEAR RESEARCH AS IT IS FUNDED TODAY." REPRESENTING THE SCIENTISTS' INSTITUTE FOR PUBLIC INFORMATION WAS ALLAN MCGOWAN. SPEAKERS

FOLLOWING MR. MCGOWAN'S BRIEF REMARKS WERE FRANK ELDRIDGE, MITRE CORPORATION; JOSEPH LINDMAYER, SOLAREX CORPORATION; PIET BOS, EPRI; RON LARSON, GEORGIA INSTITUTE OF TECHNOLOGY; WILL SMITH, SCIENCE AND TECHNOLOGY COMMITTEE; AND DAN AHEARNE, CONSULTANT TO CONGRESSMAN HAROLD RUNNELS AND THE OFFICE OF TECHNOLOGY ASSESSMENT.

76-0270 COOK E
MAN, ENERGY, SOCIETY.
SAN FRANCISCO, CAL., W. H. FREEMAN, 1976. 487P.

WIND POWER IS DISCUSSED BRIEFLY AS A RENEWABLE ENERGY SOURCE.

76-0271 COROTIS R B
STOCHASTIC MODELLING OF SITE WIND CHARACTERISTICS. FINAL REPORT JANUARY 1975--SEPTEMBER 1976.
NTIS, NOVEMBER 1976. 311P.
PB-261178

THE ECONOMIC FEASIBILITY OF A WIND ENERGY CONVERSION SYSTEM DEPENDS ON AN ACCURATE ASSESSMENT OF THE WIND CHARACTERISTICS AT EACH SITE. STATISTICAL METHODS AND PROBABILITY MODELS ARE USED TO DETERMINE OPTIMAL EVALUATION PROCEDURES FOR SURVEY DATA. SEVERAL YEARS OF HOURLY RECORDS FROM SIX MIDWEST SITES AND ONE ROCKY MOUNTAIN SITE PROVIDE A DATA BASE TO DEVELOP THE MODELS AND PROCEDURES. (PORTIONS OF THIS DOCUMENT ARE NOT FULLY LEGIBLE.)

76-0272 COTY U A
WIND ENERGY MISSION ANALYSIS. EXECUTIVE SUMMARY.
NTIS, OCTOBER 1976.
TID-27698, SAN/1075-1/3

THE WIND ENERGY CONVERSION BRANCH OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION UNDERTOOK THE TASK OF DETERMINING THE ECONOMIC VIABILITY OF WIND ENERGY CONVERSION SYSTEMS (WECS). A CONTRACT, AT(04-3)-1075 "WIND ENERGY MISSION ANALYSIS," WAS AWARDED TO LOCKHEED EARLY IN 1975 AND COMPLETED EARLY IN 1976. THE RESULTS OF THIS STUDY ARE SEVERELY CONDENSED AND SUMMARIZED IN THIS EXECUTIVE SUMMARY TO PROVIDE AN OVERVIEW OF OVER 850 PAGES OF REPORT AND APPENDICES AND OVER 1,000 PAGES OF PROCESSED WIND DATA.

76-0273 COTY U A
WIND ENERGY MISSION ANALYSIS. FINAL REPORT.
NTIS, SEPTEMBER 1976. 608P.
SAN/1075-1/1

MAPS OF WIND POWER DENSITIES ARE PRESENTED COVERING THE UNITED STATES AND TERRITORIES. EACH REGION IS ASSESSED IN TERMS OF AVAILABLE WIND POWER, ITS DISTRIBUTION OVER THE LAND, AND ITS FREQUENCY, DEVIATION, AND STRENGTH. A MATRIX OF ENERGY USERS AND THEIR APPLICATIONS OF WIND ENERGY CONVERSION SYSTEMS IS ASSEMBLED AND EVALUATED TO SELECT THOSE COMBINATIONS WHICH HAVE THE HIGHEST POTENTIAL IN TERMS OF NATIONWIDE IMPACT. THE HIGH POTENTIAL APPLICATIONS ARE ANALYZED IN DEPTH TO DETERMINE DEGREE OF MARKET PENETRATION, PERFORMANCE AND COST GOALS, MARKETING CHANNELS, INCENTIVES TO IMPLEMENTATION, AND INSTITUTIONAL CONSTRAINTS. AN INITIAL ASSESSMENT OF PUBLIC ACCEPTANCE WAS PERFORMED DURING THE COURSE OF THE STUDY WHICH IS ANALYZED AND REPORTED. WIDELY VARYING SCENARIOS ARE POSTULATED TO DEVELOP EXTREME, YET POSSIBLE, LIMITS OF IMPLEMENTATION RATES. THE EFFECTS OF THESE IMPLEMENTATION RATES ARE DETERMINED AS THEY PERTAIN TO PRODUCTION RATES, SUPPLY OF CRITICAL MATERIALS, LAND USAGE, CAPITAL REQUIREMENTS, ENVIRONMENTAL POLLUTION, ELECTRICAL ENERGY GENERATED, FOSSIL FUEL SAVED, BALANCE OF TRADE, NET FLOW OF FREE ENERGY, AND ENERGY PAYBACK TIME.

76-0274 COTY U A, DUBEY M
HIGH POTENTIAL OF WIND AS AN ENERGY SOURCE.
LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2: ENERGY LA; TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. NORTH HOLLYWOOD, CAL., WESTERN PERIODICAL CO., 1976. P. 181-187.

WIND ENERGY IS AN ABUNDANT RESOURCE IN THE UNITED STATES. IT CAN BE CAPTURED ECONOMICALLY BY LARGE WIND TURBINE GENERATORS AND USED TO SUPPLEMENT ELECTRIC ENERGY PROVIDED FROM FOSSIL FUEL AND HYDROELECTRIC

RESOURCES. TODAY'S TECHNOLOGY IS MORE THAN ADEQUATE FOR WIND ENERGY TO MAKE AN IMMEDIATE CONTRIBUTION TO ALLEVIATING THE ENERGY CRUNCH. A RECENTLY COMPLETED STUDY SPONSORED BY THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION SHOWS THAT THE FULL POTENTIAL OF THE WIND IS FAR GREATER THAN PREVIOUSLY ESTIMATED. FULL IMPLEMENTATION WOULD PRODUCE CLEAN ENERGY WITHOUT POLLUTION, AND WOULD MAKE A SIGNIFICANT CONTRIBUTION TO THE CONSERVATION OF OUR FOSSIL FUEL RESERVES.

76-0275 CROMACK D, DARKAZALLI G, HERONEMUS W, MCGOWAN J
ENERGY AND ECONOMIC PERFORMANCE OF WIND AND SOLAR HEATED HOUSES.
NESEA 76: 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. 533.

76-0276 CURVERS A
A GRAPHICAL METHOD FOR CALCULATING WIND-ROTOR CHARACTERISTICS.
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNVIERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, WIND ENERGY GROUP, REPT. R-257-S, APRIL 1, 1976. 37P.

TO DETERMINE WINDROTOR CHARACTERISTICS ONE HAD TO GET THROUGH A LOT OF WORK. A RAPID METHOD IS DESCRIBED HERE OF MAKING CALCULATIONS BY MEANS OF GRAPHS. FOR SEVEN STANDARD RADII TWO GRAPHS ARE REQUIRED, VALID FOR ONLY ONE NUMBER OF BLADES, BUT OTHERWISE UNIVERSAL, SINCE THEY ARE INDEPENDENT OF SHAPE OF THE BLADE SECTION. THE GRAPHS ARE BASED ON THE GENERAL MOMENTUM THEORY.

76-0277 DARROW K, PAM R
APPROPRIATE TECHNOLOGY SOURCEBOOK.
STANFORD, CALIFORNIA, VOLUNTEERS IN ASIA, NOVEMBER 1976. 305P.

THIS BOOK IS A MUCH EXPANDED NEW EDITION OF 1975:91. IT CONTAINS INFORMATION AND REFERENCES TO BOOKS AND ARTICLES ON THE VARIOUS TECHNOLOGIES THAT WOULD BE VALUABLE TO THE VOLUNTEER IN THE FIELD IN LESSER-DEVELOPED COUNTRIES. THE SECTION ON WIND POWER IS 15 PAGES LONG.

76-0278 DAWSON J K
ALTERNATIVE ENERGY SOURCES FOR THE UK.
ATOM, P. 11-20, JANUARY 1976.

THE PAPER PRESENTS FORECASTS CONCERNING ALTERNATIVE ENERGY SOURCES IN THE UNITED KINGDOM. THESE ARE ALTERNATIVE SOURCES OF HEAT--SOLAR AND GEOTHERMAL ENERGY, AND ALTERNATIVE SOURCES OF ELECTRICITY--WIND, TIDES, AND WAVES. A TENTATIVE JUDGMENT OF THE POTENTIAL CONTRIBUTION OF ALTERNATIVE SOURCES TO UK ENERGY SUPPLIES IN THE YEAR 2000 IS PRESENTED.

76-0279 DEAN T
UPDATED HOMESTEADER.
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. 257-261.

THE DESIGN AND CONSTRUCTION OF A MINIMUM-ENERGY-DEPENDENT HOME FOR A MIDDLE-AGED AMERICAN COUPLE WHOSE ENVIRONMENTAL EXPECTATIONS ARE TYPICAL OF MANY PEOPLE ARE DESCRIBED. THE UTILIZATION OF SOLAR AND WIND ENERGY, TOGETHER WITH GARDENING AS A HOBBY, PRODUCED A HOST OF RELATED ACTIVITIES WHICH EFFECTIVELY CHANGED THEIR LIFE-STYLE. SURPRISINGLY, THIS UNASSUMING AND PERSONAL HOME HAS ELICITED WIDESPREAD PUBLIC ATTENTION. PRIMARY ENERGY FOR THE HOME IS PROVIDED BY A 570 SQUARE FOOT ROOF-MOUNTED FLAT-PLATE COLLECTOR, A 3.2-KW WIND GENERATOR, AND A WOOD-BURNING STOVE.

76-0280 DEPENDABILITY OF WIND ENERGY GENERATORS WITH SHORT-TERM ENERGY STORAGE.
SCIENCE 194(2468): 935-937, NOVEMBER 26, 1976.

POWER FLUCTUATIONS AND POWER DURATION CURVES FOR WIND ENERGY GENERATORS, INCLUDING ENERGY STORAGE FACILITIES OF A CERTAIN CAPACITY, ARE COMPARED TO THOSE OF TYPICAL NUCLEAR REACTORS. A STORAGE SYSTEM CAPABLE OF DELIVERING THE YEARLY AVERAGE POWER OUTPUT FOR ABOUT 10 HOURS ALREADY MAKES THE DEPENDABILITY OF THE WIND ENERGY SYSTEM COMPARABLE TO THAT OF A TYPICAL NUCLEAR PLANT.

76-0281 DESIGN STUDY OF WIND TURBINES 50KW TO 3000KW FOR ELECTRIC UTILITY APPLICATIONS. VOLUME 1 - SUMMARY REPORT.
NTIS, SEPTEMBER 1976. 65P.
ERDA/NASA/9403-76/1, NASA-CR-134934, N78-12529

THIS STUDY WAS ONE OF TWO PARALLEL EFFORTS CONDUCTED TO DEFINE THE WIND TURBINE CONFIGURATION THAT WOULD LEAD TO GENERATION OF ELECTRICAL POWER IN A COST EFFECTIVE MANNER. ALL POSSIBLE OVERALL SYSTEM CONFIGURATIONS, OPERATING MODES, AND SUBSYSTEM CONCEPTS WERE EVALUATED FOR BOTH TECHNICAL FEASIBILITY AND COMPATIBILITY WITH UTILITY NETWORKS, AS WELL AS FOR ECONOMIC ATTRACTIVENESS. A DESIGN OPTIMIZATION COMPUTER CODE WAS DEVELOPED TO DETERMINE THE COST SENSITIVITY OF THE VARIOUS DESIGN FEATURES, AND THUS ESTABLISH THE CONFIGURATION AND DESIGN CONDITIONS THAT WOULD MINIMIZE THE GENERATED ENERGY COSTS. THE PRELIMINARY DESIGNS OF BOTH A 500 KW UNIT AND A 1500 KW UNIT OPERATING IN A 12 MPH AND 18 MPH MEDIAN WIND SPEED RESPECTIVELY, WERE DEVELOPED. THIS REPORT SUMMARIZES BOTH THE RATIONALE EMPLOYED IN THIS STUDY AND THE KEY FINDINGS OF THIS STUDY, BUT DOES NOT PRESENT AN IN-DEPTH DETAILED DISCUSSION OF ALL DESIGN CONSIDERATIONS.

76-0282 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. VOLUME II - ANALYSIS AND DESIGN.
PHILADELPHIA, GENERAL ELECTRIC COMPANY, DECEMBER 1976. 328P.
ERDA/NASA/9403-76/2, N78-17462

THIS STUDY WAS ONE OF TWO PARALLEL EFFORTS CONDUCTED TO DEFINE THE WIND TURBINE CONFIGURATION THAT WOULD LEAD TO GENERATION OF ELECTRICAL POWER IN A COST EFFECTIVE MANNER. ALL POSSIBLE OVERALL SYSTEM CONFIGURATIONS, OPERATING MODES, AND SUBSYSTEM CONCEPTS WERE EVALUATED FOR BOTH TECHNICAL FEASIBILITY AND COMPATIBILITY WITH UTILITY NETWORKS, AS WELL AS FOR ECONOMIC ATTRACTIVENESS. A DESIGN OPTIMIZATION COMPUTER CODE WAS DEVELOPED TO DETERMINE THE COST SENSITIVITY OF THE VARIOUS DESIGN FEATURES, AND THUS ESTABLISH THE CONFIGURATION AND DESIGN CONDITIONS THAT WOULD MINIMIZE THE GENERATED ENERGY COSTS. THE PRELIMINARY DESIGNS OF BOTH A 500 KW UNIT AND A 1500 KW UNIT OPERATING IN A 12 MPH AND 18 MPH MEDIAN WIND SPEED RESPECTIVELY, WERE DEVELOPED. THIS REPORT PRESENTS A DETAILED TECHNICAL DISCUSSION OF THE VARIOUS DESIGN FEATURES AND COMPONENTS EVALUATED, AND THE RATIONALE EMPLOYED TO SELECT THE FINAL DESIGN CONFIGURATION. ALL PERTINENT TECHNICAL PERFORMANCE DATA AND COMPONENT COST DATA IS INCLUDED. THE COSTS OF ALL MAJOR SUBASSEMBLIES ARE ESTIMATED AND THE RESULTANT ENERGY COSTS FOR BOTH THE 500 KW AND 1500 KW UNITS ARE CALCULATED.

76-0283 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. VOLUME III - SUPPLEMENTARY DESIGN AND ANALYSIS TASKS.
NTIS, DECEMBER 1976. 55P.
NASA-CR-135121, N78-17463

THIS STUDY WAS CONDUCTED TO PROVIDE ADDITIONAL DESIGN AND ANALYSIS DATA TO SUPPLEMENT THE RESULTS OF THE TWO PARALLEL DESIGN STUDY EFFORTS. THE KEY RESULTS OF THE THREE SUPPLEMENTAL TASKS INVESTIGATED ARE: THE VELOCITY DURATION PROFILE HAS A SIGNIFICANT EFFECT IN DETERMINING THE OPTIMUM WIND TURBINE DESIGN PARAMETERS AND THE ENERGY GENERATION COST; MODEST INCREASES IN CAPACITY FACTOR CAN BE ACHIEVED WITH SMALL INCREASES IN ENERGY GENERATION COSTS AND CAPITAL COSTS; REINFORCED CONCRETE TOWERS THAT ARE ESTHETICALLY ATTRACTIVE CAN BE DESIGNED AND BUILT AT A COST COMPARABLE TO THOSE FOR STEEL TRUSS TOWERS. THE APPROACH USED, METHOD OF ANALYSIS, ASSUMPTIONS MADE, DESIGN REQUIREMENTS, AND THE RESULTS FOR EACH TASK ARE DISCUSSED IN DETAIL IN THIS REPORT.

76-0284 DESIGN STUDY OF WIND TURBINES 50 KW TO 3000 KW FOR ELECTRIC UTILITY APPLICATIONS. ANALYSIS AND DESIGN.
NTIS, FEBRUARY 1976. 535P.
DOE/NASA/9404-76/2, NASA-CR-134937

THIS REPORT PRESENTS COMPLETE DETAILS OF THE RESULTS OF A PROGRAM TO DEVELOP PRELIMINARY DESIGNS OF LOW POWER (50-500 KW) AND HIGH POWER (500-3000 KW) WIND GENERATOR SYSTEMS WGS) FOR ELECTRIC UTILITY APPLICATIONS. THESE DESIGNS PROVIDE THE BASES FOR DETAIL DESIGN, FABRICATION, AND EXPERIMENTAL DEMONSTRATION TESTING OF THESE UNITS AT SELECTED UTILITY SITES. THE PROGRAM INCLUDED FOUR TASKS: A CONCEPTUAL DESIGN TASK; AN OPTIMIZATION TASK; A PRELIMINARY DESIGN TASK; AND A UTILITY REQUIREMENTS EVALUATION TASK.

76-0285 DESIGN STUDY OF WIND TURBINES, 50 KW--3000 KW, FOR ELECTRIC UTILITY APPLICATIONS.
BLOOMFIELD, CONNECTICUT, KAMAN AEROSPACE CORPORATION, KAMAN AEROSPACE REPORT R-1382, FEBRUARY 1976.

76-0286 DICERTO J J
THE ELECTRIC WISHING WELL: THE SOLUTION TO THE ENERGY CRISIS.
NEW YORK, MACMILLAN PUBLISHING CO., 1976. 317P.

LONG-TERM ENERGY PRODUCTION IS EXAMINED, AND ALTERNATIVES TO THE CONVENTIONAL OIL AND NATURAL GAS SOURCES ARE PRESENTED. TOPICS INCLUDE THE USE OF HYDROGEN AS A FUEL; NUCLEAR, TIDAL, WIND, SOLAR, AND GEOTHERMAL POWER; AND BRIEFLY, MAGNETOHYDRODYNAMICS.

76-0287 DIVONE L V
FEDERAL WIND ENERGY PROGRAM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.I.1--I.8.
SAND-76-5586

A BRIEF REVIEW OF THE U.S. WIND ENERGY PROGRAM IS PRESENTED.

76-0288 FOLEY W M
FROM DA VINCI TO THE PRESENT -- A REVIEW OF AIRSCREW THEORY FOR HELICOPTERS, PROPELLERS, WINDMILLS, AND ENGINES.
AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, FLUID AND PLASMA DYNAMICS CONFERENCE, 9TH, SAN DIEGO, CALIFORNIA, JULY 14-16, 1976. PAPER 76-367. 13P.

THE DEVELOPMENT OF AIRSCREW THEORY IS SUMMARIZED IN A CONVENIENT PERIODIZATION:INTUITIVE ERA FROM 400 BC TO MID-NINETEENTH CENTURY; THE MOMENTUM THEORY ERA FROM THE MID-NINETEENTH TO THE EARLY TWENTIETH CENTURY; THE CLASSICAL VORTEX WAKE ERA FROM THE EARLY TWENTIETH CENTURY TO CIRCA 1970; AND THE COMPUTER MODELED WAKE ERA FROM CIRCA 1960 TO THE PRESENT. THE MIX OF EXPERIMENTAL AND THEORETICAL METHOD CHARACTERISTIC OF THESE PERIODS IS REVIEWED AND EVALUATED. GREATEST PROGRESS IS SEEN IN THE FLEXIBLE METHODS AVAILABLE WITHIN THE LAST DECADE, WITH PROGRAMS HANDLED BY LARGE DIGITAL COMPUTERS, AND CAPABILITY OF PERFORMANCE PREDICTION. THE VALUE OF APPROXIMATE METHODS, RELYING ON PRESCRIBED EXPERIMENTAL WAKE MODELS, WIND TUNNEL DATA, CASCADE TUNNEL AIRFOIL DATA AND FLOW VISUALIZATION, WHEREVER EVEN COMPUTER CALCULATIONS BECOME EXORBITANTLY CUMBERSOME, IS STRESSED.

76-0289 DONALDSON W L
WIND POWER, FACT OR FANTASY.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.291--II.300.
SAND-76-5586

THE FEASIBILITY OF ECONOMICALLY USING WIND POWER FOR ELECTRIC POWER GENERATION IN THE U.S. IS DISCUSSED.

76-0290 DREES H M
WIND POWERED CYCLOTURBINE AND ITS POTENTIAL.
NESEA 76: 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. 535.

76-0291 DRUCKER E R
SOLAR POWER PLANT.
U.S. PATENT NO. 3,979,597, SEPTEMBER 7, 1976. 6P.

A SOLAR ENERGY POWERPLANT HAS A GROUP OF TALL, VERTICAL TOWERS OPEN AT BOTH ENDS AND CONTAINING A PLURALITY OF WIND-POWERED IMPELLERS MOUNTED IN VERTICALLY SPACED LOCATIONS WITHIN EACH TOWER, SUCH THAT THERMAL UPDRAFTS IN THE TOWER DRIVES THE IMPELLERS. VERTICALLY SPACED, RADIALLY PROJECTING HEATING CHAMBERS ARE MOUNTED EXTERNALLY ON EACH TOWER AND EACH CHAMBER HAS AN AIR INLET TO ADMIT AMBIENT AIR AND AN AIR OUTLET INTO THE TOWER FOR HEATED AIR. THE HEATED AIR ENTERING THE TOWER FROM THE SOLAR HEATING CHAMBERS ALSO CONTAIN HEAT EXCHANGE TUBES WHICH CONNECT WITH AN

INSULATED WATER RESERVOIR IN THE BASE FOR THE TOWERS.

76-0292 DUBEY M
CONVERSION AND STORAGE OF WIND ENERGY AS NITRATE FERTILIZER.
ERDA CONTRACTORS' REVIEW MEETING ON CHEMICAL ENERGY STORAGE AND HYDROGEN ENERGY SYSTEMS, PROCEEDINGS. NTIS, 1976. P. 83-86.
CONF-761134

76-0293 DUBIN F S
ANALYSIS OF ENERGY USAGE ON LONG ISLAND FROM 1975 TO 1995: THE OPPORTUNITIES TO REDUCE PEAK ELECTRICAL DEMANDS AND ENERGY CONSUMPTION BY ENERGY CONSERVATION, SOLAR ENERGY, WIND ENERGY, AND TOTAL ENERGY SYSTEMS.
NEW YORK, DUBIN-MINDELL-BLOOME ASSOCIATES, 1976. 91P. A CONDENSATION OF A COMPREHENSIVE STUDY DATED OCTOBER 31, 1975, DONE FOR THE DEPARTMENT OF ENVIRONMENTAL CONTROL, COUNTY OF SUFFOLK, NEW YORK.

THE LONG ISLAND LIGHTING COMPANY (LILCO) SERVES LONG ISLAND AND A SMALL SECTION OF QUEENS, NEW YORK, WITH ELECTRICITY AND GAS. THE COMPANY HAS UNDER CONSTRUCTION ONE NUCLEAR-POWERED, 830-MW ELECTRIC GENERATING PLANT, THE SHOREHAM, SCHEDULED TO COME ON-LINE LATE IN 1978; IN ADDITION, LILCO HAS MADE APPLICATION TO CONSTRUCT TWO NEW NUCLEAR PLANTS IN THE TOWN OF RIVERHEAD IN SUFFOLK COUNTY, LONG ISLAND; JAMESPORT I AND JAMESPORT II, EACH WITH A CAPACITY OF 1150 MW ARE PLANNED TO COME ON-LINE IN 1982 AND 1984, RESPECTIVELY. LILCO'S JUSTIFICATION FOR THESE TWO NEW PLANTS IS BASED ON THE SYSTEM REQUIRED TO MEET THE LOADS WHICH, ACCORDING TO THEIR FORECASTS, WILL OCCUR DURING THE PERIOD 1975-1995. THE PROJECTION OF THE PEAK ELECTRIC DEMAND AND THE YEARLY CONSUMPTION OF ELECTRICITY AND THE METHOD OF FORECASTING (EXPONENTIAL SMOOTHING ANALYSIS) BY LILCO ARE ANALYZED. AN INTENSIVE ENERGY CONSERVATION PROGRAM COUPLED WITH A MODEST SOLAR ENERGY SYSTEM FOR DOMESTIC HOT WATER AND SPACE HEATING AND COOLING IS SHOWN TO HAVE THE POTENTIAL OF REDUCING THE NORMAL LOADS TO THE EXTENT THAT NOT ONLY COULD THE JAMESPORT I AND II PLANTS BE CANCELLED, BUT ALSO THAT THE COMPLETION OF THE SHOREHAM PLANT COULD BE DELAYED. THE POTENTIAL OF THE WIND ENERGY AVAILABLE OVER LONG ISLAND IS SHOWN TO EXCEED ALL OF ITS ENERGY REQUIREMENTS FOR THE NEXT TWENTY YEARS. ON-SITE TOTAL ENERGY SYSTEMS AND THE USE OF SOLID WASTE FOR FUEL ARE CITED AS TWO ADDITIONAL MEASURES TO FURTHER REDUCE THE NEED FOR RAW SOURCE ENERGY (FOSSIL FUEL OR NUCLEAR), FOR CENTRAL ELECTRIC GENERATING PLANTS.

76-0294 DUC M
EQUIPMENT FOR UTILIZATION OF WIND ENERGY, PARTICULARLY FOR HEATING OF LIQUIDS.
GERMAN (FRG) PATENT NO. 2,545,951/A/. TO UNICUM S.A., 42 - SAINT-ETIENNE, FRANCE. APRIL 29, 1976. 31P. (IN GERMAN)

A PLANT FOR UTILIZING WIND ENERGY, WHICH IS PARTICULARLY USED FOR HEATING LIQUIDS, IS DESCRIBED. THE WIND TURBINE HAS EITHER A HORIZONTAL OR A VERTICAL AXIS. AN ELECTRIC GENERATOR IS ARRANGED DIRECTLY ON THE AXIS. THE ELECTRIC ENERGY SUPPLIED BY THE GENERATOR IS USED FOR HEATING ELEMENTS ARRANGED IN THE SUPPLY VESSEL OF THE LIQUID. DEPENDING ON THE ENERGY AMOUNT GENERATED, THE LIQUID OF THE HEATING SYSTEM (E.G. CENTRAL HEATING) IS HEATED EITHER PROPORTIONALLY OR COMPLETELY THROUGH THE WIND ENERGY EQUIPMENT. WITH CALM OR LOW WIND, THE LIQUID IS HEATED CONVENTIONALLY BY MEANS OF A NORMAL HEATING SYSTEM.

76-0295 DUFFY R
AN ANALYSIS OF THE FEASIBILITY OF WINDMILLS FOR POWER GENERATION IN NEW YORK STATE.
NTIS, OCTOBER 1976. 136P.
N77-26638, RPI-TA-17

THE POTENTIAL USE OF WIND ENERGY AS A SOURCE OF GENERATING ELECTRIC POWER AS A METHODOLOGY IS DESCRIBED FOR EVALUATING THE ECONOMIC VIABILITY AND ACCEPTABILITY OF WINDMILLS FOR WIND ENERGY CONVERSION IN A LARGE SIZE SUCH AS NEW YORK STATE. THE MINIMUM COST OF ENERGY PRODUCTION FOR A SYSTEM YIELDING HIGH LEVELS OF ENERGY IS DETERMINED. ELEMENTS IN THE EVALUATION INCLUDE: (1) AN ANALYSIS OF RECORDED WIND DATA FROM WHICH AVAILABLE WIND ENERGY LEVELS MAY BE DETERMINED; (2) AN ENGINEERING ANALYSIS OF KNOWN WINDMILL CONCEPTS TO DETERMINE THOSE SPECIFIC WINDMILLS WHICH HAVE THE GREATEST POTENTIAL FOR LARGE SCALE GENERATION OF SYNCHRONOUS AC CURRENT; AND (3) A COUPLING OF THE SELECTED MILLS AND THE AVAILABLE WIND ENERGY PROFILES WITH CAPITAL INVESTMENT AND OPERATING COST INFORMATION TO DETERMINE ISOECONOMIC CONTOUR LINES THROUGHOUT THE STATE.

76-0296 DUGUNDJI J
SOME DYNAMIC PROBLEMS OF ROTATING WINDMILL SYSTEMS.
ADVANCES IN ENGINEERING SCIENCE 2: 493-447, 1976. PAPERS PRESENTED AT THE 13TH ANNUAL MEETING OF THE SOCIETY OF ENGINEERING SCIENCE, HAMPTON, VIRGINIA, NOVEMBER 1-3, 1976. NTIS, 1976.
N77-10265

THE BASIC WHIRL STABILITY OF A ROTATING WINDMILL ON A FLEXIBLE TOWER IS REVIEWED. EFFECTS OF UNBALANCE, GRAVITY FORCE, GYROSCOPIC MOMENTS, AND AERODYNAMICS ARE DISCUSSED. SOME EXPERIMENTAL RESULTS ON A SMALL MODEL WINDMILL ARE GIVEN.

76-0297 ERDA WATCH. NEW TEST SITE SELECTED.
WIND POWER DIG. 1(7): 19, DECEMBER 1976.

THE MUNICIPAL UTILITY IN CLAYTON, NEW MEXICO, HAS BEEN SELECTED TO FIELD TEST A 200 KILOWATT WIND TURBINE GENERATOR FOR ERDA.

76-0298 ENERGY FOR RURAL DEVELOPMENT: RENEWABLE RESOURCES AND ALTERNATIVE TECHNOLOGIES FOR DEVELOPING COUNTRIES.
WASHINGTON, D.C., NATIONAL ACADEMY OF SCIENCES, 1976. 318P.

ENERGY R+D WITH POTENTIAL FOR SMALL-SCALE APPLICATION IS LISTED BY NATION, AND INSTITUTION OR ORGANIZATION, AND CONTACT INFORMATION IS INCLUDED. MANUFACTURERS OF SOLAR HEATING AND COOLING DEVICES AND TERRESTRIAL SOLAR PHOTOVOLTAIC DEVICES ARE TABULATED ALSO. EXTERNAL COMBUSTION ENGINES, THE RANKINE AND STERLING ENGINES, ARE DISCUSSED AS SMALL-SCALE POWER SOURCES FOR DEVELOPING NATIONS. CURRENTLY MANUFACTURED WINDMILL PUMPS AND GENERATORS AND COMMERCIAL DEVELOPERS OF WIND MACHINES ARE LISTED. WINDMILL TOWERS FOR CONSTRUCTION ON THE FARM ARE DESCRIBED. CURRENTLY MANUFACTURED SMALL-SCALE HYDROPOWER MACHINERY IS ILLUSTRATED WITH SPECIFICATIONS. THE HELICAL ROTARY SCREW EXPANDER AND ITS POTENTIAL FOR GEOTHERMAL APPLICATION ARE EXPLAINED.

76-0299 ENERGY RESEARCH AND DEVELOPMENT. NEW ZEALAND ENERGY
NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE, AUCKLAND, NEW ZEALAND. NTIS, 1976. 15P.
NP-21435

THE NEW ZEALAND ENERGY RESEARCH AND DEVELOPMENT COMMITTEE WAS FORMED IN 1974 TO PROMOTE AND SUPPORT ENERGY R AND D IN GOVERNMENT DEPARTMENTS, UNIVERSITIES, RESEARCH ASSOCIATIONS, AND THE PRIVATE SECTOR. THE COMMITTEE ESTABLISHED A SERIES OF PRIORITIES TO ASSIST IT IN DECIDING ON PROJECTS THAT SHOULD BE FUNDED. A CONSORTIUM HAS UNDERTAKEN A STUDY OF THE RAKAIA RIVER TO DETERMINE THE POTENTIAL OF THE RIVER FOR POWER GENERATION AND FOR IRRIGATION. FOUR CONTRACTS HAVE BEEN LET ON INVESTIGATIONS OF SOLAR ENERGY, AND TWO CONTRACTS HAVE BEEN LET ON THE POTENTIAL OF WIND ENERGY DEVELOPMENT. ENERGY DEMAND FROM THE MEAT, PULP, AND PAPER INDUSTRIES IS REPORTED. THE COMMITTEE IS CONCERNED WITH ENERGY POLICY AND WITH A SMALL GROUP CONDUCTING DETAILED STUDIES OF VARIOUS ENERGY SCENARIOS. THE COMMITTEE ADMINISTERS THE ENERGY RESEARCH THAT IS CONDUCTED UNDER THE JOINT US/NZ AGREEMENT FOR SCIENTIFIC AND TECHNOLOGICAL COOPERATION; SEVERAL JOINT PROJECTS ARE UNDERWAY, MAINLY ON GEOTHERMAL ENERGY.

76-0300 ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS.
SEMIANNUAL EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, FALMOUTH, MASSACHUSETTS, OCTOBER 6, 1976. PROCEEDINGS. P.5.1--5.41.
EPRI-ER-371-SR

THE FOLLOWING FOUR TOPICS ARE DISCUSSED: REFERENCE PLANT DESIGNS; REFERENCE SITE SELECTION; SOLAR THERMAL ENVIRONMENTAL ASSESSMENT; AND COST-EFFECTIVENESS ANALYSIS.

76-0301 ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS.
SEMIANNUAL EPRI SOLAR PROGRAM REVIEW MEETING AND WORKSHOP, FALMOUTH, MASSACHUSETTS, OCTOBER 6, 1976. P.9.1--9.53.
EPRI-ER-283-SR(VOL. 2)

THE ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER PLANTS IS DISCUSSED FOR THE FOLLOWING SOLAR ENERGY CONCEPTS: (1) SOLAR THERMAL, A CONCEPT BASED UPON CONCENTRATION OF THE THERMAL ENERGY AVAILABLE FROM DIRECT SOLAR INSOLATION FOR USE AS A HEAT SOURCE IN A THERMODYNAMIC CYCLE; (2)

PHOTOVOLTAIC, A CONCEPT BASED UPON DIRECT CONVERSION OF SOLAR INSOLATION (DIRECT AND DIFFUSE) TO ELECTRICITY UTILIZING SOLAR CELLS WHICH EXHIBIT PHOTOVOLTAIC CHARACTERISTICS; (3) WIND, A CONCEPT BASED UPON CONVERSION OF THE KINETIC ENERGY AVAILABLE IN THE MOVING ATMOSPHERE INTO ROTATING MECHANICAL ENERGY TO TURN ELECTRIC GENERATORS; (4) OCEAN THERMAL, A CONCEPT BASED UPON THE TEMPERATURE DIFFERENCE THAT EXISTS BETWEEN OCEAN SURFACE WATER AND DEEP WATERS; AND (5) PHOTOPRODUCTION, A CONCEPT BASED UPON THE UTILIZATION OF BIOMASS (VEGETATION) FORMED BY PHOTOSYNTHESIS AS A SOURCE OF ENERGY.

76-0302 ERDA, NASA SELECT TEAM TO BUILD LARGEST WINDMILL IN HISTORY.
SPACE WORLD M-11-155: 30-31, NOVEMBER 1976.

76-0303 FANUCCI J B, WALTERS R E
INNOVATIVE WIND MACHINES; THEORETICAL PERFORMANCE OF THE VERTICAL AXIS WIND TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.III.61--III.96.
SAND-76-5586

THE PURPOSE OF THE PROJECT IS TO THEORETICALLY AND EXPERIMENTALLY STUDY TWO WIND MACHINE CONCEPTS. THE FIRST CONCEPT IS THAT OF A VORTEX CONCENTRATOR, I.E., A VERTICAL AIRFOIL IS USED TO FORM A STRONG WING TIP VORTEX, AND THE CONCENTRATED ENERGY IN THE VORTEX IS HARNESSED BY A RELATIVELY SMALL, HIGH-SPEED TURBINE LOCATED DOWNSTREAM OF THE WING TIP. THE SECOND MACHINE IS A VERTICAL-AXIS STRAIGHT-BLADED TURBINE WHICH UTILIZES HIGH-LIFT, VARIABLE ANGLE-OF-INCIDENCE CIRCULATION-CONTROLLED AIRFOILS TO FORM THE BLADES.

76-0304 FERNANDO A D N, SMULDERS P T
WIND ENERGY UTILIZATION IN SRI LANKA: POTENTIALITIES AND CONSTRAINTS.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE WIND ENERGY DEVELOPING COUNTRIES, DHV, CONSULTING ENGINEERS; IN COLLABORATION WITH THE NETHERLANDS ALUMNI ASSOCIATION OF SRI LANKA, COLOMBO, SRI LANKA, MAY 1976. 18P.

AFTER GIVING A BRIEF HISTORICAL REVIEW OF THE USE OF WIND ENERGY IN SRI LANKA, THE AUTHOR DISCUSSES THE AVAILABLE METEOROLOGICAL DATA. WATER RESOURCES IN TERMS OF GROUND WATER POTENTIAL, RAINFALL, SEEPAGE AND WATERDEPTH ARE GIVEN. WATERNEEDS FOR PURPOSE OF DRAINAGE, IRRIGATION, DAIRY FARMING ARE BRIEFLY ANALYZED. WITH THIS INFORMATION POSSIBLE AREAS WHERE WIND ENERGY COULD BE UTILIZED FOR WATER PUMPING ARE SUGGESTED. THE REPORT ALSO MENTIONS THE APPLICATION OF ELECTRICITY GENERATION. MAPS ARE INCLUDED.

76-0305 FINAL REPORT/ENERGY CONSERVATION STATION. THE NEW ENGLAND REGIONAL COMMISSION, CONTRACT NUMBER 10530670.
PROVIDENCE, RHODE ISLAND, REDE CORPORATION, 1976.

THIS NEW ENGLAND ENERGY CONSERVATION PROJECT EMPLOYED WORKING PROTOTYPES THAT DEMONSTRATED PRACTICAL ALTERNATIVE ENERGY STRATEGIES IN FOUR SPECIFIC AREAS: (1) SOLAR RETROFITTING OF BUILDINGS; (2) INNOVATIVE WIND GENERATORS; (3) ENERGY STORAGE SYSTEMS; AND (4) TASK-ORIENTED LIGHTING. ORIGINALLY DESIGNED TO BE DEMONSTRATED ON THE STILLMAN WHITE BRASS FOUNDRY RESTORATION IN DOWNTOWN PROVIDENCE, R.I., SUBSEQUENT INSTALLATION AND TESTING WAS COMPLETED AT THE FAMILY EDUCATION CENTER OF THE UNITED AUTO WORKERS INTERNATIONAL UNION IN NORTHERN MICHIGAN. THE REPORT CONCLUDES THAT RETROFITTING OF CERTAIN PUBLIC AND PRIVATELY OWNED FACILITIES IS COST EFFECTIVE AT THE PRESENT TIME; THAT THE NEW ENGLAND STATES SHOULD TAKE AN ACTIVE ROLE TO EXPOSE THE GENERAL PUBLIC TO SOLAR DEVICES AT PUBLIC FACILITIES, SO AS TO ACCELERATE MARKET ACCEPTANCE OF SOLAR WATER HEATING; THAT WIND GENERATORS ARE PRACTICAL AS SUPPLEMENTAL ELECTRIC-GENERATING SOURCES; THAT ENERGY STORAGE FROM RENEWABLE RESOURCES IS VIABLE; AND THAT TASK-ORIENTED LIGHTING CAN REDUCE ELECTRIC LIGHT USE BY AS MUCH AS 50 PERCENT OF PRESENT CONSUMPTION. THE REPORT SUGGESTS THAT NEW EMPLOYMENT CAN BE CREATED FOR UNSKILLED WORKERS IN THE RELAMPING OF STATE-OWNED PROPERTIES, AND THAT EMPLOYMENT CAN BE EXPANDED FOR ROOFERS, CARPENTERS, PLUMBERS, AND GENERAL CONTRACTORS IN THE RETROFIT AREAS DEMONSTRATED, AND FOR METAL WORKERS, PLASTICS FABRICATORS, ELECTRICAL WORKERS, AND INSTALLERS IN THE WIND-CONVERSION INDUSTRIES. THE STATEMENTS, FINDINGS, AND RECOMMENDATIONS CONTAINED IN THE REPORT ARE SOLELY THOSE OF THE RESEARCH AND DESIGN INSTITUTE, AND DO NOT NECESSARILY

REFLECT THE VIEWS OF THE NEW ENGLAND REGIONAL COMMISSION.

76-0306 FINE R
RENEWABLE ENERGY HANDBOOK.
TORONTO, ENERGY PROBE, 1976. 61P.

THE POTENTIAL FOR RENEWABLE ENERGY USE IN CANADA IS EXAMINED. IT IS POINTED OUT THAT CANADA CAN CHOOSE TO BEGIN TO DIVERSIFY ITS ENERGY SUPPLY NOW, MOVING RAPIDLY AND SMOOTHLY TOWARDS AN EFFICIENT ENERGY SOCIETY BASED ON RENEWABLE ENERGY SOURCES; OR, IT CAN CONTINUE ON ITS PRESENT COURSE AND FACE THE POSSIBILITY OF BEING FORCED BY NECESSITY TO MAKE A LATER TRANSITION TO RENEWABLE SOURCES, PROBABLY WITH A GREAT DEAL OF ECONOMIC AND POLITICAL DISRUPTION. THE HANDBOOK BEGINS WITH A DISCUSSION ON MAJOR ISSUES AND OPTIONS AVAILABLE. THE SECOND SECTION DEALS WITH THE TECHNOLOGY, APPLICATIONS AND COSTS OF DIRECT SOLAR ENERGY UTILIZATION, SOLAR THERMAL ELECTRICITY GENERATION, PHOTOVOLTAIC CONVERSION, WIND ENERGY, BIOMASS ENERGY, HEAT PUMPS, AND ENERGY STORAGE. SECTION THREE DISCUSSES HOW RENEWABLE ENERGY MIGHT REALISTICALLY SUPPLY CANADA'S ENERGY REQUIREMENTS WITHIN A REASONABLE PERIOD OF TIME. SOME ISSUES ON HOW GOVERNMENT, INDUSTRY, AND THE INDIVIDUAL MAY BECOME INVOLVED TO MAKE THIS HAPPEN ARE SUGGESTED. A LIST OF RESOURCE PEOPLE AND RENEWABLE ENERGY BUSINESSES IS PROVIDED IN THE LAST SECTION. A RECOMMENDED READING LIST AND BIBLIOGRAPHY COMPLETE THE HANDBOOK.

76-0307 FISCHER A
WIND ENERGY GENERATION FOR ELECTRIC POWER PRODUCTION, PRELIMINARY STUDIES. PART 1.
NTIS, MARCH 1976. 18P. (IN SWEDISH)
STU-75-3260

STUDIES OF WIND POWER GENERATION DONE BY SAAB-SCANIA DURING 1975 ARE DESCRIBED. THE PROJECT DEALS WITH GENERATION OF ELECTRICITY FOR DELIVERY TO THE TRANSMISSION SYSTEM. BOTH PLANTS WITH HORIZONTAL AXIS AND PLANTS WITH VERTICAL AXIS HAVE BEEN STUDIED. A PROJECTED PILOT PLANT WITH A ROTOR OF 18 METERS AND AN EFFECT OF 50 KW AT 10 M/S WIND VELOCITY IS DESCRIBED. SUGGESTIONS ARE MADE FOR A CONTINUATION OF THE PROJECT.

76-0308 FLYING IN THE FACE OF THE WIND.
CONSULT. ENG. (LONDON) 40(11): 42-43, NOVEMBER 1976.

THE PRACTICAL APPROACH TO BUILDING A WINDMILL IN DENMARK IS DISCUSSED TOGETHER WITH A PROJECT TO BUILD A 54 M DIAM, 2 MW WINDMILL, WHICH WILL GENERATE ALL THE COMMUNITY'S ELECTRICITY AND HAVE SPARE CAPACITY TO FEED THE NATIONAL GRID.

76-0309 FOLEY G, NASSIM C, LEACH G
THE ENERGY QUESTION.
NEW YORK, PENGUIN BOOKS, 1976. 344P.

THIS SURVEY OF THE WORLD'S ENERGY RESOURCES AND THEIR POTENTIAL FOR DEVELOPMENT DEMONSTRATES THE INEXTRICABLE LINKAGE BETWEEN INDUSTRIAL CIVILIZATION AND ENERGY CONSUMPTION. APPROACHES TO ENERGY DEMAND AND CONSUMPTION FORECASTING, ENERGY CONVERSION PROCESSES, AND THE NEED TO CONSERVE ENERGY AND PLAN FOR SCARCITY ARE ALSO ADDRESSED.

76-0310 FORBES R B
GEOTHERMAL ENERGY AND WIND POWER: ALTERNATE ENERGY SOURCES FOR ALASKA.
ALASKAN GEOTHERMAL AND WIND POWER RESOURCES PLANNING CONFERENCE, ANCHORAGE, ALASKA, JULY 8-9, 1975. CONFERENCE PROCEEDINGS. NTIS, APRIL 1976. 256P.
PB-261521

THE ALASKAN ENERGY PROBLEMS THAT CAN BE ALLEVIATED THROUGH WIND AND GEOTHERMAL RESOURCES ARE DEFINED, AND RECOMMENDED PLANS FOR THE INITATION OF STATE AND FEDERAL PROGRAMS ARE PRESENTED. WORKING GROUPS WERE FORMED IN THE FOLLOWING AREAS: AGRICULTURE, ELECTRIC POWER, FISHERIES AND AGRICULTURE, GEOTHERMAL RESOURCE RESEARCH AND DEVELOPMENT, SPACE HEATING AND INDUSTRIAL APPLICATION, AND WIND POWER DEVELOPMENT AND APPLICATIONS.

76-0311 FOREMAN K M, GILBERT B, OMAN R A
DIFFUSER AUGMENTATION OF WIND TURBINES.
NTIS, 1976. 13P.
CONF-760842-6

WIND TUNNEL INVESTIGATION OF MODELS OF TWO DIFFUSER DESIGN CONCEPTS IS 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 USED 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. ECONOMIC STUDIES OF DAWTS HAVE USED THESE TEST DATA AND RECENT (1975) COST PROJECTIONS OF WIND TURBINES WITH DIAMETER. 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 METERS DIAMETER, AND FOR ROTOR DIAMETERS LESS THAN ABOUT 20 METERS. THE COST-TO-BENEFIT ASSESSMENT FOR INTERMEDIATE SIZE ROTORS IS AFFECTED BY THE UNCERTAINTY BAND OF COST FOR THESE ROTOR SIZES.

76-0312 FOX W
THE MILL.
TORONTO, MCCLELLAND + STEWART, 1976. 224P.

76-0313 FRAENKEL P L
FOOD FROM WINDMILLS.
WIND POWER DIG. 1(7): 50-55, DECEMBER 1976.

THIS REPORT DESCRIBES WORK DONE TO IMPROVE AND EVALUATE A SERIES OF WINDMILLS DEVELOPED FOR IRRIGATING SMALL PLOTS OF LAND ON THE BANKS OF THE OMO RIVER, USING RIVER WATER.

76-0314 FRAENKEL P L
VERTICAL AXIS WIND-MACHINES.
APPROP. TECHNOL. 3(2): 17-19, 1976.

MENTIONED ARE THE SAVONIUS- AND DARRIEUS-ROTORS. THE DARRIEUS-ROTOR IS THE MOST PROMISING ONE THOUGH SOME CONSTRUCTIONAL PROBLEMS SHOULD BE SOLVED BEFORE IT CAN LEAVE THE WIND TUNNEL PHASE.

76-0315 FRANK W
AUSTRIAN ENERGY.
OESTERR. Z. ELEKTRIZITAETSWIRT. 29(5): 163-166, MAY 1976. (IN GERMAN)

THE AUTHOR STUDIES THE NON-RENEWABLE FOSSIL FUEL RESERVES (INCLUDING URANIUM) AS WELL AS THE HYDRO POWER RESOURCES, THE RESERVES OF BIOLOGICAL WASTE, GEOTHERMAL ENERGY AND SOLAR AND WIND ENERGY AS RENEWABLE FORMS OF ENERGY.

76-0316 FREE ENERGY--AT A COST: ELECTRICITY BY WIND ENERGY CONVERSION.
INT. CONSTR. 15(11): 40-41, 43, 45, 47-48, NOVEMBER 1976.

76-0317 FREEMAN B E
A NEW WIND ENERGY SITE SELECTION METHODOLOGY. FINAL REPORT. 17 MARCH 1975-16 APRIL 1976.
NTIS, MAY 1976. 236P.
PB-282834, NSF/RA-761229

THE OBJECTIVES OF THIS STUDY WERE TO DEVELOP SIMULATION METHODS TO MAKE THE SITING OF WIND ENERGY DEVICES MORE ACCURATE, TO IDENTIFY AND OBTAIN DATA ON METEOROLOGICAL FIELD EXPERIMENTS, AND TO BEGIN THE PROCESS OF EVALUATION OF COMPUTER CODES BY THE COMPARISON OF CALCULATIONS WITH FIELD DATA. ONE OF THE MAJOR TASKS ACCOMPLISHED WAS THE ADAPTATION, DEVELOPMENT, AND INITIAL TESTING OF METEOROLOGICAL SIMULATION MODELS. THE MESOSCALE COMPUTER CODES (SIGMET) WERE EXTENSIVELY MODIFIED TO BROADEN THE PHYSICAL EFFECTS TO BE TAKEN INTO ACCOUNT, AND A MICROSCALE COMPUTER CODE (MICMET) WAS SELECTED, MODIFIED, AND TESTED.

76-0318 FREEMAN B E
DISCUSSION OF THE ROLE OF METEOROLOGICAL MODELING IN SELECTING WIND ENERGY SITES.
NTIS, JUNE 176.
PB-282975, NSF/RA-761231

A DISCUSSION OF SEVERAL ASPECTS OF THE METEOROLOGY OF WIND ENERGY SITES AND OF THE MODELS WHICH CAN BE APPLIED TO LOCATING WINDY SITES IS PRESENTED. THE TOPICS CONSIDERED INCLUDE THE PHYSIC OF NEAR SURFACE

WINDS, CLASSES OF WIND MODELS, TESTS OF WIND SITE MODELS, METHODOLOGY OF WIND SITE SELECTION, AND COST-BENEFITS OF SITE SELECTION.

76-0319 FREEMAN B E, PATNAIK P C, PHILLIPS G T
DEVELOPMENT OF A WIND ENERGY SITE SELECTION METHODOLOGY. PROGRESS REPORT, MAY 3--DECEMBER 3, 1976.
NTIS, 1976. 152P.
RLO/2440-76/4

THE COMPONENTS OF THE SITE SELECTION METHODOLOGY, AND THE METHOD OF EMPIRICAL ORTHOGONAL EIGENFUNCTIONS FOR THE IDENTIFICATION OF RECURRENT METEOROLOGICAL PATTERNS IN THE CLIMATOLOGICAL DATA ARE DESCRIBED. SEVERAL FASTER METEOROLOGICAL COMPUTER CODES ARE COMPARED. THE FURTHER DEVELOPMENT AND TESTING OF THE PRIMITIVE EQUATION MODELS (THE SIGMET FAMILY OF CODES) ARE DESCRIBED. THIS CONSISTS OF DEVELOPMENTS WHICH WILL PERMIT CALCULATIONS TO BE PERFORMED MORE RAPIDLY (THROUGH PARTIAL IMPLICITIZATION) AND MORE ACCURATELY (THROUGH IMPROVED PHYSICAL MODELS).

76-0320 FREEMAN B E, TAFT J R
MATHEMATICAL MODELING OF TOPOGRAPHIC EFFECTS OF WIND ENERGY SYSTEMS.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, U.K., DEPARTMENT 7, 1976. NTIS, APRIL 1976. 26P.
BNWL-SA-5935, CONF-760909-3

IN THE BASIC WIND CHARACTERISTICS ASSESSMENT PROCEDURE A NEW STEP IS INCORPORATED TO OVERCOME ITS MOST SERIOUS DEFICIENCIES. THIS STEP EMPLOYS MATHEMATICAL MODEL-BASED METEOROLOGICAL PREDICTION TOOLS. WITH THEM CLIMATOLOGICAL DATA FROM WEATHER STATIONS IN THE REGION ARE USED TO INFER CLIMATOLOGICAL DATA AT THE UNMEASURED LOCATIONS WITHIN THE REGION. METEOROLOGICAL PHENOMENA TAKING PLACE IN REGIONS COMPARABLE TO THE DISTANCE BETWEEN SYNOPTIC WEATHER STATIONS (APPROXIMATELY 200 KM) AND IN THE IMMEDIATE VICINITY OF THE WINDMILL SITE (APPROXIMATELY 1 KM) ARE CONSIDERED. COMPUTER CODES WERE DEVELOPED FOR EACH OF THESE REGIMES, AND CALCULATIONS OF WIND FLOW OVER COMPLEX TERRAIN HAVE BEEN PERFORMED. RESULTS OF SOME OF THESE WIND CALCULATIONS ARE PRESENTED, ILLUSTRATING THE EFFECTS OF TERRAIN ON WIND ENERGY POTENTIAL.

76-0321 GEOTHERMAL AND WIND POWER: ALTERNATE ENERGY SOURCES FOR ALASKA.
PROCEEDINGS OF A CONFERENCE HELD IN ANCHORAGE, ALASKA, JULY 8-9, 1975.
ANCHORAGE, FORBES, R.B., ALASKA STATE ENERGY OFFICE, 1976. 249P.
GEOTHERMAL AND WIND POWER: ALTERNATE ENERGY SOURCES FOR ALASKA.
ANCHORAGE, ALASKA, JULY 8-9, 1975.

THE REPORT ATTEMPTS TO DEFINE ALASKA ENERGY PROBLEMS THAT CAN BE ALLEVIATED THROUGH THE EFFICIENT USE OF WIND POWER AND GEOTHERMAL RESOURCES, AND TO PRESENT RECOMMENDED SHORT- AND LONG-RANGE PLANS FOR THE INITIATION OF STATE AND FEDERAL PROGRAMS IN THE MORE PROMISING AREAS. AFTER THE INITIAL CHAPTER, ALASKA AND THE ENERGY CRUNCH, THE CHAPTERS FOLLOWING ARE: ENERGY ECONOMICS; ALASKA'S GEOTHERMAL POTENTIAL; GEOTHERMAL RESOURCE APPLICATIONS; SPACE HEATING AND INDUSTRIAL APPLICATIONS; ENVIRONMENTAL HAZARDS AND PROTECTION; WIND POWER POTENTIAL OF ALASKA; POWER AND ENERGY PRODUCTIVITY OF SMALL WIND-MILLS IN ALASKA; WIND POWER APPLICATIONS; ALASKAN AGRICULTURE AND THE ENERGY PROBLEM; FISHERIES AND AQUACULTURE; AND CONCLUSIONS AND RECOMMENDATIONS. MUCH ADDITIONAL INFORMATION ON ESKIMO VILLAGES, GEOTHERMAL SPRINGS, AND DEMONSTRATION PROJECTS IS GIVEN IN SEVEN APPENDIXES.

76-0322 GILMORE E
WIND ENERGY: VALUE AND FUTURE IMPACT ON TEXAS.
PRESENTED AT TEXAS ENERGY FORECAST CONFERENCE, HOUSTON, MARCH 15-16, 1976. 7P.

THE WIND POWER POTENTIAL FOR TEXAS HAS BEEN ESTIMATED TO BE ABOUT 250,000 MW, OR ABOUT 10 TIMES THE AVERAGE OF ELECTRICITY GENERATED IN THE STATE. THE IMPACT OF WIND ENERGY DEPENDS ON THE PHILOSOPHY OF ALTERNATIVE ENERGY. IT IS NOT A QUESTION OF AVAILABLE WIND ENERGY OR NEED FOR A SCIENTIFIC OR TECHNOLOGICAL BREAKTHROUGH, BUT A QUESTION OF HOW MUCH EVERYONE IS WILLING TO PAY FOR ENERGY NOW AND IN THE FUTURE. THE PRICE INCLUDES THE EFFECT ON THE ENVIRONMENT.

76-0323 GLASGOW J C, LINSCOTT B S
EARLY OPERATION EXPERIENCE ON THE ERDA/NASA 100 KW WIND TURBINE.
NTIS, SEPTEMBER 1976. 28P.

N77-10640, NASA-TM-X-71601

AS PART OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA) WIND-ENERGY PROGRAM, NASA LEWIS RESEARCH CENTER IS TESTING AN EXPERIMENTAL 100-KW WIND TURBINE AT SANDUSKY, OHIO. ROTOR-BLADE AND DRIVE-SHAFT LOADS AND TOWER DEFLECTION WERE MEASURED DURING OPERATION OF THE WIND TURBINE AT RATED RPM. THE BLADE LOADS MEASURED ARE HIGHER THAN ANTICIPATED. PRELIMINARY RESULTS INDICATE THAT AIR-FLOW BLOCKAGE BY THE TOWER STRUCTURE PROBABLY CAUSES THE HIGH ROTOR-BLADE-BENDING MOMENTS.

76-0324 GOLDSMITH M W
NEW ENERGY SOURCES: DREAMS AND PROMISES.
FRAMINGHAM, MASSACHUSETTS, ENERGY RESEARCH GROUP, MARCH 1, 1976. 35P.

A SHORT SECTION ON WIND POWER IS INCLUDED IN THIS PAMPHLET.

76-0325 GOVINDA RAJU S P, NARAHARI RAO K, NARASHIMA R
SOME WINDMILL ROTORS SUITABLE FOR USE IN A RURAL ENVIRONMENT.
BANGALORE, INDIA, INDIAN INSTITUTE OF SCIENCE, DEPARTMENT OF AERONAUTICAL ENGINEERING, REP. 76 FM 1, JANUARY 1976. 15P.

AS PART OF A PROJECT FOR ASTRA ON WINDMILLS SUITABLE FOR FABRICATION AND USE IN INDIAN RURAL AREAS, FOUR ROTORS WERE TESTED IN A SMALL WIND TUNNEL. BASED ON THE RESULTS OF THESE TESTS, A SMALL WINDMILL USING SAILS FOR THE ROTOR SURFACES WAS FABRICATED AND TESTED. THIS REPORT SUMMARISES THE RESULTS OBTAINED TO DATE AND DESCRIBES A DESIGN THAT APPEARS PROMISING IN THE LIGHT OF THE EXPERIMENTS.

76-0326 GRAVEL M
ENERGY: A RADICAL REDIRECTION.
J. ENERGY DEV. 1: 191-200, SPRING 1976.

SUITABLE APPROACHES FOR A NATIONAL ENERGY POLICY ARE DISCUSSED, TAKING INTO ACCOUNT THE GOAL OF ENERGY SELF-SUFFICIENCY FOR THE U.S. CURRENT COMMITMENTS IN REGARD TO ENERGY POLICY ARE CRITICALLY EXAMINED. IT IS CONCLUDED THAT THE PREFERENTIAL TREATMENT OF THE BREEDER REACTOR IN THE ALLOCATION OF FUNDS AT THE EXPENSE OF SOLAR ENERGY OPTIONS CANNOT BE JUSTIFIED. THE PROPOSAL IS MADE TO PLACE GREATER EMPHASIS ON THE DEVELOPMENT OF APPROACHES FOR THE UTILIZATION OF SOLAR ENERGY. ATTENTION IS GIVEN TO SOLAR HEATING AND COOLING OF BUILDINGS, WIND ENERGY, AND BIOCONVERSION TO FUELS. DIFFICULTIES CONCERNING A USE OF SOLAR CELLS ARE RELATED TO THEIR HIGH PRICE. IT IS RECOMMENDED TO PROVIDE GOVERNMENT SUPPORT IN ASSURING A MARKET WHICH WOULD MAKE A LOWERING OF THE PRODUCTION COSTS POSSIBLE.

76-0327 GRAYBILL C L
WIND ENERGY CONVERSION DEVICE.
U.S. PATENT NO. 3,995,170, NOVEMBER 30, 1976. 8P.

A WIND ENERGY CONVERSION DEVICE FOR CONVERTING DIRECTIONAL WIND FORCE TO TORQUE ALONG ON A VERTICAL ROTATIONAL AXIS IS DESCRIBED. THE DEVICE INCLUDES A PLURALITY OF FLEXIBLE VANES MOUNTED TO A FRAMEWORK FOR ROTATION THEREWITH ABOUT A VERTICAL AXIS. THE VANES ARE MOUNTED TO UPRIGHT POSTS ON THE FRAMEWORK. AXIAL VANE SIDE EDGES EXTEND TO OPPOSITE RADIAL SIDES OF THE POSTS AND ARE CONNECTED IN A SPECIFIC MANNER TO THE FRAME IN ORDER TO PRODUCE A POSITIVE EFFECT ON ROTATION OF THE DEVICE IN A PRESCRIBED DIRECTION, IN RESPONSE TO WIND CURRENTS.

76-0328 GRIMMER D
A LOW-COST METHOD OF CONSTRUCTING DARRIEUS BLADES.
WIND POWER DIG. 1(6): 31-34, SEPTEMBER 1976.

DESCRIBED ARE DARRIEUS ROTOR BLADES MADE OF A MILD STEEL STRIP BENT AS A TROPOSKIEN, ON WHICH IS GLUED EXPANDABLE HONEYCOMB PAPER CUT IN THE RIGHT CURVED AIRFOIL. THE PAPER HONEYCOMB IS WATER-PROOFED AND COVERED WITH A THIN OUTERSKIN (DACRON POLYESTER OR FIBERGLASS).

76-0329 GUIZZI G L
(POTENTIALITIES AND LIMITATIONS OF THE UTILIZATION OF WIND MACHINES).
CONFERENZA LAXIALE DI INGEGNERIA AMBIENTALE, 1ST, ROME, APRIL 2, 1976.
INGEGNERIA, P. 265-274, SEPTEMBER-OCTOBER, 1976. (IN ITALIAN)

THE ARTICLE REVIEWS ECONOMIC AND TECHNOLOGICAL EXPLOITATION OF WIND POWER

IN THE PAST AND THE SITUATION FAVORING IT, AND SURVEYS THE CURRENT OUTLOOK FOR WIDE-SCALE UTILIZATION OF WIND POWER, TAKING A DIM VIEW OF THE PROSPECTS EXCEPT FOR PUMPING OF WATER FROM DEEP WELLS WHERE IT IS COMPETITIVE WITH OTHER POWER SOURCES. THE HIGH COST AND SHORT LIFE OF THE BATTERIES NEEDED TO STORE ENERGY DERIVED FROM WIND AND RELEASE IT ON DEMAND IS SEEN AS THE MAJOR OBSTACLE, ALONG WITH THE LOW ENERGY CONCENTRATION AND IRREGULARITY IN MAGNITUDE, DIRECTION, AND VELOCITY. PUMPING WATER AS PART OF A TURBINE SYSTEM, AND USE AS AUXILIARY POWER SOURCE IN VEHICLES POWERED BY OTHER SOURCES, ARE MENTIONED. LARGE-SCALE WIND POWER FARMS ARE VIEWED AS NOT ONLY NONCOMPETITIVE, BUT POSSIBLY CONDUCIVE TO CLIMATIC "POLLUTION" BY SLOWING DOWN AND DISTRIBUTING WIND CURRENTS AND PATTERNS.

76-0330 HAM N D
AEROELASTIC ANALYSIS OF THE TROPOSKIEN-TYPE WIND TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P.II.185--II.204.
SAND-76-5586

AN AEROELASTIC ANALYSIS OF THE STABILITY OF THE COUPLED BENDING AND TORSIONAL MOTION OF TROPOSKIEN-TYPE BLADES IS PRESENTED WITH A VIEW TO DETERMINE THE CAUSE OF THESE VIBRATIONS AND A MEANS OF SUPPRESSING THEM.

76-0331 HARDY D M
WIND POWER STUDIES: FIELD MEASUREMENT PRIORITIES FOR NUMERICAL ANALYSIS OF WIND ENERGY. PROGRESS REPORT. APRIL-JUNE 1976.
NTIS, JUNE 15, 1976.
UCRL-50034-76-3

RESULTS OF INITIAL NUMERICAL STUDIES AND THEIR ROLE IN PLANNING THE JULY-AUGUST 1976 FIELD PROGRAM ARE PRESENTED. THE ACQUISITION, CALIBRATION, AND DEPLOYMENT OF METEOROLOGICAL INSTRUMENTS FOR THE FIELD PROGRAM ARE REVIEWED.

76-0332 HARDY D M
WIND POWER STUDIES: REGIONAL WIND ENERGY MEASUREMENTS. PROGRESS REPORT, JULY-SEPTEMBER 1976.
NTIS, NOVEMBER 1, 1976. 12P.
UCRL-50034-76-4

THIS REPORT DISCUSSES THE WIND POWER FIELD MEASUREMENT PROGRAM WHICH IS BEING CONDUCTED IN CONJUNCTION WITH NUMERICAL ANALYSES OF REGIONAL WIND ENERGY. EARLY EXAMPLES OF DATA COLLECTED IN THE PROGRAM ARE GIVEN, INCLUDING DATA CONFIRMING THE EXISTENCE OF A BROAD AREA OF HIGH WIND SPEEDS WHICH WERE PREDICTED IN PREVIOUS NUMERICAL ANALYSES. THE MEASUREMENT PROGRAM IS DESCRIBED, AND PLANS FOR FURTHER NUMERICAL ANALYSIS AND THE CONTINUATION OF THE MEASUREMENT PROGRAM ARE DISCUSSED.

76-0333 HARTEL R W
WIND-POWERED AERATION FOR REMOTE LOCATIONS. M.S. THESIS.
FORT COLLINS, COLORADO, COLORADO STATE UNIVERSITY, FALL 1976. 103P.

THE OBJECTIVES OF THIS RESEARCH WERE TO INVESTIGATE THE USE OF WIND-POWERED AERATORS (WPA'S) AND TO FURTHER DEVELOP THE DESIGN. THESE WPA'S WERE STUDIED FOR USE IN INCREASING OXYGEN LEVELS IN LAKES TO PREVENT WINTERKILL AND IN SEWAGE LAGOONS TO INCREASE LAGOON CAPACITY. THE WPA CONVERTS THE ENERGY IN THE WIND INTO COMPRESSED AIR WHICH IS FORCED TO EXIT AT THE BOTTOM OF THE LAKE. THESE AIR BUBBLES CAUSE CIRCULATION WHICH BRINGS THE WARMER WATER AT THE BOTTOM OF THE LAKE IN CONTACT WITH THE ICE. A HOLE IS MELTED IN THE ICE THROUGH WHICH OXYGEN FROM THE ATMOSPHERE IS TRANSFERRED. THREE DIFFERENT WPA'S WERE INSTALLED AT DIFFERENT SITES. THESE SYSTEMS WERE TESTED AND EVALUATED. THE RESULTS OF THIS WORK SHOW THAT THESE SYSTEMS WORKED SATISFACTORILY BUT THAT CERTAIN IMPROVEMENTS IN DESIGN MUST BE MADE TO INCREASE THE EFFICIENCY OF THE WPA. FROM THE EXPERIENCE GAINED IN STUDYING THESE SYSTEMS A NEW PROTOTYPE IS DESIGNED. IN ADDITION TO THE STUDY OF THE MECHANICS OF THE WPA, PRELIMINARY RESEARCH WAS PERFORMED CONCERNING TWO-PHASE AIR-BUBBLE FLOW. RESEARCH OF THIS NATURE IS NEEDED FOR INCREASING THE EFFICIENCY OF THE WPA BY DETERMINING THE OPTIMUM BUBBLE FLOW PARAMETERS. FROM THIS RESEARCH ON TWO-PHASE AIR-BUBBLE FLOW, ANOTHER EXPERIMENT IS RECOMMENDED WHICH DETERMINES THE HEAT TRANSFER CHARACTERISTICS OF THE AIR-BUBBLE FLOW AND INDUCED CIRCULATION.

76-0334 HAWRALEK J, RACHUK T, BARLISHEN J
WIND POWER IN ALBERTA.
ALBERTA RESEARCH COUNCIL INF. SER. NO. 70, SEPTEMBER 1976. 118P.

THIS MANUAL WAS PREPARED IN RESPONSE TO A GROWING INTEREST IN THE DOMESTIC USE OF WIND POWER AS AN ENVIRONMENTALLY ATTRACTIVE ENERGY SOURCE. IT PROVIDES FACTUAL INFORMATION ON EQUIPMENT, CONSTRUCTION, OPERATION AND COSTS. OTHER TOPICS COVERED INCLUDE A BRIEF HISTORY OF WIND MACHINES AND CURRENT RESEARCH BEING UNDERTAKEN IN CANADA; THE BASIC STRUCTURE AND OPERATION OF WIND MACHINES, INCLUDING WIND PUMPS AND AEROGENERATORS. A DETAILED "HOW TO" GUIDE EXPLAINS THE STEPS INVOLVED IN SITING AND SELECTING THE CORRECT WIND PLANT TO MEET ENERGY REQUIREMENTS. THE FINAL CHAPTERS OF THE MANUAL INCLUDE LISTS OF MANUFACTURERS AND DISTRIBUTORS, THOSE AGENCIES FROM WHICH CONSTRUCTION PLANS ARE AVAILABLE, AND ASSOCIATIONS PROMOTING WIND POWER UTILIZATION.

76-0335 HEATH S D
LOOK AT VOCATIONAL TRAINING FOR THE SOLAR ENERGY INDUSTRY.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 8. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 298-310.

THE PRIMARY THRUST OF THIS PAPER IS TO EXPLORE THE OPPORTUNITY FOR PRESENT AND PROSPECTIVE TRADESMEN TO BECOME COMPETENT IN SOLAR SYSTEM INSTALLATIONS AND MAINTENANCE. A TRAINING PROGRAM WHICH OFFERS A MAJOR CONTRIBUTION TO OVERCOMING BARRIERS TO INNOVATION THAT MIGHT EXIST IN THE CONSTRUCTION INDUSTRY IS DISCUSSED. THE PURPOSE AND OPERATION OF THE TRAINING MUST NECESSARILY TEACH NEW SKILLS AND UPGRADE PRESENT SKILLS IN RELATION TO ESTABLISHED CONSTRUCTION LABOR CLASSIFICATIONS. CERTAIN EMPHASIS MUST ALSO BE PLACED ON TEACHING OF THE BASIC THEORY AND TECHNICAL RUDIMENTS RELATED TO THE INSTALLATION OF SOLAR ENERGY SYSTEMS. A VIABLE TRAINING PROGRAM MUST PROCESS TRAINEES THROUGH STRUCTURED SOLAR SYSTEM INSTRUCTION AND AT THE SAME TIME CONTINUE TO EVALUATE THE TRAINEE'S RESPONSE TO SOLAR SYSTEM EXPOSURE. CURRENT EMPLOYMENT OPPORTUNITIES MUST ALSO BE UNDER CONTINUAL EVALUATION AND ANALYSIS. A COMPREHENSIVE LOOK AT ONE TRAINING PROGRAM NOW IN OPERATION IN THE SOUTHWEST UNITED STATES IS DISCUSSED. THE TRAINING FACILITY IS OPERATED BY THE SAN DIEGO COUNTY CONSTRUCTION LABORERS TRAINING AND RETRAINING TRUST (A NON-PROFIT TAFT-HARTLEY AUTHORIZED ORGANIZATION). THE PROGRAM PROVIDES BASIC TRAINING APPLICABLE TO THE THE BUILDING TRADES IN THE INSTALLATION AND MAINTENANCE OF A WIDE VARIETY OF SOLAR ENERGY SYSTEMS.

76-0336 HENGEVELD H J
EEN ELEKTRONISCHE GELIJKSPANNINGS-DRAAISPANNINGS OMZETTER T.B. V. HET TRANSPORT VAN ENERGIE VAN EEN WINDMOLENAS NAAR HET DRAAISTROUMNET. (AN ELECTRONIC DC TO AC CONVERTER TO BE USED FOR THE TRANSFER OF ENERGY FROM A WINDMILL SHAFT TO THE UTILITY NETWORK).
EINDHOVEN, THE NETHERLANDS, UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF ELECTRICAL ENGINEERING, REP. NO. EM 76-12, JUNE 1976.

DESCRIBED IS THE DESIGN AND CONSTRUCTION OF AN ELECTRONIC CONVERTER CONSISTING OF A LOW TO HIGH CHOPPER AND A THREE PHASE BRIDGE CONVERTER. THE CHOPPER CONTROL CHARACTERISTIC TO OBTAIN THE MAXIMUM EFFICIENCY IN THE SYSTEM WIND-TURBINE-GENERATOR-LOAD AT ALL WIND SPEEDS IS DERIVED. MEASUREMENTS OF A TEST CIRCUIT (BKW) ARE GIVEN.

76-0337 HERONEMUS W E
OCEANIC WINDPOWER.
ENERGY FROM THE OCEANS: FACT OR FANTASY. REPORT NO. 76-19. RALEIGH, NORTH CAROLINA, NORTH CAROLINA STATE UNIVERSITY, 1976. P. 10-18.

THE OCEANIC WINDPOWER RESOURCE IS EXAMINED MACROSCOPICALLY. ONE REGION IN WHICH THAT RESOURCE IS KNOWN TO BE RICH IS THEN EXAMINED IN GREATER DETAIL. SIX DIFFERENT PRODUCTS ASSOCIATED WITH THE U.S. ENERGY INDUSTRY ARE THEN PROPOSED AS PRODUCTS THAT COULD BE PROVIDED FROM WINDPOWER SYSTEMS. A CLOSER LOOK AT THE POSSIBLE SIZE OF THAT ATLANTIC COAST RESOURCE IS TAKEN AND AN ESTIMATED TOTAL ANNUAL PRODUCTIVITY IS WEIGHED AGAINST THE LAST YEAR'S 73 QUAD U.S. ENERGY BUDGETS: A 12 PERCENT IMPACT FROM THIS ONE SOLAR REPLENISHED RESOURCE ALONE IS PREDICTED. STATEMENTS AS TO SYSTEM ENERGY BUDGET AND ENVIRONMENTAL IMPACT ARE MADE. CONCLUSIONS SUGGEST THAT WINDPOWER SYSTEMS, INCLUDING OCEANIC WINDPOWER SUBSYSTEMS, SHOULD BE ADVANCED RAPIDLY BY THE UNITED STATES.

76-0338 HERONEMUS W E
THE U. MASS. WIND FURNACE PROGRAM.
WIND POWER DIG. 1(7): 34-38, DECEMBER 1976.

76-0339 HERONEMUS W E
WIND POWER; A SIGNIFICANT SOLAR ENERGY SOURCE.
CHEM. TECH. 6: 498-503, AUGUST 1976.

76-0340 HERWIG L O
SUMMARY OF THE ROLE OF PLANNING AND ANALYSIS IN THE DEVELOPMENT OF THE FEDERAL SOLAR ENERGY PROGRAM.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 188-210.

THE PROJECTS THAT HAVE GUIDED THE GROWING FEDERAL EFFORTS TO DEVELOP SOLAR ENERGY TECHNOLOGIES ARE SUMMARIZED. PLANNING AND ANALYSIS INCLUDE STUDIES INVOLVING MISSION ANALYSIS, COMPARATIVE SYSTEM EVALUATION, APPLICATION SELECTION, PRELIMINARY SYSTEM DESIGN, AND ENGINEERING AND ECONOMIC EVALUATION. AS PLANNING METHODOLOGY HAS EVOLVED AND EXPANDED OVER THE PAST THREE TO FIVE YEARS, THE RESULTS OF THE PLANNING STUDIES HAVE INFLUENCED DIRECTION, CONTENT, SCHEDULE, AND GOALS OF THE FEDERAL SOLAR ENERGY PROGRAM. PLANNING PROJECTS ARE REVIEWED IN EACH OF A LARGE NUMBER OF IMPORTANT SUBPROGRAM AREAS OF SOLAR TECHNOLOGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION. REFERENCES TO THE RESULTS OF THESE PLANNING STUDIES ARE GIVEN AS THEY ARE NOW AVAILABLE.

76-0341 HEWSON E W, BAKER R W, BROWNLOW R
RESEARCH ON WIND POWER POTENTIAL IN SELECTED AREAS OF OREGON: FOURTH PROGRESS REPORT.
CORVALLIS, OREGON, OREGON STATE UNIVERSITY, JUNE 1976. 43P.

DURING THE FOURTH YEAR OF THE PROJECT, RESEARCH CENTERED ON WIND SITE PROSPECTING AND ANALYSIS OF POTENTIAL WIND POWER SITES, THE DEVLOPMENT OF A PROMISING NEW WIND ANALYSIS TECHNIQUE, AND CONTINUED RESEARCH ON WIND TUNNEL SIMULATIONS OF WIND FLOW OVER A MODEL OF A COASTAL HEADLAND. A DETAILED FIELD PROGRAM OF MONITORING THE WIND FLOW OVER YAQUINA HEAD USING A TEMPORARY, 27-M (90-FT) TOWER INSTRUMENTED AT FOUR LEVELS WAS ACCOMPLISHED. THE DATA FROM THIS PROJECT AGREED CLOSELY WITH THAT OBTAINED FROM THE WIND TUNNEL RESEARCH. A PERMANENT 30-M (100-FT) METEOROLOGICAL TOWER WAS ERECTED FARTHER EAST ON YAQUINA HEAD AND INSTRUMENTED AT TWO LEVELS. THIS IS THE PROPOSED SITE FOR THE EARLY ERECTION OF A LARGE AEROGENERATOR. FURTHER ANALYSIS OF DATA FROM THE OREGON COASTAL AREAS NEAR CAPE BLANCO AND TILLAMOOK INDICATES THAT THERE MAY BE SUFFICIENT WIND TO SUPPORT MEDIUM-SIZED WIND POWER FARMS IN THESE AREAS. THE COLUMBIA RIVER GORGE AREA FROM THE CENTRAL CASCADE RANGE TO ITS EASTERN EXTENSION INTO WASHINGTON AND OREGON IS A PROMISING AND ATTRACTIVE AREA FOR LARGE PERMANENT WIND POWER FARMS. THE TECHNIQUE FOR MEASURING THE WINDS IN THE LOWER BOUNDARY LAYER BY USING SINGLE ENGINE SMOKE ROCKETS SHOWS MUCH PROMISE; HOWEVER, FURTHER DEVELOPMENT IS NEEDED TO ENSURE STABLE FLIGHTS UNDER STRONG WIND FLOW.

76-0342 HIRST P
REGULATION, STORAGE AND CONVERSION OF WIND PRODUCED ELECTRICAL ENERGY AT THE LEVEL OF A FEW HUNDRED WATTS.
ENERGY DIG. 5(6): 7-9, DECEMBER 1976.

THIS ARTICLE IS AN EXCERPTED PAPER FROM AN INTERNATIONAL SYMPOSIUM: "WIND ENERGY SYSTEMS" HELD AT ST. JOHN'S COLLEGE, CAMBRIDGE, ENGLAND. THE WIND TURBINE ASSUMED IS ONE OF THE VERTICAL AXIS TYPE COUPLED THROUGH A GEARBOX TO A PERMANENT MAGNET ALTERNATOR. BY REDUCING MAGNETIC "COGGING" IN THE ALTERNATOR AND MECHANICAL FRICTION AS MUCH AS POSSIBLE, THE SYSTEM WILL ROTATE AT VERY LOW WIND SPEEDS WITH THE ALTERNATOR UNLOADED. THE BATTERY CHARGER WILL ACCEPT, OVER A 10:1 RANGE, WHATEVER VOLTAGE THE ALTERNATOR PRODUCES, AND WILL LOAD THE ALTERNATOR WITH A CURRENT DETERMINED TO BE A PRE-PROGRAMMED FUNCTION OF ALTERNATOR VOLTAGE. IN THIS WAY THE WIND TURBINE MAY BE OPERATED NEAR OPTIMUM EFFICIENCY OVER A CONSIDERABLE RANGE OF WIND SPEED. ON RISING WIND SPEED THE ALTERNATOR VOLTAGE RISES UNTIL A SELECTED LEVEL IS REACHED. A SIMPLE VOLTAGE SENSING ARRANGEMENT PROVIDES A SIGNAL AND POWER TO A LINEAR FORCE MOTOR TO RELEASE THE FRICTION BRAKE ON THE EPICYCLIC GEARBOX. THIS PERMITS THE ANNULUS TO ROTATE AND LIMITS THE SPEED AND TORQUE OF THE ALTERNATOR

ROTOR. FOR POWERING MANY COMMERCIAL PIECES OF EQUIPMENT AN AC SUPPLY IS REQUIRED. PRODUCING A TRUE SINE WAVE IS INEFFICIENT AND EXPENSIVE. A SIMPLE SQUARE-WAVE INVERTER MAY BE ADEQUATE.

76-0343 HODGES L, NEFF J
SOLAR ENERGY: 1976.
DES MOINES, IOWA, IOWA ENERGY POLICY COUNCIL, NP-21386, JUNE 1976. 70P.

IN THIS REPORT, THE IOWA ENERGY POLICY COUNCIL ATTEMPTS TO DESCRIBE SOME USES TO WHICH SOLAR ENERGY IS BEING PUT IN SPRING, 1976, AND TO ANTICIPATE SOME FURTHER FUTURE USES.

76-0344 HOLME O
A CONTRIBUTION TO THE AERODYNAMIC THEORY OF THE VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, ENGLAND, SEPTEMBER 1976. PROCEEDINGS.

76-0345 HOLTEN T VAN
RENDEMENT VAN WINDMOLEN DOOR NIEUW TYPE VLEUGEL VERGROTEN. (AUGMENTING THE EFFICIENCY OF WINDMILLS BY A NEW WING TYPE).
DELFT, DELFT UNIVERSITY OF TECHNOLOGY, TECHNO MAGAZINE, JANUARY 1976. P. 10-11. (IN DUTCH)

76-0346 HVELPLUND F, LINDEROTH H
POWER STATION ECONOMY UNDER DANISH CONDITIONS. A REPORT ON THE ECONOMICS, EMPLOYMENT AND MONETARY ASPECTS OF ATOMIC POWER STATIONS, DECENTRALIZED STATIONS PRODUCING BOTH ELECTRICITY AND HEAT, AND WIND ENERGY SYSTEMS.
NTIS, 1976. 110P. (IN DANISH)

AN ANALYSIS IS PRESENTED BASED ON DANISH CONDITIONS OF ECONOMICS, EMPLOYMENT, AND MONETARY ASPECTS OF THE WIND ENERGY, OIL/COAL/GAS, AND ATOMIC POWER TECHNOLOGIES. IT IS CONCLUDED THAT ATOMIC POWER IS NOT ADVANTAGEOUS IN DENMARK.

76-0347 HOWE E D
WIND POWER.
SUNWORLD NO. 2: 6-9, NOVEMBER 1976.

COMPARISONS ARE MADE BETWEEN WIND-POWER AND WATER-POWER GENERATION IN A SUPERFICIAL REVIEW. DIFFERENT TYPES OF EACH ARE BRIEFLY DESCRIBED. IT IS CONCLUDED THAT WIND-POWER IS TRENDING TOWARD A MORE FAVORABLE SOURCE AROUND THE WORLD.

76-0348 HUL F A J R VAN T, VAN DE VEN N J
(FAST RUNNING WIND SCREWS).
THE NETHERLANDS, TWENTE UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF MECH., REF. NR. BMS-037, JUNE 1976. (IN DUTCH)

THIS IS A STUDY OF AN OPTIMAL CONSTRUCTION METHOD OF THE ONE-BLADE, SELF-ADJUSTING WINDMILL (SO-CALLED CYPRODYNE). PROPULSIVE SCREW THEORY IS FITTED FOR WIND SCREW THEORY. CONSIDERING BETZ'S MINIMUM VELOCITIES, DRAG AND BLADE NUMBER, A WIND SCREW CALCULATION METHOD IS GIVEN. TO OPTIMIZE FOR A GIVEN BLADE NUMBER AND TIP-SPEED RATIO, A NEW CONSTRUCTION METHOD IS GIVEN AND PERFORMED ARITHMETICALLY AS WELL AS GRAPHICALLY. DYNAMICAL FORCES AND TORQUES CAUSED BY BLADE-ADJUSTMENT, ARE QUANTICISED AND OPTIMISED. THE INFLUENCE OF BLADE-ADJUSTMENT ON THE WINDMILL CHARACTERISTICS IS MEASURED.

76-0349 IEEE POWER ENGINEERING SOCIETY SUMMER MEETING. TEXT OF "A" PAPERS.
NEW YORK, IEEE, 1976. 820P.
IEEE POWER ENGINEERING SOCIETY SUMMER MEETING, 1976.

NINETY-EIGHT PAPERS WERE PRESENTED, INCLUDING SOME ON WIND ENERGY.

76-0350 HUXLEY B
A VERTICAL AXIS SAILWING ROTOR.
DUBLIN, IRELAND, LOW ENERGY SYSTEMS, 1976. 21P.

CONSTRUCTION OF A SIMPLE TO BUILD VERTICAL AXIS WIND TURBINE WITH 3 OR 4 SAILWINGS IS DESCRIBED. CONSTRUCTION PLANS OF THE COMPONENTS ARE GIVEN IN DETAIL.

76-0351 IGT ANNUAL REPORT 1976.
CHICAGO, ILLINOIS, INSTITUTE OF GAS TECHNOLOGY, 1976. 33P.

PROGRAMS OF THE INSTITUTE OF GAS TECHNOLOGY, AFFILIATED WITH THE ILLINOIS INSTITUTE OF TECHNOLOGY IN CHICAGO, FOR 1976 ARE REVIEWED. THE INSTITUTE'S R+D EFFORTS AND ACCOMPLISHMENTS CONCERNING FOSSIL AND NONFOSSIL FUEL RESOURCES, ENERGY SUPPLY, THE HYGAS PROCESS, THE STEAM-IRON PROCESS, ASH AGGLOMERATION, COAL GASIFICATION, OIL SHALE AND PEAT GASIFICATION, PLANNING AND POLICY, ENERGY CONSERVATION, AND PRESERVATION OF THE ENVIRONMENT ARE DISCUSSED. IGT EDUCATIONAL PROGRAMS, FINANCING, AND INFORMATION SERVICES ARE ALSO SUMMARIZED.

76-0352 IGT RESEARCH ON NONFOSSIL FUEL SOURCES.
GAS SCOPE 35(1): 1-8, SPRING 1976.

THE INSTITUTE OF GAS TECHNOLOGY'S RESEARCH INTO FUEL CELLS, HYDROGEN, OCEAN THERMAL ENERGY, AND WIND ENERGY IS REVIEWED. HYDROGEN PRODUCTION, TRANSMISSION, AND USE IN VEHICLES AND APPLIANCES IS DISCUSSED. THE INSTITUTE IS ANALYZING CHEMICAL-ENERGY CARRIERS, SPECIFICALLY GASEOUS AND LIQUID HYDROGEN, AMMONIA, METHANOL, AND SYNTHETIC GASOLINE, FOR OCEAN THERMAL FLOATING PLANTS. INVESTIGATIONS INDICATE THAT A WIND ENERGY SYSTEM USING AVAILABLE COMPONENTS WOULD BE TECHNICALLY FEASIBLE NOW FOR A DAIRY, POULTRY, OR SWINE FARM. BATTERY AND HOT WATER STORAGE WOULD PROVIDE FOR WIND VARIATIONS.

76-0353 IGRA 0
SHROUDS FOR AEROGENERATORS.
AIAA J. 14(10): 1481-1483, OCTOBER 1976.

TO USE WIND POWER EFFICIENTLY, REDUCE THE SIZE OF ROTORS, AND TO INCREASE THE ROTATIONAL SPEEDS, VARIOUS COMBINATIONS OF TURBINES OPERATING INSIDE SPECIALLY DESIGNED SHROUDS COMPOSED OF A BELL-SHAPED INTAKE, A CYCLINDRICAL SECTION, AND A DIFFUSER HAVE BEEN RECENTLY INVESTIGATED. THIS ARTICLE PRESENTS A NEW APPROACH TO SHROUD DESIGN, SUCH THAT GOOD AERODYNAMIC PERFORMANCE IS RETAINED, WHILE THE SHROUD IS MADE MORE ATTRACTIVE ECONOMICALLY.

76-0354 HERMAN S W, CANNON J S
INEXHAUSTIBLE RESOURCES.
ENERGY FUTURES; INDUSTRY AND THE NEW TECHNOLOGIES, BY HERMAN S W AND CANNON J S. NEW YORK, INFORM INC., 1976. P. 17-257.

THIS SECTION, SECTION I, SUMMARIZES INFORMATION ON NONDEPLETABLE RESOURCES OF SOLAR HEATING AND COOLING, SOLAR CELLS, SOLAR THERMAL ELECTRIC CONVERSION, OCEAN THERMAL ELECTRIC CONVERSION, WIND GENERATORS, NUCLEAR FUSION, AND HYDROGEN PRODUCTION. EACH OF THE SEVEN CHAPTERS CONSISTS OF TWO-PARTS--AN OVERVIEW, OR GENERAL INTRODUCTION TO THE STATUS OF THE TECHNOLOGY, FOLLOWED BY FROM 3 TO 34 INDIVIDUAL PROFILES OF COMPANIES' PROJECTS IN THE TECHNOLOGY. THE OVERVIEW SUMMARIZES DATA ON THE TECHNOLOGY, THE ENVIROMENTAL IMPACT, THE HISTORY, OBSTACLES TO THE COMMERCIALIZATION, FEDERAL AND PRIVATE PROGRAMS, AND A BRIEF PROGNOSIS OF THE TECHNOLOGY'S FUTURE.

76-0355 INTERVIEW WITH HERMAN DREES, PRESIDENT, PINSON ENERGY CORP.
WIND POWER DIG. 1(7): 5-13, DECEMBER 1976.

76-0356 JANSEN W A M
HORIZONTAL AXIS FAST RUNNING WIND TURBINES FOR DEVELOPING COUNTRIES.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE FOR WIND ENERGY IN DEVELOPING COUNTRIES, SWD, DHV, CONSULTING ENGINEERS, JUNE 1976. 91P.

THIS REPORT GIVES BRIEFLY THE THEORIES THAT FORM THE BASIS FOR CALCULATION OF THE DESIGN AND THE BEHAVIOUR OF A WINDMILL. A MODIFICATION OF THE PRANDTL MODEL OF TIP LOSSES IS DERIVED. THIS MODIFICATION TAKES THE RELATIVELY HEAVY LOADING OF THE WINDMILL ROTOR INTO ACCOUNT. IT IS ARGUED THAT, IN CONTRAST WITH PROPELLER DESIGN, A MAXIMUM ENERGY EXTRACTION IS REACHED BY ENLARGING THE CHORDS OF THE BLADES NEAR THE TIPS. SELECTION, DESIGN AND CONSTRUCTION OF SEVERAL ROTORS AND OF A TEST UNIT ARE DESCRIBED. TESTS OF STEEL PLATE ROTORS AND SO-CALLED SAIL TROUSER ROTORS ARE DESCRIBED WHILE TEST RESULTS ARE PRESENTED IN THE FORM OF CP-LAMBDA AND CQ-LAMBDA CHARACTERISTICS. FINAL CONCLUSION IS THAT WITH SIMPLE MATERIALS HIGH POWER COEFFICIENTS ARE POSSIBLE.

76-0357 JANSEN W A M
LITERATURE SURVEY, HORIZONTAL AXIS FAST RUNNING WIND TURBINES FOR DEVELOPING COUNTRIES.
AMERSFOORT, THE NETHERLANDS, STEERING COMMITTEE FOR WIND ENERGY IN DEVELOPING COUNTRIES, SWD, DHV, CONSULTING ENGINEERS, MARCH 1976. 43P.

LITERATURE IS EXAMINED ON THE KEYWORDS: ROTOR, AERODYNAMIC PROFILES, TURBINE AERODYNAMICS, PERFORMANCE, DEVELOPING COUNTRIES, SMALL PLANTS. AS A RESULT, SOME STARTING POINTS ARE NOTED FOR RESEARCH ON BEHAVIOUR AND APTITUDE OF FAST RUNNING WIND TURBINES FOR DEVELOPING COUNTRIES.

76-0358 JAYADEV T S
WINDMILLS STAGE A COMEBACK.
IEEE SPECTRUM 13(11): 44-49, NOVEMBER 1976.

THERE IS NEW INTEREST IN THE WIND BECAUSE WIND POWER PLANTS CAN BE CONNECTED DIRECTLY TO THE LOCAL POWER GRID, RESULTING IN AN IMMEDIATE SAVINGS IN FOSSIL FUEL. THERE IS NO NEED FOR A SEPARATE ENERGY-STORAGE FACILITY SO LONG AS THE CONTRIBUTION DERIVED FROM WIND POWER IS SMALL COMPARED WITH THE SYSTEM'S TOTAL CAPACITY. A WIND-ENERGY SYSTEM CONSISTS OF THREE SUBSYSTEMS--AERODYNAMIC, MECHANICAL, AND ELECTRICAL--THAT INTERACT AND INFLUENCE EACH OTHER'S PERFORMANCE. PRESENT-DAY U.S. TECHNOLOGY IS WELL DEVELOPED IN ALL THESE AREAS, BUT THERE REMAINS THE PROBLEM OF FAILURES IN WIND SYSTEMS AT THEIR AERODYNAMIC-STRUCTURAL INTERFACE. RESONANT FREQUENCIES ARE MORE TROUBLESOME IN VARIABLE-SPEED CONSTANT-FREQUENCY (VSCF) SYSTEMS THAN IN CONSTANT-SPEED CONSTANT-FREQUENCY (CSCF) SYSTEMS, BUT THE SPREAD IN VARIABLE SPEED NEED NOT SPAN THE RESONANT FREQUENCIES. FOR EXAMPLE, WITH A 20-30 PERCENT SPEED VARIATION, A DOUBLE-OUTPUT INDUCTION GENERATOR PROVIDES 90 PERCENT OF THE ENERGY THAT COULD BE COLLECTED FROM AN IDEAL VSCF SCHEME.

76-0359 JAYADEV T S, SMITH R T
WIND-POWERED ELECTRIC UTILITY PLANTS.
J. ENG. IND. 98: 293-296, FEBRUARY 1976.

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 WIND ELECTRIC CONVERSION SYSTEMS (WECS).

76-0360 JENSEN B H, CILETTI M D
WIND-SOLAR COUPLED DOMESTIC HEATING SYSTEM.
SOLAR COOLING AND HEATING: A NATIONAL FORUM. SOLAR COOLING AND HEATING FORUM, MIAMI BEACH, FLORIDA, 13 DECEMBER 1976. NTIS, 1976. P. 195-196.
CONF-761220

76-0361 JOPP M
MARTIN ANSWERS.
ALTERN. SOURCES ENERGY NO. 20: 24-25, MARCH 1976; NO. 21: 34-35, JUNE 1976; NO. 22: 32-33, SEPTEMBER 1976; NO. 23: 34-35, DECEMBER 1976.

THIS REGULAR COLUMN IN A.S.E. FEATURES MARTIN JOPP RESPONDING TO LETTERS FROM READERS CONCERNING PROBLEMS WITH WIND GENERATORS.

76-0362 JORDAN P F, GOLDMAN R L
SEGMENTED AND SELF-ADJUSTING WIND TURBINE ROTORS. FINAL REPORT.
NTIS, APRIL 1976. 113P.
COO/2613-2

AN INVESTIGATION WAS CARRIED OUT TO EXAMINE THE USE OF BLADE AEROELASTIC PROPERTIES FOR PROVIDING ROTATIONAL SPEED CONTROL FOR A WIND TURBINE GENERATOR (WTG). THE STUDY WAS SPECIFICALLY DIRECTED AT OBTAINING A ROTOR CONFIGURATION THAT HAS THE CAPABILITY FOR MAINTAINING NEARLY CONSTANT TORQUE AT CONSTANT RPM IN THE PRESENCE OF VARYING WIND CONDITIONS AND IS AIMED AT ELIMINATING THE CURRENT REQUIREMENT FOR MECHANICAL PITCH CHANGE DEVICES. THE APPROACH CONSIDERED IS ONE IN WHICH ROTOR TWIST DUE TO AERODYNAMIC LOADING IS USED TO ADJUST THE BLADE'S PITCH AS THE WIND SPEED CHANGES. THE PRELIMINARY DESIGN CONCEPT THAT HAS EVOLVED IS A FLEXIBLE ROTOR BLADE FORMED FROM A SERIES OF INDIVIDUAL, LIGHT, RIGID SEGMENTS THAT ARE ARRANGED ALONG THE BLADE SPAR. EACH

SEGMENT CAN ROTATE AROUND THE SPAR BUT IS RESTRICTED IN PITCH BY A NONLINEAR MECHANICAL SPRING. THE RESULTS OF PERFORMANCE CALCULATIONS AS WELL AS VIBRATION AND FLUTTER ANALYSES ARE PRESENTED. BASED ON THESE RESULTS, THE CONCEPT APPEARS TO PROVIDE AN ATTRACTIVE SOLUTION TO THE PROBLEM OF WTG OPERATION IN A VARYING WIND FIELD.

76-0363 JOSEPHSON J
ENERGY: THE U.S. AT THE CROSSROADS.
ENV. SCI. TECHNOL. 10(9): 854-859, SEPTEMBER 1976.

A QUICK-FIX TO THE ENERGY PROBLEM IS POSSIBLE THROUGH CONSERVATION MEASURES NORMALLY ASSOCIATED WITH WARTIME AUSTERITY. EFFORTS SHOULD BE ACCELERATED TO BRING RENEWABLE ENERGY RESOURCES TO A STATE OF HIGH TECHNOLOGY. SOLAR ENERGY FOR HEAT AND HOT WATER, AND EVEN FOR COOLING, IS NOW AVAILABLE. SOME ELECTRIC UTILITIES ARE INTERESTED IN WIND ENERGY AND SEVERAL FIRMS CARRY EQUIPMENT FOR HOME, FARM, AND BUSINESS NEEDS. THE CALIFORNIA GEYSERS PROVIDE 502 MW FOR 5 PERCENT OF THE NEEDS OF THE PACIFIC GAS + ELECTRIC CO. HYDROGEN SYSTEMS WERE THE CENTRAL TOPIC OF THE FIRST WORLD HYDROGEN ENERGY CONFERENCE HELD IN MARCH 1976. ADVANCING RENEWABLE ENERGY RESOURCES TECHNOLOGY IS DISCUSSED. THE MAIN THRUST OF ENERGY DEVELOPMENT WILL REMAIN FOSSIL AND NUCLEAR.

76-0364 JUSTUS C G
WIND ENERGY STATISTICS FOR LARGE ARRAYS OF WIND TURBINES (NEW ENGLAND AND CENTRAL U.S. REGIONS). FINAL REPORT.
NTIS, AUGUST 1976. 129P.
PB-260679

THE PERFORMANCE CHARACTERISTICS HAVE BEEN SIMULATED FOR LARGE DISPERSED ARRAYS OF 500 KW-1500 WIND TURBINES PRODUCING POWER AND FEEDING IT DIRECTLY INTO THE UTILITY DISTRIBUTION GRID IN THE NEW ENGLAND-MIDDLE ATLANTIC AND THE CENTRAL U.S. REGIONS. DESPITE COMPARABLE WIND REGIMES IN COASTAL NEW ENGLAND AND IN THE CENTRAL U.S., WIND POWER IS POTENTIALLY CLOSER TO BEING COST-EFFECTIVE AS A FUEL SAVER IN NEW ENGLAND. THIS IS BECAUSE OF THE HEAVY RELIANCE ON EXPENSIVE FUELS IN NEW ENGLAND AS COMPARED WITH THE CENTRAL U.S. AREA. BY ARRAY POWER RETURN TIME ANALYSIS, IT IS ESTIMATED THAT 24 TO 48 HOURS OF STORAGE WOULD INCREASE THE POWER RELIABILITY OF 200 KW PER 1500 KW GENERATOR TO ABOUT 95 PERCENT IN NEW ENGLAND, AND TO BETTER THAN 95 PERCENT IN THE CENTRAL U.S. PRELIMINARY ANALYSIS OF DIURNAL CYCLES OF MONTHLY MEAN WINDS VERSUS TIME OF DAY SHOWS THAT IN BOTH NEW ENGLAND AND THE CENTRAL U.S., THERE IS A STRONG SUMMERTIME AFTERNOON PEAK IN AVAILABLE WIND, WHICH WOULD CORRESPOND TO THE SUMMERTIME PEAK AIR CONDITIONING LOAD. THE APPENDICES INCLUDED IN THIS REPORT ARE: (1) ANALYSIS METHODS; AND (2) SOME ASPECTS OF STATISTICS OF ARRAYS OF WIND TURBINES.

76-0365 KADLEC E G
SYSTEM DESIGN, 17-METER RESEARCH TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.1--II.9.
SAND-76-5586

BRIEFLY DESCRIBED IS THE 17-M RESEARCH TURBINE USED BY SANDIA LABORATORIES TO PROVIDE A TEST BED FOR SYSTEM PERFORMANCE AND RESPONSE AND FOR COMPONENT EVALUATION.

76-0366 KIRSCHBAUM H S, SULZBERGER V T, SOMERS E V
EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION (ABSTRACT).
COMBUSTION 48: 8, JULY 1976.

76-0367 KAPLAN G
PLANNING SOLAR'S FUTURE.
IEEE SPECTR. 13(6): 54-59, JUNE 1976.

EXAMINES THE BUDGETARY AND DEVELOPMENTAL TARGETS OF VARIOUS SOLAR-ELECTRIC TECHNOLOGIES--NAMELY, WIND, PHOTOVOLTAIC, SOLAR-THERMAL, OCEAN-THERMAL, AND SATELLITE POWER GENERATION--IN COMPARISON WITH OTHER TECHNOLOGIES THAT ARE EXPECTED TO CONTRIBUTE SIGNIFICANTLY, IN THE LONG TERM, TO THE GENERATION OF ELECTRIC POWER. THE PRESENT STATUS AND PROBLEMS OF SOME OF THE SOLAR-ELECTRIC TECHNOLOGIES ARE ALSO ADDRESSED.

76-0368 KIRSCHBAUM H S, SOMERS E V, SULZBERGER V T

EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION.
AM. POW. CONF. PROC. 38: 474-483, 1976.

AN EVALUATION OF AN OFFSHORE SITE OFF THE NEW JERSEY SHORE FOR WIND ENERGY GENERATION IS GIVEN. THE SITE POTENTIAL IS DISCUSSED AND A BRIEF ECONOMIC ANALYSIS IS MADE.

76-0369 KING J
A FORECAST FOR SAILING SHIPS.
FUTURES 8(6): 517-524, DECEMBER 1976.

THE INCREASE IN FUEL PRICES HAS SPURRED REEVALUATION OF THE ECONOMIC FEASIBILITY OF WIND-POWERED VESSELS. ADVANCEMENTS IN THE FIELDS OF AERODYNAMICS, NAVAL ARCHITECTURE, CLIMATOLOGY, AND NAUTICAL ENGINEERING HAVE BEEN GENERALLY IGNORED BY COMMERCIAL SHIPPERS AND SHIPBUILDERS BECAUSE OF THE AVAILABILITY OF INEXPENSIVE FUEL. THE DYNASCHIFF CAN COMPETE SATISFACTORILY IN WORLD SHIPPING MARKETS, IF GIVEN THE OPPORTUNITY. THE SHIP'S MASTS AND ASSOCIATED SAILS ARE DESIGNED AS A HIGH-ASPECT RATIO, VERTICAL WING THAT PROVIDES THE SHIP WITH MORE EFFICIENT SAILING QUALITIES TO THE WINDWARD. A "ROTOR-SHIP" HAS VERTICAL CYLINDERS MOUNTED ON ITS DECK THAT ARE ROTATED ABOUT THEIR MAJOR AXES BY SMALL MOTORS, AND THE AIRFLOW AROUND THE ROTATING CYLINDERS CREATES LIFT. STILL, THAT THE TECHNICAL PROBLEMS CAN BE OVERCOME IS SAYING ONE THING, BUT TO PROVIDE THE CONDITIONS THAT WOULD ENCOURAGE THE USE AND DEVELOPMENT OF VIABLE SAILING VESSELS IS ANOTHER OF A DIFFERENT CHARACTER.

76-0370 KIRK J A, STUDER P A, EVANS H E
MECHANICAL CAPACITOR.
NTIS, MARCH 1976. 61P.
N76-20634

A NEW ENERGY STORAGE SYSTEM (THE MECHANICAL CAPACITOR), USING A SPOKELESS MAGNETICALLY LEVITATED COMPOSITE RING ROTOR, IS DESCRIBED AND DESIGN FORMULAS FOR SIZING THE COMPONENTS ARE PRESENTED. THIS NEW SYSTEM IS CONFIGURED AROUND A PERMANENT MAGNET (FLUX BAISED) SUSPENSION WHICH HAS ACTIVE SERVO CONTROL IN THE RADIAL DIRECTION AND PASSIVE CONTROL IN THE AXIAL DIRECTION. THE STORAGE RING IS USED AS A MOVING ROTOR AND ELECTRONIC COMMUTATION OF THE STATIONARY ARMATURE COILS IS PROPOSED. THERE IS NO MECHANICAL CONTACT WITH THE ROTATING SPOKELESS RING; THEREFORE, LONG LIFE AND NEAR ZERO RUNDOWN LOSSES ARE PROJECTED. A 7-KW H SYSTEM IS SIZED TO DEMONSTRATE FEASIBILITY. A LITERATURE REVIEW OF FLYWHEEL ENERGY STORAGE SYSTEMS IS ALSO PRESENTED AND GENERAL FORMULAS ARE DEVELOPED FOR COMPARING ROTOR GEOMETRIES.

76-0371 KIRSCHBAUM H S, SULZBERGER V T, SOMERS E V
EVALUATION OF OFFSHORE SITE FOR WIND ENERGY GENERATION.
IEEE POWER ENG. SOC., TEXT OF "A" PAPER FROM THE SUMMER MEETING, PORTLAND, OREGON, JULY 18-23, 1976. NEW YORK, IEEE, CAT. NO. 76CH1135-3-PWR, 1976. 7P.

AN ANALYSIS OF THE POTENTIAL FOR WIND GENERATION AT AN OFFSHORE SITE IDENTIFIED BY PSE+G OF NEWARK, N.J., INDICATES A POTENTIAL IN EXCESS OF 5700 KWH/KW FOR A 1MW WINDMILL RATED AT 20 MI/H AND 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 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 MUST HAVE BEEN ANALYZED.

76-0372 KLING A
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,506,160/A/, AUGUST 26, 1976. 49P. (IN GERMAN)

THE INVENTION IS CONCERNED WITH A WIND-POWER PLANT WHOSE ROTOR AXIS IS PIVOTED IN THE SUPPORTING STRUCTURE AND SWINGABLE AROUND AN AXIS OF TILT, FORMING AN ANGLE WITH THE ROTOR AXIS AND THE VERTICAL AXIS, AND ALLOWING PRECESSION OF THE ROTOR. ON CHANGES OF WIND DIRECTION AN ELECTRIC POSITIONING DEVICE IS MOVING THE ROTOR AXIS INTO THE NEW DIRECTION IN SUCH A WAY THAT NO PRECESSION FORCES ARE EXERTED ON THE SUPPORTING STRUCTURE AND THIS ONE MAY VERY EASILY BE HELD. INSTEAD OF ONE ROTOR, ALSO A TYPE WITH TWO COAXIAL, CO-PLANAR COUNTERCURRENT ROTORS MAY BE

USED. EACH OF THE TWO COUNTERCURRENT ROTORS IS CARRYING A NUMBER OF MAGNETIC POLES, DISTRIBUTED ALL OVER THE CIRCUMFERENCE, ACTING TOGETHER WITH THE MAGNETIC POLES OF THE OTHER ROTOR. AT LEAST THE POLES OF ONE ROTOR HAVE ELECTRIC LINE WINDINGS BEING CONNECTED BY LEADS WITH A COLLECTOR SO THAT THE TWO ROTORS FORM THE TWO PARTS OF A POWER GENERATOR BEING EACH ROTATABLE WITH RESPECT TO THE OTHER('STATOR' AND 'ROTOR').

76-0373 KNOX J B, HARDY D M, SHERMAN C A, SULLIVAN T J
STATUS REPORT OF LAWRENCE LIVERMORE LABORATORY. WIND ENERGY STUDIES.
NTIS, JUNE 1976. 20P.
VCID-17157-1

NUMERICAL MODEL CALCULATIONS OF THREE-DIMENSIONAL REGIONAL WIND FIELDS ORIENTED TOWARD IDENTIFYING THE LOCATION, INTENSITY AND EXTENT OF WIND ENERGY-RICH AREAS ON OAHU ARE REPORTED. THE USE OF THESE CALCULATIONS IN PLANNING A FIELD DATA-COLLECTION PROGRAM TO STUDY AREAS OF EXPECTED HIGH WIND ENERGY IS DESCRIBED. CRITERIA FOR THE SELECTION OF WIND-ENERGY SUBREGIONS OF PRIMARY INTEREST ARE DISCUSSED.

76-0374 KOCIVAR B
WIND CAR -- LAND SAILOR FOR THE HIGHWAY.
POP. SCI. 209: 102-104, 162, NOVEMBER 1976.

DESCRIBED IS THE WINDMOBILE, A THREE-WHEELED EXPERIMENTAL CAR WHICH RUNS ON THE WIND WITH ELECTRIC MOTORS AS AUXILIARY POWER.

76-0375 KOHL J
ENERGY FROM THE OCEANS: FACT OR FANTASY. REPT. NO. 76-1.
RALEIGH, NORTH CAROLINA, NORTH CAROLINA STATE UNIVERSITY, 1976. 115P.
CONFERENCE ON ENERGY FROM THE OCEANS: FACT OR FANTASY, RALEIGH, NORTH CAROLINA, JANUARY 27, 1976.

76-0376 KORSBECH U
ATOMIC POWER OR WINDMILLS.
INGENIOEREN 2(31): 3-4, 1976. (IN DANISH)

IT IS ARGUED THAT IF THE DANISH MINISTRY OF TRADE'S PLANS FOR NUCLEAR POWER IN THE NINETIES ARE CHANGED TO WINDPOWER, THE PRICE WILL BE 5 TIMES AS HIGH. A THOROUGH ESTIMATION OF THE ECONOMY OF A BIG DANISH WINDPOWER PROGRAM IS GIVEN.

76-0377 LARGEST WINDMILL TO PRODUCE 1.5 MW.
MACH. DES. 48: 6, SEPTEMBER 9, 1976.

76-0378 LAWAND T A, ALWARD R, SAULNIER B, BUDGEN H P, BRUNET E
RURAL ENERGY CENTRE FOR AFRICA USING SOLAR, WIND, AND BIOGAS ENERGIES.
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. 282-309.

A RURAL ENERGY CENTRE UTILIZING SOLAR, WIND AND BIOGAS ENERGIES IN ORDER TO SATISFY THE BASIC ENERGY NEEDS, HAS BEEN DESIGNED FOR A TYPICAL VILLAGE IN SENEGAL. THE PARAMETERS OF SITE SELECTION, AND THE BALANCE BETWEEN THE SUPPLY AND DEMAND FOR ENERGIES ARE DISCUSSED. IN THE CENTRE, ENERGY WILL BE SUPPLIED FOR WATER PUMPING AND POTABILIZATION, COOKING AND SOME LIGHTING. THE ENERGY REQUIRED FOR ECONOMIC FACTORS HAVE BEEN CONSIDERED IN MAKING THE SELECTION OF EQUIPMENT NEEDED. THE CONCEPT OF AN APPROPRIATE TECHNOLOGY APPROACH HAS BEEN FOLLOWED IN UNDERTAKING THE STUDY.

76-0379 LEON H I, GORMAN R, SAWLEY R
SOLAR ENERGY OPTIONS FOR ELECTRIC UTILITIES.
ENGINEERING IN A CHANGING ECONOMY. PROCEEDINGS OF THE SOUTHEAST REGION 3 CONFERENCE, CLEMSON, SOUTH CAROLINA, APRIL 5-7, 1976. NEW YORK, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, 1976. P. 76-78.

FOUR SOLAR ELECTRIC TECHNOLOGIES FOR UTILITIES ARE EXAMINED: SOLAR THERMAL, SOLAR PHOTOVOLTAIC, OCEAN THERMAL, AND WIND CONVERSION. THE TECHNOLOGIES ARE ASSESSED AND COMPARED BY DEFINING A BASELINE OF CONVENTIONAL PLANTS, THE SOLAR ELECTRIC PLANT OBJECTIVES FOR PERFORMANCE, CAPITAL COST AND YEAR OF COMMERCIAL AVAILABILITY, AND A STANDARD SET OF ECONOMIC MEASURES TO CALCULATE BUS BAR COST.

76-0380 MARVIN H H
SOLAR ENERGY AND THE ERDA PLAN FOR RESEARCH, DEVELOPMENT, AND DEMONSTRATION.
ERDA/AGA/NCA/EPRI ENERGY TECHNOLOGY CONFERENCE, 3D, WASHINGTON, D.C., MARCH 29-31, 1976. P. 129-134.

ERDA'S PLANS TO PROMOTE SOLAR ENERGY ARE DISCUSSED. SOLAR HEATING AND COOLING, SOLAR PROCESS HEATING, WIND ENERGY, SOLAR THERMAL CONVERSION, PHOTOVOLTAICS, OCEAN THERMAL ENERGY, AND FUELS FROM BIOMASS ARE CONSIDERED BRIEFLY. NO TECHNOLOGICAL BREAKTHROUGH IS NEEDED TO CONVERT SOLAR ENERGY TO SEVERAL USEFUL FORMS. CAPITAL COSTS ARE NOW SEVERAL TIMES THE COST OF COMPETING ENERGY FORMS--THE MAJOR AIM IS TO LOWER THESE COSTS.

76-0381 LEVY R, MCGINNESS H
WIND POWER PREDICTION MODELS.
NTIS, NOVEMBER 15, 1976. 61P.
N77-12509, NASA-CR-149235

INVESTIGATIONS WERE PERFORMED TO PREDICT THE POWER AVAILABLE FROM THE WIND AT THE GOLDSTONE, CALIFORNIA, ANTENNA SITE COMPLEX. THE BACKGROUND FOR POWER PREDICTION WAS DERIVED FROM A STATISTICAL EVALUATION OF AVAILABLE WIND SPEED DATA RECORDS AT THIS LOCATION AND AT NEARBY LOCATIONS SIMILARILY SITUATED WITHIN THE MOJAVE DESERT. IN ADDITION TO A MODEL FOR POWER PREDICTION OVER RELATIVELY LONG PERIODS OF TIME, AN INTERIM SIMULATION MODEL THAT PRODUCES SAMPLE WIND SPEEDS IS DESCRIBED. THE INTERIM MODEL FURNISHES UNCORRELATED SAMPLE SPEEDS AT HOURLY INTERVALS THAT REPRODUCE THE STATISTICAL WIND DISTRIBUTION AT GOLDSTONE. A STOCHASTIC SIMULATION MODEL TO PROVIDE SPEED SAMPLES REPRESENTATIVE OF BOTH THE STATISTICAL SPEED DISTRIBUTIONS AND CORRELATIONS IS ALSO DISCUSSED.

76-0382 LIGON C, KIRBY G, JORDAN D, LAWRENCE J H, WIESNER W, KISOVEC A, SWANSON R K, SMITH R T, JOHNSON C C, HODSON H O
OPERATIONAL, COST, AND TECHNICAL STUDY OF LARGE WINDPOWER SYSTEMS INTEGRATED WITH AN EXISTING ELECTRIC UTILITY. FINAL REPORT.
NTIS, APRIL 1976. 392P.
COO/2621-2

DETAILED WIND ENERGY ASSESSMENT FROM THE AVAILABLE WIND RECORDS, AND EVALUATION OF THE APPLICATION OF WIND ENERGY SYSTEMS TO AN EXISTING ELECTRIC UTILITY WERE PERFORMED IN AN AREA KNOWN AS THE TEXAS PANHANDLE, ON THE GREAT PLAINS.

76-0383 LINDHAUT A H
NATIONAL PROGRAMME FOR ENERGY INVESTIGATION 1976.
ATOOMENERG. TOEPASS. 18(9): 232-238, SEPTEMBER 1976. (IN DUTCH)

GIVEN IS AN ESTIMATE OF (DUTCH) ENERGY REQUIREMENTS UP TO THE YEAR 2000, SHOWING AN OVERALL INCREASE OF ABOUT 40 PERCENT, REACHING A LEVELLING OFF. THE CONTRIBUTION FROM IMPORTED COAL WILL INCREASE, AND AFTER 1990 THERE WILL BE A SMALL AMOUNT FROM SOLAR AND WIND ENERGY. ATOMIC ENERGY WILL CONTINUE TO INCREASE, BUT WILL ACCOUNT FOR AT MOST 20 PERCENT OF THE TOTAL. NATURAL GAS AND OIL MUST BE IMPORTED. DEVELOPMENT IS CONTINUING ON FAST URANIUM-PLUTONIUM REACTORS, THERMAL URANIUM-THORIUM REACTORS, AND NUCLEAR FUSION. COAL AND NATURAL GAS ARE BEING PROCESSED BEFORE USE (E.G. TRANSFORMED INTO HYDROGEN AND METHANOL RESPECTIVELY).

76-0384 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT, EXECUTIVE SUMMARY, JULY 1975 - AUGUST 1976.
NTIS, 1976. 23P.
COO-2618-1(SUMM.)

THE DECISION TO INTRODUCE A SIGNIFICANT WIND ENERGY CONVERSION SYSTEM (WECS) INTO A UTILITY REQUIRES THAT UTILITY MANAGEMENT CONCLUDE THE SYSTEM IS TECHNICALLY FEASIBLE, ECONOMICALLY VIABLE, AND ENVIRONMENTALLY ACCEPTABLE. UTILITY PLANNERS NEED A METHOD, COMPATIBLE WITH THEIR CURRENT PLANNING METHODS, TO EVALUATE THESE WECS TECHNOLOGY ISSUES. THIS STUDY WAS DIRECTED TOWARD (1) UNDERSTANDING THIS PLANNING/DECISION PROCESS AND (2) DEFINING THE TECHNICAL, FINANCIAL, AND ENVIRONMENTAL ISSUES WHICH MUST BE ADDRESSED BEFORE A LARGE-SCALE APPLICATION OF WECS

AS AN ENERGY ALTERNATE.

76-0385 LINDQUIST O H, MALVER F S
THE APPLICATION OF WIND POWER SYSTEMS TO THE SERVICE AREA OF THE MINNESOTA POWER AND LIGHT COMPANY. FINAL REPORT, JULY 1975 - AUGUST 1976.
NTIS, 1976. 349P.
COO-2618-1

HONEYWELL, IN A JOINT EFFORT WITH MINNESOTA POWER AND LIGHT COMPANY, BOEING VERTOL COMPANY, AND DR. C.G.JUSTUS, GEORGIA INSTITUTE OF TECHNOLOGY, HAS CONDUCTED A REGIONAL APPLICATION STUDY OF WIND ENERGY SYSTEMS. PROOF OF ECONOMIC VIABILITY IS NEEDED TO JUSTIFY THE CAPITAL INVESTMENT TO BUILD A PRACTICAL WIND ENERGY CONVERSION SYSTEM (WECS). THE OBJECTIVES OF THIS STUDY HAVE BEEN 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. MINNESOTA POWER AND LIGHT COMPANY, AN INVESTOR-OWNED COMPANY WITH 853-MW OWNED CAPACITY, HAS SERVED AS THE CASE STUDY SUBJECT UTILITY. AN INITIAL SYSTEM DEFINITION WAS DEVELOPED BASED ON AVAILABLE WIND INFORMATION AND NEAR-TERM WIND TURBINE GENERATOR (WTG) TECHNOLOGY. THE SYSTEM WAS TAILORED TO FIT MP + L'S FORECASTED GENERATION NEEDS AND THE COMPANY'S EXISTING TRANSMISSION AND DISTRIBUTION SYSTEM. HONEYWELL DEVELOPED A WECS SIMULATION TO CONVERT WIND DATA TO WIND ENERGY AVAILABLE FOR INPUT TO THE UTILITY'S GRID. THE SIMULATION WAS USED TO EVALUATE THE PERFORMANCE OF PRELIMINARY DESIGN WIND TURBINE GENERATORS DEVELOPED FOR ERDA/NASA BY THE GENERAL ELECTRIC COMPANY AND KAMAN AEROSPACE CORPORATION, AND TO EVALUATE THE PERFORMANCE OF A WIND TURBINE OPTIMIZED FOR THE NORTHERN MINNESOTA WIND REGIME AND DEVELOPED BY THE BOEING VERTOL COMPANY UNDER SUBCONTRACT TO HONEYWELL. OVERALL EVALUATION OF WECS PERFORMANCE WAS CONDUCTED BY MP + L USING THE COMPANY'S PRODUCTION COSTING AND FINANCIAL PLANNING MODELS.

76-0386 LINDSEY F C
WIND DRIVEN MECHANICAL DRIVE.
U.S. PATENT NO. 3,964,426, JUNE 22, 1976. 4P.

A MECHANICAL DRIVE ACTUATED BY WIND HAS PROPELLERS ROTATABLY MOUNTED ON A VERTICAL STANDARD WHICH IS ROTATABLY FASTENED TO THE DECK OF A SHIP. THE ROTATIONAL FORCE OF THE PROPELLERS IS TRANSMITTED BY A SERIES OF SHAFTS TO DRIVE THE SHIP'S SCREW. THE VERTICAL STANDARD MAY BE ROTATED TO TAKE FULL ADVANTAGE OF THE PREVAILING WINDS.

76-0387 LINGELBACH D D
SIMULATION OF WIND TURBINE GENERATOR SYSTEM POWER FLOW DYNAMICS.
KANSAS STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, MIDWEST POWER SYMPOSIUM, MANHATTAN, KANSAS STATE UNIVERSITY, OCTOBER 6-8, 1976. PAPER. 31P.

THE DYNAMICS OF THE POWER FLOW IN A PARTICULAR WIND TURBINE DRIVING DIFFERENT TYPES OF GENERATORS IS ANALYZED. THE TYPES OF GENERATOR DISCUSSED INCLUDE THE CONVENTIONAL SYNCHRONOUS GENERATOR, THE INDUCTION GENERATOR, AND THE FIELD-MODULATED GENERATOR OPERATING INTO AN ELECTRICAL SYSTEM AND INTO AN ISOLATED PURE RESISTIVE LOAD. THE DISCUSSION IS LIMITED TO THE DYNAMICS OF REAL POWER (WATTS), DISREGARDING PROBLEMS OF REACTIVE POWER FLOW. TO OBTAIN THE DYNAMIC RESPONSE OF THE SYSTEM, APPROXIMATE INCREMENTAL CHANGES IN THE WIND VELOCITY WERE SIMULATED MANUALLY. IT IS SHOWN THAT THE FIELD-MODULATED GENERATOR WITHOUT FEEDBACK SUPPLYING A PURE RESISTIVE LOAD IS ABLE TO EXTRACT MORE ENERGY THAN THE OTHERS FOR VARIABLE WIND VELOCITIES. REGARDLESS OF THE TYPE OF ELECTRICAL GENERATOR USED, A SYSTEM WITH VELOCITY TYPE DAMPING LOSSES SHOULD OPERATE AT A TIP SPEED RATIO BELOW THAT YIELDING MAXIMUM POWER COEFFICIENT IN ORDER TO MAXIMIZE THE ELECTRICAL POWER DEVELOPED.

76-0388 LISSAMAN P B S

WIND ENERGY OVERVIEW.
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE, 11TH, STATELINE, NEVADA, SEPTEMBER 12-17, 1976. PROCEEDINGS. NEW YORK, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, 1976.

WIND ENERGY IS COMPARED WITH AIR TRANSPORTATION, AND IT IS NOTED THAT, IN ITS EARLY DAYS, AIR TRANSPORTATION, ALTHOUGH TECHNICALLY FEASIBLE, APPEARED COMPLETELY NON-COMPETITIVE WITH LONG ESTABLISHED TRADITIONAL

TRANSPORTATION NETWORKS. THIS SITUATION HAS NOW REVERSED, BECAUSE OF THE IMPORTANCE OF THE NON-REPLENISHABLE RESOURCE OF TIME. IT IS SUGGESTED THAT ANOTHER NON-REPLENISHABLE, FOSSIL FUEL, MAY PROVIDE THE SAME DRIVING FORCE FOR COMMERCIALIZATION OF WIND ENERGY. BECAUSE OF THE CURRENT EXTENSIVE AND WIDE RANGING RESEARCH EFFORT IN WIND ENERGY, THESE PROCEEDINGS DO NOT COVER THE ENTIRE WIND PROGRAM. HOWEVER, THEY PROVIDE AN OVERVIEW OF SOME OF THE IMPORTANT TECHNICAL AND ECONOMIC WORK IN PROGRESS.

76-0389 LITTLER J G F
AUTONOMOUS HOUSE EXPERIMENT.
ASPECTS OF ENERGY CONVERSION, PROCEEDINGS OF A SUMMER SCHOOL, LINCOLN COLLEGE, OXFORD, ENGLAND, JULY 14-25, 1975. ELMSFORD, NEW YORK, PERGAMON PRESS, 1976. P. 609-620.

A PROJECT RELYING ON ON-SITE RESOURCES OF ENERGY SUPPLY AT AN ACCEPTABLE PRICE IS DESCRIBED. A PROTOTYPE HOUSE WITH ITS OWN WATER SUPPLY, WASTE DISPOSAL, WIND GENERATOR, AND SOLAR HEATING SYSTEM IS PROPOSED, AND CALCULATIONS ARE PRESENTED.

76-0390 LOAN GUARANTEES FOR SOLAR ENERGY DEMONSTRATIONS.
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY. HEARINGS, 94TH CONGRESS, 1ST SESSION, OCTOBER 7, 1975. WASHINGTON, D.C., GOVT. PRINT. OFFICE, 1976.

HEARINGS WERE HELD TO REVIEW FEDERAL LOAN GUARANTEES FOR SOLAR ENERGY DEMONSTRATIONS, PROPOSED IN SECTION 103 OF THE SENATE VERSION OF H.R.3474, THE ERDA AUTHORIZATION FOR FY 76 AND FOR THE TRANSITION PERIOD. WITNESSES INCLUDED: A SOLAR ENERGY INDUSTRIES ASSN. OFFICER, THE ARIZONA PUBLIC SERVICE CO. PRESIDENT, AND A NATIONAL RURAL ELECTRIC ASSOCIATON COUNSEL. SUMMARIES OF NSF FUNDED STUDIES OF INCENTIVES AND BARRIERS TO SOLAR ENERGY UTILIZATION, ABSTRACTS OF STATE LEGISLATIVE ENACTMENTS OF 1974-75 REGARDING SOLAR ENERGY, AND AN FEA PROJECT INDEPENDENCE REPORT "SOLAR ENERGY" ARE APPENDED.

76-0391 LOTKER M
DESIGN, ECONOMIC AND SYSTEM CONSIDERATIONS OF LARGE WIND-DRIVEN GENERATORS.
IEEE POWER ENGINEERING SOCIETY, WINTER MEETING, JANUARY 1976.

76-0392 LOWERY G W
NEW TECHNOLOGIES IN SOLAR ENERGY CONVERSION - AN OVERVIEW.
TECHNOLOGY FOR THE NEW HORIZON. SPACE CONGRESS, 13TH, COCOA BEACH, FLORIDA, APRIL 7-9, 1976. PROCEEDINGS. 6P.

76-0393 LUTTERVELD R VAN
TOEPASSINGSMOGELIJKHEDEN VOUR ZONNE - EN WINDENERGIE BIJ DE NEDERLANDSE PTT. (POSSSIBLE APPLICATION OF SOLAR AND WIND ENERGY BY THE DUTCH POSTAL AND TELEGRAPH AND TELEPHONE SERVICES).
DR. NEHERLABORATORIUM 1976. 74P.

IN THIS REPORT POSSIBILITIES ARE DISCUSSED TO DIMINISH THE ENERGY CONSUMPTION OF THE DUTCH P.T.T. WIND TURBINES ARE MENTIONED TOGETHER WITH SOLAR CELLS AS A POSSIBLE ENERGY SOURCE FOR TELECOMMUNICATION-EQUIPMENT IN ISOLATED PLACES. REVIEWED ARE DIFFERENT SMALL POWER (UP TO 1KW) WIND MACHINES AND ACTIVITIES IN THIS FIELD CARRIED OUT BY POST-TELEGRAPH SERVICES OF OTHER COUNTRIES (GERMANY, NORWAY, FRANCE, SWITZERLAND AND ITALY). IT IS CONCLUDED THAT WIND ENERGY IS TECHNICALLY AND ECONOMICALLY USABLE FOR PTT SERVICES IN THE NETHERLANDS.

76-0394 MCCALLUM B
CAN CANADA HARNESS THE WIND?
ENG. J. 59: 46-48, SEPTEMBER 1976.

CANADA'S OPTIONS FOR WIND POWER AND NEW DEVELOPMENTS IN WIND POWER GENERATOR (WPG) TECHNOLOGY ARE DISCUSSED. BATTERIES FOR POWER STORAGE ACCOUNT FOR ABOUT 50 PERCENT OF SYSTEMS COSTS, REQUIRE MAINTENANCE AND POSSIBLY BACKUP FROM A CONVENTIONAL GENERATOR IN SLACK-WIND PERIODS. A POWER CONVERSION UNIT DEVELOPED BY WINDWORKS MAKES IT POSSIBLE TO DO WITHOUT BATTERIES AND TO CONVERT VARIABLE CURRENT FROM A WPG TO 60-CYCLE AC SO THAT LOAD CAN BE SHARED WITH THE LOCAL POWER GRID AND EXCESS WIND-GENERATED POWER CAN BE FED INTO THE GRID. POSSIBILITIES OF ACCOMMODATING LARGER WPG INTO SUCH A SETUP ARE GOOD, AND THE OUTLOOK FOR

WPG ON THE ORDER OF 10 KW TO 100 KW IS EXAMINED, PARTICULARLY OFFSHORE WPG. BRIEF DATA ARE PROVIDED ON CANADA'S WINDIEST REGIONS BEST SUITED TO WPG USE. THE HERONEMUS PLAN FOR LARGE WPG ON THE GREAT LAKES AND WESTERN GREAT PLAINS, WITH ELECTROLYTICALLY RECOVERED HYDROGEN AS SECONDARY PRODUCT, IS MENTIONED.

76-0395 MCCORMACK M M
PROTECTING THE ENVIRONMENT.
ENCYCLOPEDIA OF ENERGY, D.N. LAPEDES, ED. NEW YORK, MCGRAW HILL BOOK CO., 1976. P. 49-55.

THE ENVIRONMENTAL IMPACTS OF PRODUCING AND UTILIZING FOSSIL AND NUCLEAR FUELS ARE INVESTIGATED. THE MEASURES APPLIED FOR KEEPING THESE IMPACTS WITHIN SOCIALLY ACCEPTABLE LIMITS AND MAJOR LEGISLATIVE APPROACHES TO THIS END ARE EXAMINED. THE EFFECTS OF PRODUCING COAL, OIL, NATURAL GAS, URANIUM, OIL SHALE, TAR SANDS, AND GEOTHERMAL ENERGY ARE SPECIFICALLY INVESTIGATED. HEAT ENERGY FROM THESE SOURCES CAN BE USED DIRECTLY AS PROCESS HEAT BY INDUSTRY TO HEAT AND COOL BUILDINGS OR FOR CONVERSION INTO ELECTRICAL AND MECHANICAL ENERGY. COMMON TO ALL OF THESE USES ARE THE ENVIRONMENTAL EFFECTS FROM BURNING OF FOSSIL FUELS OR THE FISSIONING OF URANIUM. THE ENVIRONMENTAL ASPECTS OF THE CONVERSION OF HEAT INTO MECHANICAL ENERGY AND ELECTRICITY ARE REVIEWED. THE ENVIRONMENTAL IMPACTS OF HYDRO POWER, TIDAL POWER, SOLAR POWER, AND WIND POWER ARE DISCUSSED BRIEFLY. MEASURES TO CONTROL AIR QUALITY, WATER QUALITY, LAND POLLUTION, STRIP MINING, AND NUCLEAR POWER ARE NOT WITHOUT IMPACTS OF THEIR OWN IN TERMS OF COST, JOBS, OR RESOURCES. THE AUTHOR CONCLUDES THAT THE PROBLEM IS TO BALANCE SOCIETY'S NEED FOR ENERGY AGAINST THE NEED FOR A LIVABLE ENVIRONMENT, AT THE SAME TIME GIVING APPROPRIATE ATTENTION TO IMPORTANT ECONOMIC, TECHNICAL, AND SOCIAL FACTORS.

76-0396 MCCORMICK M E
OVERVIEW OF THE OCEANS AS ENERGY SOURCES.
ENERGY FROM THE OCEANS: FACT OR FANTASY. REP. NO 76-1. RALEIGH, NORTH CAROLINA, NORTH CAROLINA STATE UNIVERSITY, 1976. P. 1-4.

AN OVERVIEW OF RENEWABLE OCEAN ENERGY RESOURCES IS PRESENTED, INCLUDING WAVES, TIDES, CURRENTS, SALINITY GRADIENTS AND THERMAL GRADIENTS, ALONG WITH THE UTILIZATION OF OCEAN COOLNESS AND THE USE OF THE OCEAN AS "REAL ESTATE" FOR THE CONVERSION OF SOLAR RADIATION AND WIND ENERGY.

76-0397 MAGNUS FORCE HARNESSED.
WIND POWER DIG. 1(6): 23, SEPTEMBER 1976.

DESCRIBED IS A PROTOTYPE MAGNUS FORCE WINDROTOR DEVELOPED AT THE UNIVERSITY OF MISSOURI.

76-0398 MAILE L H J
COMMERCIAL VERTICAL AXIS WIND TURBINES.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.28--III.38.
SAND-76-5586

RESEARCH AND DEVELOPMENT ACTIVITIES WITH VERTICAL AXIS WIND TURBINES (VAWT) OVER THE PAST TWO AND A HALF YEARS ARE REVIEWED. COMMERCIALLY AVAILABLE, "OFF THE SHELF", WIND TURBINES ARE DESCRIBED. SOME PRODUCTION AND DESIGN CONSIDERATIONS ARE PRESENTED.

76-0399 MALZAHN E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,410,802/A/, SEPTEMBER 18, 1975. 7P. (IN GERMAN)

A WIND TURBINE IS DISCLOSED WHICH CONSISTS OF A ROTATING DRUM CARRIED IN BALL BEARINGS AND ADJUSTABLE TO THE WIND DIRECTION BY MEANS OF A VERTICAL CONTROL SURFACE ATTACHED TO CONNECTING RODS LEADING TO THE DRUM. THE DRUM HAS AN AXIAL WIND INLET OPENING. TWO AXIAL GUIDE PLATES ARE CONNECTED TO THE BASE PLATE AND THE DRUM ON BOTH SIDES OF THIS OPENING; THEY SERVE AS CONTROL DEVICES FOR THE WIND ENTERING THE DRUM. OPPOSITE TO THE WIND INLET OPENING IN THE DRUM, THERE IS ANOTHER OPENING FOR REMOVING THE WIND TO THE BACK. THE DRUM AND THE TWO SHEET STEEL WALLS ON ITS SIDES ARE COVERED BY A PLATE IN ORDER TO FULLY UTILIZE THE WIND ENTERING THE DRUM.

76-0400 MARCUS S
HERE COMES THE WIND.
ENV. ACTION 8(3): 3-7, JUNE 5, 1976.

BOSTON WIND, FOUNDED IN JULY 1975 AS THE ONLY ALTERNATIVE ENERGY CENTER IN BOSTON, BELIEVES THAT INDIVIDUAL SELF-SUFFICIENCY IS THE MOST SENSIBLE GOAL FOR ENERGY PRODUCTION. DESPITE THE PAST PROVED PERFORMANCE OF WIND MILLS, WIND ENERGY BECAME OBSOLETE DURING THE 1930'S-40'S BECAUSE OF THE EASY ACCESSIBILITY OF FOSSIL FUELED ELECTRIC POWER. BUT AS THE SUPPLY OF FOSSIL FUELS DWINDLE AND THEIR PRICES INCREASE, A RETURN TO WIND POWER GENERATION BECOMES MORE ATTRACTIVE TO INDIVIDUAL CONSUMERS. WIND ENERGY IS ACTUALLY SOLAR ENERGY IN KINETIC FORM, AND A MILL TO GATHER THIS ENERGY IS SIMPLE TO BUILD, ACCORDING TO BOSTON WIND. WHILE WIND POWER BY ITSELF IS NOT A PANACEA, IF INTEGRATED WITH OTHER ENLIGHTENED TECHNOLOGIES, WIND MILLS COULD HELP PROVIDE A HIGH QUALITY, LONG LASTING ANSWER TO MANY ENERGY NEEDS TO THE NORTHEAST.

76-0401 MAUGHMER M D
OPTIMIZATION AND CHARACTERISTICS OF A SAILWING WINDMILL ROTOR. FINAL REPORT. FEBRUARY 1, 1975 -- JANUARY 31, 1976.
NTIS, MARCH 1976. 90P.
PB-259898

WITHIN THIS FOURTH AND FINAL QUARTER PROGRESS REPORT ARE COMPREHENSIVELY DISCUSSED ALL OF THE RESEARCH EFFORTS UNDERTAKEN BY THE PRINCETON WINDMILL GROUP OVER THE PAST YEAR. THIS INCLUDES A DETAILED ACCOUNTING OF THE DEVELOPMENT AND OPERATIONAL TECHNIQUES OF THE PRINCETON MOVING-VEHICLE WINDMILL TESTING FACILITY. ALSO PRESENTED IS A COMPLETE DOCUMENTATION OF THE PERFORMANCE BUILD-UP (DP(MAX) = .06 TO CP(MAX) = .40) OF A 12 FT. DIAMETER, TWO-BLADED SAILWING ROTOR. THIS REPORT FURTHER INCLUDES AN EXAMINATION OF AN EXPLORATORY RESEARCH EFFORT DIRECTED TOWARD USING A SMALL, FIRST-STAGE, COAXIAL ROTOR TO AUGMENT WINDMILL PERFORMANCE. FINALLY CONSIDERED ARE THE RESULTS AND CONCLUSIONS OF AN EXTENSIVE WIND-TUNNEL TEST PROGRAM AIMED AT A QUANTITATIVE DETERMINATION OF THE AERODYNAMIC PENALTIES ASSOCIATED WITH NUMEROUS SIMPLIFICATIONS OF THE BASIC DOUBLE-MEMBRANED SAILWING CROSS-SECTION.

76-0402 MELISS M
ENERGIEQUELLEN FUER MORGEN. NICHTNUKLEARENICHTOSSILE PRIMAERENERGIEQUELLEN. T. I. ZUKUENFTIGE ENERGIEBEDARFSDECKUNG UND DIE BEGEUTUNG DER NICHTFOSSILEN UND NICHTNUKLEAREN PRIMAERENERGIEQUELLEN. (ENERGY SOURCES FOR TOMORROW. NON-NUCLEAR-NON-FOSSIL PRIMARY ENERGY CARRIERS. PT. 1. MEETING THE ENERGY DEMAND IN THE FUTURE AND THE IMPORTANCE OF NON-FOSSIL AND NON-NUCLEAR PRIMARY ENERGY CARRIERS).
FRANKFURT AM MAIN, GERMANY F.R., UMSCHAU VERLAG, 1976. 85P. (IN GERMAN)

IN THE STUDY IN QUESTION, THE REGENERATIVE PRIMARY ENERGY SOURCES, SOLAR ENERGY, WIND, TIDAL POWER, GEOTHERMAL POWER AND HYDRO-ELECTRIC POWER ARE EXAMINED. THE THEORETICAL, TECHNICAL AND ECONOMICAL POTENTIALS OF THESE PRIMARY ENERGY SOURCES FOR A FUTURE ENERGY SUPPLY NOT ONLY IN THE WORLD BUT ALSO IN THE FEDERAL REPUBLIC OF GERMANY, ARE ANALYZED IN PARTICULAR. IN THIS CONTEXT, THE STATE OF TECHNOLOGY AND THE FUTURE DEVELOPMENT POSSIBILITIES OF THE UTILISATION TECHNOLOGIES OF THESE PRIMARY ENERGY SOURCES ARE DESCRIBED, AND SUGGESTIONS ARE MADE FOR A PROGRAMME PROMOTING FURTHER DEVELOPMENT AND INTRODUCTION INTO THE MARKET.

76-0403 MELISS M
ENERGIEQUELLEN FUER MORGEN. NICHTNUKLEARENICHTFOSSILE PRIMAERENERGIEQUELLEN. T. 3. NUTZUNG DER WINDENERGIE. (ENERGY SOURCES FOR TOMORROW. NON-NUCLEAR-NON-FOSSIL PRIMARY ENERGY CARRIERS. PT. 3. UTILIZATION OF WIND ENERGY).
FRANKFURT AM MAIN, GERMANY F.R., UMSCHAU VERLAG, 1976. 201P. (IN GERMAN)

THE 3RD PART OF THE PROGRAMME STUDY "NON-NUCLEAR-NON-FOSSIL PRIMARY ENERGY SOURCES" SUPPORTED BY BMFT EVALUATES THE POSSIBLE WINNING OF ENERGY FROM THE WIND AND THEN DEALS WITH THE WAYS TO OBTAIN MEASURING DATA OF THE WIND. THE STUDY IS GLOBAL, RELATED TO EUROPE AND ESPECIALLY TO THE FRG. IN THE FOLLOWING CHAPTERS 1) THE HISTORICAL DEVELOPMENT OF THE WIND ENERGY CONVERTERS IS EXPLAINED; 2) FREE-DRIVING AND WIND TURBINES WITH A SHELL AND THEIR POWER VALUES ARE DISCUSSED; 3) THE ADVANTAGES AND DISADVANTAGES OF SEVERAL WIND TURBINES AND ROTORS ARE COMPARED; 4) THE PRESENT LEVEL OF TECHNOLOGY IS EXPLAINED AND THE FUTURE

POSSIBLE DEVELOPMENT OF THE WIND CONVERTERS IS ESTIMATED. THE CALCULATION OF THE CONVERSION EFFICIENCY, THE AVAILABILITY OF SECONDARY ENERGY AND THE TECHNICALLY UTILIZED WIND ENERGY POTENTIAL IS BASED ON THE TWO-WING WIND CONVERTER WITH HORIZONTAL AXIS. FUNDAMENTALS ARE WIND ENERGY UTILIZATION SYSTEMS OF 3 MW AND 1 MW AND SMALL SYSTEMS. RELATIVELY BRIEFLY EXPLAINED ARE WAYS TO STORE THE SECONDARY ENERGY PRODUCED. ELECTRO-CHEMICAL, HEAT- AND PUMP STORAGES AND PRESSURE-AIR-STORAGE GAS TURBINES ARE DISCUSSED. THE CHAPTER "ASPECTS OF UTILIZATION" SHOWS BRIEFLY ENVIRONMENTAL EFFECTS AND ASPECTS OF SECURITY AND THEN DEALS WITH COST DETERMINATION FOR SYSTEMS OF DIFFERENT POWER AND WITH THE COSTS NECESSARY FOR RESEARCH AND DEVELOPMENT. THE REPORT ENDS WITH RECOMMENDATIONS AND PROPOSALS FOR RESEARCH AND DEVELOPMENT.

76-0404 MELISS M
ENERGY SOURCES FOR TOMORROW. TRANSLATED FROM A GERMAN PAPER.
NTIS, 1976. 17P.
ERDA-TR-226

THE REGENERATIVE SOURCES OF SOLAR ENERGY, WIND ENERGY FROM THE SEAS, EARTH HEAT, AND RUNNING WATER WERE INVESTIGATED BY A CONSORTIUM OF MAJOR RESEARCH INSTALLATIONS. THE SOURCES WERE ASSESSED FIRST ON A GLOBAL BASIS, THEN MORE SPECIFICALLY FOR THE GERMAN FEDERAL REPUBLIC. THIS PAPER SUMMARIZES RESULTS FROM THE COMPLETE STUDY, BUT IS DEVOTED MOSTLY TO AN ANALYSIS OF UTILIZATION OF WIND ENERGY, USING THE FOLLOWING TOPICS: PHYSICAL BASES AND THEORETICAL POTENTIAL, WIND ENERGY INSTALLATIONS AND TECHNICALLY USEFUL POTENTIAL, UTILITY ASPECTS, AND RECOMMENDATIONS FOR RESEARCH AND DEVELOPMENT WORK.

76-0405 MERONEY R N, SANDBORN V A, BOUWMEESTER R J B, RIDER M A
SITES FOR WIND POWER INSTALLATIONS: WIND TUNNEL SIMULATION OF THE INFLUENCE OF TWO-DIMENSIONAL RIDGES ON WIND SPEED AND TURBULENCE--TABULATED EXPERIMENTAL DATA. PROGRESS REPORT FOR THE PERIOD JUNE--NOVEMBER 1976.
COLORADO STATE UNIVERSITY, CIVIL ENGINEERING DEPARTMENT,
CER76-77RNM-VAS-RB-MAR29, DECEMBER 1976. 69P. ALSO NTIS, DECEMBER 1976. 70P.
RLO/2438-76/1

IN THE SECOND PART OF THE REPORT ON THE WIND FIELD DEVELOPED OVER TWO DIMENSIONAL MODEL HILLS EXPERIMENTAL DATA ARE PRESENTED IN TABULAR FORM. FOR THE INITIAL INTERPRETATION OF THE LARGE QUANTITY OF DATA THE FIRST ANNUAL REPORT SHOULD BE CONSULTED (ERDA/NSF-00702/75/T1). THE OBJECTIVE OF THIS RESEARCH WAS TO INCREASE TECHNICAL CAPACITY TO LOCATE FAVORABLE WIND SYSTEM SITES, REDUCE UNCERTAINTY IN THE PREDICTION OR VALIDATION OF THE CHARACTERISTICS OF SITES, AND THUS ASSIST IN THE SIZING AND PERFORMANCE PREDICTION OF WIND SYSTEMS. THE RESEARCH INCLUDED EVALUATION OF LOW SPEED AERODYNAMICS OVER TERRAIN AND BOUNDARY FLOW CONDITIONS OVER RIDGES BY MEANS OF WIND TUNNEL MODELING. MEASUREMENTS REPORTED HEREIN HAVE BEEN COMPLETED OVER TRIANGULAR AND SINUSOIDAL SHAPE HILLS OF WIND SPEED, STATIC PRESSURE VARIATION, AND TURBULENCE INTENSITY. HILL ASPECT RATIOS STUDIED RANGE FROM 1/2 TO 1/6 WITH SOME DATA AVAILABLE AT 1/20.

76-0406 MERONEY R N, SANDBORN V A, BOUWMEESTER R J B, RIDER M A
SITES FOR WIND POWER INSTALLATIONS: WIND TUNNEL SIMULATION OF THE INFLUENCE OF TWO-DIMENSIONAL RIDGES ON WIND SPEED AND TURBULENCE. ANNUAL REPORT: FIRST YEAR.
COLORADO STATE UNIVERSITY, CIVIL ENGINEERING DEPARTMENT,
CER76-77-RNM-VAS-RB-MAR5, JULY 1976. ALSO NTIS, JULY 1976. 88P.
ERDA/NSF/00702-75/1

THE OBJECTIVE OF THIS RESEARCH WAS TO INCREASE TECHNICAL CAPACITY TO LOCATE FAVORABLE WIND SYSTEM SITES, REDUCE UNCERTAINTY IN THE PREDICTION OR VALIDATION OF THE CHARACTERISTICS OF SITES, AND THUS ASSIST IN THE SIZING AND PERFORMANCE PREDICTION OF WIND SYSTEMS. THE RESEARCH INCLUDED EVALUATION OF LOW SPEED AERODYNAMICS OVER TERRAIN AND BOUNDARY FLOW CONDITIONS OVER RIDGES BY MEANS OF WIND TUNNEL MODELING.

76-0407 MIDDLETON P, ARGUE R, ARGUE R, BURRELL T, HATHAWAY G
CANADA'S RENEWABLE ENERGY RESOURCES: AN ASSESSMENT OF POTENTIAL.
NTIS, APRIL 1976. 528P.
N78-13588

RISING COSTS OF CONVENTIONAL, FRONTIER, AND NUCLEAR ENERGY PRODUCTION AND

THE PROSPECT OF FUTURE SHORTAGES HAVE PROMPTED A RESURGENCE OF INTEREST IN ALTERNATIVE, RENEWABLE ENERGY TECHNOLOGIES. PRINCIPAL SOURCES OF RENEWABLE ENERGY (SOLAR RADIATION, WIND, AND BIOMASS), AS WELL AS WAVES, THERMAL GRADIENTS, AND SENSIBLE HEAT SOURCES ARE REVIEWED TO ESTABLISH, IN GENERAL TERMS, THEIR SIGNIFICANCE IN THE CANADIAN CONTEXT. NEXT, THE TECHNICAL CHARACTERISTICS, EFFICIENCY, COSTS, IMPACTS, AND STATE OF THE ART OF SIXTEEN HARNESSING OR CONVERSION TECHNOLOGIES ARE PRESENTED AS AN INFORMATION BASE UPON WHICH TO BUILD AN ASSESSMENT OF POTENTIAL. A METHOD OF COMPARING THE LIFE COST OF A RENEWABLE ENERGY SYSTEM TO THAT OF THE LIKELY CONVENTIONAL ALTERNATIVE IS PROPOSED AND APPLIED IN CASES WHERE ADEQUATE TECHNICAL AND ECONOMIC DATA ARE AVAILABLE.

76-0408 MIERNIK M
IMPACTS OF ALTERNATIVE ENERGY SYSTEMS: A CRITICAL LOOK.
NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY. CONFERENCE AND EXHIBITION OF THE NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1ST, AMHERST, MASSACHUSETTS, JUNE 24, 1976. SHAW, E., ED. TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. P. 73-79.

THIS PAPER POINTS OUT SOME HAZARDS OF ALTERNATIVE ENERGY SYSTEMS. THE PROBLEMS ENCOUNTERED IN UTILIZING SOLAR ENERGY CONVERSION SYSTEMS ARE VARIED-INCLUDING SUCH AREAS AS BUILDING CONSTRUCTION, ACCESS TO SUNLIGHT, ZONING, AND TRANSFERABLE DEVELOPMENT RIGHTS. SOLAR HEATING AND COOLING AND DIRECT CONVERSION TO POWER BY THERMAL AND PHOTOVOLTAIC MEANS ARE SPECIFICALLY DISCUSSED. ENVIRONMENTAL PROBLEMS ENCOUNTERED WHEN UTILIZING WIND POWER AND OCEAN THERMAL GRADIENTS TO GENERATE POWER ARE SUMMARIZED. OWNERSHIP OF THESE RESOURCES IS EXAMINED.

76-0409 MILLER R H, MARTINEZ-SANCHEZ M, DUGUNDJI J, LARRABEE E E, CHOPRA I
WIND ENERGY CONVERSION.
NTIS, OCTOBER 1976. 431P.
PB-268718

AN INVESTIGATION IS MADE OF VARIOUS PROBLEMS ASSOCIATED WITH THE DESIGN OF HORIZONTAL AXIS, LOW SOLIDITY, HIGH PERFORMANCE WIND TURBINES. THE REPORT DEALS WITH THE FOLLOWING TOPICS: (A) WIND TURBINE PERFORMANCE AS DETERMINED FROM VARIOUS ELEMENTARY AND MORE REFINED MOMENTUM THEORIES; (B) PERFORMANCE TRADE-OFFS BETWEEN CONSTANT RPM AND CONSTANT VELOCITY RATIO OPERATION; (C) AERODYNAMIC VORTEX THEORIES FOR BLADE LOADINGS INCLUDING UNSTEADY EFFECTS AND WIND SHEAR VELOCITY GRADIENTS; (D)CONTROL DYNAMICS OF A SYNCHRONOUS ALTERNATOR-WIND TURBINE SYSTEM; (E) LINEAR AEROELASTIC STABILITY STUDIES OF ROTOR BLADES IN THE PRESENCE OF MODERATE INITIAL CONING ANGLES; (F) NONLINEAR DYNAMIC RESPONSE OF ROTOR BLADES INCLUDING GRAVITY AND WIND SHEAR EXCITATION; (G) AN EXPERIMENTAL INVESTIGATION OF A .914 M (3 FT) DIAMETER, 2 BLADED WIND TURBINE PLACED IN A WIND TUNNEL.

76-0410 MINARDI J E, LAWSON M O, WILLIAMS G
ELECTROFLUID DYNAMIC (EFD) WIND DRIVEN GENERATOR. FINAL REPORT.
NTIS, OCTOBER 1976. 84P.
COO/4130--77/1

THE EFD WIND DRIVEN GENERATOR DIRECTLY CONVERTS WIND ENERGY TO ELECTRICAL ENERGY WITHOUT MOVING PARTS EXCEPT, POSSIBLY, FOR DIRECTING IT INTO THE WIND. ADVANTAGES OF THE EFD WIND DRIVEN GENERATOR ARE: THERE ARE NO FUNDAMENTAL REASONS TO RESTRICT THE SIZE, AND THUS ECONOMICS OF SCALE CAN BE REALIZED; ALL PROBLEMS OF PITCH CONTROL, BEARINGS, TRANSMISSIONS, GENERATOR DESIGN, AND MATCHING OF GENERATOR CHARACTERISTICS TO WIND ROTOR CHARACTERISTICS ARE AVOIDED IN THE EFD SINCE IT IS A DIRECT ENERGY CONVERSION DEVICE. THE TECHNICAL AND ECONOMIC IMPACT OF THE EFD WIND DRIVEN GENERATOR ON WIND ENERGY SYSTEMS IS POTENTIALLY VERY FAVORABLE. THEORETICAL ANALYSIS PREDICTS FAVORABLE PERFORMANCE CHARACTERISTICS FOR THE EFD WIND GENERATOR; HOWEVER, DETAILED EXPERIMENTAL DATA HAVE BEEN LACKING ON THE ACTUAL PERFORMANCE OF SUCH GENERATORS. THEREFORE, THE FIRST YEAR OF RESEARCH ON EFD WIND DRIVEN GENERATORS WAS DESIGNED TO INCLUDE EXPERIMENTS ON AN EFD WIND DRIVEN GENERATOR TEST RIG, AS WELL AS THEORETICAL STUDIES OF SUITABLE GENERATOR CONFIGURATIONS. PRESENTED IS A THEORETICAL ANALYSIS OF THE EFD WIND DRIVEN GENERATOR, INCLUDING A COMPUTER STUDY OF ELECTRIC FIELD GEOMETRY AND AN ANALYSIS OF CHARGED COLLOID PRODUCTION REQUIREMENTS. ALSO DESCRIBED IS EXPERIMENTAL DATA OBTAINED WITH THE EFD TEST RIG AND A SMALL WIND TUNNEL DESIGNED AND BUILT FOR THIS PROGRAM. FUTURE PLANS ARE ALSO DETAILED.

76-0411 MOMENT R L
SYSTEMS DEVELOPMENT AND TEST CENTER ACTIVITIES IN THE WIND SYSTEMS PROGRAM AT ROCKY FLATS.
NTIS, 1976. 5P.
RFP-2698

A TEST CENTER HAS BEEN ESTABLISHED WITH 12 MACHINE TOWERS OF VARYING DESCRIPTIONS AND EIGHT WTGS ERECTED TO DATE. ADDITIONALLY, TWO LARGE AND THREE SMALL METEOROLOGICAL TOWERS HAVE BEEN INSTALLED AS WELL AS A SMALL IRRIGATION SYSTEM, TYPICAL OF THE TYPE COMMONLY USED THROUGHOUT THE COUNTRY. EXPERIENCE WITH THESE MACHINES HAS REVEALED A NUMBER OF OPERATIONAL PROBLEMS, BUT HAS RESULTED IN HARDWARE MODIFICATIONS BY MANUFACTURERS. THE OTHER MAIN AREA OF EFFORT HAS BEEN TO SOLICIT AND EVALUATE PROPOSALS FOR DEVELOPMENT OF 8 KW, 40 KW, AND HIGH RELIABILITY SWECS.

76-0412 MOSEY D
POWER FROM HYPERION'S GRANDCHILDREN.
SCI. DIMENSION 8(5): 14-20, 1976.

THE PRACTICABILITY OF EXPLOITING WIND ENERGY TO AUGMENT CANADA'S ENERGY SUPPLIES IN SELECTED AREAS IS EXAMINED WITH REFERENCE TO WINDMILL DESIGN, AVAILABLE WIND POWER, PRODUCTIVITY, COSTS, AND OTHER RELEVANT PARAMETERS. CURRENT RESEARCH UNDER THE NATIONAL RESEARCH COUNCIL INCLUDES A BROAD RANGE OF ECONOMIC AND ENGINEERING ASPECTS OF HIGH-GRADE WIND ENERGY. ADVANTAGES OF THE VERTICAL AXIS TURBINE WIND GENERATOR ARE OUTLINED, NOTING THAT POWER PRODUCTION OF THE TURBINE INSTALLATION AT THE MAGDALEN ISLANDS SITE (AVERAGE WIND SPEED 32 KM/HR) CAN BE ESTIMATED AT ABOUT 70 KW YEAR-ROUND WITH A CAPITAL COST PER KILOWATT OF APPROXIMATELY $1400, A RELATIVELY HIGH FIGURE, BUT SUITABLE FOR THE SITE, WHERE FUEL COSTS ARE VERY LARGE. ADVANTAGES AND DISADVANTAGES OF THE SEVERAL TYPES OF WINDMILLS-CONVENTIONAL, CONSTANT SPEED VERTICAL AXIS, HORIZONTAL AXIS, ETC.-ARE DISCUSSED AND ILLUSTRATED. MIXING POWER FROM WIND GENERATORS WITH THAT FROM CONVENTIONAL DIESEL UNITS OFFERS PROMISING POSSIBILITIES FOR THE SOLUTION OF BASE AND PEAK LOAD DEMANDS. DETAILED INFORMATION ON WIND CONDITIONS AND SPEED PROBABILITY DISTRIBUTIONS OVER LARGE AREAS FOR EACH MONTH OF A 3-YR PERIOD ARE REQUIRED BEFORE REASONABLY ACCURATE ESTIMATES OF WIND ENERGY AVAILABILITY CAN BE ATTEMPTED. ENVIRONMENTAL ASPECTS - OBTRUSIVENESS OF THE STRUCTURES ON A LANDSCAPE - MUST NOT BE DISREGARDED. PHOTOGRAPHS, CHARTS, AND TABLES AUGMENT THE TEXT.

76-0413 MUSGROVE P J
VARIABLE GEOMETRY VERTICAL AXIS WINDMILL.
ENERGY DIG. 5(6): 10-11, DECEMBER 1976.

THE VGVAW OPERATES AERODYNAMICALLY IN EXACTLY THE SAME WAY AS THE DARRIEUS WINDMILL, BUT HAS STRAIGHT BLADES ATTACHED TO A HORIZONTAL CROSS-ARM. IF THE BLADES ARE RIGIDLY ATTACHED TO THE CROSS-ARM, BENDING STRESSES IN HIGH WIND SPEEDS BECOME EXCESSIVE, AND CROSS-BRACING BETWEEN THE BLADES, THOUGH POSSIBLE, IS IMPRACTICAL. IN THE VGVAW EXCESSIVE BLADE STRESSES ARE AVOIDED BY ATTACHING THE BLADES TO THE CROSS-ARM VIA A HINGE. AT LOW ROTATIONAL SPEEDS, CORRESPONDING TO LOW WIND SPEEDS, THE BLADES ARE KEPT IN THE UPRIGHT POSITION, AGAINST HINGE STOPS, BY TENSION IN THE TIE-WIRES. THESE TIE-WIRES, ATTACHED TO THE UPPER PART OF EACH BLADE, ARE CONNECTED TO A SINGLE VERTICAL EXTENSION SPRING HOUSED WITHIN THE INNER, TUBULAR, WINDMILL DRIVE SHAFT. TYPICALLY THE SPRING RATE AND PRE-TENSION ARE ADJUSTED SO THAT WHEN THE WIND SPEED IS LESS THAN ABOUT 5 M/S THE MOMENT ABOUT THE HINGE DUE TO THE TIE-WIRE TENSION EXCEEDS THE MOMENT ABOUT THE HINGE DUE TO BLADE CENTRIFUGAL FORCES. UP TO THIS SPEED, WHICH IS APPROXIMATELY THE ANNUAL AVERAGE WIND SPEED OVER THE ULK., THE BLADES THEREFORE REMAIN UPRIGHT AND GIVE MAXIMUM AERODYNAMIC EFFICIENCY. WHEN THE WIND SPEED INCREASES, THE ROTATIONAL SPEED OF THE WINDMILL ALSO INCREASES, AND THE RESULTING INCREASED CENTRIFUGAL FORCES MAKE THE BLADES INCLINE OUTWARDS. THE PROTOTYPE VGVAW HAS A DIAMETER OF 3M AND 2 BLADES EACH 2M LONG AND IS SUPPORTED ON A 5M HIGH, 10CM DIAMETER GUYED STEEL TOWER.

76-0414 NESEA 76: DECISION MAKING IN SOLAR TECHNOLOGY.
TOWNSHEND, VERMONT, NEW ENGLAND SOLAR ENERGY ASSOCIATION, 1976. 577P.
NEW ENGLAND SOLAR ENERGY ASSOCIATION, CONFERENCE AND EXHIBITION, 1ST, AMHERST, MASSACHUSETTS, JUNE 24, 1976.
CONF-760657

THIS CONFERENCE CONSISTED OF 81 PAPERS ON VARIOUS ASPECTS OF SOLAR TECHNOLOGY.

76-0415 NAERGER M
BORTOP WIND TURBINE.
WIND POWER DIG. 1(6): 21, SEPTEMBER 1976.

THE AUTHOR DESCRIBES A VERTICAL AXIS WIND TURBINE HE DEVELOPED FOR WATER-LIFTING APPLICATIONS.

76-0416 NASSAR F M
ANALYSIS OF THE WIND-DRIVEN RECIPROCATOR.
ENERGY LA: TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 209-216.

THE CONCEPT OF THE RECIPROCATING CASCADE IS PROPOSED AS A MEANS FOR WIND ENERGY CONVERSION. PRELIMINARY AERODYNAMIC AND PERFORMANCE ANALYSES ARE CONDUCTED. A TYPICAL FULL-SCALE CONFIGURATION IS SELECTED AND ESTIMATES OF WEIGHT AND COST ARE MADE. A COST COMPARISON BETWEEN THE RECIPROCATOR AND THE CONVENTIONAL ROTARY PROPELLER UNDER THE SAME CONDITIONS INDICATES POTENTIAL REDUCTION IN THE COST PER OUTPUT FIGURE.

76-0417 NATIONAL PLAN FOR ENERGY RESEARCH, DEVELOPMENT + DEMONSTRATION: CREATING ENERGY CHOICES FOR THE FUTURE. VOL. 2. PROGRAM IMPLEMENTATION. SOLAR ENERGY TECHNOLOGY.
NTIS, JUNE 30, 1976. P. 75-116.
ERDA-76-1 (VOL. 2)

THE NATIONALLY-BASED SOLAR ENERGY PROGRAM IS ORGANIZED INTO FOUR MAJOR AREAS: THERMAL APPLICATIONS; TECHNOLOGY SUPPORT AND UTILIZATION; SOLAR ELECTRIC APPLICATIONS; AND FUELS FROM BIOMASS. THE STRATEGY IN SOLAR ENERGY R+D IS TO LOWER COST AND IMPROVE EFFICIENCY AND RELIABILITY TO DEVELOP AN ECONOMICALLY COMPETITIVE SOLAR ENERGY SYSTEM. THE ROLE OF INDUSTRY IS EMPHASIZED TO ENSURE THAT RESULTS CONFORM TO MARKET NEEDS AND CONSTRAINTS. THE BASIC PRINCIPLES OF SEVERAL SOLAR HEATING AND COOLING SYSTEMS ALREADY IN OPERATION ARE DESCRIBED.

76-0418 NAZARE E
AEROTHERMIC POWER PLANT WITH ARTIFICIAL CYCLONE.
HELIOTECHNIQUE AND DEVELOPMENT. INTERNATIONAL CONFERENCE ON HELIOTECHNIQUE AND DEVELOPMENT, DHAHRAN, SAUDI ARABIA, NOVEMBER 2, 1975. CAMBRIDGE, MASSACHUSETTS. DEVELOPMENT ANALYSIS ASSOCIATES, INC., 1976. P. 773-776.

A TOWER OF THE VENTURI TYPE IS CONCEIVED SO THAT AIR CONVECTED BY SOLAR HEAT BE GUIDED INTO ACCELERATOR DUCTS. THE WHIRL HAVING BEEN THUS STARTED, THE CORIOLIS FORCES DUE TO THE ROTATION OF THE EARTH SUSTAIN THE CYCLONE ROTATION. WITH A DIFFERENCE OF TEMPERATURE OF 50 DEGREES C, A 300 M HIGH TOWER COULD PRODUCE 650 MW OF ELECTRICITY. FOR EQUAL POWER A TOWER WILL COST 4 TIMES LESS THAN A NUCLEAR POWER PLANT. IT CAN ALSO COMPLEMENT THE CONVENTIONAL PLANTS BY RECUPERATING PART OF THE 60 PERCENT THERMIC ENERGY LOST TO THE ATMOSPHERE. THE CYCLE BEING NATURAL, IT WILL NOT CREATE AN ECOLOGY DISORDER AND CAN IN CERTAIN CASES CONSTITUTE A CLIMATIC REGULATOR.

76-0419 NEW WIND LEGISLATION.
WIND POWER DIG. 1(7): 18, DECEMBER 1976.

76-0420 NUNN R H
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE UNIVERSITY, SEPTEMBER 7-9, 1976. CONFERENCE REPORT.
NTIS, DECEMBER 7, 1976. 28P.
AD-A034871

VERTICAL- AND HORIZONTAL-AXIS SYSTEMS WERE DISCUSSED BOTH IN THEORY AND IN PRACTICE. APPLICATIONS RANGED FROM WIND FARMS EACH WITH HUNDREDS OF MEGAWATT UNITS TO THE USE OF CRETAN WINDMILLS TO PROVIDE WATER FOR CATTLE. WIND ENERGY CONVERSION UNITS HAVE BEEN OPERATED IN SEVERAL CONFIGURATIONS AND THE THEORY OF THEIR PERFORMANCES IS SUFFICIENTLY ADVANCED TO ALLOW DESIGN FOR FABRICATION. THE TRENDS ARE TOWARDS LARGER UNITS FOR MUNICIPAL POWER SYSTEMS AND SMALLER UNITS FOR DOMESTIC USE. IN

THE FORMER CASE, THE BEHAVIOR OF LARGE WIND TURBINES OPERATING IN LARGE ARRAYS, AND THE OUTPUT (WITH AND WITHOUT STORAGE) OF SEVERAL SUCH ARRAYS WHEN GEOGRAPHICALLY DISPERSED, HAS YET TO BE WELL UNDERSTOOD. THE FIELD HAS REACHED A LEVEL OF MATURITY CHARACTERIZED BY SUCH FACTORS AS ECONOMICS, ENVIRONMENTAL IMPACT, AND PUBLIC ACCEPTANCE.

76-0421 OBERMEYER J L, TOWNES H W
ECONOMIC EVALUATION OF SMALL-SCALE WIND POWERED ELECTRIC GENERATION SYSTEMS.
ASME PAPER 76-WA/ENER-1, 1976. 4P.

PRESENTED IS AN ECONOMIC EVALUATION OF SEVERAL COMMERCIAL WIND POWERED ELECTRIC GENERATION SYSTEMS OF THE TYPE WHICH COULD BE USED BY AN INDIVIDUAL HOME OWNER. A SYSTEM INCLUDES A WIND PLANT, TOWER, STORAGE BATTERY AND D-C TO A-C INVERTER. THE ANALYSIS CONSIDERED A TOTAL OF 12 DIFFERENT SYSTEM CONFIGURATIONS. THE EVALUATION OF ENERGY OUTPUT WAS BASED ON WIND SPEED DATA FOR SEVERAL LOCATIONS IN THE STATE OF MONTANA. THE ANALYSIS CAN BE EXTENDED TO OTHER LOCATIONS ON THE BASIS OF MEAN ANNUAL WIND SPEED. THE RESULTS OF THE EVALUATION INDICATE THAT SOME OF THE "HOME BUILT" SYSTEMS ARE COMPETITIVE ECONOMICALLY AT THE PRESENT TIME IN SOME "WINDY" LOCATIONS. NONE OF THE SYSTEMS WHICH ARE ECONOMIC COULD INDIVIDUALLY SUPPLY THE ENTIRE POWER REQUIREMENT FOR A SINGLE FAMILY DWELLING.

76-0422 OWEN J A
ANALYSIS OF A SOLAR THERMAL WIND ASSISTED, TURBOELECTRIC COMMUNITY POWER SYSTEM WITH EXCESS HEAT RECOVERY ASPECTS.
NESEA 76: 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. 553.

76-0423 PANTALONE D K, POTTER A G
APPLICATION OF WIND POWER TO THE ELECTRIC POWER SYSTEM.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1976. P. 6.1--6.22.

A WIND GENERATOR SYSTEM CONSISTS OF A WIND TURBINE, AN ELECTRIC GENERATOR, AND A LINK TO THE ELECTRIC POWER LINE. THE DYNAMICS OF A WGS ARE EXHIBITED BY BLOCK DIAGRAMS AND A FREQUENCY AND TIME RESPONSE, AND THE RESULTING EIGENVALUES OF THE SYSTEM FOR DIFFERENT CONDITIONS ARE CALCULATED. POSITIVE DAMPING CHARACTERISTICS ARE SHOWN THAT INDICATE STABILITY FOR SMALL DISTURBANCES.

76-0424 PARK J
BUILDING THE GREAT AEROMOOSE.
WIND POWER DIG. 1(6): 35-37, SEPTEMBER 1976.

AEROMOOSE IS A THREE-BLADE DARRIEUS WITH A SAVONIUS STARTER ROTOR, DESIGNED BY THE AUTHOR.

76-0425 PARVIN B
THE PIPERS OF RENAISSANCE.
NEW ZEALAND ENERGY J. 49(4): 59-61, APRIL 25, 1976.

ENERGY SOURCES TERMED RECOVERABLE MAY BE THOUGHT OF AS THE PIPERS OF THE ENERGY RENAISSANCE. THEIR TUNE IS INCISIVE, PERSISTENT, AND GATHERING A CROWD OF FOLLOWERS. PROSPECTS OF SOLAR AND WIND ENERGY SYSTEMS ARE DISCUSSED.

76-0426 RAMSDELL J V
WIND SHEAR DOWNWIND OF LARGE SURFACE ROUGHNESS ELEMENTS.
CONFERENCE ON AEROSPACE AND AERONAUTICAL METEOROLOGY, 7TH, MELBOURNE, FLORIDA, NOVEMBER 16, 1976. NTIS, AUGUST 1976. 22 P.
BNWL-SA-5840

THE EXISTING INFORMATION ON MEAN WIND PROFILES AND THE CHARACTERISTICS OF TURBULENCE AT A POINT ARE ADEQUATE FOR MANY PURPOSES, BUT THEY ARE NOT SUFFICIENT FOR WECS DESIGN. THE PURPOSE OF THIS PAPER IS TO DESCRIBE SOME OF THE VARIABILITY OBSERVED IN A RECENT MEASUREMENT PROGRAM. IN PARTICULAR, THE VARIATIONS OF THE VERTICAL AND LATERAL SHEAR OF THE LONGITUDINAL COMPONENT OF THE WIND WILL BE DESCRIBED. DATA ON THE FLUCTUATIONS OF THE VERTICAL AND LATERAL SHEARS OF THE LONGITUDINAL WIND

COMPONENT NEAR THE SEATTLE, WASHINGTON, CENTRAL BUSINESS DISTRICT HAVE BEEN ANALYZED TO DETERMINE SHEAR CHARACTERISTICS DOWNWIND OF LARGE ROUGHNESS ELEMENTS. THE ANALYSIS HAS EXAMINED THE FREQUENCY DISTRIBUTIONS AND TIME SCALES OF THE SHEAR FLUCTUATIONS. WHEN POSSIBLE THE RESULTS HAVE BEEN COMPARED WITH RESULTS OF ANALYSIS OF DATA FROM CAPE KENNEDY, FLORIDA.

76-0427 PETERSON R, CROMACK D
CENTRALIZED SOLAR/WIND HOME HEATING.
ANNUAL CONFERENCE ON ENERGY, 2D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1975. PROCEEDINGS. NORTH HOLLYWOOD CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 108-115.

IN THE IMMEDIACY OF NATIONAL GOALS FOR ENERGY INDEPENDENCE, THE NEED EMERGES TO USE DIALECTIC METHODS TO DIMINISH THE ENERGY-CONSUMPTIVE CHARACTERISTICS OF THE TYPICAL HOME. AT THE CUTTING EDGE OF RESOURCEFUL PROGRESS ARE THE RESIDENTIAL DEVELOPMENTS THAT EMBRACE ALTERNATIVE AND CONSERVATIVE ENERGY TECHNIQUES. IN CONJUNCTION WITH SUCH A PLANNED, LOW-IMPACT COMMUNITY, THIS PAPER PROPOSES A CLUSTER-CENTRALIZED SYSTEM THAT UTILIZES WIND ENERGY IN COMBINATION WITH SOLAR THERMAL ENERGY FOR SPACE AND DOMESTIC WATER HEATING. A DESCRIPTION OF THE RANDOM SOLAR-WIND RESOURCE EMBODIES A MATCHING PROBLEM THAT IN TURN REVEALS THE BENEFITS OF THE COMBINED MODE OF ENERGY COLLECTION. THOUGH SOLAR AND WIND ENERGY SYSTEMS HAVE BEEN COINCIDENTALLY ADVANCED, THEIR MUTUAL AND UNIFIED APPLICATION REMAINS NOVEL. THE COMBINED SYSTEM DEMONSTRATES AN APPEALING ABILITY TO FULFILL THE HEATING REQUIREMENTS.

76-0428 PICKEL H
WIND TURBINES WITH VERTICAL MAIN AXLES AND WITH VERTICALLY STANDING TURBINE BLADES ROTATING ROUND THEIR OWN VERTICAL AXLE AND WHICH ARE PLACED IN THE BEST POSITION FOR THE DIRECTION OF WIND OVER TOOTHED GEARS.
GERMAN (FRG) PATENT NO. 2,506,584/A/, SEPTEMBER 16, 1976. (IN GERMAN)

THE DISCOVERY CONCERNS A WIND TURBINE ROTATING ROUND A VERTICAL AXLE WITH VERTICALLY STANDING TURBINE BLADES ROTATING ROUND THEIR OWN VERTICAL AXLE. THE TURBINE ROTATES ROUND THE BEARING MAST AND SEVERAL SUCH TURBINES CAN BE ARRANGED SO AS TO SAVE SPACE. THE TURBINE BLADES ARE ADJUSTED OVER THE TOOTHING GEARS, WHICH ARE, E.G., POWERED BY AN ELECTRONIC CONTROL SYSTEM, TO SUIT THE WIND DIRECTION AT THE TIME.

76-0429 PIEPERS G G
WINDENERGIE IN NEDERLAND. (WIND ENERGY IN THE NETHERLANDS).
TNO PROJECT 76(2): 49-56, 1976. (IN DUTCH)

IF THE NORTHSEA COAST WERE HALF OCCUPIED BY WIND TURBINES, NEARLY 15 PERCENT OF THE ELECTRICITY PRODUCED IN 1974 WOULD BE AVAILABLE BY MEANS OF 5000 (DIAM.50M) WIND TURBINES. THE COSTS PER RMH AT DEN HELDER ARE ESTIMATED TO BE COMPARABLE WITH THOSE USING CONVENTIONAL FUEL. IN THE NATIONAL RESEARCH PROGRAM ON WIND ENERGY, FINANCED BY THE GOVERNMENT, A NUMBER OF DUTCH RESEARCH INSTITUTES AND INDUSTRIES WILL INVESTIGATE HORIZONTAL AXIS AND VERTICAL AXIS WIND TURBINES AND THEIR POSSIBLE CONTRIBUTION TO THE NATIONAL ENERGY PRODUCTION.

76-0430 PIPE TOWER DEVELOPED.
WIND POWER DIG. 1(7): 18, DECEMBER 1976.

A NOVEL TOWER SYSTEM DESIGNED TO SUPPORT A 2500 WATT, 32 VOLT JACOBS WIND GENERATOR IS DESCRIBED.

76-0431 POLLARD W G
THE LONG-RANGE PROSPECTS OF SOLAR ENERGY.
AM. SCI. 64(4): 424-429, JULY-AUGUST 1976.

THE LONG-RANGE POTENTIAL OF VARIOUS WAYS OF USING SOLAR ENERGY IS EVALUATED FROM AN ECONOMIC AND COMMERCIAL STANDPOINT. SOLAR RADIATION USED DIRECTLY AND INDIRECTLY IS ANALYZED. THE VARIOUS TECHNOLOGIES ARE ASSUMED TO BE ESTABLISHED AND THE RESULTING SYSTEMS ARE VISUALIZED IN OPERATION BY INDUSTRY IN THE NORMAL BUSINESS OF SELLING ELECTRICITY, FUEL, OR EQUIPMENT. MANY SOLAR SYSTEMS ARE CONFRONTED BY CONSTRAINTS AND SHOW VARYING DEGREES OF PROMISE. SMALL, SELF-CONTAINED TOTAL ENERGY SYSTEMS FOR RURAL AREAS SEEM DESTINED TO PLAY AN INCREASINGLY IMPORTANT ROLE IN THE TOTAL WORLD ENERGY SYSTEM. WIND POWER IS DISCUSSED AS AN INDIRECT FORM OF SOLAR ENERGY.

76-0432 PONTIN G W W
APPLICATIONS OF WIND POWER FOR FUEL SAVINGS IN AGRICULTURE.
SOLAR ENERGY IN AGRICULTURE. JOINT CONFERENCE BETWEEN UNIVERSITY OF READING AND UK SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, READING, UK, 13 SEPTEMBER 1976. NTIS, 1976. P. 59-60.
CONF-7609161

INFORMATION IS SUMMARIZED ON WIND TURBINE DESIGN, WIND TURBINE MATERIALS, POWER CONVERSION, AND APPLICATION FEASIBILITY.

76-0433 PONTIN G W W
ENERGY PRODUCING WINDMILLS.
EXEC. ENG. 56(5-6): 23-24, JUNE-JULY 1976.

IN THIS ARTICLE, THE AUTHOR COVERS THE THEORY OF WINDMILLS AND SIGNIFICANCE OF THE THEORETICAL FACTORS. THE ECONOMICS AFFECTING ENERGY CONVERSION ARE DISCUSSED. SOME FEATURES OF MODERN WIND UNITS, TOGETHER WITH A CLASSIFICATION SYSTEM AND POSSIBLE APPLICATIONS, ARE PROVIDED.

76-0434 POTTER A G
SOLAR-ASSISTED POWER SYSTEMS.
ANNUAL CONFERENCE ON ENERGY, 2D., UNIVERSITY OF MISSOURI, ROLLA, OCTOBER 7-9, 1975. PROCEEDINGS. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 47-56.

EXCEPT FOR HYDROELECTRIC POWER, SOLAR ELECTRIC GENERATION HAS NOT BEEN WIDELY USED IN THE PAST TO ASSIST POWER SYSTEM GENERATION BECAUSE OF ITS RELATIVELY HIGH COST. THIS SITUATION HAS NOW STARTED TO CHANGE WITH THE ADVENT OF THE ENERGY CRISIS AS EXEMPLIFIED BY DECREASING NATURAL GAS SUPPLIES AND INCREASING FOSSIL FUEL PRICES. ONE POSSIBLE RESPONSE TO THIS SITUATION WHICH APPEARS TO HAVE A RELATIVELY GOOD CHANCE FOR ECONOMIC SUCCESS IS THE UTILIZATION OF WIND AND SOLAR THERMAL ENERGY FOR SPACE AND WATER HEATING LOADS SERVED BY NATURAL GAS OR ELECTRIC POWER. UNFORTUNATELY, A LARGE PORTION OF THE ENERGY COLLECTED IN A TYPICAL SOLAR HEATING SYSTEM IS LOST BECAUSE THE RECEIVED SOLAR ENERGY IS VARIABLE AND, IN MOST CASES, IS NOT WELL CORRELATED WITH COLLECTION SITE LOADS. THIS PAPER EXAMINES THE FEASIBILITY OF USING THE EXCESS ENERGY AVAILABLE FROM SOLAR HEATING SYSTEMS FOR ELECTRIC POWER PRODUCTION SO THAT POWER SYSTEM PEAKING CAPACITY AND TOTAL FOSSIL FUEL CONSUMPTION CAN BE REDUCED. AS SOLAR ELECTRIC GENERATION BECOMES LARGER, ENERGY STORAGE SYSTEMS WILL BE NEEDED TO ASSURE POWER SYSTEM STABILITY AND RELIABILITY. AT THE SOLAR COLLECTION SITE, THERMAL ENERGY AND CHEMICAL STORAGE UNITS IN BATTERY FORM ARE PREFERRED. FOR LARGE CENTRAL ENERGY STORAGE FACILITIES, PUMPED HYDRO, COMPRESSED AIR, LIQUID AMMONIA, STORAGE BATTERIES, AND LIQUID HYDROGEN SYSTEMS ARE POSSIBLE CHOICES. THE LIQUID AMMONIA STORAGE SYSTEM IS CONSIDERED THE BEST OVERALL CHOICE WHEN PUMPED HYDRO OR COMPRESSED AIR ARE NOT FEASIBLE.

76-0435 PYTLINSKI J T
USE OF SOLAR AND WIND ENERGY AS ALTERNATIVE ENERGY SOURCES.
PERSPECTIVES IN ENERGY: 1976. SHULTIS, J.K., ED. KANSAS STATE UNIVERSITY. NTIS, AUGUST 2, 1976.
CES-17

THIS IS ONE OF 17 LECTURES IN THIS 429 PAGE VOLUME CONTAINING PRESENTATIONS FROM VARIOUS WORKSHOPS HELD AT KANSAS STATE UNIVERSITY ON ENERGY TOPICS.

76-0436 RAMAKUMAR R
OPERATIONAL AND CONTROL ASPECTS OF WIND ENERGY SYSTEMS UTILIZING FIELD MODULATED GENERATORS.
1976 CONTROL OF POWER SYSTEMS CONFERENCE AND EXPOSITION, OKLAHOMA CITY, MARCH, 10-12, 1976. NEW YORK, IEEE, 1976. P. 111-114.

TWO CONTROL SYSTEMS ARE PRESENTED AND DISCUSSED FOR OPERATING WIND-DRIVEN VARIABLE-SPEED CONSTANT-FREQUENCY FIELD MODULATED GENERATOR SYSTEMS IN PARALLEL WITH UTILITY POWER LINES. ONE OF THEM USED WIND SPEED AND AEROTURBINE SHAFT SPEED AS CONTROL INPUTS AND THE OTHER USES AEROTURBINE SHAFT TORQUE AND SPEED AS CONTROL INPUTS. THE OBJECTIVE IS TO MAINTAIN A CONSTANT AND OPTIMUM TIP SPEED RATIO WITH VARYING WIND SPEEDS TO DELIVER MAXIMUM POSSIBLE ELECTRICAL POWER TO THE POWER GRID.

76-0437 RAMAKUMAR R

UTILIZATION OF SOLAR AND WIND ENERGY TO IMPROVE THE LIVING ENVIRONMENT IN LESS DEVELOPED COUNTRIES.
INST. ENVIRON. SCI. PROC. 22: 314-318, 1976.

INTRODUCTION OF DECENTRALIZED SMALL-SCALE SYSTEMS CAN "ENERGIZE" THE RURAL ECONOMIES OF LESS DEVELOPED COUNTRIES AND IMPROVE THE LIVING ENVIRONMENT FOR MILLIONS OF PEOPLE. NEARLY 66 PERCENT OF THE WORLD'S POPULATION INHABIT LESS DEVELOPED COUNTRIES, ONE HALF OF WHOM LIVE IN SCATTERED RURAL AREAS OR BIG CITY SLUMS UNDER THE MOST DEHUMANIZING CONDITIONS. A THREE-PHASE, STEP BY STEP APPROACH FOR ADOPTING TECHNOLOGIES DESIGNED TO EXPLOIT RENEWABLE ENERGY SOURCES AT THE RURAL LEVEL IS DESCRIBED. THE FIRST STEP IS THE ESTABLISHMENT OF AN ENERGY CENTER IN EACH VILLAGE OR CLUSTER OF VILLAGES TO PROVIDE THE BASIC HUMAN NEEDS OF EXISTENCE. THE CENTER WOULD THEN EXPAND TO PROVIDE ENERGY FOR IMPROVING AGRICULTURAL PRODUCTIVITY AND SMALL-SCALE INDUSTRIAL DEVELOPMENT.

76-0438 RAMAKUMAR R, HUGHES W L
WIND ENERGY UTILIZATION--AN OVERVIEW.
ANNUAL ASME SYMPOSIUM ON ENERGY ALTERNATIVES, 16TH, ALBUQUERQUE, N.M., FEBRUARY 1976. PROCEEDINGS. P. 143-149.

A BRIEF OVERVIEW OF THE POTENTIAL OF WIND AS A NATURAL, CLEAN AND REPLENISHABLE SOURCE IS PRESENTED.

76-0439 RAMAKUMAR R, HUGHES W L, ALLISON H J, YARLAGADDA R K, SMITH G G, TSUNG C C, ASHBAUGH C D, HOY L D, RAHMAN A U, ALI M H, DESHMUKH R R
DEVELOPMENT AND ADAPTATION OF FIELD MODULATED GENERATOR SYSTEMS FOR WIND ENERGY APPLICATION. FINAL REPORT.
NTIS, AUGUST 1976. 420 P.
PB-272495, ERDA/NSF/AER/00647-76/2

THE OBJECTIVES OF THIS PROJECT ARE: (1) TO DEVELOP A MATHEMATICAL MODEL AND UNDERSTANDING OF THE FIELD MODULATED GENERATOR SYSTEM CULMINATING IN USABLE DESIGN CURVES FOR OPTIMUM PERFORMANCE OVER THE SELECTED OPERATING SPEED RANGE; AND (2) TO STUDY THE PROBLEMS AND ARRIVE AT CONTROL PHILOSOPHIES AND PERIPHERAL EQUIPMENT NEEDED TO OPERATE A WIND-DRIVEN FIELD MODULATED GENERATOR SYSTEM IN PARALLEL WITH A CONVENTIONAL POWER SYSTEM.

76-0440 REVIE R W, BOCKRIS J O'M
SOLAR ENERGY FOR A FUTURE SOCIETY.
APEA J 16(PT.2): 39-43, 1976.

THE SUN IS AN INEXHAUSTIBLE ENERGY SOURCE CAPABLE OF ELEVATING THE ENTIRE WORLD POPULATION TO THE STANDARD OF LIVING ENJOYED IN THE U.S. METHODS OF CONVERTING SOLAR ENERGY FALL INTO SIX CATEGORIES: SOLAR HEATING AND COOLING OF BUILDINGS, INCLUDING AGRICULTURAL AND INDUSTRIAL PROCESSES; PHOTOVOLTAICS; OCEAN THERMAL ENERGY; BIOCONVERSION; WIND ENERGY; AND SOLAR-THERMAL ELECTRIC POWER. THE PRINCIPLES, PRESENT STATUS, AND FUTURE OF THESE METHODS ARE EXAMINED.

76-0441 RANGI R S
RECENT CANADIAN ACTIVITIES IN WIND POWER.
SHARING THE SUN, PROCEEDINGS OF THE JOINT CONFERENCE OF THE AMERICAN SECTION, INTERNATIONAL SOLAR ENERGY SOCIETY AND SOLAR ENERGY SOCIETY OF CANADA, INC. VOL. 1. CAPE CANAVERAL, FLORIDA, AMERICAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY, 1976. P. 110-118.

THE MAJOR PART OF THE WIND POWER ACTIVITY IN CANADA IS CENTERED AROUND VERTICAL-AXIS WIND TURBINES (VAWT). THE NATIONAL RESEARCH COUNCIL, HAVING DEVELOPED THE VAWT, IS CONCENTRATING ON THIS CONCEPT. THREE CANADIAN COMPANIES, DOMINION ALUMINUM FABRICATING, LIMITED, BRISTOL AEROSPACE LIMITED, AND BARBER HYDRAULIC TURBINE LTD., HAVE STARTED TO MARKET THE VAWT. THE NATIONAL RESEARCH COUNCIL, IN CO-OPERATION WITH QUEBEC HYDRO, IS INSTALLING A 200 KW VAWT AT A SITE ON THE MAGDALEN ISLANDS. THIS UNIT IS EXPECTED TO BE IN OPERATION IN OCTOBER 1976. BRACE RESEARCH INSTITUTE AND THE UNIVERSITY OF SHERBROOKE ARE CONTINUING WITH RESEARCH AND DEVELOPMENT OF THE HORIZONTAL WIND MACHINE. BRISTOL AEROSPACE AND THE UNIVERSITY OF MANITOBA, WITH NATIONAL RESEARCH COUNCIL FINANCIAL SUPPORT, HAVE STARTED WORK TO DEVELOP A LOW SPEED GENERATOR SUITABLE FOR WIND POWER APPLICATION.

76-0442 REED J W
PREDICTING WIND POWER AT TURBINE LEVEL FROM AN ANEMOMETER RECORD AT ARBITRARY HEIGHT.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, U.K., SEPTEMBER 7, 1976. NTIS, 1976. 10 P.
SAND-76-5397, CONF-760909-1

WIND SPEED VARIATION WITH HEIGHT IN THE FRICTIONAL BOUNDARY LAYER DEPENDS ON WIND SPEED, SURFACE ROUGHNESS AND THERMODYNAMIC STABILITY. OVER RELATIVELY FLAT TERRAIN, SUITABLE FOR EXTENSIVE FIELDS OF WIND ENERGY EXTRACTORS, USEFUL WIND INCREASES IN PROPORTION TO THE ONE-SEVENTH POWER OF HEIGHT ABOVE GROUND. THIS CLOSELY APPROXIMATES THE MORE GENERAL AND THEORETICALLY BASED LOGARITHMIC MODEL ABOVE STANDARD 10 METER ANEMOMETER HEIGHT AND WITH THE 0.03M ROUGHNESS LENGTH OFTEN FOUND BY OBSERVATION. SEVERAL DATA COLLECTIONS HAVE BEEN ASSEMBLED TO VERIFY THE UTILITY OF THIS ONE-SEVENTH POWER LAW, FROM SPECIAL METEOROLOGICAL RESEARCH TOWERS AS WELL AS LONG-TERM RECORDS FROM REGULAR WEATHER STATIONS WHERE THE ANEMOMETER HAPPENED TO BE MOVED ON OCCASION. A MINOR CORRECTION FOR LOWER SPEEDS OF 2-8M/S IMPROVES PREDICTIONS BUT IS NOT ESSENTIAL TO GROSS POWER AVAILABILITY CALCULATIONS FOR LARGE TURBINE BLADES.

76-0443 REICHEL R
HARNESSING WIND POWER IN TANZANIA.
EAST AFRICAN ACADEMY OF SCIENCES ON NEW SOURCES OF ENERGY IN EAST AFRICA, 12TH, ARUSHA, TANZANIA, AUGUST 31, 1976. 18 P.

76-0444 REICHEL R
WIND POWER AND RURAL ELECTRIFICATION. A RESEARCH PROGRAMME AT THE FACULTY OF ENGINEERING.
TANZANIA, UNIVERSITY OF DAR ES SALAAM, FACULTY OF ENGINEERING, JULY 1976. 4 P.

76-0445 RENEWABLE ENERGIES, STATE FUNDED PROGRAMS.
WIND POWER DIG. 1(7): 32-33, DECEMBER 1976.

PROGRAMS IN MONTANA, IOWA, AND MINNESOTA ARE DESCRIBED.

76-0446 REPORT OF THE MIT SOLAR ENERGY WORKING GROUP.
CAMBRIDGE, MASSACHUSETTS, MIT ENERGY LABORATORY, 1976. 86 P.

76-0447 RESEARCH ON NONFOSSIL FUEL SOURCES.
GAS WORLD 181(4694): 526-527, 529-531, SEPTEMBER 1976.

PROBABLY NOT AS WELL KNOWN AS THE PIONEERING WORK OF THE CHICAGO ISTITUTE OF GAS TECHNOLOGY IN COAL GASIFICATION IS THE ASSOCIATION'S INCREASING INVOLVEMENT IN THE DEVELOPMENT OF NONFOSSIL ENERGY SOURCES. WORK IS SUMMARIZED IN THE FIELDS OF OCEAN THERMAL ENERGY CONVERSION, FUEL CELL POWER PLANTS, HYDROGEN, LOW COST ELECTROLYZERS, THERMOCHEMISTRY, PIPELINE TRANSMISSION, SOLAR ENERGY, LARGE STORAGE CAPACITY, AND WIND ENERGY SYSTEMS.

76-0448 REUTER R C
STRUCTURAL OVERVIEW.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.126--II.129.
SAND-76-5586

WHENEVER ADVANCED HARDWARE INVOLVES LARGE, PERIODIC LOADS, LOW NATURAL FREQUENCIES AND MANY INTERACTING COMPONENTS, THE PROBABILITY OF ENCOUNTERING STRUCTURAL PROBLEMS IS HIGH. THE DARRIEUS VERTICAL AXIS WIND TURBINE IS TYPIFIED BY THESE FEATURES. THE VAWT STRUCTURAL PROGRAM AT SANDIA HAS THREE NATURAL OBJECTIVES: (1) TO UNDERSTAND THE PROBLEMS AND THEIR SOLUTIONS, (2) TO AID AND SUPPORT DESIGN, AND (3) TO ASSIST IN SYSTEM COST EVALUATION. PRESENTLY BEING EMPHASIZED ARE STRENGTH REQUIREMENTS NECESSARY TO MEET PERFORMANCE CONDITIONS, STIFFNESS REQUIREMENTS FOR CONTROL OF NATURAL FREQUENCY LOCATIONS, FATIGUE REQUIREMENTS FOR SAFETY AND LOW LIFE CYCLE COSTS, AND ALSO AEROELASTICITY EFFECTS WHICH COUPLE STRUCTURAL BEHAVIOR WITH AERODYNAMICS.

76-0449 REUTER R C
TOWER ANALYSIS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY

17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.151--II.167.
SAND-76-5586

DURING THE COURSE OF SANDIA LABORATORIES' WIND ENERGY PROGRAM, TWO WIND TURBINES HAVE BEEN BUILT AND OPERATED WITH NO APPARENT PROBLEMS RESULTING FROM BLADE SUPPORT TOWER DESIGN. THE SMALLER TURBINE, A TWO METER MODEL, HAS A PRISMATIC, TRIANGULAR CROSS SECTION TRUSS TOWER, AND THE LARGER ONE, A 5 METER TURBINE, HAS A TUBULAR TOWER. SINCE NO SUSTAINING PROBLEMS HAVE ARISEN FROM EITHER TOWER DESIGN, THE RATIONALE FOR SELECTION OF A TRUSS TOWER OR TUBULAR TOWER IS STILL UNCERTAIN. THE PURPOSE OF THIS REPORT IS TO ENHANCE TOWER SELECTION RATIONALE BY ESTABLISHING SOME DESIGN GUIDELINES FOR VAWT BLADE SUPPORT TOWERS, AND TO REVIEW THE SPECIFIC DESIGN FOR THE TOWER OF THE FORTHCOMING 17 METER TURBINE.

76-0450 REUTER R C, SHELDAHL R E
SANDIA LABORATORIES VERTICAL-AXIS WIND TURBINE PROGRAM. QUARTERLY REPORT APRIL - JUNE 1976.
ALBUQUERQUE, N.M., SANDIA LABORATORIES, NOVEMBER 1976.
SAND-76-0581

76-0451 REVIEW OF HARDWARE.
WIND POWER DIG. 1(6): 44-46, SEPTEMBER 1976.

76-0452 RI Z
WIND POWERED VEHICLE ELECTRICITY GENERATOR (HAS SPOON SHAPED HINGED PADDLES ON ROTOR ARM ENDS DRIVEN BY AIRFLOW).
GERMAN PATENT APPLICATION 2,424,578, JANUARY 20, 1976.

76-0453 RICHARDS A F
EXTRACTING ENERGY FROM THE OCEANS: A REVIEW .
MAR. TECHNOL. SOC. J. 10(2): 5-24, MARCH 1976.

METHODS AND VARIANTS OF OBTAINING ENERGY FROM THE OCEANS ARE DESCRIBED. OCEAN THERMAL, KELP BIOCONVERSION, OCEAN WAVES, TIDES AND TIDAL CURRENTS, OCEAN WINDS, OCEAN CURRENTS, SALINITY GRADIENTS, AND OCEAN GEOTHERMAL ENERGY ARE DISCUSSED IN TERMS OF CONCEPT, GEOGRAPHIC AREAS APPLICABLE, AND DEVELOPMENT COSTS AND SCHEDULE AS FAR AS INFORMATION IS AVAILABLE. NONE OF THE METHODS PRODUCES EXCESS HEAT INTO THE ENVIRONMENT, AND MOST REPRESENT RELATIVELY NEW TECHNOLOGIES.

76-0454 ROCKY FLATS: TESTING SMALL-SCALE WIND SYSTEMS.
WIND POWER DIG. 1(7): 39-41, DECEMBER 1976.

76-0455 RODEMAN R
EFFECTS OF SYSTEM IMBALANCE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.180--II.184.
SAND-76-5586

THE VAWT IS A COMPLEX STRUCTURE WITH MANY SIGNIFICANT NORMAL MODES. TO DETERMINE IF THE EFFECTS OF IMBALANCE WERE CRITICAL FOR THE 17M TURBINE A SIMPLIFIED MODEL WAS CONSTRUCTED. THIS MODEL IS KNOWN AS THE JEFFCOTT MODEL.

76-0456 ROHRBACH C
EXPERIMENTAL AND ANALYTICAL RESEARCH ON THE AERODYNAMICS OF WIND TURBINES. MID-TERM TECHNICAL REPORT, JUNE 1 -- DECEMBER 31, 1975.
NTIS, FEBRUARY 1976. 111 P.
COO-2615-76-T-1

THE SUCCESSFUL DEVELOPMENT OF RELIABLE, COST COMPETITIVE HORIZONTAL AXIS, PROPELLER-TYPE WIND ENERGY CONVERSION SYSTEMS (WECS) IS STRONGLY DEPENDENT ON THE AVAILABILITY OF ADVANCED TECHNOLOGY FOR EACH OF THE SYSTEM COMPONENTS. PAST EXPERIENCE AND CURRENT STUDIES OF THIS TYPE OF WIND ENERGY CONVERSION SYSTEMS HAVE SHOWN THAT THE WIND TURBINE SUBSYSTEM MOST SIGNIFICANTLY EFFECTS THE SYSTEM'S COST EFFECTIVENESS AND PERFORMANCE CAPABILITY. THUS ADEQUATE TECHNOLOGY BASES ARE ESSENTIAL FOR ALL ELEMENTS OF THE WIND TURBINE DESIGN. INFORMATION IS PRESENTED CONCERNING AERODYNAMICS DESIGN AND PERFORMANCE TECHNOLOGY, WIND TURBINE PARAMETRIC PERFORMANCE STUDY, SELECTION OF MODEL WIND TURBINE

CONFIGURATIONS AND STRUCTURAL DESIGN OF WIND TURBINE MODELS.

76-0457 SUMNER J
WIND POWER RESEARCH TURNS TO HARDWARE ON SITES ROUND THE WORLD.
ENGINEER 243: 32-33+, SEPTEMBER 16, 1976.

RESEARCH OF FOUR NATIONS (CANADA, U.S., DENMARK, GREAT BRITAIN) ON WIND POWER IS DESCRIBED.

76-0458 RYLE M L
ALTERNATE ENERGY SOURCES.
ILLINOIS ENERGY ANNUAL CONFERENCE, 4TH., SEPTEMBER 16-17, 1976. P. 216-228.

POTENTIAL BENEFITS OF NUCLEAR ENERGY, SOLAR ENERGY, GEOTHERMAL ENERGY, WIND ENERGY, AND CONSERVATION ARE DISCUSSED. SEVERAL ACTIONS TAKEN TOGETHER WILL DELAY EXPANSION OF THE NUCLEAR ENERGY INDUSTRY. SOLAR ENERGY CAN CONTRIBUTE TO HOME HEATING IN THE NEXT 10 YEARS. THE FUTURE OF SOLAR ENERGY DEPENDS ON DEVELOPMENT OF IMPROVED STORAGE DEVICES. GEOTHERMAL ENERGY WILL LIKELY PROVIDE AROUND 1 PERCENT OF U.S. ELECTRICITY NEEDS AFTER 1985. CONSERVATION IS A NECESSITY, BUT IT WILL BE HARD TO INITIATE.

76-0459 SALIEVA R B
COMPOSITE METHOD OF PLOTTING PRODUCTIVITY PROVISION CURVES OF JOINTLY UTILIZED SOLAR AND WIND ENERGY PLANTS.
GELIOTEKHNIKA 4: 52-56, 1976. TRANSL.: APPL. SOLAR ENERGY 12(4): 39-42, 1976.

A METHOD OF COMPOSITE PLOTTING OF A RESULTANT SUMMARY CURVE OF PROVISION OF PRODUCTIVITY OF A SOLAR AND A WIND ENERGY PLANT JOINTLY USED FOR ENERGY AND WATER MANAGEMENT PURPOSES IS CONSIDERED.

76-0460 SALIEVA R B
DESIGN PRINCIPLES FOR SOLAR AND WIND POWER INSTALLATIONS.
GELIOTEKHNIKA 12(1): 51-57, 1976. TRANSL.: APPL. SOLAR ENERGY 12(1): 41-45, 1976.

THE SYSTEMS APPROACH FOR PLANNING AND DESIGN OF SOLAR AND WIND POWER INSTALLATIONS INVOLVING NATURAL, TECHNOLOGICAL AND HUMAN FACTORS IS DISCUSSED. FIVE BASIC FEATURES ARE CONSIDERED; OPERATIONAL TARGETS, THE PRESENCE OF CONTROL, HIERARCHIC STRUCTURE, CONTINUOUS VARIATION OF THE STATE OF SUBSISTENCE AND ELEMENTS, AND THE NECESSITY OF USING COMPUTERS FOR THE SOLUTION OF ALL OPTIMISATION PROBLEMS.

76-0461 SALIEVA R B
EXPERIENCE OF EVALUATION OF THE RELIABILITY OF SYSTEMS OF POWER SUPPLY FROM RENEWABLE ENERGY SOURCES BY TWO-MODEL DISTRIBUTION CURVES.
GELIOTEKHNIKA 4: 57-62, 1976. TRANSL.: APPL. SOL. ENERGY 12(4): 43-47, 1976.

THE POWER SUPPLY CONSIDERED AS AN EXAMPLE RELATES TO A RADIO RELAY COMMUNICATION SYSTEM WHICH IS TO BE EQUIPPED WITH WIND AND SOLAR POWER PLANTS SUPPLEMENTED OCCASIONALLY BY A DIESEL POWER PLANT. MATHEMATICAL DESCRIPTION OF THE FUNCTION OF DISTRIBUTION OF THE LENGTH OF THE PERIOD OF OPERATION OF AN ELECTRIC STORAGE BATTERY W$SUB $PHI$$ BY MEANS OF A TWO-MODAL CURVE IS CONSIDERED. THE PARAMETER W$SUB $PHI$$ CHARACTERIZES THE DISTRIBUTION OF THE LENGTH OF CONTINUOUS FUNCTIONING OF THE APPARATUS CONTROLLING THE WORK OF THE ELECTRIC STORAGE BATTERY. THIS IS IMPORTANT IF ONE IS TO TAKE INTO ACCOUNT THAT 90-95 PERCENT OF THE ENERGY CONSUMED IS TO BE PRODUCED BY WIND ENERGY OR SOLAR ENERGY PLANTS WORKING JOINTLY WITH AN ELECTRIC STORAGE BATTERY.

76-0462 SALIEVA R B
OPTIMISATION CRITERIA FOR SOLAR AND WIND POWER SYSTEMS.
GELIOTEKHNIKA 12(1): 58-63, 1976. TRANSL.: APPL. SOL. ENERGY 12(1): 46-49, 1976.

IT IS SHOWN THAT THE DESIGN OF SOLAR AND WIND POWER SYSTEMS REQUIRES BOTH THE SPECIFICATION OF THE TARGET FUNCTION AND THE OPTIMISATION OF THE SYSTEM WITH RESPECT TO TWO CRITERIA, NAMELY, THE SYSTEM MUST BE ECONOMICAL AND IT MUST BE RELIABLE.

76-0463 SAVINO J M, WAGNER L H
WIND TUNNEL MEASUREMENTS OF THE TOWER SHADOW ON MODELS OF THE ERDA/NASA 100KW WIND TURBINE TOWER.
NTIS, NOVEMBER 1976. 37 P.
NASA-TM-X-73548, N77-13534, DOE/NASA/1004-77/1

DETAILED WIND SPEED PROFILE MEASUREMENTS WERE MADE IN THE WAKE OF 1/25 SCALE AND 1/48 SCALE TOWER MODELS TO DETERMINE THE MAGNITUDE OF THE SPEED REDUCTION (THE TOWER SHADOW). THE 1/25 SCALE TOWER MODELED CLOSELY THE ACTUAL WIND TURBINE INCLUDING THE SERVICE STAIRWAY AND THE EQUIPMENT ELEVATOR RAILS ON ONE FACE. THE 1/48 SCALE MODEL WAS MADE OF ALL TUBULAR MEMBERS. MEASUREMENTS WERE MADE ON THE 1/25 SCALE MODEL WITH AND WITHOUT THE STAIRWAY AND ELEVATOR RAILS, AND ON THE 1/48 ALL TUBE MODEL WITHOUT STAIRS AND RAILS. THE TEST RESULTS SHOW THAT THE STAIRS AND RAILS WERE A MAJOR SOURCE OF WIND FLOW BLOCKAGE. THE ALL TUBULAR 1/48 SCALE TOWER WAS FOUND TO OFFER LESS RESISTANCE TO THE WIND THAN THE 1/25 SCALE MODEL THAT CONTAINED A LARGE NUMBER OF SQUARE SECTIONS. SHADOW PHOTOS ARE INCLUDED TO SHOW THE EXTENT OF THE BLOCKAGE OFFERED TO THE WIND FROM VARIOUS DIRECTIONS.

76-0464 SCHIERHOLZ P M, SOMERVELL W L, BABCOCK W, HARTEL R, WATSON K
WIND-POWERED AERATION FOR REMOTE LOCATIONS. FINAL REPORT, MARCH 15, 1975 - AUGUST 31, 1976.
NTIS, OCTOBER 1976. 152 P.
ERDA/NSF/00833-75/1

WIND-POWERED AERATORS WERE INSTALLED AND OPERATED AT THREE FISH WINTERKILL LAKES AND AT A SEWAGE LAGOON. A WIND-POWERED AERATOR IS A SYSTEM THAT CONVERTS THE ENERGY IN THE WIND DIRECTLY INTO COMPRESSED AIR WHICH CAN BE USED IN AN AERATION PROCESS. NO AUXILIARY ENERGY STORAGE IS REQUIRED IN THAT THE LAKE ACTS AS A STORAGE DEVICE FOR THE OXYGEN. NONE OF THE LAKES WHERE WIND-POWERED AERATORS WERE INSTALLED EXPERIENCED FISH WINTERKILL DURING THE 1975-1976 WINTER. WIND-POWERED AERATION SHOWS PROMISE FOR INCREASING SEWAGE LAGOON CAPACITY ONLY UNDER SEVERE WEATHER CONDITIONS. THE MOST DESIRABLE WIND-POWERED AERATOR WOULD BE AN AMERICAN WIND TURBINE DRIVING A ROTARY BLOWER MOUNTED ON A SINGLE POLE TOWER. THE WINDS ARE OF SUFFICIENT STRENGTH AND FREQUENCY FOR WIND-POWERED AERATION IN NORTHEASTERN COLORADO AND SOUTHEASTERN WYOMING, BETWEEN THE FRONT RANGE AND THE CONTINENTAL DIVIDE.

76-0465 SCHIERHOLZ P M, SOMERVELL W L, BABCOCK W, HARTEL R, TIMBRE K
WIND POWERED AERATION FOR REMOTE LOCATIONS. PROGRESS REPORT. MARCH 15, 1975-MARCH 15, 1976.
NTIS, APRIL 1976. 74 P.
PB-259304, ERDA/NSF/00833-75/1

THIS REPORT CONCERNS THE USE OF WIND POWER DIRECTLY TO COMPRESS AIR TO INCREASE OXYGEN LEVELS IN POLLUTED RIVERS AND LAKES SUBJECT TO WINTERKILL. A PRIME ADVANTAGE MAY BE USING THE WATER FOR STORAGE OF OXYGEN ELIMINATING REQUIREMENTS FOR ENERGY STORAGE SUCH AS BATTERIES. THREE SITES ARE PROPOSED FOR THE INSTALLATION OF WIND POWERED SYSTEMS. ONE IS A LAKE CHOSEN ON THE HIGH PLAINS FOR EASE OF ACCESS, ANOTHER IS A HIGH MOUNTAIN LAKE SUBJECT TO WINTERKILL AND THE THIRD IS A HIGH PLAINS RIVER WITH POLLUTION PROBLEMS.

76-0466 SCHOENBALL W
MECHANICAL OVERLOAD PROTECTION FOR WIND IMPELLERS.
GERMAN (FRG) PATENT NO. 2,558,848/A/, SEPTEMBER 16, 1976. 5 P. (IN GERMAN)

THE INVENTION CONCERNS A WIND IMPELLER WITH A HORIZONTAL AXIS OF ROTATION, WHICH IS AT RIGHT ANGLES TO THE WIND AT NORMAL WINDSPEEDS, BUT AT HIGH WIND PRESSURES IS PRESSED UPWARDS THROUGH A RIGHT ANGLE, OUT OF THE WIND DIRECTION, BY A SWIVELLING AXLE. ACCORDING TO THE INVENTION THE IMPELLER IS HELD IN POSITION AGAINST THE WIND BY A COUNTER WEIGHT HUNG ON ROPES. WHEN THE IMPELLER IS PRESSED UPWARDS, THE COUNTER WEIGHT IS PULLED UP BY THE ARRANGEMENT OF ROPES. WHEN THE WIND PRESSURE DROPS THE IMPELLER IS PULLED BACK INTO POSITION AGAINST THE WIND BY THE LOAD OF THE COUNTER WEIGHT.

76-0467 SCHROEDER K
WIND-POWERED ENGINE, PARTICULARLY FOR PRODUCING ELECTRICAL ENERGY.
GERMAN (FRG) PATENT NO, 2,502,783/A/, JULY 29, 1976. 7 P. (IN GERMAN)

THE WIND-POWERED ENGINE HAS 2 WIND-OPERATED PROPELLERS WHICH ARE SITUATED ONE BEHIND THE OTHER, BEARING-MOUNTED, INDEPENDENT OF ONE ANOTHER AND ROTATING IN OPPOSITE DIRECTIONS, WHICH CONVERT THEIR ENERGY OF ROTATION IN AN ELECTRIC GENERATOR. THE ROTOR AND STATOR OF THE GENERATOR ARE EACH CONNECTED TO ONE PROPELLER, SO THAT THEY ROTATE IN OPPOSITE DIRECTIONS. SPEED REGULATION TAKES PLACE DUE TO STRESSES IN THE PROPELLERS. THE PITCH OF THE BLADE ENDS CHANGES AT HIGH WIND SPEEDS. BRAKING SURFACES ARE CREATED THERE WHICH STOP THE MACHINE.

76-0468 SEGINER A
FLAP-AUGMENTED SHROUDS FOR AEROGENERATORS.
ENERGY LA: TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 188-196.

AXISYMMETRICAL SHROUDS FOR WINDMILLS ARE AUGMENTED BY RING-SHAPED "FLAPS" AND THEIR PERFORMANCE IS STUDIED EXPERIMENTALLY. THE CONCEPT OF THE SHROUD AS AN ANNULAR "WING" IS JUSTIFIED, LEADING TO THE CONCLUSION THAT HIGH-LIFT TECHNIQUES SHOULD BE USED IN SHROUD DESIGN, AND THAT HIGH-LIFT DEVICES, SUCH AS FLAPS, WOULD INCREASE THE POWER OUTPUT OF THE WINDMILL. IT IS SHOWN EXPERIMENTALLY THAT THE IDEAL POWER OUTPUT OF A FLAP-AUGMENTED SHROUDED TURBINE CAN BE MORE THAN 4 TIMES THE POWER OF UNSHROUDED TURBINES OF THE SAME DIAMETER.

76-0469 SELLMAN D L
WIND MOTORS.
U.S. PATENT NO. 3,988,072, OCTOBER 26, 1976. 4 P.

WIND MOTORS ARE DESCRIBED WHICH ARE PROPELLED BY IMPACT OF THE WIND AGAINST THE VANES OF AN IMPELLER WHEEL THAT HAVE WIND CHANNELING DEVICES THAT GATHER THE WIND FROM A LARGE AREA AND FUNNEL IT AT INCREASED DENSITY AND PRESSURE TO APPLY MULTIPLIED IMPACT AGAINST THE IMPELLER VANES.

76-0470 SFORZA P M
VORTEX AUGMENTOR CONCEPTS FOR WIND ENERGY CONVERSION. PROGRESS REPORT MAY-NOVEMBER 1975.
NTIS, JANUARY 1976. 65 P.
PB-263749

A PROGRESS REPORT ON RESEARCH, DESIGN, AND DEVELOPMENT OF AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT HERE IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH KINETIC ENERGY DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF LOW KINETIC ENERGY DENSITY. PROPERLY DESIGNED TURBINES WOULD BE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC). TWO MAJOR GOALS ARE DESCRIBED: (1) EVALUATION AND ASSESSMENT OF THE VAC FOR WIND ENERGY CONVERSION APPLICATIONS; AND (2) CONSTRUCTION AND OPERATION OF A SMALL-SCALE OUTDOOR TEST MODEL. EACH TASK OBJECTIVE IS REVIEWED SO THAT A DESCRIPTION OF PROGRESS TO DATE AS WELL AS ANTICIPATED ACTIVITIES FOR THE REMAINDER OF THE PROGRAM IS PRESENTED.

76-0471 SFORZA P M
VORTEX AUGMENTORS FOR WIND ENERGY CONVERSION. PROGRESS REPORT MAY-NOVEMBER 1976.
NTIS, DECEMBER 1976. 114 P.
TID-27885

A PROGRESS REPORT ON ADVANCED RESEARCH, DESIGN, AND DEVELOPMENT ON AERODYNAMIC DEVICES WHICH CAN CONCENTRATE AND AUGMENT NATURAL WINDS IS PRESENTED. THE KEYSTONE ELEMENT HERE IS THE GENERATION AND CONTROL OF DISCRETE VORTICES OF HIGH KINETIC ENERGY DENSITY BY THE APPROPRIATE INTERACTION OF SUITABLY DESIGNED AERODYNAMIC SURFACES WITH NATURAL WINDS OF LOW KINETIC ENERGY DENSITY. PROPERLY DESIGNED TURBINES WOULD BE UTILIZED TO TRANSFORM THE ENERGY IN THIS COMPACTED FIELD TO USEFUL SHAFT WORK. THIS IDEA IS TERMED THE VORTEX AUGMENTOR CONCEPT (VAC). PERFORMANCE, DESIGN, SYSTEMS, ECONOMICS, AND FIELD TESTING ARE DISCUSSED.

76-0472 SHEAHAN R T
FUELING THE FUTURE; AN ENVIRONMENTAL AND ENERGY PRIMER.

NEW YORK, ST. MARTIN'S PRESS, 1976.

WIND POWER IS BRIEFLY DISCUSSED AS AN ALTERNATIVE ENERGY SOURCE.

76-0473 SHELDAHL R E, BLACKWELL B F
AERODYNAMIC CHARACTERISTICS OF FOUR SYMMETRICAL AIRFOIL SECTIONS THROUGH 180 DEGREES ANGLE OF ATTACK AT LOW REYNOLDS NUMBERS (PRELIMINARY DATA REPORT).
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.73--II.106.
SAND-76-5586

SANDIA LABORATORIES CONTRACTED WITH WICHITA STATE UNIVERSITY TO CONSTRUCT FOUR DIFFERENT SYMMETRICAL AIRFOIL SECTIONS AND TO TEST THE MODELS AT ANGLES OF ATTACK 180 DEGREES FOR THREE DIFFERENT REYNOLDS NUMBERS. ONE OF THE REYNOLDS NUMBERS WAS TO BE AS LOW AS COULD BE OBTAINABLE AND STILL BE WITHIN THE OPERATIONAL RANGE OF THE FACILITY AND BALANCE SYSTEM. THE PURPOSE OF THESE TESTS WAS TO OBTAIN NEEDED SECTION DATA FOR THE NACA-0012 AIRFOIL OVER THE ANGLE OF ATTACK RANGE OF INTEREST AT AS LOW A REYNOLDS NUMBER AS POSSIBLE. IN ADDITION TO HELP ANSWER THE QUESTION OF THE OPTIMUM AIRFOIL FOR THE TURBINE, SIMILAR SECTION DATA FOR A THINNER (NACA-0009) AND THICKER (NACA-0015) AIRFOIL WAS DEEMED NECESSARY. ALSO, A NON-STANDARD AIRFOIL, A MODIFIED-0012 DESIGNATED NACA/0012H, WAS TESTED.

76-0474 SHULTIS J K
PERSPECTIVES IN ENERGY: 1976.
NTIS, AUGUST 1976. 429 P.
CES-17

VARIOUS ASPECTS OF ENERGY PRODUCTION AND CONSUMPTION ARE EXAMINED. TOPICS INCLUDE ENERGY AND CIVILIZATION, ENERGY RESOURCES, CURRENT U.S. PROBLEMS, ENERGY CONSERVATION, CONVENTIONAL ELECTRIC ENERGY PRODUCTION, NUCLEAR POWER REACTORS, ELECTRICAL GENERATION AND DISTRIBUTION AND DIRECT USE OF FOSSIL FUELS, SOLAR AND WIND ENERGY, FUTURE ENERGY ALTERNATIVES, FINANCIAL CONSIDERATIONS, RADIOACTIVITY AND BIOLOGICAL EFFECTS OF RADIATION, POLLUTION FROM ENERGY PRODUCTION, ENVIRONMENTAL EFFECTS OF ENERGY CONSUMPTION, RISK/BENEFIT CONSIDERATIONS, NATIONAL ENERGY POLICY, AND PLANNING AND LICENSING OF ELECTRIC POWER PLANTS.

76-0475 SIMON D I M
(THERMAL ATMOSPHERIC POWER SYSTEM CONCEPTS).
INTERNATIONAL SCIENTIFIC TECHNOLOGICAL CONFERENCE ON SPACE, 16TH, ROME, MARCH 18-20, 1976. PROCEEDINGS. ROME, RASSEGNA, INTERNAZIONALE ELETTRONICAL NUCLEARE ED AEROSPAZIALE, 1976. P. 525-536. (IN GERMAN)

THERMAL ATMOSPHERIC AREA POWER SYSTEMS EXPLOITING INSOLATION OF A ROOFED-OVER AREA, WITH THE GROUND ACTING AS A NATURAL COLLECTOR OF SUNSHINE ENERGY, AND A CENTRAL CHIMNEY PROVIDING A CONVECTION CHANNEL FOR EXTRACTING ENERGY FROM AIR CURRENTS GENERATED, ARE DESCRIBED. TRANSFORMATION OF THE KINETIC ENERGY OF THE RISING AIR CURRENTS TRAVERSING THE VERTICAL CHIMNEY INTO ELECTRICAL POWER OR MECHANICAL SHAFT OUTPUT BY MEANS OF WIND TURBINES, AND UTILIZATION OF RANDOM HORIZONTAL WIND IN ADDITION BY MEANS OF AN AUXILIARY SLEWABLE WIND TURBINE STAGE ATOP THE VERTICAL CHIMNEY, ARE ALSO DESCRIBED. THE CONCEPTS ARE RECOMMENDED PRIMARILY FOR ENERGY-POOR SEMI-ARID REGIONS WITH ABUNDANT INSOLATION. APPLICATIONS IN MORE TEMPERATE ENVIRONMENTS ARE ALSO CONSIDERED.

76-0476 SINGER R, ROBERTS T C
LAND USE REQUIREMENTS FOR FIVE ENERGY ALTERNATIVES.
AMERICAN NUCLEAR SOCIETY PUBLIC INFORMATION COMMITTEE REPORT, BLACK + VEATCH CONSULTING ENGINEERS, 1976. 12 P.

THE AMOUNT OF LAND NEEDED FOR VARIOUS ALTERNATIVE SOURCES OF ELECTRIC POWER GENERATION IS USUALLY IGNORED, EVEN THOUGH THE SURFACE OF THE EARTH IS A FINITE RESOURCE. STILL, ESSENTIAL SITING CHARACTERISTICS LIKE WATER SUPPLY, TRANSPORTATION, AFFECTED POPULATIONS, GEOGRAPHICAL FEATURES, AND ELECTRICAL TRANSMISSION FACILITIES MUST BE CONSIDERED IF ANY DISCUSSION IS TO PROCEED. ANALYSES OF A NUMBER OF FACILITIES FOR FIVE TYPES OF GENERATION STATIONS--HYDROELECTRIC, FOSSIL, NUCLEAR, SOLAR, AND WIND--INDICATE THAT NUCLEAR POWER REQUIRES THE LEAST AMOUNT OF LAND

AND WIND POWER THE MOST. BECAUSE OF THEIR EFFICIENT USE OF LAND, NUCLEAR AND FOSSIL-FUELED FACILITIES WILL BE EASIEST TO LOCATE NEAR ESSENTIAL SITING REQUIREMENTS.

76-0477 SINGH T, SONI J S
REVIEW AND ANALYSIS OF NATIONAL ENERGY RESEARCH AND DEVELOPMENT PROGRAMS AND PROPOSALS.
NTIS, JANUARY 1976. 433 P.
AD-A020794

TABULATED AND ANALYZED IN THIS REPORT ARE RECENTLY COMPLETED AND ON-GOING ENERGY R AND D PROGRAMS BY PERTINENT GOVERNMENTAL AND INDUSTRIAL ORGANIZATIONS. THE FIVE MAJOR AREAS OF DISCUSSION IN THIS STUDY INCLUDE: NUCLEAR FISSION; RENEWABLE ENERGY RESOURCES; CONVERSION SYSTEMS; ENERGY CONSERVATION; AND MULTI-DIRECTIONAL ENERGY R AND D STUDIES. OUTLINED ARE THE STATE-OF-THE-ART; ESTABLISHED NATIONAL GOALS AND OBJECTIVES; NATURE OF R AND D STUDIES CURRENTLY UNDERWAY; AND RECOMMENDATIONS FOR FUTURE R AND D WORK BY THE U.S. ARMY.

76-0478 SKURKA N, NAAR J
DESIGN FOR A LIMITED PLANET; LIVING WITH NATURAL ENERGY.
NEW YORK, BALLENTINE BOOKS, 1976. 215 P.

76-0479 SMITH R T
ANALYSIS OF POLYPHASE COMMUTATOR GENERATORS FOR WIND POWER APPLICATIONS.
IEEE TRANS. AEROSP. ELECTRON. SYST. AES-12 (1): 39-41, JANUARY 1976.

THIS PAPER DESCRIBES THE MATHEMATICAL MODELING OF THE AC POLYPHASE COMMUTATOR GENERATOR BY MEANS OF PARK'S EQUATIONS. FOR CLARITY, A TWO-PHASE, BALANCED-OPERATION MACHINE IS ANALYZED. EQUATIONS OF PERFORMANCE ARE DEVELOPED IN TERMS OF FAMILIAR PARAMETERS. THE MACHINE IS SHOWN TO HAVE ATTRACTIVE CHARACTERISTICS FOR VARIABLE-SPEED CONSTANT-FREQUENCY POWER GENERATION, WITH POSSIBLE APPLICATION TO WIND-POWER SYSTEMS.

76-0480 SMULDERS P T
PHYSICAL ASPECTS OF WINDMILL DESIGN.
PHYS. TECHNOL. 7(5): 208-214, SEPTEMBER 1976.

THE REVIVAL OF INTEREST IN RENEWABLE ENERGY SOURCES HAS LED TO SOME AMBITIOUS PROJECTS FOR HARNESSING WIND ENERGY - IN PARTICULAR THE NASA-ERDA PLAN TO BUILD A 1.5 MW WINDMILL IN 1978. THE UNDERLYING PHYSICS DETERMINING WINDMILL DESIGN FOR EFFICIENT ENERGY EXTRACTIONS IS DESCRIBED.

76-0481 SOLAR ENERGY, DFVLR ACTIVITIES.
BRAUNSCHWEIG, GERMANY F.R., DEUTSCHE FORSCHNUNGS- UND VERSUCHANSTALT FUER LUFT- UND RAUMFAHRT E.V. TRANSL.: NTIS, FEBRUARY 11, 1976. 8P.
ERDA-TR-143

THE RESEARCH PROGRAMS OF THE DFVLR IN THE AREA OF UTILIZATION OF SOLAR ENERGY ARE BRIEFLY SUMMARIZED IN TERMS OF SYSTEMS WITH FOCUSING COLLECTORS, SYSTEMS WITH FLAT COLLECTORS, AND WIND TURBINES.

76-0482 SUN + WIND IN MAINE.
WIND POWER DIG. 1(7): 20, DECEMBER 1976.

THE MAINE AUDUBON SOCIETY'S NEW HEADQUARTERS IS AN INTEGRATION OF ENERGY-EFFICIENT DESIGN, SOLAR AND WOOD SPACE-HEATING, AND WIND-POWERED WATER DELIVERY.

76-0483 SUMNER J
WINDMILL AIR STORAGE BOOSTS ENERGY HOPES.
ENGINEER 243: 13, DECEMBER 16-23, 1976.

A LECTURE BY P. MUSGROVE IS DISCUSSED. HE RECOMMENDS AN OFFSHORE WINDMILL SITE IN THE SOUTHERN NORTH SEA, WHICH HAS A POTENTIAL FOR STORING COMPRESSED AIR IN EXHAUSTED OIL AND GAS WELLS.

76-0484 SORENSEN B
DEPENDABILITY OF WIND ENERGY GENERATORS WITH SHORT-TERM ENERGY STORAGE.
SCIENCE 194(4268): 935-937, NOVEMBER 26, 1976.

POWER FLUCTUATIONS AND POWER DURATION CURVES FOR WIND ENERGY GENERATORS, INCLUDING ENERGY STORAGE FACILITIES OF A CERTAIN CAPACITY, ARE COMPARED TO THOSE OF TYPICAL NUCLEAR REACTORS. A STORAGE SYSTEM CAPABLE OF DELIVERING THE YEARLY AVERAGE POWER OUTPUT FOR ABOUT 10 HR ALREADY MAKES THE DEPENDABILITY OF THE WIND ENERGY SYSTEM COMPARABLE TO THAT OF A TYPICAL NUCLEAR PLANT.

76-0485 SORENSEN B
DIRECT AND INDIRECT ECONOMICS OF WIND ENERGY SYSTEMS RELATIVE TO FUEL.
ENERGY DIG. 5(6): 4-5, DECEMBER 1976.

76-0486 SOUTH P
A HIGH-SPEED VERTICAL-AXIS WIND MACHINE.
ADVANCED WIND ENERGY SYSTEMS. WORKSHOP PROCEEDINGS. STOCKHOLM, STU/VATTENFALL, 1976. P. 3-5 TO 3-18.

76-0487 STANSELL J
(IS WINDPOWER READY TO TAKE OFF)?
ARCH. ENERGIEWIRTSCH. 30(8): 681-685, AUGUST 1976. (IN GERMAN) ALSO ELECTR. REV. 197(15): 456-457, OCTOBER 1975.

THIS ARTICLE GIVES A BRIEF SURVEY ABOUT THE POSITION OF WIND ENERGY DEVELOPMENTS IN THE USA, IN DENMARK, AND IN GREAT BRITAIN. THE PROTOTYPE OF A WIND ENGINE WHICH WAS BUILT BY WESCO (WIND ENERGY SUPPLY COMPANY) TO PRODUCE 140 KW IS DEALT WITH MORE INTENSIVELY. SOME DATA ABOUT THE PROFITABILITY OF WIND-ENERGY PLANTS ARE GIVEN.

76-0488 STARR C
ROLE OF ADVANCED ENERGY SYSTEMS.
TECHNOLOGY OF CONTROLLED NUCLEAR FUSION, 2D TOPICAL MEETING, RICHLAND, WASHINGTON, SEPTEMBER 21, 1976. PROCEEDINGS. VOL. 1. CONF-760935. P. 7-19.

WIND POWER IS MENTIONED BRIEFLY AS A TECHNOLOGY THAT COULD PROVIDE PART OF OUR ELECTRICITY NEEDS BETWEEN NOW AND THE FIRST PART OF THE 21ST CENTURY.

76-0489 STEWART H J
DUAL OPTIMUM AERODYNAMICS DESIGN FOR A CONVENTIONAL WINDMILL.
AIAA J. 14(11): 1524-1527, NOVEMBER 1976.

THE THEORETICAL POSSIBILITY OF DESIGNING THE BLADING OF A CONVENTIONAL WINDMILL SO AS TO MATCH THE OPTIMUM LOADING FOR MAXIMUM OUTPUT AT TWO DIFFERENT OPERATING CONDITIONS (I.E., AT TWO DIFFERENT VALUES OF THE RATIO OF TIP SPEED TO WIND SPEED) IS INVESTIGATED USING THE VORTEX BLADE ELEMENT THEORY. THE THEORY OF OPTIMUM LOADING IS DEVELOPED, INCLUDING THE EFFECT OF PROFILE DRAG. FOR THE RANGE OF PARAMETERS CONSIDERED, IT IS SHOWN THAT THE EFFECT OF PROFILE DRAG ON BLADE LOADING IS QUITE SMALL, ALTHOUGH THE EFFECT ON EFFICIENCY IS SIGNIFICANT. THE SIMPLER THEORY, NEGLECTING PROFILE DRAG, AND FIRST PRESENTED BY GLAUERT, THEN IS USED TO DESIGN THREE SETS OF BLADING WHICH MATCH THE GLAUERT LOADING CONDITIONS AT TWO CONDITIONS, TIP SPEED RATIOS OF 4 AND 5.

76-0490 STICKNEY G H
WINDMILL OPTIMIZATION.
ENERGY LA: TACKLING THE CRISIS. GREATER LOS ANGELES AREA ENERGY SYMPOSIUM, CALIFORNIA, MAY 19, 1976. LOS ANGELES COUNCIL OF ENGINEERING + SCIENCE, PROCEEDINGS SERIES VOL. 2. NORTH HOLLYWOOD, CALIFORNIA, WESTERN PERIODICAL COMPANY, 1976. P. 197-202.

THIS PAPER TREATS THE DEVELOPMENT AND STATEMENT OF THE WINDMILL LAW. IT ALSO SHOWS THE DERIVATION OF THE EQUATION FOR THE POWER SURFACE RELATING THE WIND VELOCITY, POWER AND ANGULAR VELOCITY OF THE ROTOR. IT IS AN APPLICATION OF BASIC FUNDAMENTALS AND YIELDS SEVERAL INSIGHTS REGARDING THE PHENOMENA ENCOUNTERED IN WIND POWER APPLICATIONS. IT HAS BEEN DEMONSTRATED THAT HIGH SPEED MILLS CAN EXTRACT MORE POWER FROM THE WIND THAN SLOW ONES. THE EQUATION OF THE POWER SURFACE HAS BEEN DERIVED. ITS GRAPH COMPARES FAVORABLY WITH PERFORMANCE CHARACTERISTICS OF MODEL WINDMILLS. IT SHOWS THAT INCREASING THE NUMBER OF BLADES GREATLY ENHANCES THE POWER OUTPUT OF A LOW SPEED MILL BUT HAS LITTLE EFFECT ON A HIGH SPEED MILL. IT SHOWS, HOWEVER, THAT STARTING TORQUE IS GREATLY ENHANCED FOR ALL MILLS BY INCREASING THE NUMBER OF BLADES.

76-0491 STOY B
NON-NUCLEAR, NON-FOSSIL SOURCES OF ENERGY.
ATOMWIRTSCH. - ATOMTECH. 21(11): 527-534, NOVEMBER 1976.

THE POTENTIAL OF ENERGY FROM THE EARTH'S CORE, EARTH'S CRUST, RIVERS, GROUNDWATER, GLACIAL ICE, SEA WATER, WAVES, TIDES, WIND, AMBIENT AIR, AND SOLAR RADIATION IS EVALUATED BY COMPARING EACH POTENTIAL ENERGY RESOURCE FOR TECHNICAL VIABILITY, ECONOMICS, AVAILABILITY, ECOLOGICAL IMPACT, AND POSSIBLE CONTRIBUTIONS TO FUTURE ENERGY REQUIREMENTS. AMBIENT AIR, A SOURCE OF ENERGY OVERLOOKED IN SYSTEMS STUDIES SO FAR, SEEMS TO HAVE THE GREATEST POTENTIAL. SINCE THE DIRECT OR INDIRECT USE OF SOLAR ENERGY IS NOT FEASIBLE WITHOUT THE APPLICATION OF ELECTRICITY, PARTICULAR IMPORTANCE IS ATTACHED TO THE FURTHER EXPANSION OF NUCLEAR POWER CAPABILITIES.

76-0492 STRICKLAND J H
AERODYNAMICS OF THE DARRIEUS TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.29--II.58.
SAND-76-5586

AN ANALYTICAL PERFORMANCE PREDICTION MODEL FOR THE DARRIEUS TURBINE IS PRESENTED. THIS MODEL IS SHOWN TO PREDICT THE PERFORMANCE OF SMALL SCALE ROTORS, FOR WHICH TEST DATA IS AVAILABLE, WITH REASONABLE ACCURACY. IT DISPLAYS A MARKED IMPROVEMENT OVER OLDER METHODS IN WHICH THE "INDUCED VELOCITY" THROUGH THE ROTOR IS CONSIDERED TO BE CONSTANT. THE MODEL IS CAPABLE OF PREDICTING THE OVERALL ROTOR POWER OUTPUT AND THE DISTRIBUTION OF AERODYNAMIC FORCES ALONG THE ROTOR BLADES. THE MODEL CAN BE USED TO STUDY THE EFFECTS OF ROTOR GEOMETRY VARIATIONS SUCH AS BLADE SOLIDITY, BLADE TAPER, AND VARIATIONS IN ROTOR HEIGHT TO DIAMETER RATIOS. IN ADDITION, SPACIAL VARIATIONS IN FREESTREAM VELOCITY SUCH AS THAT PRODUCED BY ATMOSPHERIC WIND SHEAR CAN BE HANDLED BY THE MODEL.

76-0493 SULLIVAN W N
5-M TURBINE FIELD TESTING.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.107--II.117.
SAND-76-5586

THE 5-M TURBINE (ACTUALLY DESIGNED AS, AND PREVIOUSLY DESIGNATED AS A 15-FOOT-DIAMETER UNIT) HAS RECENTLY UNDERGONE A SERIES OF OPERATIONAL FIELD TESTS. THIS TEST SERIES WAS INITIATED TO SEE IF FIELD DATA COULD POSSIBLY BE USED TO MEASURE THE PERFORMANCE OF THE 5-M TURBINE AND TO DEVELOP STANDARDIZED TECHNIQUES APPLICABLE FOR THE 17-M TEST PROGRAM.

76-0494 SULLIVAN W N
STRUCTURAL LOADS FOR THE 17M DARRIEUS TURBINE.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.130--II.136.
SAND-76-5586

THE MAIN PURPOSE OF THE STRUCTURAL LOAD EFFORT AT SANDIA IS TO PROVIDE A REALISTIC LOAD INPUT TO THE STRUCTURAL ANALYSIS PROGRAMS WHICH HAVE BEEN DEVELOPED TO EXAMINE THE 17M TURBINE. THERE ARE THREE MAJOR LOAD SYSTEMS WHICH ACT ON THIS TURBINE: GRAVITATIONAL, CENTRIFUGAL, AND AERODYNAMIC. ONLY THE AERODYNAMIC LOADS ARE DISCUSSED SINCE THE GRAVITATIONAL AND CENTRIFUGAL LOADS ARE WELL UNDERSTOOD AND CAN BE ROUTINELY INPUT TO AN ANALYSIS.

76-0495 SULLIVAN W N
SYSTEM ENGINEERING: PERFORMANCE CONSIDERATIONS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.10--II.18.
SAND-76-5586

THE KNOWN PERFORMANCE CHARACTERISTICS OF THE DARRIEUS TURBINE ARE REVIEWED WITH EMPHASIS ON COMPARING THE PERFORMANCE OF THIS TURBINE WITH STATE-OF-THE-ART HORIZONTAL AXIS MACHINES. ALSO, THE POTENTIAL ADVANTAGES GAINED BY USING THE DARRIEUS TURBINE IN AN ASYNCHRONOUS

(VARIABLE RPM) MODE ARE DISCUSSED.

76-0496 SUMNER J
BIG US WIND POWER SCHEME GETS GO-AHEAD.
ENGINEER 243: 13, AUGUST 19, 1976.

76-0497 THE SUNWIND WIND CAR.
WIND POWER DIG. NO. 1(6): 38-40, SEPTEMBER 1976.

THIS WINDMOBILE IS A PROTOTYPE HIGHWAY VEHICLE POWERED BY WIND AND BATTERIES. ITS AERODYNAMICALLY EFFICIENT SHAPE ENABLES IT TO CRUISE AT 43 MPH OR FASTER ON WIND POWER ALONE.

76-0498 A SURVEY OF THE WINDS ON THE ISLAND OF MAUI FOR POTENTIAL WIND POWER GENERATION.
HONOLULU, UNIV. OF HAWAII, DEPT. OF METEOROLOGY, 1976. 2 VOLS: UHMET76-06 AND 76-07.

76-0499 SWAMY N V C, FRITZSCHE A A
AERODYNAMIC STUDIES ON VERTICAL-AXIS WIND TURBINE.
INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS, CAMBRIDGE, ENGLAND, SEPTEMBER 1976.

76-0500 SWANSON R K, SMITH R T, JOHNSON C C
OPERATIONAL, COST, AND TECHNICAL STUDY OF LARGE WINDPOWER SYSTEMS INTEGRATED WITH AN EXISTING ELECTRIC UTILITY. FINAL REPORT.
NTIS, APRIL 1976. 19P.
COO/2621-2(EXEC. SUMM.)

THE OBJECTIVE OF THIS PROGRAM WAS TO EXPLORE THE FEASIBILITY OF THE USE OF WINDPOWER GENERATING SYSTEMS AS SUPPLEMENTAL ENERGY SOURCES ON EXISTING ELECTRIC UTILITIES IN THE TIME FRAME OF THE NEXT TWO DECADES. SPECIFICALLY THE STUDY WAS CENTERED UPON THE GEOGRAPHICAL REGION SERVED BY SOUTHWESTERN PUBLIC SERVICE COMPANY, AN INVESTOR-OWNED FACILITY WITH HEADQUARTERS IN AMARILLO, TEXAS.

76-0501 THRESHER R W, MEYER E E
DARRIEUS STRUCTURAL STUDIES AT OREGON STATE UNIVERSITY.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.10-III.37.
SAND-76-5586

THE OBJECT OF THE CURRENT RESEARCH EFFORT IS TO INVESTIGATE THE STATIC AND DYNAMIC RESPONSE OF THE DARRIEUS ROTOR USING A MORE REALISTIC MODEL BASED ON A RIGOROUS ANALYTICAL FORMULATION. SIMPLIFYING ASSUMPTIONS ARE STILL NECESSARY TO ACHIEVE A PRACTICAL SOLUTION; HOWEVER, THEY WILL BE APPLIED IN A MORE SYSTEMATIC FASHION THAN WAS POSSIBLE DURING THE PREVIOUS STUDY. THE FOLLOWING TASKS ARE BEING ACCOMPLISHED: FORMULATION OF BLADE KINEMATICS; FORMULATION OF BLADE STRAIN ENERGY; FORMULATION OF BLADE POTENTIAL AND KINETIC ENERGY; DEVELOPMENT OF AN AERODYNAMIC FORCE MODEL; DEVELOPMENT OF THE BLADE GOVERNING EQUATIONS; AND SOLUTION OF VARIOUS PROBLEMS OF PRACTICAL IMPORTANCE SUCH AS: BLADE DEFORMATION UNDER STATIC AND QUASI-STATIC LOADING, ROTOR BLADE STEADY STATE RESPONSE AND BLADE STABILITY BOUNDARIES.

76-0502 TAKLE E S, BROWN J M
WIND + WIND ENERGY IN IOWA. FINAL REPORT TO THE IOWA ENERGY POLICY COUNCIL.
AMES, IOWA, IOWA STATE UNIVERSITY. IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION, OCTOBER 1, 1976. 139P.

THE PURPOSE OF THIS STUDY WAS TO DOCUMENT THE CHARACTERISTICS OF WIND AND WIND ENERGY IN IOWA IN THE LOWEST 200 FEET OF THE ATMOSPHERE. WIND ENERGY WAS ALSO EXPLORED IN A GENERAL WAY BY STUDYING THE CHARACTERISTICS OF "METEOROLOGICAL ENERGY" AND N A SPECIFIC WAY BY MODELING THE ENERGY PRODUCTION OF WIND-DRIVEN GENERATORS USING IOWA WIND STATISTICS AS INPUT.

76-0503 A TALK WITH JIM SENCENBAUGH
WIND POWER DIG. NO. 1(6): 4-9, SEPTEMBER 1976.

76-0504 TAUBENFELD R F, TAUBENFELD H J
BARRIERS TO THE USE OF WIND ENERGY MACHINES: THE PRESENT LEGAL/REGULATORY

REGIME AND A PRELIMINARY ASSESSMENT OF SOME LEGAL/POLITICAL/SOCIETAL PROBLEMS.
NTIS, JULY 1976. 159P.
PB-263576

THIS REPORT ANALYZES AND ASSESSES THE PRESENT STATE OF LAW AND REGULATION OF ALL LEVELS OF GOVERNMENT THAT MAY AFFECT WIND ENERGY MACHINES. ALSO ANALYZED AND ASSESSED IS THE STATE OF ANALOGOUS AND RELATED LAW AND REGULATION, REQUIREMENTS AT VARIOUS LEVELS OF GOVERNMENT, AND INTERNATIONAL RULES, AS WIND MACHINES GROW LARGER AND/OR ARE USED IN ARRAYS. IT SUGGESTS SOME POTENTIAL IMPACTS OF THE DEVELOPMENT OF WIND-BASED POWER TECHNOLOGY ON SELECTED ASPECTS OF THE AMERICAN ECONOMY, PARTICULARLY ON THE ENERGY DELIVERING UTILITIES.

76-0505 ROSE M
WTG SYSTEMS.
WIND POWER DIG. 1(7): 42-45, DECEMBER 1976.

76-0506 TEMPLIN R J, SOUTH P
CANADIAN WIND ENERGY PROGRAM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. I.57-I.88.
SAND-76-5586

THE VERTICAL-AXIS WIND TURBINE RESEARCH AND DEVELOPMENT WORK CARRIED OUT BY THE NATIONAL RESEARCH COUNCIL OF CANADA IN SUPPORT OF THE MAGDALEN ISLANDS TURBINE IS REVIEWED.

76-0507 TEWARI S K
RURAL ELECTRIFICATION AND WIND POWER.
INDIAN EAST. ENG. 118(10): 455, 457-459, OCTOBER 1976.

THE ECONOMIC ASPECTS OF USING WIND GENERATED ELECTRICITY IN RURAL VILLAGES OF INDIA ARE STUDIED.

76-0508 TEXAS ENERGY: FUTURE SOURCES.
AUSTIN, TEXAS, GOVERNOR'S ENERGY ADVISORY COUNCIL, OCTOBER 1976. 16P.

THIS PAMPHLET BRIEFLY DESCRIBES THE DEVELOPMENT OF FUTURE ENERGY SOURCES FOR TEXAS INCLUDING COAL, SOLID WASTE, NUCLEAR AND WIND POWER, AND SOLAR AND GEOTHERMAL ENERGY.

76-0509 THOMAS R I
HARNESSING THE WIND'S ENERGY.
SPEC. ENG. 35(1): 57-62, JULY 1976.

THE STATUS OF THE NASA-LEWIS WIND SYSTEM IN SANDUSKY, OHIO, IS REVIEWED. THE 125 FT DIAMETER, 100 KW ROTOR TURBINE ACHIEVED ITS RATED POWER AT 18 MPH AND 40 REVOLUTIONS/MIN IN DECEMBER 1975. PERFORMANCE IS AS EXPECTED, EXCEPT FOR BLADE BENDING PROBLEMS. WIND TURBINES OF SIMILAR DESIGN ARE DESCRIBED. ERDA'S PRESENT FEDERAL WIND ENERGY PROGRAM CALLS FOR OPERATION OF THE FIRST LARGE, 1000-2000 KW WIND TURBINES NEAR THE END OF 1979.

76-0510 THOMAS R L
LARGE EXPERIMENTAL WIND TURBINES: WHERE WE ARE NOW.
ENERGY TECHNOLOGY III: COMMERCIALIZATION. BETHESDA, MARYLAND, GOVERNMENT INSTITUTES, INC., 1976. P. 135-157. ALSO NTIS, 1976. 31P.
NASA-TM-X-71890

SEVERAL LARGE WIND TURBINE PROJECTS HAVE BEEN INITIATED BY NASA-LEWIS AS PART OF THE ERDA WIND ENERGY PROGRAM. THE PROJECTS CONSIST OF PROGRESSIVELY LARGE WIND TURBINES RANGING FROM 100 KW WITH A ROTOR DIAMETER OF 125 FEET TO 1500 KW WITH ROTOR DIAMETERS OF 200 TO 300 FEET. ALSO INCLUDED IS SUPPORTING RESEARCH AND TECHNOLOGY FOR LARGE WIND TURBINES AND FOR LOWERING THE COSTS AND INCREASING THE RELIABILITY OF THE MAJOR WIND TURBINE COMPONENTS. THE RESULTS AND STATUS OF THE ABOVE PROJECTS ARE BRIEFLY DISCUSSED. IN ADDITION, A BRIEF SUMMARY AND STATUS OF THE PLANS FOR SELECTING THE UTILITY SITES FOR THE EXPERIMENTAL WIND TURBINES IS ALSO DISCUSSED.

76-0511 TISON R R

WIND-POWERED HYDROGEN ELECTRIC SYSTEMS FOR FARM AND RURAL USE. FINAL REPORT MAY - DECEMBER 1975.
NTIS, APRIL 1976. 171P.
PB-259318

PRELIMINARY DESIGN FOR WIND-ENERGY CONVERSION SYSTEMS SUPPLYING THE TOTAL ENERGY NEEDS OF SELECTED FARMS AND A RURAL HOME ARE SYNTHESIZED. THE CONCEPT IS A FULLY DEDICATED SYSTEM WHOSE COMPONENTS AND SUBSYSTEMS ARE OFF-THE-SHELF TECHNOLOGY. THE PRINCIPAL SUBSYSTEMS AND COMPONENTS ARE: (1) INPUT (WIND TURBINE, ELECTROLYZER, AND RECTIFIERS); (2) STORAGE (BATTERIES, AND STORAGE TANKS OF HYDROGEN AND HOT WATER);AND (3) OUTPUT (INVERTER, MOTOR GENERATOR, ENGINE GENERATOR, AND FUEL CELL). TWO METHODS OF ENERGY STORAGE ARE EVALUATED FOR USE AND SUBSEQUENTLY FORM THE BASES UPON WHICH EACH DESIGN IS OPTIMIZED. IT IS SHOWN THAT WIND-ENERGY SYSTEMS BASED ON BATTERY-STORAGE SYSTEMS ARE: (1) SIMPLER TO CONSTRUCT AND MAINTAIN; (2) MORE EFFICIENT; AND (3) LESS EXPENSIVE THAN THOSE BASED ON HYDROGEN-STORAGE SYSTEMS. FURTHER, THE RELATIVE ECONOMICS OF EACH WIND-ENERGY SYSTEM ARE HEAVILY DEPENDENT ON WIND AVAILABILITY, NUMBER OF DAYS OF ENERGY STORAGE REQUIRED, AND THE MATCH BETWEEN THE WIND ENERGY AVAILABLE AND THE ENERGY REQUIREMENTS OF THE LOAD. OF ALL THE ENERGY REQUIREMENTS CHARACTERIZED, THE CASH GRAIN OPERATION IS SHOWN TO BE THE LEAST ADAPTABLE TO WIND-ENERGY SYSTEMS.

76-0512 TODD J
THE NEW ALCHEMISTS.
CO EVOLUTION Q. NO. 9: 54-65, SPRING 1976.

THE NEW ALCHEMY INSTITUTE'S EXPERIENCES WITH WINDPOWER ARE DESCRIBED ALONG WITH OTHER PROJECTS OF THIS GROUP. THEY HAVE COMBINED WINDPOWER WITH SOLAR IN SEVERAL BIO-SHELTER APPLICATIONS.

76-0513 TORREY V
WIND-CATCHERS; AMERICAN WINDMILLS OF YESTERDAY AND TOMORROW.
BRATTLEBORO, VT., STEPHEN GREENE PRESS, 1976. 226P.

"WIND-CATCHERS" PROVIDES THE ESSENTIAL BACKGROUND OF WINDMILL DEVELOPMENT ABROAD, BUT THE MEAT OF THE BOOK IS THE STORY OF WINDMILL PROGRESS IN AMERICA AND ITS PROJECTION INTO THE FUTURE OF WINDMILLS AS AN ENERGY SOURCE. IT DESCRIBES DOZENS OF AMERICAN WINDMILLS FROM ALL OVER THE COUNTRY, GIVING AN ACCOUNT OF THEIR DESIGNS, SPECIFICATIONS, AND CAPABILITIES--FROM THE HOME-BUILT INSTALLATION THAT GENERATES ELECTRICITY FOR AN ENTIRE MECHANIZED FARM IN IOWA TO THE NASA, ERDA AND OTHER PROJECTS THAT FORESHADOW A WINDCATCHING TOMORROW. IT INCLUDES PICTURES.

76-0514 TOWER OF POWER.
WIND POWER DIG. 1(6): 46, SEPTEMBER 1976.

A LIGHTWEIGHT TOWER IS DESCRIBED.

76-0515 TURNQUIST R O, APPL F C
DESIGN AND TESTING OF A PROTOTYPE SAVONIUS WIND MACHINE.
FRONTIERS OF POWER TECHNOLOGY CONFERENCE, STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, 1976. P. 15.1-15.3.

THE VARIOUS TYPES OF MECHANICAL DEVICES THAT HAVE BEEN TRIED OR PROPOSED TO RECOVER WIND ENERGY CAN BE SEPARATED INTO TWO CATEGORIES: VERTICAL AXIS AND HORIZONTAL AXIS MACHINES. ONE OF THE SIMPLEST VERTICAL AXIS WIND MACHINES IS THE SAVONIUS TYPE. DURING 1974, IT WAS THEREFORE DECIDED TO STUDY THE SAVONIUS TYPE WIND MACHINE AT KANSAS STATE UNIVERSITY BECAUSE OF ITS SIMPLICITY AND POTENTIAL FOR A REASONABLY HIGH EFFICIENCY. SINCE THEN, THIS DECISION HAS BEEN FURTHER JUSTIFIED BY RESULTS OF RECENT WIND TUNNEL TESTS OF SAVONIUS ROTORS. DESIGN DETAILS ARE SUMMARIZED. RESULTS INDICATE THAT EFFICIENCIES OF 30 PERCENT WERE REACHED, BUT WITH OPTIMIZATION, EFFICIENCIES OF 37 PERCENT COULD BE ATTAINED.

76-0516 UPMALIS A
MIT WINDKRAFT ENERGIELUECKEN SCHLIESSEN. (WIND POWER PLANTS FOR PEAK DEMANDS).
ENERGIE 28(9): 262-265, SEPTEMBER 1976. (IN GERMAN)

A SURVEY OF THE CURRENT DEVELOPMENT OF WIND TURBINES AND CONTROL SYSTEMS FOR STORAGE AND PEAKING REQUIREMENTS IS GIVEN. THE PROSPECTS OF USING WIND POWER PLANTS MOUNTED ON ROOFS OF HIGH BUILDINGS ARE EVALUATED.

76-0517 UTILIZATION OF WIND ENERGY.
NTIS, OCTOBER 1976. 10P. (IN IRANIAN)
CRAR--76-7

THIS REPORT IS BY THE ATOMIC ENERGY ORGANIZATION OF IRAN, TEHERAN, CENTRE FOR RESEARCH AND FOR APPLICATION OF RADIOISOTOPES. THE STATISTICS OF THE WIND ENERGY IN THE THREE AEROLOGY STATIONS IN THE SHAHBANU FARAH DAM REGION--OVER A PERIOD OF EIGHT YEARS--WERE EVALUATED AND ANALYZED. THE AVERAGE OF MAXIMAL VELOCITY CALCULATIONS INDICATES A SPEED OF 15 M/S. THE YEARLY PHYSICAL CONVERSION VALUE OF THIS ENERGY, IS 150,000 KW/H WHICH IS QUITE SUFFICIENT FOR A FAMILY OF FIVE PERSONS. ON A LARGER SCALE, THIS POWER CAN BE USED TO SUPPLY THE ENERGY REQUIRED FOR THE SEDIMENT DREDGING ACTIVITIES OF THE SHAHBANU FARAH DAM.

76-0518 WINDMILLS IN TVIND.
INGENIOEREN NO. 25-26, JUNE 1976. TRANSL.: NTIS, 1976. 13P.
ERDA-TR-230

DESIGN CHARACTERISTICS AND OPERATING PARAMETERS OF WIND TURBINES BUILT BY THE TVIND, DENMARK SCHOOLS ARE PRESENTED.

76-0519 VAN LIER J J C
HEAT AND ELECTRICITY PRODUCTION FOR THE NETHERLANDS ENERGY SURVEY.
POLYTECH. TIJDSCHR. PROCESTECH. 31(1): 2-17, JANUARY 1976.

76-0520 VENERUSO A F
AUTOMATIC CONTROL AND DATA ACQUISITION.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.263-II.269.
SAND-76-5586

THE PRIMARY GOAL OF AUTOMATIC CONTROL AND DATA ACQUISITION FOR THE WIND TURBINE PROGRAM IS TO MINIMIZE THE MANPOWER COSTS OF OPERATION BY HAVING COST EFFECTIVE AUTOMATION CAPABLE OF OPERATING AND MONITORING THE COMPLETE WIND TURBINE SYSTEM INDEPENDENTLY OF ON-SITE PERSONNEL. TO ACHIEVE THIS GOAL SANDIA LABORATORIES' WIND TURBINE TEST FACILITY IS EQUIPPED WITH A MICROPROCESSOR SYSTEM AND A NUMBER OF PERIPHERAL ELECTRONIC DEVICES WHICH INTERFACE THE PROCESSOR WITH THE TURBINE'S POWER SYSTEMS, OPERATING SENSORS, ANEMOMETERS AND OUTPUT RECORDING DEVICES.

76-0521 VENERUSO A F
ELECTRICAL POWER SYSTEM.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.241-II.262.
SAND-76-5586

THE BASIC APPROACH TO THE ELECTRICAL POWER SYSTEM FOR THE VERTICAL AXIS WIND TURBINE (VAWT) HAS BEEN TO USE STANDARD INDUCTOR MACHINES WITH ALL THE VAWT'S BUILT AND TESTED. OTHER MACHINES HAVE ALSO BEEN OF INTEREST IN THIS ENDEAVOR. FOR EXAMPLE, AUTOMOTIVE TYPE ALTERNATIVES HAVE BEEN USED IN SMALL SCALE SYSTEMS TESTS WITH THE 5 METER VAWT AND A 60 KW SYNCHRONOUS GENERATOR BEING DESIGNED AND BUILT ALONG WITH AN INDUCTION MACHINE FOR THE 17 METER VAWT TO BE USED AS A GENERAL PURPOSE COST EFFECTIVE ELECTRICAL POWER TESTBED FOR OPERATION OF THE VAWT IN CONJUNCTION WITH THE UTILITY SYSTEMS.

76-0522 VON KOENING F M
WINDENERGIE IN PRAKTISCHER NUTZUNG. RAEDER, ROTOREN, MUCHLEN, WINDKRAFTWERKE. (WIND ENERGY IN PRACTICAL USE. WHEELS, ROTORS, WINDMILLS, WIND POWER PLANTS).
GERMANY, F.R., PFRIEMER, 1976. 182P. (IN GERMAN)

FOLLOWING A BRIEF INTRODUCTION TO ENERGY CONVERSION THE FUNDAMENTALS OF ENERGY PRODUCTION FROM WIND POWER ARE PRESENTED, E.G. WIND SYSTEMS ON THE EARTH, ANNUAL COURSE OF THE WIND VELOCITY CURVES, DEPENDENCE OF THE WIND VELOCITY ON HEIGHT, ENERGY CONTENT OF AN AIR STREAM. THE MAIN PART OF THE BOOK CONTAINS A SURVEY OF THE USE OF WIND ENERGY FROM ANTIQUITY TO THE PRESENT. THE VARIOUS TYPES OF TECHNICAL SYSTEMS ARE DESCRIBED. FINALLY, A SURVEY IS GIVEN OF TODAY'S STATE OF WIND ENERGY UTILIZATION REPORTING ON LARGE WIND POWER PROJECTS AS WELL AS ON ECONOMIC QUESTIONS.

76-0523 VORTEX TURBINE TESTED.
WIND POWER DIG. 1(6): 22, SEPTEMBER 1976.

WIND TUNNEL TESTS OF A VORTEX TURBINE ARE SUMMARIZED.

76-0524 WADE G, HARTMANN M, HARTMANN S
HOMEGROWN ENERGY; POWER FOR THE HOME AND HOMESTEAD. REV. ED.
N.Y., CHARLES SCRIBNER'S SONS, 1976. 150P.

THIS BOOK IS A LIST OF COMPANIES PRODUCING PRODUCTS OR PUBLICATIONS IN ALTERNATIVE ENERGY, WITH A MASTER INDEX BY PRODUCT.

76-0525 WALTER STRESE'S WIND MUSEUM.
WIND POWER DIG. 1(7): 22, DECEMBER 1976.

76-0526 WALTERS R E
INNOVATIVE WIND MACHINES. EXECUTIVE SUMMARY AND FINAL REPORT.
NTIS, JUNE 1976. 218P.
ERDA/NSF/00367-76/2

INFORMATION IS PRESENTED CONCERNING WING TRAILING VORTICES, VORTEX TYPE CONCENTRATORS, VERTICAL AXIS WIND MACHINE ANALYSIS USING STRIP THEORY, NUMERICAL SOLUTION FOR THE UNSTEADY LIFTING CHARACTERISTICS OF VARIABLE PITCH CROSS-FLOW WIND TURBINES, AND OUTDOOR VAT TEST MODEL.

76-0527 WEINGARTEN L I, LOBITZ D W
BLADE STRUCTURAL ANALYSIS.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. II.137-II.150.
SAND-76-5586

THE ANALYSIS PRESENTED ADDRESSES THE BLADE WHICH IS BEING DESIGNED AND BUILT BY KAMAN FOR SANDIA'S 17-METER WIND TURBINE. THE BLADE CONSISTS OF TWO STRAIGHT SECTIONS AND A CENTER CIRCULAR SECTION. STRUTS ARE INCLUDED BETWEEN THE BLADE AND THE SHAFT TO PROVIDE ADDITIONAL SUPPORT. THE GEOMETRIC PROPERTIES USED IN THE ANALYSIS ARE ALSO GIVEN. THE STRUTS HAVE THE SAME CROSS SECTION AS THE BLADE. THE LOAD-CARRYING PORTION OF THE BLADE IS A 6061-T6 ALUMINUM LEADING-EDGE D-SECTION AND TRAILING-EDGE SPLINE. STRUCTURAL ANALYSIS RESULTS ARE PRESENTED.

76-0528 WEINGARTEN L I, BLACKWELL B F
SANDIA VERTICAL-AXIS WIND TURBINE PROGRAM. TECHNICAL QUARTERLY REPORT. JANUARY - MARCH 1976.
NTIS, AUGUST 1976. 55P.
SAND-76-0338

THIS QUARTERLY REPORT DESCRIBES THE ACTIVITIES WITHIN THE SANDIA LABORATORIES VERTICAL-AXIS WIND TURBINE PROGRAM DURING THE THIRD QUARTER OF THE FISCAL YEAR 1976. INCLUDED ARE THE HIGHLIGHTS OF THE QUARTER; A REVIEW OF THE STATUS OF GENERAL DESIGN EFFORTS IN THE AREAS OF AERODYNAMICS, STRUCTURES, SYSTEMS ANALYSIS, AND TESTING; A SUMMARY OF PRELIMINARY DESIGN DETAILS OF THE PROPOSED 17-M TURBINE/60-KW GENERATOR SYSTEM FOR POWER GRID APPLICATION; AND STRUCTURAL ANALYSIS AND OPERATIONAL TEST RESULTS FOR THE EXISTING 5-M TURBINE.

76-0529 WEISS G
AUTOMATICALLY ADJUSTABLE WIND POWER UNIT (HAS CARRIER POLE FOR WHEEL TILTABLY MOUNTED, AND WIND SCREEN).
GERMAN PATENT APPL. 2,423,612, JANUARY 6, 1976.

76-0530 WELLS W D, MCGOWAN J G
DESIGN AND INSTALLATION OF HEATING SYSTEM FOR UMASS SOLAR HABITAT I.
NTIS, DECEMBER 1976. 102P.
UM-WF-TR-76-10

DETAILS ARE PRESENTED OF DESIGN PRINCIPLES AND INSTALLATION OF THE SOLAR AND WINDPOWERED HEATING SYSTEMS INSTALLED IN UMASS SOLAR HABITAT I. INCLUDED ARE A COMPLETE SPECIFICATION OF MATERIALS AND OPERATING INSTRUCTIONS. A SUMMARY OF POTENTIAL MODIFICATIONS AND IMPROVEMENTS TO THE SYSTEM IS ALSO INCLUDED.

76-0531 WENTINK T

STUDY OF ALASKAN WIND POWER AND ITS POSSIBLE APPLICATIONS. QUARTERLY PROGRESS REPORT 1 OCTOBER-31 DECEMBER 1975.
GEOPHYSICAL INSTITUTE, UNIVERSITY OF ALASKA, FAIRBANKS, ALASKA. NTIS, JANUARY 20, 1976. 14P.
PB-263695

EXTENSIVE ANALYTICAL STUDIES ON WIND SPECTRA WERE EXTENDED TO THE PREDICTION OF THE MONTHLY AND AVERAGE POWER OUTPUT FROM SPECIFIED WINDMILLS, BASED ON ONLY KNOWLEDGE OF THE MEASURED MEAN WINDSPEED. FOR THE ELEKTRO WINDMILL AND 44 SETS OF LONG TERM ALASKAN WIND FREQUENCY DATA, THE AUTHOR CALCULATED THE EXPECTED MEAN POWERS. THEN, FROM ANALYTICAL CONSIDERATIONS HE PREDICTED THE EXPECTED MEAN POWER, WITH RESULTING ERRORS OF 0 TO 7 PERCENT.

76-0532 WENTINK T
WIND POWER POTENTIAL OF ALASKA. PART 11. WIND DURATION CURVE FITS AND OUTPUT POWER ESTIMATES FOR TYPICAL WINDMILLS.
NTIS, AUGUST 1976. 92P.
RLO/2229/T12--76/1

AN EMPIRICAL ANALYTICAL FUNCTION (F1) AND THE WEIBULL FUNCTION (F3) WERE COMPARED FOR USE IN CASTING MEASURED LONG-TERM WIND SPEED FREQUENCY DATA IN THE FORM OF THE WIND SPEED DURATION CURVES. DATA FROM 18 ALASKAN LOCATIONS WERE USED IN THE 248 CASES TREATED. THE FITTED DURATION CURVES WERE COUPLED WITH THE INSTANTANEOUS POWER VS. WIND SPEED CHARACTERISTICS FOR THREE WIND ENERGY CONVERSION SYSTEMS (WECS) TO PREDICT THE PROBABLE MONTHLY AND ANNUAL MEAN ENERGY PRODUCTIVITY AND POWER LEVELS OF THE WECS. THE LATTER, AS USED HERE, WERE RATED AT 6 KW (ELEKTRO), 15 KW (GRUMMAN), AND 100 KW (NASA-MOD-0). IN THE ABSENCE OF THE RELIABLE TEST DATA FOR AVERAGE ENERGY OR AVERAGE POWER (ANTI P) AT KNOWN AVERAGE WIND SPEEDS NO CHOICE BETWEEN F1 AND F3 IS OBVIOUS, BUT STATISTICAL TESTS FAVOR F1. BOTH SEEM EQUALLY USEFUL FOR WIND POWER ESTIMATION. THE VALIDITY OF USE OF THE LONG-TERM AVERAGE WIND SPEED AS A KEY PARAMETER IN WIND WORK IS DEMONSTRATED.

76-0533 WHISPERING WIND.
CONSULT. ENG. (LONDON) 40(11): 44-45, NOVEMBER 1976.

THIS IS A REVIEW OF THE INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS HELD AT CAMBRIDGE, ENGLAND, IN SEPTEMBER 1976.

76-0534 WHITEHURST C A, SARCO B, BLANCHARD W A
WIND ENERGY POTENTIAL IN THE COASTAL AREAS OF LOUISIANA.
LA. ENG. P. 6-9, DECEMBER 1976.

WIND POWER DATA FOR VARIOUS SITES ALONG THE LOUISIANA GULF COAST ARE PRESENTED. THE FEASIBILITY OF USING CURRENT DESIGN WIND TURBINES FOR ELECTRIC POWER GENERATION AT THESE SITES IS DISCUSSED.

76-0535 WIDGER W K
ESTIMATING WIND POWER FEASIBILITY.
POWER ENG. 80: 58-61, AUGUST 1976.

A DESCRIPTION IS GIVEN OF A METHOD WHICH MAKES IT POSSIBLE TO OBTAIN WIND POWER FEASIBILITY FOR AN AREA ON THE BASIS OF AVERAGE WIND SPEED DATA. THE METHOD APPEARS PARTICULARLY USEFUL, WHEN APPLIED TO CLIMATOLOGICAL AVERAGE WIND SPEED DATA, AND FOR INITIAL FEASIBILITY ASSESSMENTS. ATTENTION IS GIVEN TO DATA NEEDS AND SOURCES, RELATIONSHIPS BETWEEN WIND SPEEDS, THE NOMINAL AVERAGE WIND POWER, AND A TECHNICAL EVALUATION.

76-0536 WIDGER W K, DERRICKSON R A
NEW ENGLAND WIND POWER -- COASTAL OR MOUNTAIN.
POWER ENG. 80(12): 43-47, DECEMBER 1976.

A COMPARATIVE STUDY IS MADE OF THE WIND POWER AVAILABLE IN THE COASTAL AND IMMEDIATE OFFSHORE AREA OF THE GULF OF MAINE AND ON THE EXPOSED RIDGES AND SUMMITS IN OR PERIPHERAL TO THE WHITE MOUNTAINS AND OTHER NEW ENGLAND RANGES. IT IS CONCLUDED THAT THE WIND POWER AVAILABLE AT ELEVATIONS OF ABOUT 3000 FT MSL OR ABOVE EQUALS OR EXCEEDS THAT AVAILABLE 50 OR MORE MILES OFFSHORE IN THE GULF OF MAINE. THERE IS NO WAY TO AVOID DAY-TO-DAY VARIABILITY DUE TO CHANGING SYNOPTIC WEATHER SITUATIONS, BUT THE HIGHER ELEVATIONS INLAND DO APPEAR TO PERMIT RELATIVELY STEADY SEASONAL AVERAGE POWER GENERATION, IF THE OPERATING RANGE IS

APPROPRIATELY TRUNCATED.

76-0537 WIEDUWILT G
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,505,954/A/, AUGUST 26, 1976. 17P. (IN GERMAN)

THE WIND POWER PLANT DESCRIBED IN THIS INVENTION CONSISTS OF A VERTICAL ROTOR WITH A HORIZONTAL AND TRAVERSE TO WIND DIRECTION RUNNING SHAFT, WITH CIRCULAR IMPELLER SHOVELS. EXTRA GUIDE SHOVELS PROVIDE THAT WIND CANNOT HAVE A HINDERING AFFECT ON THE IMPELLER SHOVELS AT ANY POSITION. IN ADDITION A WIND DETOUR CANAL IS PROVIDED. THIS HAS THE TASK OF CAPTURING A GREATER AMOUNT OF WIND AND THAT OF DISTRIBUTING THE WIND TO THE WHEELS SO THAT THE BACK SIDE OF THE WHEELS ARE ACTIVATED ALSO. THROUGH CHANNELED WIND GUTTERS THE WIND IS EVENTUALLY LEAD TO THE CENTER OF THE WIND POWER PLANT. ADDITIONALLY THE COMPLETE INSTALLATION HAS A VERTICAL AXIS TURBINE. IT IS SIMILARLY CONSTRUCTED AS THE ABOVE DESCRIBED HORIZONTAL AXIS TURBINE, BUT DISPLAYS A SUBSTANTIALLY SMALLER MOMENT OF INERTIA, SO THAT IT IS ALSO CAPABLE OF RESPONDING TO SMALL WIND VELOCITIES.

76-0538 WIENECKE R
POSSIBLE SUBSTITUTES FOR THE PRESENT PRIMARY ENERGY SOURCES.
SYMPOSIUM ON ENVIRONMENTAL PROTECTION CONDITIONS AND LIMITS OF ECONOMIC GROWTH, AUGSBURG, GERMANY FR, JUNE 27, 1976. NTIS, 1976. 24P.
AED-CONF-76-323-001

THE PARAMETERS OF THE DEVELOPMENT OF ENERGY SUPPLY ARE EXAMINED FOR THE NEXT THOUSAND YEARS, IN ORDER TO GET A VIEW OF THE PARTS PLAYED BY THE DIFFERENT ENERGY CARRIERS. PROCEEDING FROM A RISING WORLD ENERGY DEMAND IN THE FUTURE, IT IS ESTABLISHED THAT GEOGRAPHICAL DISTRIBUTION AND THE QUANTITY OF RESERVES OF FOSSIL-ENERGY CARRIERS COMPEL THE INDUSTRIAL NATIONS, BEFORE ANYTHING ELSE, TO DEVELOP ALTERNATIVE ENERGY SOURCES. FOLLOWING THE PRESENT SITUATION, NUCLEAR ENERGY WILL THEREFORE DOMINATE. FROM THE DEVELOPMENT OF NON-NUCLEAR, NON-FOSSIL ENERGY CARRIERS (SUN, WIND ETC.) A CERTAIN EASING OF THE SITUATION ON THE ENERGY SECTOR HAS LONG BEEN AWAITED. UNTIL THE YEAR 2000, THESE ENERGY CARRIERS WILL, OF COURSE, BE ABLE TO CONTRIBUTE ONLY ABOUT 3 PERCENT TOWARDS INCREASING GUARANTEES OF SUPPLY.

76-0539 WILKE O, NEWTON O
AN ASSESSMENT OF WIND POWER AND ITS AGRICULTURAL USES ON THE HIGH PLAINS OF TEXAS.
TEXAS AGRIC. EXP. STA. MISC. PUBL. 1251, FEBRUARY 1976. 2P.

76-0540 WILKERSON A W
CIRCUIT FOR USING GEOPHYSICAL SOURCES OF ENERGY.
GERMAN (FRG) PATENT 2,608,627/A/, SEPTEMBER 16, 1976. 43P. (IN GERMAN)

THE PATENT SPECIFICATION CONCERNS ELECTRICAL RECTIFIER CIRCUITS IN TWO WAY AND IN FULL WAVE RECTIFIER CIRCUITS FOR SINGLE PHASE AND MULTI PHASE AC SUPPLY NETWORKS, WHICH WORK WITH ELECTRONICALLY CONTROLLED THYRISTORS. IT IS PROPOSED TO CONNECT A DC GENERATOR DRIVEN BY A WIND ROTOR ON THE DC SIDE OF THE RECTIFIER CIRCUIT, IN ORDER TO SUPPLY THE AC CONSUMER CONNECTED IN PARALLEL TO THE AC SIDE OF THE DC CIRCUIT TO THE SUPPLY NETWORK WITH ELECTRICAL ENERGY, AND THUS TO REDUCE THE AC CONSUMPTION FROM THE PUBLIC SUPPLY, OR EVEN TO SUPPLY POWER INTO THE SUPPLY NETWORK AT HIGH WIND SPEEDS.

76-0541 WILLIAM H
DELP II.
MOTHER EARTH NEWS NO. 40: 6-17, JULY 1976.

THIS IS AN INTERVIEW WITH BILL DELP, A DESIGNER, MANUFACTURER, AND INSTALLER OF WATER, WIND, SOLAR ETC., ENERGY SYSTEMS.

76-0542 WILSON R E, WALKER S N, LISSAMAN P B S
AERODYNAMICS OF THE DARRIEUS ROTOR.
J. AIRCRAFT 13: 1023-1024, DECEMBER 1976.

TO ANALYZE A DARRIEUS TYPE CROSSWIND-AXIS WIND TURBINE, THE FORCES ON THE SYSTEM ARE EXPRESSED BY A MOMENTUM ANALYSIS OF THE WAKE AND BY AN AIRFOIL THEORY AT THE LIFTING SURFACE. EQUATING WAKE AND WING FORCES YIELDS EQUATIONS FOR DETERMINING INDUCED FLOWS. SOME AVAILABLE EXPERIMENTAL

DATA ON ROTOR POWER AND THRUST COEFFICIENTS ARE COMPARED WITH THEORETICAL RESULTS OF WILSON AND LISSAMAN (1974).

76-0543 WILSON R E
AERODYNAMICS OF THE DARRIEUS ROTOR.
VERTICAL-AXIS WIND TURBINE TECHNOLOGY WORKSHOP, ALBUQUERQUE, N.M., MAY 17, 1976. PROCEEDINGS. ALBUQUERQUE, N.M., SANDIA LABS., JULY 1976. P. III.1 - III.9.
SAND-76-5586

PERFORMANCE MODELS OF THE DARRIEUS ROTOR HAVE BEEN FORMULATED BY WILSON AND LISSAMAN, TEMPLIN, JAMES, MURACA, SHANKAR AND STRICKLAND. THE CURRENT ANALYSIS IS IN ESSENCE A STRIP THEORY IN WHICH THE TIME-AVERAGED FORCE ON A BLADE ELEMENT IS EQUATED TO THE MEAN MOMENTUM FLUX THROUGH A STREAMTUBE OF FIXED LOCATION AND DIMENSIONS. THE ANALYSIS USES QUASI-STEADY AERODYNAMICS NEGLECTING THE EFFECTS OF MUTUAL INTERFERENCE AND OF MORE SIGNIFICANCE, NEGLECTS THE EFFECTS OF THE REAR BLADES IN CROSSING THE VORTEX SHEETS OF THE FORWARD BLADES (FRONT AND REAR BLADE LOADS ARE THE SAME).

76-0544 WILSON R E, LISSAMAN P B S, WALKER S N
AERODYNAMIC PERFORMANCE OF WIND TURBINES.
NTIS, JUNE 1976. 170P.
PB-259089

THIS REPORT SUMMARIZES THE STATE-OF-THE-ART OF PERFORMANCE PREDICTION METHODS FOR BOTH HORIZONTAL AND VERTICAL AXIS WIND TURBINES. STRIP THEORY METHODS FOR HORIZONTAL AXIS WIND TURBINES ARE EVALUATED FOR VARIOUS TIP LOSS MODELS AND OCCURRENCE OF MULTIPLE SOLUTIONS IN STRIP THEORY ANALYSIS IS DISCUSSED AND ILLUSTRATED. THE PERFORMANCE OF HIGH-SOLIDITY TURBINES SUCH AS THE CHALK DESIGN ALSO ARE DISCUSSED. THE CONFIGURATION AND PERFORMANCE OF OPTIMUM HORIZONTAL AXIS WIND TURBINES ARE ADDRESSED. OPTIMIZATION SCHEMES ARE DEVELOPED AND DISCUSSED AND COMPARISONS WITH THE MOD-0 ROTOR ARE MADE. PERFORMANCE AT OFF-DESIGN CONDITIONS IS ALSO EXAMINED. PERFORMANCE PREDICTION METHODS FOR VERTICAL AXIS WIND TURBINES ARE COVERED. CHAPTER 4 DEVELOPS THE PERFORMANCE MODEL FOR THE DARRIEUS ROTOR. MULTIPLE SOLUTIONS ARE FOUND TO OCCUR FOR DARRIEUS ROTORS IN THE SAME MANNER AS OCCURS FOR HORIZONTAL AXIS ROTORS. THIS FLOW MODEL IS COMPARED TO EXISTING EXPERIMENTAL DATA AND SHOWN TO YIELD EXCELLENT AGREEMENT. CHAPTER 5 CONTAINS AN ANALYTICAL MODEL OF THE FLOW IN A SAVONIUS ROTOR. THE FLOW MODEL IS SHOWN TO PREDICT THE ESSENTIAL FEATURES OF FLOW IN SAVONIUS ROTORS WITH CONSIDERATION OF VISCOUS EFFECTS.

76-0545 WIND AND WAVE.
AMERICAN NUCLEAR SOCIETY. CONFERENCE ON ENVIRONMENTAL ASPECTS OF NONCONVENTIONAL ENERGY SOURCES, DENVER, FEBRUARY 29-MARCH 3, 1976. P. 18-19.

76-0546 WIND ENERGY DEVELOPMENT POTENTIAL FOR THE NIAGARA FRONTIER TRANSPORTATION AUTHORITY: PRE-PROPOSAL.
ENERGY RESEARCH GROUP OF WESTERN NEW YORK, 1976. 67P.

INFORMATION ON THE FEASIBILITY OF USING WIND POWER FOR ELECTRIC POWER PRODUCTION IN WESTERN NEW YORK IS PRESENTED. AREAS OF INVESTIGATION FOR THE NIAGARA FRONTIER TRANSPORTATION AUTHORITY INCLUDE AN ENERGY DEMAND ANALYSIS; ALTERNATIVE ENERGY OPTIONS; WIND SURVEY OF THE NFTA WATERFRONT SITE; ECONOMIC ANALYSIS; PERFORMANCE SPECIFICATIONS OF ALTERNATIVE ENERGY HARDWARE; AND ALTERNATIVE ENERGY HARDWARE ANALYSIS.

76-0547 YEN J T
TORNADO-TYPE WIND ENERGY SYSTEM: BASIC CONSIDERATION.
ASME PAPER 76-WA/ENER-2, 1976. 11P.

SINCE WIND ENERGY DENSITY IS LOW, A LARGE ROTOR BECOMES A NECESSITY FOR COLLECTING A SIGNIFICANT AMOUNT OF WIND ENERGY. IT IS GENERALLY RECOGNIZED THAT AROUND 200 FT IN DIAMETER IS ROUGHLY THE PRACTICAL LIMITING SIZE FOR SUCH ROTORS, USING MODERN MATERIALS AND MANUFACTURING PROCESSES. YET, SUCH A ROTOR SIZE WILL GENERATE ONLY AROUND 1-MW WITH A STRONG 30-MPH WIND. TO BREAK THROUGH THE "1-MW LIMIT", A NEW CONCEPT IS PROPOSED CALLED THE TORNADO-TYPE WIND ENERGY SYSTEM, ONE VERSION OF WHICH IS ILLUSTRATED AND A PATENT HAS BEEN APPLIED FOR THIS CONCEPT. A GENERAL DESCRIPTION OF THE CONCEPT, SCALING LAWS, AND WIND TUNNEL TEST DATA HAVE

BEEN COVERED IN A PREVIOUS PAPER. A BASIC THERMODYNAMIC CONSIDERATION WILL BE PRESENTED IN THIS PAPER TO GAIN A PROPER PERSPECTIVE OF THE OVERALL PERFORMANCE OF THE NEW DESIGN. SOME DETAILS OF WIND TUNNEL DATA, DERIVATION OF THE SCALING LAWS, AND SOME RECENT RESULTS IN FLOW VISUALIZATION ARE ALSO PRESENTED.

76-0548 WIND LAWS ENACTED.
WIND POWER DIG. 1(6): 20, SEPTEMBER 1976.

76-0549 WIND POWER--THE MODERN VERSION.
PETROL. ECON. 43(6): 221-223, JUNE 1976.

THE NETHERLANDS HAS ACCEPTED AN INVITATION FROM THE INTERNATIONAL ENERGY AGENCY TO ACT AS HEAD COUNTRY FOR THE NEW LINE OF R+D INTO WIND POWER. THE U.K. IS TO ACT AS HEAD COUNTRY IN THE RELATED FIELD OF WAVE POWER. THE MOST OBVIOUS DRAWBACK TO THE CONCEPT OF WIND ENERGY IS VARIABILITY OF THE INCIDENCE OF WINDS. THIS DRAWBACK MAY EVENTUALLY BE OVERCOME BY THE DEVELOPMENT OF SUITABLE TECHNIQUES FOR ENERGY STORAGE. WIND AND WAVE POWER SYSTEMS ARE DISCUSSED.

76-0550 BUICK T R, MCMULLAN J T, MORGAN R, MURRAY R B
ON MONITORING WIND POWER.
WEATHER 31(12): 412-416, DECEMBER 1976.

THREE MAIN CONSIDERATIONS IN ANY PROPOSED WIND-POWER SCHEME ARE 1) AMOUNT OF POWER THAT IS THEORETICALLY AVAILABLE AT THE PROPOSED SITE; 2) TOTAL AMOUNT OF ENERGY (POWER X TIME) THAT CAN BE OBTAINED FROM A PROPOSED PLANT; AND 3) THE STRUCTURAL STRENGTH REQUIRED TO WITHSTAND THE FORCE THAT THE WIND IMPOSES ON THE POWER PLANT. WIND-FORCE MEASUREMENT PRESENTS SOME PROBLEMS. THIS PAPER DESCRIBES A DEVICE THAT WILL GIVE INFORMATION ON WIND SPEED, FORCE, POWER, AND ENERGY.

76-0551 WIND POWER PLANT WITH AIRFOIL BALLOONS (TO WHICH ATTACHED CABLES ARE CONNECTED TO IMPELLERS DRIVING GENERATORS).
GERMAN PATENT APPLICATION 2,437,003, FEBRUARY 12, 1976.

76-0552 DONALD COOKSEY, SITE PROJECT ENGINEER. THE NASA WIND TURBINE GENERATOR PROJECT.
MOTHER EARTH NEWS NO. 39: 6-11, MAY 1976.

76-0553 A WIND-POWERED "HYBRID HOUSE".
WIND POWER DIG. 1(7): 23, DECEMBER 1976.

DEL SCHLUMPBERGER'S "HYBRID HOUSE," WHICH INCLUDES TWO JACOBS WINDMILLS, IS DESCRIBED.

76-0554 MANALIS M S
AIRBORNE WINDMILLS AND COMMUNICATION AEROSTATS.
J. AIRCRAFT 13: 543-544, JULY 1976.

76-0555 MARIER D
NOTES ON WINDMILLS.
ALTERN. SOURCES ENERGY NO. 20: 27-29, MARCH 1976; NO. 22: 34, SEPTEMBER 1976.

THE AUTHOR DESCRIBES HIS EXPERIENCES IN REWINDING A JACOBS WIND GENERATOR TO CHANGE IT FROM 32 VOLTS TO 110 VOLTS.

76-0556 SOLAR ENERGY RESEARCH INSTITUTE, OVERSIGHT HEARINGS.
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY. HEARINGS. 94TH CONGRESS, 1ST SESSION, OCTOBER 22, 1975. HEARINGS TRANSCRIPT. WASHINGTON, D.C., GOV'T. PRINT. OFF., 1976. 409P.

HEARINGS WERE HELD TO REVIEW ERDA PLANS FOR THE SOLAR ENERGY RESEARCH INST. PROVIDED FOR BY THE SOLAR ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1974, PUBLIC LAW 93-473. SOLAR PROGRAMS ESTABLISHED BY THE ACT ARE NOW CONSOLIDATED IN THE NATIONAL SOLAR ENERGY R+D PROGRAMS WITHIN ERDA, WITH ERDA RESPONSIBLE FOR IMPLEMENTING THE SERI CONCEPT. WITNESSES INCLUDED: ERDA OFFICIALS, SOLAR ENERGY RESEARCH INST. OFFICIALS, AND INDUSTRY REPRESENTATIVES.

76-0557 SWIFT-HOOK D T
ATMOSPHERE AND THE OCEANS AS ENERGY SOURCES.

ASPECTS OF ENERGY CONVERSION, PROCEEDINGS OF A SUMMER SCHOOL, LINCOLN COLLEGE, OXFORD, ENGLAND, JULY 14-25, 1975. ELMSFORD, NEW YORK, PERGAMON PRESS, 1976. P. 405-430.

WIND POWER, WAVE POWER, TIDAL POWER AND POWER FROM OCEAN THERMAL GRADIENTS ARE CONSIDERED, AND TECHNOLOGICAL SOLUTIONS FOR WINDMILL DESIGN, TIDAL BARRAGES, THERMAL SEA POWER UTILIZATION, AND WAVE POWER CONVERSION DEVICES, ARE EVALUATED.

76-0558 WIND POWER.
MECH. ENG. 98: 62, SEPTEMBER 1976.

76-0559 KALLIO-MANNILA R
TUULESTA ENERGIAA. (WIND ENERGY).
TEHO 5(5): 26-27, 29-31, 49, 1976. (IN FINNISH)

76-0560 KARLSTROM C, KRIEG R, KVICK T, OLSSON L E, LJUNGSTROM O
PRELIMINARY SURVEY OF THE AERIAL WIND ENERGY RESOURCES IN SWEDEN.
NTIS, JANUARY 1976. 135P. (IN SWEDISH)
VES-1975-28

WIND VELOCITY DATA FOR DIFFERENT HEIGHTS ARE REVIEWED FOR SEVERAL METEOROLOGICAL STATIONS IN SWEDEN. WIND ENERGY RESOURCES ARE ESTIMATED FOR THE DIFFERENT COUNTIES. IT IS SHOWN THAT IT IS POSSIBLE TO PRODUCE WIND ENERGY IN SWEDEN. UP TO 30 TWH/YEAR COULD BE PRODUCED. IT IS DESIRABLE TO PRODUCE THIS ENERGY IN BIG PLANTS OTHERWISE IT WILL NOT BE AN ECONOMIC WAY OF PRODJCING ENERGY.

76-0561 BATTY J C, RILEY J P, GRENNEY W J, BELL D A
AN ENERGY ACCOUNTING EVALUATION OF SEVERAL ALTERNATIVES FOR HYDROPOWER AND GEOTHERMAL DEVELOPMENT.
NTIS, JUNE 1976. 40P.
PB-269188, PRJER-031-1, W77-09057

ALTERNATIVE MANAGEMENT STRATEGIES FOR HYDROPOWER AND GEOTHERMAL DEVELOPMENT ARE MYRIAD. THE APPROACH TAKEN IN THIS STUDY IS BASED ON THE NOTION OF OPTIMUM DEPLOYMENT OF FINITE RESOURCES. A LEGITIMATE QUESTION WHICH THIS STUDY HAS ATTEMPTED TO ADDRESS IS: DOES THE CONSTRUCTION OF LARGE WATER MANAGEMENT FACILITIES, SUCH AS HYDROPOWER DAMS, WHICH INVOLVE HUGE AMOUNTS OF ENERGY, CONCRETE, AND STEEL, CONSTITUTE AN EFFICIENT USE OF BASIC RESOURCES. AN ENERGY ACCOUNTING ANALYSIS TECHNIQUE IS PROPOSED; AND, USING THIS PROCEDURE, ENERGY RESOURCE INPUTS ARE EXAMINED AND COMPARED FOR SPECIFIC HYDROPOWER DAMS AND GEOTHERMAL POWER PLANTS.

75-0420 ACKER F
THE WINDS OF CHANGE?
CHARTERED MECH. ENG. 22(3): 93-95, 1975.

THE RECENT SURGE OF INTEREST IN WINDPOWER HAS BEEN CONFINED TO POWER GENERATION FROM LAND-BASED SITES. THE ADDITIONAL NOTION THAT A SAILING SHIP CAN NOW RIVAL A MOTOR SHIP IN COST TERMS IS THE SURPRISING RESULT OF A RESEARCH STUDY CARRIED OUT AT HAMBURG UNIVERSITY. THE NATURE OF THIS NEW DYNA SHIP IS DESCRIBED HERE.

75-0421 ALTERNATE ENERGY SOURCES FOR HAWAII.
NTIS, FEBRUARY 1975. 276P.
PB-230470

THIS IS A REPORT OF THE COMMITTEE ON ALTERNATE ENERGY SOURCES FOR HAWAII, WHICH WAS ESTABLISHED BY THE GOVERNOR'S STATE ADVISORY TASK FORCE ON ENERGY POLICY TO HELP RESPOND TO PROBLEMS CREATED BY THE ARAB OIL EMBARGO. FOURTEEN STUDIES WERE UNDERTAKEN -- TEN ON ALTERNATE ENERGY SOURCES, AND FOUR MORE GENERAL STUDIES. INCLUDED AS APPENDICES TO THE REPORT ARE ALL THE STUDIES ON THE POTENTIAL OF DIFFERENT ENERGY SOURCES TO MINIMIZE THE STATE'S NEAR-TOTAL DEPENDENCE ON SEABORNE PETROLEUM. THESE ALTERNATE SOURCES OF ENERGY ARE: SOLID WASTE; BIOCONVERSION; HYDROELECTRIC; WIND; GEOTHERMAL; SOLAR COLLECTORS; OCEAN THERMAL ENERGY CONVERSION; WAVES; TIDES; CURRENTS; OSMOSIS; COAL; NUCLEAR.

75-0422 AN ANALYSIS IDENTIFYING ISSUES IN THE FISCAL YEAR 1976 ERDA BUDGET.
NTIS, MARCH 1975. 101P.
PB-244863

THE REPORT, PREPARED WITH THE ASSISTANCE OF AN AD HOC O.T.A. ENERGY PANEL, APPRAISES THE RELATIVE LEVELS OF FUNDING OF VARIOUS PROGRAMS EMBODIED IN THE FISCAL YEAR 1976 BUDGET OF THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (ERDA), AND IDENTIFIES MAJOR ISSUES INVOLVING FUTURE ENERGY PROBLEMS. AREAS EXAMINED INCLUDE FOSSIL FUEL RESEARCH; NUCLEAR ENERGY RESEARCH; SOLAR, GEOTHERMAL, AND ADVANCED ENERGY SYSTEMS; CONSERVATION AND ENERGY PRODUCTIVITY AND ENVIRONMENTAL IMPACTS.

75-0423 ANDERSON W D
100 KW METAL WIND TURBINE BLADE DYNAMICS ANALYSIS, WEIGHT/BALANCE, AND STRUCTURAL TEST RESULTS.
NTIS, JUNE 1975. 100P.
NASA-CR-134957, N77-21468

THIS REPORT PRESENTS THE RESULTS OF DYNAMIC ANALYSES, WEIGHT AND BALANCE TESTS, STATIC STIFFNESS TESTS, AND STRUCTURAL VIBRATION TESTS ON THE 60-FOOT LONG METAL BLADES FOR THE ERDA-NASA 100-KW WIND TURBINE. THE ANALYTICAL RESULTS SHOW THE METAL BLADES TO BE FREE FROM STRUCTURAL OR DYNAMIC RESONANCE AT THE WIND TURBINE DESIGN SPEED AND SHOW THAT AEROELASTIC INSTABILITIES ARE UNLIKELY TO OCCUR WITHIN THE NORMAL OPERATING RANGE OF THE WIND TURBINE.

75-0424 BADE P
FLAPPING-VANE WIND MACHINE AND ROD-PISTON PUMP, AN INTEGRATED DELIVERY SYSTEM FOR LARGE WELL DEPTHS AND SMALL FLOW RATES.
INTERNATIONAL CONFERENCE ON APPROPRIATE TECHNOLOGIES FOR SEMI-ARID AREAS; WIND AND SOLAR ENERGY FOR WATER SUPPLY, SEPTEMBER 15-20, BERLIN, 1975. PROCEEDINGS. P. 71-82.

THIS IS A SHORT DESCRIPTION OF PERFORMANCE AND CONSTRUCTION OF A NON-CONVENTIONAL WINDDRIVEN PUMP, CONSISTING OF AN AERODYNAMICALLY SHAPED VANE, MOVING IN A NODDER PUMP-LIKE CONSTRUCTION, THUS CONVERTING WIND ENERGY DIRECTLY IN AN UP AND DOWN GOING MOVEMENT, CONVENIENTLY USABLE FOR A RECIPROCATING PUMP. THREE EXAMPLES OF DESIGN ARE GIVEN.

75-0425 BADE P
FLAPPING-VANE WIND MACHINE.
INTERNATIONAL CONFERENCE ON APPROPRIATE TECHNOLOGIES FOR SEMI-ARID AREAS; WIND AND SOLAR ENERGY FOR WATER SUPPLY, SEPTEMBER 15-20, BERLIN, 1975. PROCEEDINGS. P. 83-88.

INCLUDED ARE THE PATENT SPECIFICATION AND PATENT CLAIMS OF A NON-CONVENTIONAL WINDDRIVEN RECIPROCATING PUMP.

75-0426 BAINBRIDGE G R
ALTERNATIVE SOURCES OF ELECTRICAL ENERGY. II.
TECH. RUNDSCH. 67(37): 1-2, SEPTEMBER 2, 1975. (IN GERMAN)

75-0427 BANKWITZ H, FRITZSCHE A, SCHMELZLE J, WELTE D, SWAMY C N N
DEVELOPMENT OF A VERTICAL-AXIS WIND TURBINE (PHASE I). NON-NUCLEAR ENERGY TECHNOLOGY.
NTIS, OCTOBER 1975. 123P. (IN GERMAN)
BMFT-FB-T-76-55, N77-17112

STARTING FROM THE WORLDWIDE STATE OF THE ART THE PAPER DEALS WITH THE AERODYNAMIC, MECHANICAL, OPERATIONAL AND MANUFACTURING ASPECTS OF A VERTICAL-AXIS WIND ENERGY CONVERTER (DARRIEUS ROTOR). DESIGN TECHNIQUES AND DESIGN STUDIES ARE DESCRIBED.

75-0428 BESSELINK J, MASSELINK H
HET OPWEKKEN VAN ELECTRISCHE ENERGIE M.B.V. WINDMOLENS, HET KADER VAN DE SOCIAAL AANGEPASTE TECHNOLOGIE. (GENERATING ELECTRIC ENERGY BY MEANS OF WINDMILLS, WITH REGARD TO SOCIALLY APPROPRIATE TECHNOLOGY).
REP., HTS ENSCHEDE, THE NETHERLANDS, MAY 1975. (IN DUTCH)

75-0429 BLANC M
L'UTILISATION DE L'ENERGIE EOLIENNE POUR LE POMPAGE DE L'EAU. (THE UTILIZATION OF WIND ENERGY FOR WATER PUMPING).
PARIS, BUREAU CENTRAL D'ETUDES POUR LES EQUIPEMENTS D'OUTRE-MER. 11P. (IN FRENCH)

WIND-DRIVEN WATERPUMPS ARE VERY OFTEN INTENDED FOR SEMI-ARID AND REMOTE AREAS. REQUIREMENTS FOR WINDMILLS IN THOSE AREAS ARE GIVEN. A COMPARISON IS MADE BETWEEN MULTI-BLADE WATER PUMPING WIND TURBINES AND WIND ELECTRIC TURBINES.

75-0430 BLOW S J
ENERGY: AN ANNOTATED BIBLIOGRAPHY.
NTIS, FEBRUARY 1975. 550P.
N75-27558

THIS ENERGY BIBLIOGRAPHY CONTAINS APPROXIMATELY 3,300 REFERENCES ON ENERGY AND POWER, ENERGY AND POWER SOURCES, AND ENERGY AND POWER STORAGE AND TRANSMISSION WITH THE SOURCES DATED FROM AUGUST 1974 - DECEMBER 1974.

75-0431 BONGAR Y
LE MARCHE DES AEROGENERATEURS. (THE MARKET FOR WIND GENERATORS).
REP. CNEXO, MAY 1975. (IN FRENCH)

75-0432 BOYLE G
LIVING ON THE SUN: HARNESSING RENEWABLE ENERGY FOR AN EQUITABLE SOCIETY.
LONDON, MARION BOYARS PUBLISHERS LTD., 1975. 127P.

THE FOLLOWING CHAPTERS ARE INCLUDED: ENERGY AND EXPLOITATION, DOMESTIC ENERGY CONSUMPTION, POWER FROM BIOMASS, DIRECT SOLAR POWER, WIND POWER, WATER POWER, INTEGRATION OF THE VARIOUS ENERGY SOURCES, AND RENEWABLE ENERGY IN A DECENTRALIZED SOCIETY.

75-0433 BRAND R VAN DE
IN NEDERLAND EN BELGIE VERKRIOGBARE WINDMOLENS. (WINDMILLS, OBTAINABLE IN THE NETHERLANDS AND BELGIUM).
DE KLEINE AARDE NO. 12: 13-16, MARCH-APRIL 1975. (IN DUTCH)

COMPARED ARE SEVEN WINDGENERATORS IN THE RANGE 100 TO 200 WATT (AEROWATT, BOSMAN, LUBING AND WINCHARGER). THE ANNUAL OUTPUT AND INSTALLATION COSTS PER KWH ARE CALCULATED FROM THE MANUFACTURERS SPECIFICATIONS.

75-0434 BRANGWYN F, PRESTON H
WINDMILLS.
DETROIT, GALE RESEARCH COMPANY, 1975. 126P. (REPRINT OF 1923: 1)

75-0435 BROWN C K
ANALYSIS OF THE POTENTIAL FOR WIND ENERGY PRODUCTION IN NORTHWESTERN ONTARIO.
NTIS, NOVEMBER 1975. 177P.
NP-22490

A STUDY OF THE FEASIBILITY OF GENERATING ELECTRIC POWER FROM WIND GENERATORS AT REMOTE SITES IN NORTHWESTERN ONTARIO HAS BEEN CARRIED OUT ON BEHALF OF THE ONTARIO MINISTRY OF ENERGY, WITH PROJECT MANAGEMENT FROM ONTARIO HYDRO. THE WORK INCLUDED (1) A SURVEY OF COMMERCIALLY AVAILABLE WIND DRIVEN ELECTRIC PLANTS, BOTH CURRENTLY AVAILABLE AND PLANNED FOR PRODUCTION, (2) AN ANALYSIS OF EXISTING WIND DATA AND PREPARATION OF AN ISOVENT MAP FOR ONTARIO SHOWING ANNUAL MEAN WIND SPEEDS, (3) THE SELECTION OF SUITABLE SITES FOR A DEMONSTRATION UNIT AND A PROTOTYPE SYSTEM, (4) THE MATCHING OF AVAILABLE PLANT TO THE WIND REGIMES TO PREDICT ANNUAL ENERGY PRODUCTION, AND (5) A SYSTEMS ANALYSIS OF PURE DIESEL, HYBRID WIND/DIESEL AND PURE WIND ELECTRIC PLANTS TO DETERMINE THE COST OF POWER FROM THE VARIOUS ALTERNATIVES.

75-0436 LIMAYE D R
COMPREHENSIVE EVALUATION OF ENERGY CONSERVATION MEASURES.
NTIS, MARCH 1975. 449P.
PB-250824

AN ANALYSIS OF THE RELATIVE SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS AND ENERGY SAVINGS ASSOCIATED WITH THIRTY PROPOSED ENERGY CONSERVATION MEASURES IS PRESENTED. THE STUDY COVERS RESIDENTIAL, COMMERCIAL, INDUSTRIAL, POWER GENERATION AND TRANSPORTATION ENERGY CONSUMPTION. PROJECTIONS ARE NATIONAL FOR THE YEARS 1977, 1980, 1985, AND 1990. A RANKING OF MEASURES COMPARES THE RELATIVE COSTS AND EFFECTIVENESS OF MEASURES. THE METHODOLOGY CAN BE ADAPTED TO A VARIETY OF SITUATIONS.

75-0437 CALVERT N G
THE MONO-KAIROS WINDMILLS OF LASITHI.
BRITISH SCHOOL OF ARCHAEOLOGY AT ATHENS, ANNUAL, 70: 51-57, 1975.

DESCRIBED ARE OLD CORN GRINDING WINDMILLS ON CRETE. AT MIRABELLO AND LASITHI THERE ARE ABOUT ONE HUNDRED MILLS IN VARIOUS STATES OF RUIN, THE CHARACTERISTIC FEATURE OF WHICH IS THE FIXED DIRECTION, FACING THE PREVAILING WINDS. CONSTRUCTIONAL DETAILS ARE GIVEN.

75-0438 CANEGHEM A E VON
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,402,647/A/, JULY 24, 1975. 17P. (IN GERMAN)

THE INVENTION APPLIES TO A WIND POWER PLANT IN WHICH THE WIND IS USED TO DRIVE WINDMILLS. THE PLANT CONSISTS BASICALLY OF A VERTICAL TUBE WITH A LATERAL WIND ENTRANCE OPENING WITH WINDMILL ON ITS LOWER END. ON ITS UPPER END, THE TUBE CARRIES A NOZZLE-LIKE TOP WHICH INCREASES THE WIND ENTERING THE TUBE BY PRESSURE DECREASE. THE WIND IS THUS MADE SUITABLE FOR HIGHER OUTPUTS. THE INVENTION IS ILLUSTRATED BY CONSTRUCTIONAL EXAMPLES.

75-0439 CHAJES A, COSTA A, KAMINSKY F C, KIRCHOFF R H, CROMACK C E
INVESTIGATION OF THE FEASIBILITY OF USING WINDPOWER FOR SPACE HEATING IN COLDER CLIMATES. QUARTERLY PROGRESS REPORT NO. 1. MARCH-JUNE 1975.
NTIS, JUNE 1975. 57P.
NSF-RANN/AER-75-00603/PR-75/1, NSF/RA/N-75-420

THIS REPORT REVIEWS THE WORK PLAN AND PROJECT DESCRIPTION. TOPICS COVERED INCLUDE: SUPPORT STRUCTURE, MOMENTUM EXCHANGER, ELECTRICAL SYSTEMS, THERMAL AND SOLAR COMPONENTS, AND MANUFACTURING.

75-0440 CHERNE J M
SOLAR ENERGY -- AN OVERVIEW.
J. VOC. SCI. TECHNOL. 12: 975-983, SEPTEMBER-OCTOBER 1975.

75-0441 CHERRITT A W, GAIDELIS J A
A 100-KW METAL WIND TURBINE BLADE BASIC DATA, LOADS AND STRESS ANALYSIS. FINAL REPORT.
NTIS, JUNE 1975. 241P.
N77-21467, NASA-CR-134956

A ROTOR LOADS COMPUTER PROGRAM WAS USED TO DEFINE THE STEADY STATE AND CYCLIC LOADS ACTING ON 60 FT LONG METAL BLADES DESIGNED FOR THE ERDA/NASA 100 KW WIND TURBINE. BLADE LOAD AND STRESS ANALYSIS USED TO SUPPORT THE STRUCTURAL DESIGN ARE PRESENTED. FOR THE LOADING CONDITIONS EXAMINED, THE METAL BLADES ARE STRUCTURALLY ADEQUATE FOR USE, WITHIN THE NORMAL OPERATING RANGE, AS PART OF THE WIND TURBINE SYSTEM.

75-0442 CHILCOTT R E
WIND ENERGY UTILISATION PROSPECT FOR NEW ZEALAND.
CANTERBURY ENG. J., NEW ZEALAND ENERGY CONFERENCE, 2ND, MAY 22-24, 1975.
CONF. PAPER NO. 4, P. 72-75.

75-0443 COLLI J-C
THE PLACE OF NEW ENERGY SOURCES IN FUTURE GROWTH.
REV. FRANC. ELECTR. 48(4TH QUARTER): 6-11, 1975.

75-0444 COPPS S L
ENERGY SURVEY: WHAT CAN R AND D DO BY 1985... FOSSIL FUEL UTILIZATION.
TECHNOLOGY TODAY AND TOMORROW. SPACE CONGRESS, 12TH., COCOA BEACH, FLA.,
APRIL 9-11, 1975. PROCEEDINGS. P. 5-19 TO 5-27.

75-0445 COSTER H
WINDMOLENS DEBREIGD DUOR HET GYROSKOPISCH EFFEKT. (WINDMILLS THREATENED
BY THE GYROSCOPIC EFFECT).
DE KLEINE AARDE 4(3): 27-30, SEPTEMBER 1975. (IN DUTCH)

THIS BRIEFLY DESCRIBES THE INFLUENCE OF GYROSCOPIC FORCES IN VARIOUS CONSTRUCTIONS, ESPECIALLY IN WINDMILLS. SOME SUGGESTIONS TO AVOID OR TO USE THESE FORCES ARE GIVEN.

75-0446 COTY U A, COURT A, REED J W
UNITED STATES WIND SPEED AND WIND POWER DURATION TABLES, BY MONTHS
(CUMULATIVE DISTRIBUTION).
NTIS, OCTOBER 1975. 532P.
SAN/1075-2

CUMULATIVE DISTRIBUTIONS OF WIND SPEED (METERS PER SECOND), ADJUSTED TO A STANDARD HEIGHT OF 10 METERS (33 FEET) ABOVE GROUND AT 478 PLACES IN THE UNITED STATES, FOR EACH MONTH AND SEASON, AND FOR THE YEAR AS A WHOLE, ARE PRESENTED. IN ADDITION, CUMULATIVE DISTRIBUTIONS OF WIND POWER (WATTS PER SQUARE METER), BY SEASONS AND FOR THE YEAR, AT HEIGHTS OF 10, 50, AND 100 METERS ABOVE GROUND ARE GIVEN.

75-0447 COURT A
WIND SHEAR EXTREMES.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C.,
JULY 29, 1974. NTIS, MAY 1975. P. 72-79.
PB-244132

EXTREMES OF WIND SPEEDS, AND OF THEIR DIFFERENCES IN SPACE (SHEARS) AND TIME (GUSTS) ARE STUDIED ACCORDING TO EXTREME VALUE THEORY. A CENTRAL CONCEPT IN THIS THEORY IS THAT OF THE "CHARACTERISTIC EXTREME" OR "EXPECTED EXTREME". EQUATIONS THAT EXPRESS INDEPENDENT BIVARIATE NORMAL AND RELATED X2 WIND DISTRIBUTION ARE PRESENTED.

75-0448 CRAFOORD C
AN ESTIMATE OF THE INTERACTION OF A LIMITED ARRAY OF WINDMILLS.
NTIS, NOVEMBER 1975. 43P.
N77-13539, MISU/IMI-DM-16

USING LOGARITHMIC WIND PROFILES, THE INCREMENT OF ROUGHNESS PARAMETER, AS AN INFINITE ARRAY OF WINDMILLS IS ADDED TO AN ALREADY ROUGH SURFACE, IS CALCULATED BY A METHOD OF SUPERPOSITION OF SURFACE STRESS AND WINDMILL DRAG. THE OBTAINED LOGARITHMIC PROFILES ARE USED TO CALCULATE THE RELATIVE POWER OF A SINGLE WINDMILL IN AN UNLIMITED ARRAY. THESE VALUES ARE THEN USED AS LIMITING VALUES FOR THE RELATIVE POWER OF A WINDMILL UNIT IN A LIMITED ARRAY, USING A SIMPLE CONTINUITY MODEL OF ENERGY FLOW. VARIOUS EXAMPLES ARE GIVEN TO ILLUSTRATE THE EFFICIENCY OF DIFFERENT WINDMILL UNITS AND ARRAY SIZES. EXAMPLES ARE ALSO GIVEN FOR A TENTATIVE 100 MW GROUP STATION, USING DIFFERENT RATED POWER UNITS. THE RESULTS ARE TO BE SEEN AS MAINLY QUALITATIVE DUE TO THE CRUDENESS OF THE ASSUMPTIONS INVOLVED. FAIRLY INDEPENDENT OF CHOSEN RATED POWER OF THE INDIVIDUAL UNITS, GROUP STATIONS WITH SMALL ARRAYS (5 TO 10 ROWS) SEEM TO BE MAINLY FED BY HORIZONTAL FLOW, BUT FOR LARGER ARRAY SIZES EXCEEDING 50 X 50 UNITS, THE VERTICAL FLUX FROM ABOVE BECOMES MORE IMPORTANT.

75-0449 COURTINE J J
ETUDE TECHNICO-ECONOMIQUE, APPLICATION DES AEROGENERATEURS AUX BESOIN
ELECTROMENAGERS. (TECHNICAL AND ECONOMICAL STUDY ON THE APPLICATION OF
WIND GENERATORS FOR THE ELECTRICITY SUPPLY).

REP. BERTIN, APCEI, MARCH 1975. (IN FRENCH)

75-0450 DAWBER K R, EDWARDS P J
OTAGO WIND ENERGY PROGRAMME -- ASPECTS OF WIND VARIABILITY.
AUSTRALIAN CONFERENCE ON CLIMATE AND CLIMATIC CHANGE, 1ST., MONASH UNIV., DECEMBER 1975.

75-0451 MALZAHN E
WIND TURBINE.
GERMAN (FRG) PATENT NO. 2,405,767/A/, AUGUST 21, 1975. 5P. (IN GERMAN)

MECHANICAL ENERGY IS TO BE GENERATED BY MEANS OF THE DEVICE PROPOSED AND WIND PRESSURE. FOR THIS PURPOSE, A SHAFT WITH A SERIES OF BLADES IS ARRANGED WITHIN A DROP-SHAPED CYLINDER. THE CYLINDER IS MOUNTED ON A ROTATABLE PLATE. THE DIRECTION IS ADJUSTED BY THE WIND VIA A CONTROL UNIT. FURTHER CLAIMS CONCERN THE DESIGN OF THE BLADES, OF THE BEARING, OF POWER TRANSMISSION, AND THE ADDITIONAL USE OF AXIAL GUIDE BLADES.

75-0452 DIVONE L V
RECENT DEVELOPMENTS IN WIND ENERGY.
ENERGY INFORMATION WORKSHOP + FORUM FOR SCIENCE + ENGINEERING EDUCATORS, BOSTON, NOVEMBER 29, 1975. P. 105-110.

75-0453 ERDA AND NASA TO DEDICATE 100 KW WIND TURBINE AT SANDUSKY, OHIO.
INF. ERDA, WEEKLY ANNOUNCE. 1(30): 2, 75-206, 1975.

75-0454 EATON W W
TECHNOLOGICAL IMPACT OF IMPROVED STORAGE BATTERIES.
1975 IEEE SOUTHEASTERN REGION 3 CONFERENCE ON ELECTRICITY AND EXPANDING TECHNOLOGY, PROCEEDINGS. CHARLOTTE, N.C., APRIL 6-9, 1975. N.Y., IEEE, 1975. PART 1, P. 3D-3/1-9.

THE ARTICLE DISCUSSES THE USE OF STORAGE BATTERIES IN ELECTRIC VEHICLES, ENHANCED UTILIZATION OF SOLAR AND WIND ENERGY, AND ELECTRIC UTILITY LOAD-LEVELING.

75-0455 EGGERS A J
SOLAR ENERGY: STATUS AND PROSPECTS AS A NATIONAL RESOURCE.
ASHRAE J. 17: 41-43, NOVEMBER 1975.

CURRENT STATE OF SOLAR ENERGY R+D, INCLUDING OBJECTIVES OF THE SIX SOLAR PROGRAM AREAS, ARE EXAMINED. AREAS ARE: BIOCONVERSION, OCEAN THERMAL CONVERSION, WIND ENERGY, PHOTOVOLTAICS, SOLAR THERMAL CONVERSION, AND SOLAR HEATING AND COOLING OF BUILDINGS (INCLUDING AGRICULTURAL APPLICATIONS). PROVED, ECONOMICALLY VIABLE POWER SYSTEMS FOR HEATING AND COOLING BUILDINGS, BIOCONVERSION TO FUELS, AND WIND ENERGY SHOULD BE COMMERCIALLY AVAILABLE IN THE LATE 1970'S. POWER SYSTEMS BASED ON SOLAR THERMAL, PHOTOVOLTAIC, AND OCEAN THERMAL TECHNOLOGY ARE EXPECTED TO BE AVAILABLE IN THE MID-1980'S.

75-0456 EGGERS A J
STATUS AND PROSPECTS FOR WIDESPREAD UTILIZATION OF SOLAR ENERGY AS A NATIONAL ENERGY RESOURCE.
SOLAR ENERGY STORAGE SUBSYSTEMS FOR THE HEATING AND COOLING OF BUILDINGS. WORKSHOP ON SOLAR ENERGY STORAGE SUBSYSTEMS FOR THE HEATING AND COOLING OF BUILDINGS, CHARLOTTESVILLE, VA., APRIL 16, 1975. PROCEEDINGS. NEW YORK, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR CONDITIONING ENGINEERS, 1975. P. 1-4.

SOLAR ENERGY RESEARCH AND DEVELOPMENT HAS BEEN ORGANIZED PROGRAMMATICALLY UNDER SIX AREAS AS FOLLOWS: BIOCONVERSION TO FUELS, OCEAN THERMAL CONVERSION, WIND ENERGY CONVERSION, PHOTOVOLTAIC CONVERSION, SOLAR THERMAL CONVERSION, AND SOLAR HEATING AND COOLING OF BUILDINGS (INCLUDING AGRICULTURAL APPLICATIONS). THE OBJECTIVES, AND ACHIEVEMENTS IN EACH AREA ARE DISCUSSED.

75-0457 EISSA E T I, AHMED H M
POWER GENERATION FROM THE WIND.
KHARTOUM, SUDAN, UNIVERSITY OF KHARTOUM, DEPARTMENT OF MECHNICAL ENGINEERING, 1975. 476P.

75-0458 ELDRIDGE F R
WIND POWER.

ASTRONAUT. AERONAUT. 13(11): 53, 1975.

75-0459 ENERGY ALTERNATIVES: A COMPARATIVE ANALYSIS.
NTIS, MAY 1975. 706P.
PB-246365

THIS REPORT DEVELOPS A METHODOLOGY FOR SYSTEMATICALLY IDENTIFYING, ASSESSING, AND COMPARING ENERGY ALTERNATIVES IN ENVIRONMENTAL IMPACT STATEMENTS (EIS). THE REPORT PROVIDES DESCRIPTIONS AND DATA ON THE MAJOR ENERGY RESOURCE SYSTEMS IN THE UNITED STATES AND SUGGESTS PROCEDURES FOR USING THESE DESCRIPTIONS AND DATA. THE STUDY CONSISTS OF TWO MAJOR PARTS. PART 1 CONTAINS DESCRIPTIONS OF THE COAL, OIL SHALE, CRUDE OIL, NATURAL GAS, TAR SANDS, NUCLEAR FISSION, NUCLEAR FUSION, GEOTHERMAL ENERGY, HYDROELECTRIC POWER, ORGANIC WASTES, AND SOLAR ENERGY RESOURCE SYSTEMS PLUS DESCRIPTIONS OF ELECTRIC POWER GENERATION AND ENERGY CONSUMPTION. EACH RESOURCE SYSTEM DESCRIPTION CONTAINS DATA AND INFORMATION ON ENERGY EFFICIENCIES, ENVIRONMENTAL RESIDUALS AND ECONOMIC COSTS. PART II DESCRIBES PROCEDURES FOR USING THE DESCRIPTIONS AND DATA CONTAINED IN PART I IN SYSTEMATICALLY EVALUATING AND COMPARING THE RESIDUALS, EFFICIENCIES, AND ECONOMIC COSTS OF A PROPOSED ENERGY ACTION AND ITS ALTERNATIVES, AND SUGGESTS PROCEDURES FOR IMPACT ANALYSIS.

75-0460 CRAWLEY G M
ENERGY FROM THE WIND.
ENERGY. N.Y., MACMILLAN PUBL. CO. INC., 1975. P. 183-186.

75-0461 EVANS S C
ENERGY OPTIONS IN THE UNITED KINGDOM.
LONDON, LATIMER, 1975. 128P.

AN EXAMINATION OF ENERGY SOURCES AS ALTERNATIVES TO FOSSIL AND NUCLEAR FUELS IS PRESENTED, INCLUDING GEOTHERMAL, SOLAR, WIND, AND HYDROELECTRIC ENERGY. HIGH AND LOW GROWTH SCENARIOS FOR THE UNITED KINGDOM ARE DISCUSSED.

75-0462 FAUEL P L
VERGELIJKEND WINDTUNNELONDERZOEK VAN PROFIELEN VAN FOKWIEKEN VOOR WINDMOLENS. (COMPARATIVE WIND TUNNEL INVESTIGATION OF SAIL PROFILES FOR WINDMILLS).
NTIS, FEBRUARY 1975. 20P. (IN DUTCH)
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.

75-0463 FAUEL P L
VERGELIJKEND WINDTUNNELONDERZOEK VAN PROFIELEN VAN FOKWIEKEN VOOR WINDMOLENS. (COMPARATIVE WINDTUNNEL RESEARCH ON AIRFOILS OF FORE WINGS USED FOR WINDMILLS).
THE NETHERLANDS, DELFT UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF AERONAUTICAL ENGINEERING, REP. VTH-191, 1975. 7P. (IN DUTCH)

TO IMPROVE THE WORKING OF THE OLD DUTCH WINDMILL USE IS OFTEN MADE OF SO CALLED "FORE WINGS" WITHOUT SPOILING THE FINE SHAPE OF THE MILLS. AS LEADING EDGE AN AUXILIARY "FORE-SAIL" INSTEAD OF THE CLASSICAL CURVED BOARD IS USED. HOWEVER, QUANTITATIVE VALUES ARE NOT AVAILABLE ON WHICH AN OPTIMAL CHOICE OF THE FORM OF THOSE FORE-WINGS CAN BE BASED. IN THIS REPORT MEASUREMENTS ARE DESCRIBED PERFORMED IN A NUMBER OF FORE-WING CONFIGURATIONS IN A LOW SPEED WIND TUNNEL. THE RESULTS, GIVEN IN GRAPHS IN WHICH IS PLOTTED THE COEFFICIENT OF THE FORCE IN THE PLANE OF MILLING RELATED TO THE EFFECTIVE WINDSPEED AS A FUNCTION OF THE RATIO OF TIP SPEED AND EFFECTIVE WINDSPEED, SHOW THAT, AS WAS EXPECTED, FORE-WINGS LEAD TO BETTER PERFORMANCE.

75-0464 FEMENIA J
ALTERNATE ENERGY SOURCES FOR MARINE POWER PLANTS.
NTIS, SEPTEMBER 1975. 22P.
COM-75-11474

THIS REPORT DISCUSSES THE SIZE OF SHIP POWER PLANTS AND OTHER FACTORS GOVERNING THE SUITABILITY OF DIFFERENT TYPES OF FUEL FOR MARINE USE. IT THEN CONSIDERS VARIOUS ALTERNATIVES TO TRADITIONAL FUELS DERIVED FROM CRUDE PETROLEUM. TYPES OF FUEL CONSIDERED ARE OTHER LIQUID HYDROCARBON FUELS, BOTH NATURAL AND SYNTHETIC, HYDROCARBON FUELS IN SOLID, LIQUID/SOLID, AND GASEOUS FORMS, NON-HYDROCARBON FUELS AND SOLAR AND WIND ENERGY.

75-0465 FILKE R B
WIND POWER PROJECT DEVELOPMENT BY ELECTRICITE DE FRANCE.
LA HOUILLE BLANCHE 30(1): 45-66, 1975. (IN FRENCH)

THE RESULTS OF EDF'S WIND POWER DEVELOPMENT PROGRAMME FROM 1947 TO 1966 ARE REVIEWED. THE ENGINEERING DEVELOPMENT OF THE LARGER FRENCH WIND POWER GENERATORS IS DESCRIBED IN DETAIL: THESE ARE THE 800 KW NOGENT-LE-ROI, THE 132 KW AND 1,000 KW MACHINES AT SAINT-REMY-DES-LANDES. BRIEF DETAILS ARE ALSO GIVEN OF BRITISH, DANISH AND GERMAN GENERATORS. A TABLE LISTS MAIN PARAMETERS OF 15 LARGE WIND GENERATORS DEVELOPED BY EIGHT DIFFERENT COUNTRIES.

75-0466 FRAENKEL P
FOOD FROM WINDMILLS.
LONDON, INTERMEDIATE TECHNOLOGY PUBLICATIONS LTD., 1975. 75P.

THIS BOOK DESCRIBES HOW A PROGRAM OF SIMPLE SAILWING WINDMILL WATERPUMPS HAS CONSIDERABLY RAISED THE FOOD PRODUCTION OF ETHIOPIA.

75-0467 FREEMAN B E
A NEW WIND ENERGY SITE SELECTION METHODOLOGY, QUARTERLY REPORT NO. 2, 17 JUNE -- 16 SEPTEMBER 1975.
NTIS, OCTOBER 1975. 17P.
PB-282833, NSF/RA/N-75-418

MAJOR EMPHASIS WAS ON THE CODING AND TESTING OF A 3-D VERSION OF THE MESOSCALE COMPUTER PROGRAM SIGMET AND ON THE ACQUISITION OF MESOSCALE FIELD DATA FOR VALIDATION COMPARISONS.

75-0468 FROST W
WIND FIELDS OVER TERRAIN IRREGULARITIES.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C., JULY 29, 1974. NTIS, MAY 1975. P. 80-106.
PB-244132

CHANGES IN TERRAIN SUCH AS HILLS, VALLEYS OR DISCONTINUITIES IN SURFACE TEXTURE CAN DISTURB THE GROUND WINDS AS CAN ALSO OBSTRUCTION TO THE WIND SUCH AS BUILDINGS, CITIES, AND OTHER STRUCTURES CREATED BY MEN. IN THE REGION OF DISTURBANCE, THERE ARE ZONES OF HIGH WIND SPEEDS AND OF LOW WIND SPEEDS. KNOWLEDGE OF THESE WIND FIELDS IS USEFUL IN SELECTING WINDMILL SITES WITH A VIEW TOWARD UTILIZING THE REGIONS OF HIGH WIND AND TO AVOID THE REGIONS OF LOW WINDS. THE ATMOSPHERIC BOUNDARY LAYER EXISTS TO A HEIGHTH OF APPROXIMATELY ONE KILOMETER. THE INTERACTION OF SYNOPTIC PRESSURE PATTERNS, CORIOLIS FORCES AND FRICTIONAL FORCES CAUSE THE DIRECTION OF THE WIND TO TURN FROM FLOWING PERPENDICULAR TO ISOBARS NEAR THE EARTHS SURFACE. THIS TURNING EFFECT IS GENERALLY NEGLIGIBLE BELOW A HEIGHT OF 50 TO 100 METERS (164 TO 328 FT). THE EFFECTS OF TURNING ARE IGNORED IN THE FOLLOWING DISCUSSIONS; HOWEVER, THE DESIGN OF WINDMILLS EXCEEDING 164 FEET IN HEIGHT SHOULD CONSIDER THIS EFFECT.

75-0469 HABERCOM G E
DESIGN AND APPLICATIONS OF FLYWHEELS (A BIBLIOGRAPHY WITH ABSTRACTS).
NTIS, OCTOBER 1975. 74P.
NTIS-PS-75/743/5SL

THE DESIGN AND VARIED APPLICATIONS OF FLYWHEELS ARE INVESTIGATED IN THESE GOVERNMENT-SPONSORED RESEARCH REPORTS. SUCH DIVERSIFIED APPLICATIONS AS SATELLITE STABILIZATION, SURFACE VEHICLE PROPULSION, AND ENERGY TRANSFER DEVICES (E.G. WINDMILLS) ARE REVIEWED. (CONTAINS 69 ABSTRACTS)

75-0470 HEAT THROUGH WIND.
GESUND. - ING. 96(11): 314, 1975. (IN GERMAN)

A BRIEF SURVEY IS PRESENTED OF THE PROJECTS ON THE UTILIZATION OF WIND

POWER CURRENTLY IN PROGRESS IN THE FRG AND USA.

75-0471 HELION MODEL 12/16 WINDMILL PLANS.
SYLMAR, CALIFORNIA, HELION, 1975. 39P.

75-0472 HERNDON C L
RESIDENCE HEATED BY NON-FOSSIL-FUEL ENERGY.
INTER-AMERICAN CONFERENCE ON MATERIALS TECHNOLOGY, 4TH, PROCEEDINGS. SAN ANTONIO, TEXAS, RESEARCH INSTITUTE, 1977. P. 590-597.
CONF-750677-P1

A HOUSE IN BUTTE, MONTANA WAS RETROFITTED TO USE SOLAR AND WIND ENERGY. SIX INCHES OF INSULATION WERE ADDED TO THE CEILING OF THE HOUSE; THE ROOF WAS MODIFIED TO INCORPORATE THE SKYLIGHT AND COLLECTORS; TWO 4 X 6 FT DOUBLE-GLAZED PICTURE WINDOWS WERE ADDED IN THE SOUTH WALL; A DOUBLE-GLAZED SKYLIGHT (APPROXIMATELY 66 SQ FT), 240 SQ FT OF FLAT-PLATE SOLAR COLLECTORS, AND A 3-KW WIND GENERATOR WERE INSTALLED; AND A WARM AIR HEATING SYSTEM CONSISTING OF AIR-HANDLING UNIT AND AIR-DISTRIBUTION SYSTEM WERE ADDED. THE WIND GENERATOR IS USED TO HEAT EITHER THE DOMESTIC WATER HEATER OR A HEATING ELEMENT IN THE THERMAL STORAGE TANK. SCHEMATICS ARE INCLUDED OF THE FLOOR PLAN, SKYLIGHT SECTION, PIPING, AIR HANDLING UNIT SECTION, SOLAR COLLECTOR SECTION, TEMPERATURE AND FLOW RATE MEASUREMENT POINTS, AND THE CONTROL SYSTEM.

75-0473 HERWIG L O
ERDA'S SOLAR ENERGY PROGRAM.
ASTM STAND. NEWS 3(8): 29, AUGUST 1975.

GENERAL OBJECTIVES IN EACH SUBPROGRAM FOR THE NEXT FIVE YEARS ARE SUMMARIZED. SOLAR THERMAL OBJECTIVES ARE TO DESIGN, CONSTRUCT, OPERATE, AND EVALUATE A 10 MW ELECTRIC, CENTRAL RECEIVER PILOT POWER PLANT; A TOTAL ENERGY PILOT POWER PLANT OF 200 KW ELECTRIC AND 200 KW THERMAL SIZE; AND A DISTRIBUTED COLLECTOR PILOT PLANT. PHOTOVOLTAIC OBJECTIVES ARE TO REDUCE SOLAR ARRAY PRICES TO ABOUT $5 PER PEAK WATT BY 1978 THROUGH LOWER-COST FABRICATION TECHNIQUES AND ECONOMICS OF INCREASING PRODUCTION. WIND OBJECTIVES ARE TO DEVELOP AND DEMONSTRATE LARGE-SCALE (100 KW TO MULTIMEGAWATT ELECTRIC) SINGLE-UNIT WIND ENERGY SYSTEMS FOR SELECTED APPLICATIONS. BIOCONVERSION OBJECTIVES ARE TO DESIGN, CONSTRUCT, OPERATE AND EVALUATE PILOT PLANTS FOR CONVERSION OF URBAN ORGANIC WASTE AND AGRICULTURAL WASTE MATERIALS TO METHANE GAS. OCEAN THERMAL OBJECTIVES ARE TO DESIGN AND CONSTRUCT FACILITIES FOR TEST AND EVALUATION OF COMPONENTS AND SUBSYSTEMS FOR OCEAN THERMAL POWER PLANTS.

75-0474 HILTON D J
POSSIBILITIES FOR EMPLOYING LOW-COST WINDMILLS IN RURAL KENYA.
NAIROBI, UNIVERSITY OF NAIROBI, DEPARTMENT OF MECHANICAL ENGINEERING, WORKING PAPER W1, MAY 1975.

75-0475 HITCHCOCK H C
ENERGY STORAGE AND RENEWABLE ENERGY SOURCES.
CANTERBURY ENG. J., NEW ZEALAND ENERGY CONFERENCE, 2ND, MAY 22-24, 1975. CONF. PAPER NO. 4, P. 80-85.

75-0476 MANNING R S
THE WINDMILL IN CALIFORNIA.
J. WEST 14(3): 33-39, JULY 1975.

75-0477 MARTIN M, PRUNIERAS J
RESULTATS SUMMAIRES DE L'EXPERIENCE DES AEROGENERATEURS DANS LE SERVICE FRANCAIS DES PHARES AT BALISES. (CONCISE RESULTS OF THE EXPERIENCES WITH WIND GENERATORS OF THE FRENCH SERVICE FOR LIGHTHOUSES AND BUOYS).
CONFERENCE INTERNATIONALE DES SERVICES DE SIGNALISATION MARITIME, 9TH, OTTAWA, CANADA, 1975. PROCEEDINGS. (IN FRENCH)

75-0478 HOOFT J T
UIT HET WINDMOLENDAGHOEK VAN HET KRINGLOUPHUIS. (FROM THE WINDMILL DIARY OF THE DUMEHOUSE).
DE KLEINE AARDE 4(4): 25-28, DECEMBER 1975. (IN DUTCH)

DESCRIBED ARE EXPERIENCES DURING ONE YEAR WITH A SMALL POLDER-WINDMILL, SUPPLYING ELECTRICITY TO A ONE-MAN HOUSEHOLD. THE OUTPUT WAS SOMEWHAT DISAPPOINTING DUE MAINLY TO THE BAD SITE (TALL TREES).

75-0479 HUTTER U
VUM WERT DER WINDENERGIE. (ON THE VALUE OF WIND ENERGY).
STUTTGART, GERMANY, TECHNISCHE HOSHSCHULE STUTTGART, FORSCHUNGSINSTITUT WINDENERGIETECHNIK, APRIL 1975. 8P. (IN GERMAN)

ANSWERING FIVE QUESTIONS A PLAN IS MADE FOR THE USE OF WIND ENERGY IN GERMANY. THOSE QUESTIONS ARE: (1) HOW MUCH ENERGY CAN BE OBTAINED FROM THE WIND ECONOMICALLY? (2) WHAT IS THE INFLUENCE OF FLUCTUATIONS IN WIND SUPPLY? (3) WHAT ARE THE POSSIBILITIES IN ECONOMICALLY DEVELOPING A LARGE WIND ENERGY CONVERTER? (4) HOW LARGE IS THE ENVIRONMENTAL IMPACT OF THE USE OF WIND ENERGY? AND (5) WHAT ARE THE POSSIBILITIES TO USE WIND ENERGY IN DEVELOPING COUNTRIES?

75-0480 HUTTER U, MOLLY J P, DUERNER H
WINDENERGIE--VORTEILE UND GRENZEN. (WIND ENERGY--ADVANTAGES AND LIMITS).
SPARSAME UND RATIONELLE ENERGIENUTZUNG--STRATEGIEN ZUR ENERGIEINSPARUNG. BUNDESVERBAND BURGERINITIATIVEN UMWELTSCHUTZ E. V., 19-20 DECEMBER 1975, BAD ANTOGAST, SCHWARZWALD. (IN GERMAN)

75-0481 JAYADEV T S, SMITH R T
ELECTRICAL ENERGY OUTPUT OF WIND POWER PLANTS.
IAS (IEEE IND. APPL. SOC.) ANNUAL MEETING, 10TH, CONFERENCE RECORD, ATLANTA, GA., SEPTEMBER 28 - OCTOBER 2, 1975. NEW YORK, IEEE, CAT. NO. 75CH0999-31A, 1975. P. 506-511.

THIS PAPER PRESENTS A GENERAL ANALYSIS OF ELECTRICAL ENERGY OUTPUT OF CONSTANT-SPEED, CONSTANT-FREQUENCY (CSCF) AND VARIABLE-SPEED, CONSTANT-FREQUENCY (VSCF) SYSTEMS BASED ON POWER-DURATION CURVES. IT IS SHOWN, FROM A SAMPLE CALCULATION, THAT VSCF SYSTEMS HAVE A SLIGHT EDGE OVER CSCF SYSTEMS FROM THE POINT OF VIEW OF ENERGY OUTPUT, BUT THEY CALL FOR LARGE CAPITAL OUTLAY IN GENERATING SYSTEMS WHEREAS CSCF SYSTEMS CALL FOR ELABORATE PITCH CONTROLS. IT IS SHOWN THAT GENERATOR EFFICIENCY HAS A DOMINANT INFLUENCE ON ENERGY OUTPUT IN BOTH THE SYSTEMS.

75-0482 JUSTUS C G
WIND DATA COLLECTION AND ASSESSMENT.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C., JULY 29, 1974. NTIS, MAY 1975. P. 107-121.

THE WIND DATA COLLECTION AND ASSESSMENT PORTIONS HAS AS ITS OBJECTIVE TO DETERMINE FROM THE SURFACE WIND POWER THE STATISTICS NECESSARY FOR SYSTEM EVALUATION STUDIES, AND ALSO TO DETERMINE THE HEIGHT VARIATION OF THESE STATISTICS SINCE THE TYPICAL WIND GENERATOR SYSTEM WILL NOT BE LOCATED AT THE LEVEL OF SURFACE ANEMOMETERS. THE NECESSARY WIND DATA STATISTICS CAN BE CHARACTERIZED IN TERMS OF A TWO PARAMETER DISTRIBUTION FUNCTION. TWO CHOICES THAT SEEMED TO BE DOING A GOOD JOB ARE THE LOG-NORMAL DISTRIBUTION AND THE WEIBULL DISTRIBUTION. ANOTHER ASSUMPTION IS THAT THESE STATISTICS ARE SUFFICIENTLY CONTINUOUS SO THAT A NATIONAL MAP CAN BE DRAWN OF THESE WIND POWER STATISTICS. THE GOAL OF THIS PROJECT IS TO COME OUT WITH A MAP OF THE NECESSARY TWO PARAMETERS THAT DESCRIBE THE DISTRIBUTION FUNCTIONS.

75-0483 KOFOED S S
UDNYTTELSE AF VINDKRAFTENERGI TEL OPVARMNING. (UTILIZING WIND VELOCITY AS ENERGY FOR HEATING).
DET. NYE DAN. LANDBRUG 6(7): 10-13, JULY 1975.

75-0484 KYOCHUKOVA M, IVANOV P
(WIND IN BULGARIA AND THE POSSIBILITIES FOR ITS USE AS AN ENERGY SOURCE).
KHIDROLOGIYA I METEOROLOGIYA 24(6): 22-27, 1975. (IN BULGARIAN)

THE REGIME OF THE SURFACE WIND IN BULGARIA AND THE POSSIBILITIES FOR ITS USE AS AN ENERGY SOURCE ARE EXAMINED. THE WIND REGIME IN BULGARIA DOES NOT FAVOR THE USE OF WIND ENERGY ON A VAST SCALE. OVER THE LARGEST PART OF THE TERRITORY, THERE ARE WINDS WITH MEAN ANNUAL VELOCITY UNDER 3 M/SEC (THE LOWEST LIMIT OF THE WORKING VELOCITY OF THE WIND GAGE). ALONG WITH THIS, THE DURATION IN HOURS FOR A YEAR WITH WINDLESS WEATHER AND WIND VELOCITY UNDER 3 M/SEC IS ABOVE 70 PERCENT, BUT IN SOME REGIONS, IT REACHES 90 PERCENT. THE FOLLOWING PLACES ARE THE MOST FAVORABLE: OPEN MOUNTAIN PEAKS AND RIDGES, LOCATIONS ALONG THE BLACK SEA SIDE, AND DIFFERENT PLACES WITH RAISED TERRAIN IN THE NORTHEAST PART OF DOBROUDJA.

75-0485 KAUER E

TECHNICAL POSSIBILITIES OF SOLAR ENERGY UTILISATION.
ELECTROMEIST. ELEKTROHAND. 50(17): 1039-1042, SEPTEMBER 1975.

75-0486 KENWARD M
ENERGY FILE, WIND POWER.
NEW SCI. 67(959): 218, JULY 24, 1975.

A VERTICAL AXIS WINDMILL PROJECT AT READING UNIVERSITY (UK) IS DESCRIBED.

75-0487 LEE H C
WIND-DRIVEN POWER SUPPLY FOR ADVANCED BEEHIVE FUZE.
NTIS, NOVEMBER 1975. 18P.
AD-A019241

A WIND-DRIVEN FLUIDIC GENERATOR OF THE REED TYPE HAS BEEN DEVELOPED AT THE HARRY DIAMOND LABORATORIES (HDL) AS A POWER SOURCE FOR THE ADVANCED BEEHIVE FUZE. RESULTS OF LABORATORY STUDIES AND FIELD TESTS CONDUCTED IN 75-MM HOWITZERS INDICATE THAT THE FLUIDIC GENERATOR IS CAPABLE OF MEETING THE MUZZLE ACTION REQUIREMENTS OF THE BEEHIVE FUZE. AIRGUN TEST RESULTS INDICATE THAT THE DEVICE IS MECHANICALLY RUGGED TO WITHSTAND THE HIGH SETBACK FORCE ENVIRONMENT (25 K G) ENCOUNTERED BY THE BEEHIVE ROUNDS.

75-0488 LEEGWATER H, WELL A VAN
EEN MEER KAMAALS SIMULTAAN EN DIGITAAL MEET EN VERWERKINGS SYSTE TEN BEHOEVE VAN EEN WINDMOLEN PROJECT. (A MULTI CHANNEL SIMULTANEOUS AND DIGITAL MEASURING AND ANALYZING SYSTEM FOR A WINDMILL PROJECT).
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, WIND ENERGY GROUP, REP. NO. R-234-5, OCTOBER 1975. (IN DUTCH)

A SYSTEM IS DESIGNED TO PROCESS SEVEN DIFFERENT SIGNALS FROM WIND DATA COLLECTED SIMULTANEOUSLY, THE SIGNALS ARE SAMPLED WITH A SAMPLE TIME BETWEEN 1C-3 AND 100 SECONDS AND ARE TRANSFERRED TO A PUNCH TAPE FOR PROCESSING BY A DIGITAL COMPUTER. IN THIS WAY MEAN VALUE, VARIANCE, AUTO CORRELATION FUNCTION, SPECTRAL DENSITY, PROBABILITY DENSITY AND CUMULATIVE PROBABILITY DISTRIBUTION CAN BE CALCULATED. CALIBRATION PROCEDURES AND SOME EXAMPLES ARE GIVEN.

75-0489 MUSGROVE P J
THE VARIABLE GEOMETRY VERTICAL AXIS WINDMILL, THE BASIC CONCEPT.
READING, ENGLAND, UNIVERSITY OF READING, DEPARTMENT OF ENGINEERING AND CYBERNETICS, NOVEMBER 1975. 8P.

A WINDMILL DESIGN, DERIVED FROM THE DARRIEUS WINDMILL, IS DESCRIBED. IT HAS A SIMPLER AND CHEAPER BLADE FABRICATION AND POWER LIMITED BEHAVIOUR FOR HIGH WIND SPEEDS. USE IS MADE OF STRAIGHT HINGED BLADES INSTEAD OF TROPOSKIEN BLADES IN THE DARRIEUS ROTOR. A PROTOTYPE OF THIS MILL IS BEING CONSTRUCTED; THE PREDICTED PERFORMANCE IS SHOWN IN A GRAPH.

75-0490 NENIN J
L'ELECTRICITE A BON COMPTE AVEC LES EOLIENNES. (ELECTRICITY WITH A GOOD ACCOUNT WITH WINDMILLS).
FERMES MOD. 28: 27-30, FEBRUARY 1975. (IN FRENCH)

75-0491 NEWTON A B
MEETING U.S. ENERGY REQUIREMENTS: SOLAR ENERGY'S POTENTIAL SHARE.
ASHRAE J. 17: 36-40, NOVEMBER 1975.

SOLAR HEATING AND COOLING OF COMMERCIAL BUILDINGS IS TECHNICALLY FEASIBLE. IF FUEL COSTS INCREASE ONLY SLIGHTLY, COMBINED HEATING AND COOLING WILL ALSO BECOME ECONOMICALLY JUSTIFIABLE. JUSTIFICATION FOR HEATING SYSTEMS ONLY IS LESS DEMONSTRABLE, BUT IT WILL EXIST IN SEVERAL CASES. GREATER USE OF SOLAR ENERGIZED HEATING AND COOLING WILL BE POSSIBLE OVER THE NEXT FIVE YEARS AS COLLECTORS, STORAGE SYSTEMS, AND CONTROLS ARE PRODUCED IN MORE ECONOMICAL QUANTITIES. RESIDENTIAL SOLAR HEATING IS TECHNICALLY AND ECONOMICALLY FEASIBLE IN A SURPRISING NUMBER OF CASES. RESIDENTIAL COOLING, ALREADY DONE ON A SMALL SCALE, REQUIRES INCREASED DEVELOPMENT OF AIR-COOLED EQUIPMENT.

75-0492 WIND POWER.
LYNGBY, DENMARK, AKADEMIET FOR THE TEKNISKE VIDENSKABER, 1975. 20P.

THE PRESENT REPORT CONTAINS THE FINDINGS OF A COMMITTEE SET UP TO STUDY

THE CONDITIONS FOR WIND ENERGY UTILIZATION IN DENMARK, MAINLY ON THE BASIS OF WIND CLIMATE RECORDINGS AT 31 DOMESTIC METEOROLOGICAL SURVEY STATIONS. THE MAJOR CONCLUSIONS ARE THAT ECONOMICALLY EFFICIENT WIND POWER PLANTS CAN BE BUILT AT SPOTS CHARACTERIZED BY HIGH AVERAGE WIND SPEEDS, SUCH AS THE FAROE ISLANDS. THIS, HOWEVER, MUST BE PRECEDED BY EXTENSIVE RESEARCH AND DEVELOPMENT WORK WITH RESPECT TO WIND-POWER PLANT EQUIPMENT AND DESIGN.

75-0493 PUTHOFF R L, SIROCKY P
STATUS REPORT OF 100 KW EXPERIMENTAL WIND TURBINE GENERATOR PROJECT.
NTIS, JUNE 1975. 21P.
NASA-TM-X-71758, N75-29546

THE STATUS OF AN EXPERIMENTAL WIND TURBINE GENERATOR PROJECT IS DESCRIBED. THE MACHINE WILL BE READY FOR OPERATION IN AUGUST 1975. DESIGN CONSISTS OF A 125 FT. ROTOR TURBINE, TRANSMISSION, SHAFT, ALTERNATOR, AND TOWER. THE ROTOR CAN GENERATE 100 KW OF ELECTRICAL POWER AT WIND VELOCITY OF 18 MPH BY OPERATING TWO VARIABLE PITCH BLADES AT 40 RPM.

75-0494 RAMAEV M
TIEN PROCENT VAN NEDERLANDS ENERGIEVERBRUIK KAN DOOR WINDTURBINECENTRALES GEDEKT WORDEN. (TEN PERCENT OF DUTCH ENERGY CONSUMPTION CAN BE COVERED BY WIND POWER PLANTS).
ELEKTRA 57(13): 16-19, 1975. (IN DUTCH)

75-0495 RAMAKUMAR R, HUGHES W L, ALLISON H J, YARLAGADDA R K, SMITH G G
DEVELOPMENT AND ADAPTATION OF FIELD MODULATED GENERATOR SYSTEMS FOR WIND ENERGY APPLICATIONS. PROGRESS REPORT.
NTIS, OCTOBER 17, 1975. 135P.
PB-263604

TWO WARD-LEONARD VARIABLE-SPEED DRIVE SYSTEMS WERE SET UP FOR USE AS MOTORING DYNAMOMETERS FOR TESTING FIELD MODULATED GENERATORS. ALL THE PARTS REQUIRED FOR THE DYNAMOMETER CRADLE ARRANGEMENT WERE DESIGNED AND FABRICATED. A SPECIALLY DESIGNED TEST MACHINE HAS BEEN FABRICATED FOR THE EXPERIMENTAL INVESTIGATION. THE STATOR AND ROTOR ARE BEING WOUND. THE SOLID STATE INVERTER REQUIRED FOR THIS SYSTEM IS BEING ASSEMBLED IN A CONVENIENTLY TRANSPORTABLE RACK FOR TESTING. PARALLEL-BRIDGE RECTIFIER SYSTEM STUDIES WERE EXTENDED TO INCLUDE BRIDGE-INPUT CAPACITORS FOR THE CASE OF RESISTIVE LOADS. FOURIER ANALYSIS OF SOURCE CURRENT AND LOAD CURRENT WAVEFORMS HAS BEEN COMPLETED, AND THE RESULTS ARE PRESENTED IN GRAPHICAL FORM FOR DIFFERENT VALUES OF (X SUB L/R SUB 1) AND (X SUB L/X SUB C) RATIOS. PRELIMINARY LITERATURE SURVEYS HAVE BEEN COMPLETED IN THE STUDY OF: (1) THE VARIABLE LOAD BAND PASS FILTER REQUIRED AT THE OUTPUT OF THE FIELD MODULATED GENERATOR SYSTEM; AND (2) THE SNUBBER AND VOLTAGE TRANSIENT DIVIDED CIRCUITRY ASSOCIATED WITH THE ELECTRONICS SUBSYSTEM. THE RESULTS ARE SUMMARIZED IN THIS REPORT.

75-0496 REISZ A
USE OF SOLAR ENERGY IN A SOYBEAN PROCESSING OPERATION.
APPLICATION OF SOLAR ENERGY. SOUTHEASTERN CONFERENCE, 1ST., HUNTSVILLE, ALA., MARCH 24-26, 1975. PROCEEDINGS. P. 539-549.

75-0497 REPORTS ON WIND POWER BY ERA, 1949-1968. VOL. 1: WIND MEASUREMENTS AND CHARACTERISTICS.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA 75-34, SEPTEMBER 1975.

75-0498 REPORTS ON WIND POWER PUBLISHED BY ERA, 1949-1968. VOL. 2: WIND DRIVEN PLANT AND ITS APPLICATION.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA 75-35, SEPTEMBER 1975.

75-0499 REPORTS ON WIND POWER PUBLISHED BY ERA, 1949-1968, VOL. 3: DESIGN AND TESTING OF WIND-DRIVEN PLANT.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA 75-36, SEPTEMBER 1975.

75-0500 RICATEAU P, ZETTWOOG P
LA METEOROLOGIE ET L'ENERGIE EOLIENNE: CONVERSION EOLIENNE ELECTROSTATIQUE. (METEOROLOGY AND WINDPOWER: ELECTROSTATIC WIND CONVERSION).

LA METEOROLOGIE SER. 6(2): 123-130, SEPTEMBER 1975.

THE APPLICATION OF ELECTROFLUID DYNAMICS IN EXPLOITATION OF A PRINCIPLE OF DIRECT CONVERSION BY TRANSPORT OF ELECTRICAL CHARGES UNDER THE INFLUENCE OF GAS FLOW IS EXAMINED WITH PARTICULAR REFERENCE TO THE CONVERSION OF WIND ELECTROSTATICS. A DEVICE PERMITTING DEPOSITION OF UNIPOLAR CHARGES UPON PARTICLES ENTRAINED BY A FLUID IS PLACED UPSTREAM. IN CASE OF WIND FLOW, THESE PARTICLES WOULD BE THE ATMOSPHERIC AEROSOL PROPER OR, ULTIMATELY, THE AEROSOLS PRODUCED BY AN ADEQUATE GENERATOR. THE LARGER UNIPOLAR IONS THUS PRODUCED, BEING OF LOW MOBILITY, ARE ENTRAINED BY THE FLOW AND RECEIVED DOWNSTREAM ON A GRID, WHICH IS CHARGED AT A POTENTIAL OF THE SAME SIGN AS THE IONS. THE WORK ACCOMPLISHED BY THE WIND, WHICH FORCES THE LARGE IONS TO ASCEND THE ELECTRICAL FIELD CREATED BY THE SPACE CHARGE AND DIRECTED IN THE OPPOSITE SENSE OF THE WIND SPEED, IS RECEIVED IN AN ELECTRICAL FORM IN THE EXTERNAL CIRCUIT THAT CONNECTS THE INPUT GRID TO THE OUTPUT GRID. THE COMPUTATIONS OF FLOW IN THE CASE OF A UNIDIMENSIONAL HYPOTHESIS ARE SET FORTH. THE EQUATIONS FOR THE POWER EXTRACTED PER SQUARE METER AS A FUNCTION OF EXTERNAL RESISTANCE MULTIPLIED BY CURRENT DENSITY AND GENERATOR SEGMENT ARE DERIVED. IN CONNECTION WITH THE COMPUTATION PROCEDURE, THERE ARE DISCUSSED A MODULE OF AN OPEN CIRCUIT, CONSTRAINTS UPON THE DEVELOPMENT OF AN ELECTRICAL FIELD IN THE MODULE, THE MODULE OF MAXIMUM POWER, A SHORT CIRCUITING OF THE GENERATOR, LIMITATION BY GAS FLOW DISRUPTION, AND THE GENERAL CASE. IN CONNECTION WITH THE PERFORMANCE OF A MODULE, THE ORDER OF MAGNITUDE OF THE DISRUPTION FIELD MODULES OF CONSTANT OUTPUT AND THE INTERACTION OF MECHANICAL AND ELECTRICAL EQUATIONS ARE EXAMINED. THE CASES OF CORONA DISCHARGE AND OF IONIZATION BY A RADIOACTIVE SOURCE ARE DISCUSSED.

75-0501 RITTENHOUSE I D
WIND POWER NOW.
BULL. ATOM. SCI. 31(8): 20-26, 1975.

75-0502 ROLISON J P
THE NORTHEASTERN STATES CONFRONT THE ENERGY CRISIS: PAPERS OF THE REGIONAL RESPONSE TO THE ENERGY CRISIS. A CONFERENCE OF STATE LEGISLATIVE LEADERS FROM THE NORTHEASTERN STATES.
NTIS, NOVEMBER 1975. 316P.
PB-248997

A PARTIAL LISTING OF TOPICS INCLUDES: THE REGIONAL ECONOMIC AND ENVIRONMENTAL IMPACT OF ENERGY; NUCLEAR ENERGY, THE INTERMEDIATE SOLUTION; COAL-ENERGY OF THE PAST OR FUTURE; ALTERNATE SOURCES OF ENERGY - THEIR POTENTIAL AND FEASIBILITY; THE POTENTIAL OF REGIONAL ENERGY MODELING; EFFECTS OF ENERGY SHORTAGES ON THE WAY WE LIVE; AN EVALUATION OF MECHANISMS BY WHICH STATE LEGISLATORS CAN OBTAIN IMPROVED ACCESS TO INFORMATION ON ENERGY ISSUES; ENERGY REGULATION: A SUMMARY VIEW OF FEDERAL LIMITATIONS ON STATE AND LOCAL GOVERNMENTS; ON TAXES ANS SUBSIDIES TO AFFECT ENERGY CONSUMPTION; EFFICIENCY AND EQUITY CONSIDERATIONS.

75-0503 RUDMAN P S
EVALUATION OF WIND ENERGY CONVERSION SYSTEMS FOR ISRAEL.
ASSOC. ENG. ARCHIT. J. 34(4-5): 78-66, APRIL-MAY 1975.

75-0504 RUDMAN P S
AN EVALUATION OF WIND ENERGY CONVERSION SYSTEMS FOR ISRAEL.
MECH. ENG. CONGRESS, ISRAEL, JULY 1975. 40P.

75-0505 RUITER J P
ALTERNATIVE ENERGY SOURCES.
ELECKTROTECHNIEK 53(4): 183-195, MARCH 1975. (IN DUTCH)

THE POSSIBILITIES OF SOME NONCONVENTIONAL ENERGY SOURCES SUCH AS SOLAR RADIATION, TIDAL ENERGY AND GEOTHERMAL ENERGY ARE DESCRIBED. ALSO THE SOURCES DERIVED FROM THE SOLAR RADIATION SUCH AS WIND, TEMPERATURE DIFFERENCES IN THE OCEANS, AND ORGANIC WASTES ARE INCLUDED IN THIS SURVEY.

75-0506 RUITER J P, SCHURINK F
POTENTIELE ENERGIEBRONNEN. (POTENTIAL ENERGY SOURCES).
KEMA, AMHEM, THE NETHERLANDS, DIVISION OF RESEARCH AND DEVELOPMENT, SEPTEMBER 1975. 153P. (IN DUTCH)

REVIEWED ARE ENERGY SOURCES OTHER THAN FOSSIL AND NUCLEAR AND THEIR POSSIBLE CONTRIBUTION TO THE PRODUCTION OF ELECTRICITY IN THE NETHERLANDS. INCLUDED ARE: SUN, WIND, GEOTHERMAL, ORGANIC WASTE, OCEANS, STORAGE METHODS, HEAT PUMP.

75-0507 RYCKE F DE
STUDIE VAN EEN WIND-GENERATOR. (STUDY OF A WIND GENERATOR).
MECHELEN, BELGIUM, HOGER INSTITUT DE NAYER, DEPARTMENT OF ELECTROMECHANICS, 1975. (IN DUTCH)

75-0508 RYZHOV S V
WINDMILLS FOR SHEEP FARMS.
OVTSEVODSTVO 2: 33-35, FEBRUARY 1975. (IN RUSSIAN)

75-0509 SCHATTA M
WEATHER-POWER STATION.
GERMAN (FRG) PATENT NO. 2,412,908/A/, OCTOBER 2, 1975. 17P. (IN GERMAN)

A COMBINED POWER STATION IS DESCRIBED, WHICH ENABLES ONE TO CONVERT SOLAR ENERGY AND WIND ENERGY INTO OTHER FORMS OF ENERGY. THE PLANT CONSISTS OF A WATER-FILLED BOILER, IN WHICH SOLAR ENERGY HEATS THE WATER BY CONCENTRATION; SOLAR CELLS; AND FINALLY WIND ROTORS, WHICH TRANSFORM WIND ENERGY INTO ELECTRICAL ENERGY. THE TRANSFORMED ENERGY IS PARTLY AVAILABLE AS STEAM HEAT, PARTLY AS MECHANICAL OR ELECTRICAL ENERGY. THE PLANT CAN BE USED FOR SUPPLYING HEATING SYSTEMS OR ELECTROLYSIS EQUIPMENT. FINALLY, BY INCORPORATING SUITABLE MOTORS, A MOBILE VERSION OF THE SYSTEM CAN BE PRODUCED.

75-0510 SITING ENERGY FACILITIES AT CAMP GRUBER, OKLAHOMA.
NTIS, JUNE 1975. VOL.2. 71P.
PB-247127

COMPARING THE CHARACTERISTICS OF CAMP GRUBER WITH THE GENERAL SITING REQUIREMENTS FOR AN ENERGY CENTER REVEALS THAT THE CAMP IS SATISFACTORY. THE ENERGY FACILITIES FOR WHICH CAMP GRUBER DOES NOT APPEAR TO BE AN ATTRACTIVE SITE ARE THE MINE-MOUTH PLANTS. EXTRA COSTS MAY BE NECESSARY FOR PURCHASE OF WATER RIGHTS OR CONSTRUCTION OF STORAGE FACILITIES, CONVEYANCES, OR PURIFICATION PLANTS. CAMP GRUBER SATISFIES THE FOLLOWING REQUIREMENTS: AMPLE LOW COST LAND AREA; AMPLE WATER SUPPLY; FAVORABLE METEOROLOGICAL CHARACTERISTICS; MINIMUM ENVIRONMENTAL IMPACTS; LARGE MARKETS FOR ENERGY PRODUCTS; LOW CONSTRUCTION AND OPERATING COSTS; GOOD TRANSPORTATION FACILITIES; AND MINIMUM SOCIAL IMPACT.

75-0511 SIVASEGARAM S
AN EXPERIMENTAL INVESTIGATION OF A CLASS OF DIRECTION-INDEPENDENT WINDMILLS.
PERADENIYA, SRI LANKA, UNIVERSITY OF SRI LANKA, DEPARTMENT OF MECHANICAL ENGINEERING, MAY 15, 1975. 12P.

THE PAPER PRESENTS THE FINDINGS OF AN EXPERIMENTAL INVESTIGATION OF A CLASS OF DIRECTION-INDEPENDENT WINDMILLS WHICH ARE EASY TO FABRICATE AND HAVE SIMPLE BLADE PROFILES. THE PAPER DEMONSTRATES THE EXISTENCE OF CERTAIN OPTIMUM DESIGN PARAMETERS AND DISCUSSES THE SUITABILITY OF THE CLASS OF WINDMILLS FOR LOCAL APPLICATION.

75-0512 SIVASEGARAM S
ON IMPROVING THE PERFORMANCE OF THE SAVONIUS ROTOR.
PERADENIYA, SRI LANKA, UNIVERSITY OF SRI LANKA, DEPARTMENT OF MECHANICAL ENGINEERING, SEPTEMBER 1975. 8P.

DESCRIBED ARE WIND TUNNEL MEASUREMENTS ON TWO AND THREE BLADE PARAMETERS (ANGLE, SIZE, SETTING AND SPEED). SUGGESTED IMPROVEMENTS ARE MENTIONED.

75-0513 SIVASEGARAM S
AN INVESTIGATION OF DIRECTION INDEPENDENT WINDMILL DESIGN SUITABLE FOR FABRICATION OUT OF TIMBER.
PERADENIYA, SRI LANKA, UNIVERSITY OF SRI LANKA, DEPARTMENT OF MECHANICAL ENGINEERING, SEPTEMBER 1975. 9P.

WIND TUNNEL MEASUREMENTS ON MODELS OF VERTICAL AXIS ROTORS WITH ANGLED BLADES, RESEMBLING A CUP-ANEMOMETER, ARE DESCRIBED. IT IS CONCLUDED FROM THE RESULTS THAT ANGLE BLADE-ROTORS, SUITABLE FOR CONSTRUCTION OUT OF

TIMBER, POSSESS EFFICIENCIES COMPARABLE WITH CURVED BLADE DESIGNS. THE DESIGNS CAN BE CONSTRUCTED AT THE VILLAGE LEVEL.

75-0514 SMIT J
WIND POWER GENERATORS--DREAM OR PRACTICEABILITY?
POLYTECH. TIJDSCHR. ELEKTROTECH. ELEKTRON. 30(3): 76-83, FEBRUARY 5, 1975. (IN DUTCH)

75-0515 SOLAR AND PHYSICAL RESEARCH: HEARINGS BEFORE THE SUBCOMMITTEE ON ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, FEBRUARY 21, 1975.
WASHINGTON, D.C., GOV'T. PRINT. OFF., 1975. 700P.

DR. J.M. TEEM OF ERDA PRESENTS A PAPER ON THE SOLAR ENERGY DEVELOPMENT PROGRAM. MAJOR AREAS DISCUSSED IN RELATION TO BUDGET REQUESTS IN SOLAR ENERGY ARE: SOLAR HEATING AND COOLING, SOLAR THERMAL CONVERSION, WIND ENERGY, BIOCONVERSION TO FUELS, OCEAN THERMAL CONVERSION, AND PHOTOVOLTAIC CONVERSION. AREAS IN PHYSICAL RESEARCH INCLUDE: HIGH ENERGY PHYSICS AND NUCLEAR, MATERIALS, AND MOLECULAR SCIENCES. APPENDIX CONTAINS: THE NATIONAL SOLAR ENERGY PROGRAM, CURRENT ARTICLES AND BIBLIOGRAPHIES OF SOLAR ENERGY AND WIND POWER, AND PROGRAMS FOR PHYSICAL RESEARCH.

75-0516 SOLAR ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1974: NATIONAL SOLAR ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM, DEFINITION REPORT.
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY. HEARINGS. 94TH CONGRESS, 1ST SESSION, JULY 16, 1965. HEARING TRANSCRIPT. WASHINGTON, D.C., GOV'T. PRINT. OFF., 1975. 514P.

OVERSIGHT HEARINGS WERE HELD TO REVIEW THE NATIONAL SOLAR ENERGY PROGRAM DEFINITION THAT WAS TO BE SUBMITTED TO CONGRESS BY JUNE 30, 1975, PURSUANT TO PUBLIC LAW 93-473, THE SOLAR ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1974. AN ADMINISTRATOR FOR THE SOLAR, GEOTHERMAL, AND ADVANCED ENERGY SYSTEMS DIV. OF ERDA TESTIFIED ON ERDA-49, A REPORT PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 15, PUBLIC LAW 93-473. TOPICS DISCUSSED INCLUDED: TECHNICAL PROBLEMS TO BE OVERCOME, SOLAR PHOTOVOLTAIC CONVERSION; LOW COST AND DEPENDABLE SOLAR COLLECTORS; ERDA REPORTS 48, 49, AND 23A; IMPLEMENTATION OF THE SOLAR ENERGY PROGRAM; AND UNCERTAINTIES PERTAINING TO FUTURE BUDGET LEVELS AND APPROPRIATIONS. ERDA-49, A SUMMARY OF THE FEDERAL WIND ENERGY PROGRAM, AND "SOLAR ENERGY FOR EARTH," AN AIAA REPORT, ARE APPENDED.

75-0517 WIND POWER.
ALTERN. SOURCES ENERGY NO. 15: 21-23, OCTOBER 1975.

75-0518 THE SOLAR RESOURCE SYSTEM.
UNIVERSITY OF OKLAHOMA. SCIENCE + PUBLIC POLICY PROGRAM. REPORT. MAY 1975. P. 11-21.

THE SOLAR ENERGY RESOURCE SYSTEM AND ITS RESOURCE BASE ARE DISCUSSED. FOUR POTENTIAL SOURCES OF SOLAR ENERGY ARE CONSIDERED: DIRECT RADIATION, WIND, ORGANIC FUELS, AND OCEAN THERMAL GRADIENTS. ENERGY EFFICIENCIES, ENVIRONMENTAL CONSIDERATIONS, TECHNOLOGIES FOR CONVERTING THE ENERGY, AND ECONOMICS OF EACH ALTERNATIVE SOURCE ARE DESCRIBED. ALL SOLAR SOURCES ARE CHARACTERIZED BY LOW PORE DENSITIES AND CONVERSION EFFICIENCIES, THUS RESULTING IN HIGH LAND AREA REQUIREMENTS FOR A GIVEN OUTPUT. OFFSETTING THE INITIAL LARGE INVESTMENT COSTS OF SOLAR POWER SYSTEMS ARE THE ULTIMATE ECONOMIC BENEFITS OF FREE ENERGY AND LOWER OPERATING COSTS.

75-0519 SOUTH P, RANGI R S
AN EXPERIMENTAL INVESTIGATION OF A 12-FT. DIAMETER HIGH SPEED VERTICAL-AXIS WINDMILL.
NATIONAL RESEARCH COUNCIL OF CANADA, LABORATORY TECHNICAL REPORT LTR-LA-166, APRIL 1975.

75-0520 SPRENGEL N
DFVLR ACTIVITIES IN THE AREA OF ENERGY RESEARCH.
DFVLR-NACHRICHTEN, JUNE 1975. P. 640-643. (IN GERMAN)

75-0521 STODHART A H
SELECTION OF TOWER HEIGHT FOR A WIND DRIVEN PLANT.
INITIAL WIND ENERGY DATA ASSESSMENT STUDY. CONFERENCE. ASHEVILLE, N.C.,

JULY 29, 1974. NTIS, MAY 1975. P. 122-125.
PB-244132

MANY STATEMENTS HAVE BEEN MADE FROM TIME TO TIME CONCERNING THE VALUE OF INCREASING TOWER HEIGHT ABOVE THAT REQUIRED TO GIVE ADEQUATE GROUND CLEARANCE TO THE ROTOR OF AN AEROGENERATOR. THIS MINIMUM GROUND CLEARANCE IS USUALLY RECKONED TO BE AROUND 10 METERS, BECAUSE OF THE INCREASED RELATIVE EFFECT OF GROUND INDUCED TURBULENCE BELOW THIS LEVEL; THE UNDOUBTED REDUCTION IN MEAN WIND SPEED, EVEN ON THE MOST FAVORABLE SITES, NEAR TO GROUND LEVEL, AND, IN THE EXTREME CASE, THE SAFETY ELEMENT. IT IS NOT MERELY A QUESTION OF IMPROVEMENT IN WIND REGIMES THAT IS TO BE SOUGHT BUT ALSO AN IMPROVEMENT IN THE OPERATING CONDITIONS FOR THE WIND ROTOR ITSELF. THE PROBLEM OF OPTIMUM TOWER HEIGHT IS DISCUSSED.

75-0522 STROM AUS WIND, AUCH FUER SIE VERFUEGBAR. 5,8-KW-ANLAGEN FUER 50,000 KWH/JAHR. (ELECTRICITY FROM THE WIND, ALSO FOR YOU AVAILABLE. 5,8 KW PLANTS FOR 50,000 KWH/YEAR).
GRAEFELING, GERMANY, NOAH-ENERGY-SYSTEMS- GENF., TECHNISCHER VERLAG RESCH KG, 1975. (IN GERMAN)

75-0523 STRUCTURE OF THE WIND OVER NEW ZEALAND.
NEW ZEALAND, NEW ZEALAND METEOROLOGICAL SERVICE, TECH. INF. CIRC. NO. 147, MAY 1975.

75-0524 STUBBE E J
DE NIET KONVENTIONELE ENERGIEBRONNEN. (THE NON-CONVENTIONAL ENERGY SOURCES).
INGENIEURSBLAD 44(17/18): 372-384, 1975.

75-0525 WOOD J R
WIND ENERGY UTILISATION IN NEW ZEALAND. INTERIM REPORT.
UNIVERSITY OF AUCKLAND, DEPARTMENT OF MECHANICAL ENGINEERING, AUGUST 1975.

75-0526 WORLD ENERGY RESOURCES: AN ANNOTATED BIBLIOGRAPHY OF SELECTED MATERIAL ON THE AVAILABILITY AND DEVELOPMENT OF WORLD ENERGY RESOURCES.
NTIS, 1975. 21P.
ERDA-53

THE BIBLIOGRAPHY PROVIDES REFERENCES TO 173 RECENT ENGLISH LANGUAGE PUBLICATIONS COVERING THE AVAILABILITY AND DEVELOPMENT OF WORLD ENERGY RESOURCES. CITATIONS DEALING EXCLUSIVELY WITH ENERGY RESOURCES OF THE UNITED STATES HAVE BEEN OMITTED.

75-0527 SWEENEY T E, NIXON W B, MAUGHMER M D, BLAHA R
SAILWING WINDMILL CHARACTERISTICS AND RELATED TOPICS.
NTIS, MARCH 1975. 70P.
PB-265828

THE METHOD OF EXPERIMENTALLY DETERMINING THE PERFORMANCE OF LARGE SCALE WINDMILL MODELS MOUNTED ON A MOVING VEHICLE IS DISCUSSED. AS A RESULT OF THE WIND TUNNEL EXPERIMENTS, ANALYSIS, AND THE LARGE SCALE VEHICLE WORK, AN OPTIMIZATION OF A PARTICULAR ROTOR IS DESCRIBED, AS ARE THE RESULTS OF BLADE TWIST EXPERIMENTS AS A METHOD OF RPM CONTROL. BECAUSE THE WIND TUNNEL MODELS WERE NECESSARILY SMALL SCALE, RIGID ROTOR BLADES WERE USED; HOWEVER, THE LARGE SCALE ROTORS TESTED AND REPORTED UPON WERE OF THE PRINCETON SAILWING TYPE. BY MEANS OF DIMENSIONAL ANALYSIS AND BY EXPERIMENTS, THE SIGNIFICANT TENSION COEFFICIENT FOR THE TRAILING EDGE CABLE OF THE SAILWING ROTOR WAS DETERMINED AND EVALUATED. THIS TENSION COEFFICIENT ENABLES THE DESIGN OF SUCH A ROTOR TO BE SUCH THAT THE LUFFING THRESHOLD CAN BE AVOIDED FOR ANY GIVEN SET OF CONDITIONS.

75-0528 WEYER I
DER WIEDEREINSATZ VON WINDKRAFT. EIN BEITRAG ZUR ENERGIEKRISE UND ENERGIEVERSORGUNG. (THE FURTHER USE OF WIND POWER. A CONTRIBUTION TO THE ENERGY CRISIS AND ENERGY SUPPLY).
MUHLE MISCHFUTTERTECH 112(30): 395-399, JULY 31, 1975. (IN GERMAN)

75-0529 TABOR H
RENEWABLE ENERGY-SOURCES AND THE NEW ZEALAND SCENE.
CANTERBURY ENG. J., NEW ZEALAND ENERGY CONFERENCE, 2D, MAY 22-24, 1975. CONF. PAPER NO. 4, P. 64-69.

75-0530 TEWARI S K
HOW FEASIBLE IS THE SUBSTANTIAL UTILIZATION OF WIND POWER IN INDIA.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, JUNE 1975. 37P.

REVIEWED ARE SOME TECHNICALLY SUCCESSFUL WIND MACHINES FROM THE PAST, THE FIELDS IN WHICH ENERGY IS A USEFUL AND RELIABLE SOURCE (ESPECIALLY FOR WATER PUMPING AND SUPPLYING ELECTRICITY TO THE GRID), AND THE ECONOMICS OF WIND POWER IN THE INDIAN ENERGY SCENE.

75-0531 TEWARI S K, SRINATH L S
A SYSTEMS APPROACH TOWARD UTILIZATION OF WIND ENERGY. A PRELIMINARY STUDY.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, MARCH 3, 1975. 72P.

THIS IS A SHORT REVIEW OF THE ASPECTS OF SYSTEM ANALYSIS NEEDED FOR RESEARCH AND DEVELOPMENT ON WIND POWER UTILIZATION WITH SPECIAL REFERENCE TO INDIA.

75-0532 THALHAMMER T
FUTURE ENERGY DEMAND AND THE ROLE OF SOLAR ENERGY.
ACTA ELECTR. 18(4): 267-273, OCTOBER 1975.

SOME ENERGY SUPPLY AND DEMAND SCENARIOS ARE FORECASTED. SOLAR ENERGY'S CONTRIBUTION WILL BE MINOR UNTIL THE YEAR 2000, BUT ITS DEVELOPMENT SHOULD BE CONTINUED. DIFFERENT METHODS OF CONVERTING SOLAR ENERGY INTO SUITABLE FORMS FOR HUMAN NEEDS ARE PRESENTED: PHOTOTHERMAL, PHOTOVOLTAIC, BIOLOGICAL, THERMAL SEA, WIND, AND OCEAN CURRENT ENERGY. SINCE THE SUCCESS OF ANY METHOD WILL DEPEND ON ITS ECONOMIC COMPETITIVENESS, COST CONSIDERATIONS ARE PRESENTED. OTHER FACTORS AFFECTING THE INTRODUCTION OF SOLAR ENERGY ARE APPRAISED.

75-0533 THRESHER R W, WILSON R E
CHARACTERISTICS OF THE VERTICAL AXIS WIND MACHINE.
BURBANK, CAL., LOCKHEED-CALIFORNIA CO., SEPTEMBER 1975.

IT IS THE PRIMARY OBJECTIVE OF THIS STUDY TO DETERMINE THE PERFORMANCE, OPERATING AND COST CHARACTERISTICS OF VERTICAL AXIS WIND MACHINES. MAJOR EMPHASIS IS PLACED ON THE DARRIEUS, BUT THE SAVONIUS ROTOR IS ALSO CONSIDERED. THE STUDY CENTERS ON THE FOLLOWING AREAS OF INTEREST: AERODYNAMIC PERFORMANCE; STRUCTURAL REQUIREMENTS; OPERATIONAL STRATEGY; AND ECONOMIC POTENTIAL VERSUS MACHINE SIZE. THE MACHINE CONFIGURATION FOR THIS STUDY IS A THREE-BLADED, TROPOSKIEN SHAPED DARRIEUS ROTOR, WHICH AT THIS TIME IS THE MOST PROMISING MACHINE CONFIGURATION. USING THIS MACHINE CONFIGURATION, ANALYTICAL MODELS ARE DEVELOPED FOR THE AERODYNAMICS AND STRUCTURES. WHILE THESE MODELS MAY NOT CONTAIN THE EFFECTS OF ALL OF THE PHYSICAL PARAMETERS, THE KEY PARAMETERS ARE INCLUDED. IN SOME CASES, SELECTING THESE KEY PARAMETERS IS A MATTER OF JUDGEMENT. WITH THESE MODELS, THE RELATIONSHIPS GOVERNING MACHINE PERFORMANCE; STRUCTURAL NEEDS AND POTENTIAL OPERATION ARE DEDUCED.

75-0534 WEYER I
DER WIEDEREINSATZ VON WINDKRAFT. EIN BEITRAG ZUR ENERGIEKRISE UND ENERGIEVERSORGUNG. (THE FURTHER USE OF WIND POWER. A CONTRIBUTION TO THE ENERGY CRISIS AND ENERGY SUPPLY). 3.
MUHLE MISCHFUTTERTECH, 112(32): 422-426, AUGUST 14, 1975. (IN GERMAN)

75-0535 DELISLE J F, TOMLINSON A I
STRUCTURE OF THE WIND OVER NEW ZEALAND.
NEW ZEALAND METEOROLOGICAL SERVICE TECH. INF. CIRC. NO. 147, MAY 1975.
REVISED EDITION OCTOBER 1975.

75-0536 TRANSLATIONS PUBLISHED BY ERA OF WIND POWER ARTICLES, 1930 TO 1949.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA TRANS-3012, OCTOBER 1975.

75-0537 TRANSLATIONS OF WIND POWER ARTICLES 1950 TO 1962.
LEATHERHEAD, ENGLAND, ELECTRICAL RESEARCH ASSOCIATION, ERA TRANS-3013, OCTOBER 1975.

75-0538 TROMP C
ONDERZOEK AAN EEN GENERATORSYSTEEM VOOR HET OPWEKKEN VAN-DIREKT AAN HET OPENBARE NET TE LEVEREN-ELECTRISCHE ENERGIE MET BEHULP VAN EEN WINDMOLEN.
(INVESTIGATION ON A GENERATOR SYSTEM, DELIVERING ELECTRICITY DIRECTLY TO

THE UTILITY NETWORK, BY MEANS OF A WINDMILL).
DELFT, THE NETHERLANDS, DELFT UNIVERSITY OF TECHNOLOGY, REP. NO. VE75A37, MAY 1975. 128P. (IN DUTCH)

IN THIS REPORT A DESCRIPTION IS GIVEN OF A SYSTEM FOR THE GENERATION OF ELECTRICITY FOR THE PUBLIC 3-PHASE GRID, BY WINDPOWER. BESIDES THE TRANSFORMATION OF MECHANICAL ENERGY INTO ELECTRICAL ENERGY WITH THE VOLTAGE AND FREQUENCY OF THE GRID, THE GENERATION-SYSTEM IS GIVEN THE TASK TO ADJUST THE ROTATIONAL SPEED OF THE WINDMILL-SHAFT, IN ORDER TO GET THE MAXIMUM POWER THAT CAN BE EXTRACTED FROM THE WIND AT A GIVEN WIND SPEED. ALTHOUGH THIS RESULTS IN A ROTATIONAL SPEED OF THE GENERATION-SHAFT THAT IS PROPORTIONAL TO THE WIND SPEED, THE GENERATOR CAN BE CONNECTED DIRECTLY TO THE GRID, BECAUSE CONSTANT OUTPUT VOLTAGE AND FREQUENCY ARE REALISED BY A CONVERTER FEEDING THE ROTOR CIRCUIT IN A SPECIAL WAY. IMPORTANT CHARACTERISTICS OF THE SYSTEM ARE THE BEHAVIOUR OF THE GENERATOR, BEING THAT OF A NORMAL SYNCHRONOUS GENERATOR AND THE NECESSARY CONVERTER CAPACITY, BEING ONLY APPROXIMATELY 15 PERCENT OF THE RATED CAPACITY OF THE GENERATOR.

75-0539 UTILIZATION OF WIND ENERGY ON MOUNT WASHINGTON.
MOUNT WASHINGTON OBSERVATORY NEWS BULL. 16(2): 41-47, JUNE 1975.

THE UTILIZATION OF WIND AS A SOURCE OF ELECTRICAL POWER IS NOT SO SIMPLE OR SO CHEAP AS MIGHT APPEAR AND SINCE WIND VELOCITY IS NOT CONSTANT, UTILIZATION OF WIND POWER FOR THE HOME IS VIEWED, AT THE MOMENT, AS A SUPPLEMENTARY RATHER THAN AS A PRIMARY SOURCE OF POWER. MOREOVER, ELECTRICAL ENERGY GENERATED BY THE WIND WOULD BE OF THE DC RATHER THAN THE AC TYPE THAT OPERATES MOST AMERICAN MOTOR APPLIANCES. THEREFORE, WHEN CONSIDERING THE COST OF THE EQUIPMENT NEEDED TO EXTRACT, STORE, AND CONVERT WIND POWER, IT MAY NOT BE AT ALL ADVANTAGEOUS. ON MT. WASHINGTON (N.H.), THERE IS AN ABUNDANCE OF WIND, THE AREA IS NOT SERVED BY POWER COMPANIES, AND THE OUTPUT OF A WIND-POWERED GENERATOR IS PROPORTIONAL TO THE CUBE OF THE WIND SPEED (A GENERATING UNIT CAPABLE OF PRODUCING 5 KW IN A 10-M.P.H. WIND COULD PRODUCE 40 KW IN A 20-M.P.H. WIND). HOWEVER, THE HARNESSING OF STRONG MOUNTAIN WINDS PRESENTS SOME PROBLEMS SUCH AS THE PERFORMANCE OF WIND-POWERED GENERATORS IN FREQUENT WINDS OF HURRICANE VELOCITY AND STRONG TURBULENCE. SEVERE WIND CONDITIONS MAY NECESSITATE DEACTIVATING OR DEMOUNTING THE EQUIPMENT, AND ICING COULD DAMAGE OR EVEN DESTROY IT. PLANS ARE UNDER WAY TO CONSTRUCT AND TEST A PROTOTYPE MACHINE SO THAT DATA CAN BE GATHERED ON THE PRACTICABILITY OF EXTRACTING POWER FROM THE WIND ON MT. WASHINGTON.

75-0540 UZZELL R S
WIND POWERED MACHINE.
GERMAN (FRG) PATENT, JULY 31, 1975. 11P. (IN GERMAN)

THE PATENT SPECIFICATION CONCERNS A WIND-POWERED MACHINE, WHERE THE WIND ROTOR IS MOUNTED TO ROTATE IN BEARINGS ON A FRAMEWORK, AND IS CONNECTED WITH A WEATHER VANE. THE WIND ROTOR DRIVES AN ELECTRIC GENERATOR. ACCORDING TO THE INVENTION THE WIND ROTOR IS ARRANGED AT THE NARROWEST CROSSECTION (THROAT) OF A CHAMBER IN THE FORM OF A VENTURI NOZZLE. SEVERAL GUIDE VANES ARE DISTRIBUTED EVENLY OVER THE CIRCUMFERENCE OF THE INLET OPENING ON THE INNER WALL OF THE VENTURI TUBE NEAR THE INLET OPENING.

75-0541 VOEGELI H E, TARRANT J J
SURVIVAL 2001: SCENARIO FROM THE FUTURE.
N.Y., VAN NOSTRAND REINHOLD, 1975. 115P.

CONCEPTS OF ALTERNATIVE ENERGY SOURCES, INCLUDING WIND, SOLAR, TIDAL, AND WAVE POWER, AND ALTERNATIVE HOUSING DESIGN ARE EXAMINED WITH ENERGY CONSERVATION AS THE GOAL. BRIEFLY DISCUSSED ARE PROBLEMS ASSOCIATED WITH TRANSPORTATION.

75-0542 VOORSTEL NATIONAAL ONDERZOEKPROGRAMMA WINDENERGIE. (PROPOSAL FOR A NATIONAL RESEARCH PROGRAM ON WIND ENERGY).
THE NETHERLANDS, LANDELIJKE STUURGROEP VOUR ENERGIE ONDERZOEK, JUNE 2, 1975. 57P.

THIS PROPOSAL FOR RESEARCH AND DEVELOPMENT OF LARGE SCALE WIND ENERGY SYSTEMS COVERS: (1) TECHNICAL AND COSTS OF THE USE OF WIND POWER; (2) THE USE OF ENERGY FROM AN INTERMITTENT SOURCE; (3) THE SOCIAL IMPLICATIONS OF WIND ENERGY, AND (4) DOCUMENTATION.

75-0543 WALENBERG F
MODELIJKHEDEN VOOR OPTIMALISERING VAN DE ENERGIE AFGIFTE DOOR EEN WINDKRACHTCENTRALE. (POSSIBILITIES FOR OPTIMALIZATION OF THE POWER PRODUCTION OF A WIND POWER ELECTRIC PLANT).
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF ELECTRIC ENGINEERING, REP. NO. EM 75-2, APRIL 1975. 73P. (IN DUTCH)

APPLICATIONS OF WINDMILL POWER OR WIND ENERGY IN GENERAL ARE MULTIPLE; ONE SPECIAL APPLICATION IS GENERATING ELECTRICAL ENERGY. ONE OF THE PROBLEMS OF A WINDMILL-DRIVEN ELECTRICAL PLANT IS THAT ONLY AT ONE WIND VELOCITY THE EFFICIENCY OF ENERGY PRODUCTION IS MAXIMAL. THE TRANSMISSION-ALTERNATOR COMBINATION IS ADAPTED TO THE WINDMILL FOR THIS SPECIAL WIND VELOCITY ONLY. TRYING TO ADAPT THE POWER SYSTEM FOR ALL OCCURRING WIND VELOCITIES IS A PROBLEM OF CONTROL-ENGINEERING. THIS REPORT HAS THE INTENTION TO CONTRIBUTE TO THE SOLUTION OF THIS PROBLEM. FROM A SIMPLE WINDMILL-THEORY CONDITIONS OF OPTIMAL POWER-EFFICIENCY ARE DERIVED. CONTROL SYSTEMS THAT MEET THESE CONDITIONS ARE TREATED MORE OR LESS SYSTEMATICALLY. FINALLY, A SPECIAL KIND OF CONTROL SYSTEM, A SO CALLED OPTIMUM CONTROLLER, IS INTRODUCED IN THE LAST CHAPTER.

75-0544 WALKER J
ENERGY AND THE ENVIRONMENT.
BIRMINGHAM, ENGLAND, UNIVERSITY OF BIRMINGHAM, 1975. 387P.

REPORTS FROM THE 1975 INTERNATIONAL SYMPOSIUM ON MAN AND HIS ENVIRONMENT IN ENGLAND ARE PRESENTED. EXAMINED ARE SOURCES OF ENERGY INCLUDING COAL, GAS, OIL, NUCLEAR, WIND, AND SOLAR, AND THE ENVIRONMENTAL EFFECTS OF EACH. DISCUSSED ARE USERS OF ENERGY INCLUDING GENERAL INDUSTRIAL CONSUMERS, ELECTRICITY SUPPLIERS, TRANSPORTATION, AND AGRICULTURE.

75-0545 WATT S B
THE CRETAN SAIL WINDWHEEL AS A POWER SOURCE.
APPROP. TECHNOL. 2(3): 4-5, 1975.

THIS SHORT DESCRIPTION OF THE CRETAN SAIL WINDWHEEL MENTIONS ITS ADVANTAGES. COMPARED WITH THE MULTIBLADE WINDWHEEL IT IS VERY SIMPLE TO BUILD BUT NEEDS CONSTANT ATTENTION TO TRIM AND REEF THE SAILS. SOME DETAILS ON CONSTRUCTION AND PERFORMANCE ARE GIVEN.

75-0546 WEBER W
THE OPTIMUM CONFIGURATION OF ROTOR BLADES FOR HORIZONTAL WIND ENERGY CONVERTERS.
Z. FLUGWISS 23(12): 443-447, 1975. TRANSL.: NTIS, FEBRUARY 1977. 17P.
NASA-TT-F-17379

CONSIDERATIONS, PROCEDURES AND SOME RESULTS RELATING TO THE PROBLEM OF THE AERODYNAMIC CONFIGURATION OF ROTOR BLADES FOR WIND ENERGY CONVERTERS ARE PRESENTED.

75-0547 WEEKS S A, PRICE D R
EVALUATION OF WIND ENERGY SYSTEMS.
N.Y. FARM ELECTR. COUNC. ANN. PROG. REP. 32D: 48-50, 1975.

75-0548 WEINGARTEN L I
MATERIAL AND MANUFACTURING CONSIDERATIONS FOR VERTICAL-AXIS WIND TURBINES.
NTIS, 1975. 14P.
SAND-75-5512

75-0549 WEISS G
WIND POWER PLANT.
GERMAN (FRG) PATENT 2,423,612/A/, NOVEMBER 20, 1975. 9P. (IN GERMAN)

A WIND POWER PLANT IS PROPOSED SUITABLE FOR ELECTRICITY GENERATION OR WATER PUMPING. THIS PLANT IS TO BE SELF-ADJUSTING TO VARIOUS WIND VELOCITIES AND TO BE KEPT IN OPERATION EVEN DURING VIOLENT STORMS. FOR THIS PURPOSE THE MAST, CARRYING THE WIND ROTOR AND PIVOTABLE AROUND A HORIZONTAL AXIS, IS TILTABLE AND EQUIPPED WITH A WIND BLIND. FURTHER CLAIMS CONTAIN VARIOUS CONFIGURATIONS OF THE TILTING BASE IN RESPECT TO THE CUT IN OF AN ELASTIC LINK, THE ATTACHMENT AND DESIGN OF THE WIND BLIND AS WELL AS THE CONSTRUCTIVE ARRANGEMENT OF ONE OR MORE DYNAMOS.

75-0550 WEYER I
DER WIEDEREINSATZ VON WINDKRAFT. EIN BEITRAG ZUR ENERGIEKRISE UND ENERGIEVERSORGUNG. (THE FURTHER USE OF WIND POWER. A CONTRIBUTION TO THE ENERGY CRISIS AND ENERGY SUPPLY). 2.
MUHLE MISCHFUTTERTECH. 112(31): 409-412, AUGUST 7, 1975. (IN GERMAN)

75-0551 DELTA AIRFOIL GRASPS POWER FROM THE WIND. WIND GENERATOR PROMISES GREATER EFFICIENCY.
PROD ENG. 46(9): 15-16, SEPTEMBER 1975.

A WINDMILL THAT ONE DAY MAY GENERATE EIGHT TIMES THE POWER OF CONVENTIONAL ROTOR-TYPE WIND-ENERGY CONVERTERS FOR THE SAME SIZE ROTOR HAS BEEN INVENTED BY P. M. SFORZA, FROM POLYTECHNIC INSTITUTE OF NEW YORK. ONE OF THE MANY POSSIBLE SHAPES FOR SUCH A DEVICE IS THE DELTA WING OF SUPERSONIC TRANSPORTS WITH SHARP LEADING EDGES.

75-0552 SYVERSON C D
WIND POWER.
DESIGN NEWS 31(6): 155-158, 1975.

THIS IS A REVIEW ARTICLE COVERING THE CURRENT STATUS OF WIND POWER RESEARCH, INCLUDING GENERATORS, DESIGN, TOWER HEIGHT, AND SITE SELECTION.

74-0230 ABELSON P H
ENERGY: USE, CONSERVATION AND SUPPLY.
WASHINGTON, D.C., AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1974. 154P.

A CHAPTER ON WINDMILLS BY NICHOLAS WADE IS INCLUDED. WIND POWER IS ALSO MENTIONED IN OTHER CHAPTERS THROUGHOUT THE BOOK.

74-0231 ALTMAN A
DESIGNING WINDMILL BLADES, A GRAPHICAL METHOD.
ALTERN. SOURCES ENERGY NO. 14: 10-13, MAY 1974.

74-0232 ALTMAN A
02 POWERED DELIGHT PLANS.
ALTERN. SOURCES ENERGY NO. 14: 5, MAY 1974.

THE PLANS WERE DEVELOPED BY J. SENCENBAUGH.

74-0233 ALTMAN A
THE "12 FOOTER" PLANS.
ALTERN. SOURCES ENERGY NO. 14: 6, MAY 1974.

THE "12 FOOTER" IS A WINDMILL DESIGNED BY WINDWORKS.

74-0234 ALTMAN A
WINDMILL LIMITER.
ALTERN. SOURCES ENERGY NO. 14: 38, MAY 1974.

A DESIGN TO PROTECT A WINDMILL FROM OVERSPEED IS DESCRIBED.

74-0235 ALWARD R
REVIEW OF THE WINDPOWER ACTIVITIES AT THE BRACE RESEARCH INSTITUTE.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 94-109.

REVIEWED ARE ACTIVITIES OF THE PAST TWELVE YEARS INCLUDING DESCRIPTIONS OF PUBLICATIONS ON WINDPOWER.

74-0236 ARCHIBALD F
ENERGY: A WATER PUMPING WINDMILL THAT WORKS.
J. NEW ALCHEM. NO. 2: 19-22, 1974.

THIS IS A DETAILED REPORT ON M. M. SHERMAN'S DESIGN OF A WATER PUMPING WINDMILL.

74-0237 BAETEN A
L'ENERGIE EOLIENNE. THESE. VOL. 1: HISTORIE-THEORIE; VOL. 2: TECHNOL. - ECON. - RECHERCHE - DEVELOPM.
VILLE DE BRUXELLES, INST. D'ENSEIGNEMENT SUP. LUCIEN COOREMANS/INST. SUP. DE COMMERCE, 1974-1975. VOL. 1: 156P.; VOL. 2: 361P.

74-0238 BAIRAMOV R
WIND-SOLAR POWER INSTALLATIONS FOR WATER RAISING AND DISTILLATION.
PROB. OSVOENIIA PUSTYN' 4: 71-76, 1974.

74-0239 BASE T E
THE EFFECT OF ATMOSPHERIC TURBULENCE ON WINDMILL PERFORMANCE.
LONDON, ONTARIO, FACULTY OF ENGINEERING SCIENCE, UNIVERSITY OF WESTERN ONTARIO, APRIL 1974. 15P.

THEORETICAL AND EXPERIMENTAL STUDIES HAVE BEEN MADE TO DETERMINE THE EFFECTS OF FREE STREAM TURBULENCE STRUCTURE ON THE PERFORMANCE OF A SIMPLE AIRSCREW WINDMILL. A MODIFIED BLADE ELEMENT METHOD WAS DEVELOPED TO PREDICT THE FLUCTUATING LIFT FORCES ON THE ROTOR BLADES AND COMPUTED VORTEX MODELS OF TURBULENCE WERE USED TO REPRESENT THE FLUCTUATING VELOCITY FIELD. EVENTUALLY THE COMPUTER PROGRAM WILL ENABLE LARGE ROTOR DIAMETER WINDMILL PERFORMANCE STUDIES TO BE CONDUCTED AND ALSO COMPARISONS TO BE MADE WITH SMALL TEST ROTORS.

74-0240 BASE T E
THE PERFORMANCE OF AN AIRSCREW WINDMILL IN A TURBULENT AIRSTREAM.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS.

UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 157-167.

THIS IS A SHORT DESCRIPTION OF RESEARCH ON THE INFLUENCE OF TURBULENT ATMOSPHERIC BOUNDARY LAYER ON WINDSCREWS. EXPERIMENTAL (WIND TUNNEL) AND THEORETICAL (ANALYTICAL MODELS) METHODS ARE DISCUSSED.

74-0241 BEALL S E, SPIEWAK I, ARNOLD H G, MCLAIN H W, BETTIS E S
AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF ALTERNATIVE ENERGY SOURCES.
NTIS, SEPTEMBER 1974. 134P.
ORNL-5024

ALTERNATIVE ENERGY SOURCES SUCH AS GEOTHERMAL, SOLAR, WIND AND FUSION ARE EVALUATED AS TO AVAILABILITY, FEASIBILITY, COST, AND ENVIRONMENTAL IMPACT. METHODS ARE SUGGESTED FOR COMPARING OPTIONS.

74-0242 BESSELAAR H
MOLENS VAN NEDERLAND.
AMSTERDAM, B.V. UITGENERSMAATSCHAPPJ KOSMOS, 1974. 145P. (IN DUTCH)

THIS IS A WELL ILLUSTRATED SURVEY OF OLD DUTCH WINDMILLS. AN EXTENSIVE LIST OF STILL EXISTING WINDMILLS IN THE NETHERLANDS IS ADDED.

74-0243 BEURSKENS J
WINDENERGIE VOUR ONTWIKKELINGSLANDEN. (WIND ENERGY FOR DEVELOPING COUNTRIES).
THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPT. OF PHYSICS, REPT. R-215-D, NOVEMBER 1974. 5P. (IN DUTCH)

THIS REPORT IS INTENDED AS PART OF PRELIMINARY SURVEY OF THE PRACTICABILITY OF WIND ENERGY IN DEVELOPING COUNTRIES. ASSESSMENT OF THE WATER DEMAND IN INDIA IS MADE AND A WIND TURBINE-PUMP SYSTEM IS DESCRIBED AND THE OUTPUT CALCULATED. A SURVEY IS GIVEN OF VARIOUS CONSTRUCTIONS, SAFEGUARD AND CONTROL MECHANISMS AND TRANSMISSIONS. A LIST OF COMMERCIALLY AVAILABLE MACHINES IS GIVEN.

74-0244 BEURSKENS J M
WIND ENERGY.
EINDHOVEN, NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, APRIL 1974.
DICTAAT NO. 3323. 161P. (IN DUTCH)

INCLUDED IN THIS REPORT ARE: 1. INTRODUCTION: THE ENERGY PROBLEM; USE OF WIND ENERGY AS AN ALTERNATIVE ENERGY SOURCE. 2. HISTORY OF THE USE OF WIND ENERGY; CLASSIFICATION OF WINDMILL TYPES. 3. SHORT SURVEY OF MOMENTUM THEORIES, DESCRIBING OVERALL WINDMILL PERFORMANCE IN STEADY WINDS. 4. ANALYSIS OF METEOROLOGICAL DATA; WIND PROFILES OVER DIFFERENT SURFACES (LAND, SEA, ETC.) AS A FUNCTION OF HEIGHT; STABILITY OF ATMOSPHERE; ENERGY CONTAINED IN ATMOSPHERIC TURBULENCE; ESTIMATION OF USEFUL ENERGY DEPENDENT ON HEIGHT OF WIND-ROTOR. 5. DESCRIPTION OF THE WINDMILL SYSTEM: WIND-ROTOR, TRANSMISSION AND LOAD UNDER STEADY AND NON-STEADY WIND CONDITIONS. THIS MATHEMATICAL DESCRIPTION OPENS POSSIBILITIES OF OPTIMIZING A WINDMILL SYSTEM DEPENDENT ON REQUIREMENTS.

74-0245 BLACKWELL B F, FELTZ L V, RANDALL O M
WIND TURBINE.
WASHINGTON, D.C., ATOMIC ENERGY COMMISSION, PATENT APPLICATION, SEPTEMBER 20, 1974. 18P.
PAT-APPL-508016/WE

THE PATENT APPLICATION RELATES TO A WIND TURBINE ROTATABLE ABOUT A SHAFT WHICH MAY INCLUDE A DRIVE ROTOR WITH ONE OR MORE ELONGATED BLADES EACH HAVING A CENTRAL OUTWARDLY CURVED PORTION OF AIRFOIL SHAPE WHICH PRODUCES ROTARY MOTION WHEN THE BLADE ROTATES IN WIND AT A BLADE TIP VELOCITY TO WIND VELOCITY RATIO GREATER THAN ABOUT THREE OR FOUR. ADDITIONAL WIND ROTOR MEANS ARE DISPOSED AT BOTH ENDS OF THE CURVED PORTIONS OF THE ELONGATED BLADE FOR ROTATABLY ACCELERATING THE DRIVE ROTOR TO THE DESIRED VELOCITY RATIO, AND MEANS COUPLED TO SAID ROTORS FOR USING THE ROTATION THEREOF.

74-0246 BLACKWELL B F, FELTZ L V, RIGHTLEY E C
ADDENDUM TO A PROPOSAL TO NSF TO SPONSOR A VERTICAL-AXIS WIND TURBINE RESEARCH PROGRAM.
NTIS, NOVEMBER 1974. 34P.

SAND-74-0386

INFORMATION IS PRESENTED CONCERNING THE PERFORMANCE EVALUATION OF A 15 FOOT-DIAMETER TEST BED DARRIEUS ROTOR, DARRIEUS ROTOR WIND TUNNEL TESTS, SAVONIUS ROTOR WIND TUNNEL TESTS, BLADE MANUFACTURING TECHNIQUES FOR 15 FOOT-DIAMETER AND 35 FOOT-DIAMETER WIND TURBINES, STATIC AND DYNAMIC STRUCTURAL ANALYSIS, PRODUCTION PROTOTYPE DESIGN OF A 15 FOOT-DIAMETER TURBINE, PRODUCTION PROTOTYPE DESIGN OF A 35 FOOT-DIAMETER TURBINE, AND AERODYNAMIC PERFORMANCE STUDIES.

74-0247 BLOW S J
ENERGY: AN ANNOTATED BIBLIOGRAPHY.
NTIS, AUGUST 1974. 749P.

THIS BIBLIOGRAPHY ON ENERGY AND ENERGY RELATED TOPICS CONTAINS APPROXIMATELY 4,300 REFERENCES WHICH ARE DATED BETWEEN JAN., 1972 AND JULY, 1974. THE SUBJECT CATEGORIES COVERED INCLUDE ENERGY AND POWER, ENERGY AND POWER SOURCES, AND ENERGY AND POWER STORAGE AND TRANSMISSION.

74-0248 BOOTH D
THE WINDS OF CHANGE MIGHT BLOW THROUGH SAILS AGAIN.
ENGINEER 237: 44-46, APRIL 18, 1974.

THIS ARTICLE DESCRIBES THE PRESENT STATE OF WIND POWER UTILIZATION AND SOME FUTURE PROJECTS IN THE U.S.A. ARE MENTIONED. BRITAIN MUST MAKE USE OF ITS KNOWLEDGE AND FOLLOW OTHER COUNTRIES IN PLANNING FOR THE ENERGY CRISIS BY RETHINKING THE POTENTIAL SAVINGS OF WIND GENERATION.

74-0249 BUDGEN H P
MODIFIED DESIGN OF THE BRACE AIRSCREW 32 FOOT DIAMETER WIND TURBINE FOR WATER PUMPING AND ELECTRICAL GENERATION.
QUEBEC, BRACE RES. INST. PUBL. NO. T89, MAY 1974.

74-0250 BROWNE J
ALTERNATIVE LIFE SUPPORT SYSTEMS. A PRELIMINARY REPORT ON AN ELEKTRO WIND POWER INSTALLATION.
ALTERN. SOURCES ENERGY NO. 14: 14, MAY 1974.

EXPERIENCES WITH A SWISS MADE ELEKTRO IN BOULDER, COLORADO, ARE DESCRIBED.

74-0251 CAMERERO R
ENERGIE EOLIENNE: REVUE DES TRAVAUX EN COURS A L'UNIVERSITE DE SHERBROOKE. (WIND ENERGY: REVIEW OF THE ACTIVITIES AT THE UNIVERSITY OF SHERBROOKE).
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 79-93. (IN FRENCH)

THIS IS A SHORT DESCRIPTION OF RESEARCH ON WINDSCREWS AND VENTURIS, AND THEIR POSSIBLE USE FOR SPACE HEATING.

74-0252 CARVER C E, MACPHERSON R B
EXPERIMENTAL INVESTIGATION OF THE USE OF A SAVONIUS ROTOR AS A POWER GENERATING DEVICE.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 137-156.

THIS PAPER PRESENTS THE RESULTS OF A SERIES OF TESTS ON A SAVONIUS WING ROTOR 3 FEET HIGH AND 1.5 FEET IN DIAMETER MOUNTED VERTICALLY IN A WIND TUNNEL. EFFICIENCY AND POWER OUTPUT CHARACTERISTICS AS A FUNCTION OF ROTOR SPEED FOR SEVERAL WIND SPEEDS ARE GIVEN AS WELL AS STATIC TORQUE CHARACTERISTICS. MAXIMUM EFFICIENCY FOR THE DEVICE WAS DETERMINED TO BE 33 PERCENT, OCCURRING AT A RATIO OF WIND SPEED TO ROTOR TIP SPEED, U/V, OF ABOUT 0.85 TO 0.90, FOR WHICH THE POWER COEFFICIENT WAS FOUND TO BE 0.33. WIND SPEEDS RANGED FROM 15.6 FEET PER SECOND TO 21 FEET PER SECOND. IT IS CONCLUDED THAT SUCH A DEVICE CAN WELL SERVE TO PROVIDE AUXILLIARY POWER ON A SCALE COMPARABLE TO A SINGLE DWELLING, BEING RELATIVELY INEXPENSIVE TO FABRICATE, AND POSSESSING EXCELLENT TORQUE CHARACTERISTICS PARTICULARLY DURING RAPID VARIATIONS IN WIND SPEED AND DIRECTION. CONTINUED IMPROVEMENT IN DESIGN MAY WELL YIELD EFFICIENCIES OVER 40 PERCENT AND THUS THE DEVICE CAN BECOME A SERIOUS CONTENDER TO THE

HIGH SPEED ROTOR. CONSTRUCTED ON A LARGE SCALE, THE WING ROTOR HAS A DISTINCT POTENTIAL FOR USE IN WATER AS A LOW HEAD POWER GENERATING DEVICE.

74-0253 CERMAK J E
APPLICATIONS OF FLUID MECHANICS TO WIND.
ASME WINTER ANNUAL MEETING, NEW YORK, NOVEMBER 17-21, 1974. 30P.

74-0254 CHILCOTT R E
DESIGN SPEEDS FOR WIND TURBINES.
AUSTRALIAN CONFERENCE ON HYDRAULICS AND FLUID MECHANICS, 5TH, CHRISTCHURCH, NEW ZEALAND, DECEMBER 9-13, 1974. PROCEEDINGS, UNIVERSITY OF CANTERBURY, NEW ZEALAND, 1974.

PREDICTIONS OF WIND TURBINE PERFORMANCE ARE REQUIRED IN ORDER TO DESIGN AND COST WIND ENERGY CONVERSION SYSTEMS. BY ASSUMING THAT THE HOURLY-MEAN WIND-SPEED FREQUENCY CAN BE CHARACTERIZED BY THE WEIBULL DISTRIBUTION, AN OPTIMUM RATED WIND SPEED IS DEFINED WHICH MAXIMIZES THE PRIMARY ENERGY CONVERSION OF AN IDEAL WIND TURBINE. AS THE OVERALL CONVERSION SYSTEM DESIGN MAY REQUIRE A PRIME OPERATING TIME GREATER THAN THAT AVAILABLE ABOVE THE OPTIMUM RATED WIND SPEED, PRIMARY ENERGY CONVERSION PERFORMANCE AND PRIME TIME ARE PRESENTED AS FUNCTIONS OF RATED WIND SPEED. SECONDARY ENERGY CONVERSION PERFORMANCE BELOW RATED WIND SPEED IS PRESENTED IN A SIMILAR MANNER. THE INFORMATION GIVEN IS INTENDED TO PROVIDE A GUIDE TO THE RATING AND PERFORMANCE OF WIND TURBINES IN GIVEN WIND REGIMES.

74-0255 CLEWS H M
ELECTRIC POWER FROM THE WIND; A PRACTICAL GUIDE TO WIND-GENERATED POWER SYSTEMS FOR INDIVIDUAL APPLICATIONS. REVISED, EXPANDED AND UPDATED.
EAST HOLDEN, MAINE, SOLAR WIND CO., 1974. 40P.

74-0256 COLLINS C
WIND GENERATOR THEORY.
UNDERCURRENTS NO.8: 33-34, OCTOBER/NOVEMBER 1974.

GIVEN ARE SOME GENERAL NOTES ON WIND TURBINE THEORY, IMPORTANT FOR DESIGNING A SMALL WIND ELECTRIC PLANT.

74-0257 DAMBOLENA I G
WIND POWER ECONOMICS.
ENERGY TODAY, MAY 17, 1974. P. 138.

74-0258 DOBSON L
HYPERBOLOID VENTURI.
ALTERN. SOURCES ENERGY NO. 13: 38-39, FEBRUARY 1974.

74-0259 ELDRIDGE F R
SOME WIND-ENERGY STORAGE OPTIONS (SUMMARY).
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. 4P.

74-0260 ELDRIDGE F R
WIND-POWERED AQUEDUCT SYSTEMS (SUMMARY).
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. 11P.

74-0261 EMDEN P VAN, GUSSEN G, LIESHOUT H VAN, MOLLEN F, NIJSEN A
WINDMOLENS EN OKTROOIEN. (WINDMILLS AND PATENTS).
EINDHOVEN, THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, STUD. GEN., 1974. 65P. (IN DUTCH)

REVIEWED ARE DUTCH PATENTS FOR WINDMILLS IN THE 16TH AND 17TH CENTURY AND IN THE PERIOD FROM 1816 TO 1869.

74-0262 L'ENERGIE GRATUITE DU VENT PENELLE RENDRE DES SERVICES A L'AGRICULTURE? (CAN FREE WIND ENERGY GIVE SERVICES TO AGRICULTURE?)
AGRICOLE (MARCHES AGRIC.) 26: 8-12, SEPTEMBER 7, 1974.

74-0263 ENERGY CONVERSION. REPORT BIBLIOGRAPHY JANUARY 1954 TO AUGUST 1973.
NTIS, JANUARY 1974. 407P.
AD-771750

74-0264 EOLE 74, CONCOURS D'IDEES SOUS L'EGIDE DU MINISTERE DE L'INDUSTRIE. (EOLE 74, CONTEST OF IDEAS UNDER PATRONAGE OF THE MINISTER OF INDUSTRY). PARIS, BANQUE DES IDEES NOUVELLES ET INVENTIONS, 1974. 12P.

THIS IS A SHORT DESCRIPTION OF 10 UNCOMMON INVENTIONS SELECTED FROM 368 CONTRIBUTIONS TO A CONTEST ON WIND ENERGY CONVERSION SYSTEMS.

74-0265 FELIZARDO M I
A NEW TRI-ENERGY ELECTRIC POWER SYSTEM FOR SMALL PHILIPPINE COMMUNITIES. MECHANICAL AND ELECTRICAL ENGINEERING, PHILIPPINE ASSOCIATION, SECOND QUARTER, P. 6-10, 1974.

AN ELECTRICITY GENERATING PLANT TO SUPPLY ENERGY AUTONOMOUSLY FOR A SMALL COMMUNITY IS DESCRIBED. USE IS MADE OF WIND ENERGY, DRIVING A WATER SYSTEM THAT CONVERTS THE ENERGY INTO AC-ELECTRICITY. AN AUXILIARY GENERATOR IS DRIVEN BY STEAM PRODUCED BY A SOLAR ENERGY BOILER AND A GARBAGE BOILER. COST ESTIMATION IS GIVEN.

74-0266 FLYNN H
COORDINATION OF RESEARCH AND DEVELOPMENT ACTIVITIES. WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 244-259.

74-0267 FONSECA H D
BASES PARA UNA NOVA MOLINOLOGICA. (BASIS FOR A NEW TYPE OF WINDMILL). INVENTIVA 2(8): 8-20, 1974. (IN PORTUGUESE)

THE AUTHOR DESCRIBES A WIND POWER BARRAGE, A NUMBER OF STREAMLINED BODIES, ARRANGED IN A PLANE PERPENDICULAR TO THE WIND DIRECTION, HAVING WINDMILLS IN THE GAPS BETWEEN THEM. CALCULATIONS TO PREDICT THE PERFORMANCE ARE MADE. A NUMBER OF MODELS HAVE BEEN BUILT. THE APPLICATION IS DISCUSSED WITH REGARD TO THE CAPE VERDIAN ISLANDS AND SOUTH WEST ANGOLA.

74-0268 WOLF M
THE POTENTIAL IMPACTS OF SOLAR ENERGY. ENERGY CONVERS. 14(1): 9-20, AUGUST 1974.

74-0269 GOOL W VAN
SOME ASPECTS OF ENERGY PRODUCTION AND ENERGY STORAGE. ELEKTROTECHNIEK 52(13): 714-719, 1974.

THE LIMITS OF ENERGY PRODUCTION BY FOSSIL AND NUCLEAR FUELS ARE SHOWN. WHEN OTHER ENERGY SOURCES LIKE SOLAR AND WIND ENERGY ARE USED, NO LIMITS EXIST REGARDING AVAILABILITY AND AIR POLLUTION, BUT PROBLEMS WILL APPEAR WITH RESPECT TO REQUIRED LAND SURFACES AND STORAGE OF ENERGY. THE POSSIBILITIES OF THE USE OF SOLAR AND WIND ENERGY FOR THE PRODUCTION OF ELECTRICITY IN THE NETHERLANDS ARE DISCUSSED.

74-0270 GRACE D J, CHENG E D H, CHIU A N L
A STUDY OF WIND ENERGY CONVERSION FOR OAHU. HONOLULU, CENTER FOR ENGINEERING RESEARCH, UNIVERSITY OF HAWAII, OCTOBER 15, 1974.

74-0271 GREELEY R S
RECOMMENDATIONS TO RANN/NSF SOLAR ENERGY R AND T PROGRAM. NTIS, FEBRUARY 1974. 84P.
N74-31529

A SYSTEMS ANALYSIS OF SOLAR ENERGY PROGRAMS WAS CONDUCTED AND A SUMMARY OF THE RESULTS IS PROVIDED. VARIOUS SOLAR ENERGY APPLICATIONS AND TECHNIQUES ARE EXPECTED TO BECOME ECONOMICALLY COMPETITIVE WITH CONVENTIONALLY FUELED SYSTEMS BETWEEN 1985 AND 2000 AND, GIVEN STRONG FEDERAL SUPPORT, COULD PROVIDE SIGNIFICANT QUANTITIES OF ENERGY TO THE U.S. EARLY IN THE 21ST CENTURY. IN ORDER TO ACHIEVE THIS RESULT, A SET OF MULTI-DISCIPLINARY RESEARCH TASKS AND PROOF-OF-CONCEPT EXPERIMENTS ARE REQUIRED TO OVERCOME A VARIETY OF TECHNICAL, ECONOMIC, ENVIRONMENTAL, SOCIAL AND INSTITUTIONAL PROBLEMS WHICH CURRENTLY EXIST. THE PROBLEMS ASSOCIATED WITH EACH OF SEVEN SOLAR ENERGY APPLICATIONS AND TECHNIQUES ARE IDENTIFIED AND DETAILS OF PROOF-OF-CONCEPT EXPERIMENTS IN EACH AREA ARE OUTLINED. RECOMMENDED METHODS FOR THE DISSEMINATION AND UTILIZATION OF RESEARCH RESULTS ARE LISTED.

74-0272 GUTHRIE M P
ENERGY RESEARCH AND TECHNOLOGY. INTERIM BIBLIOGRAPHY OF REPORTS, WITH ABSTRACTS.
NTIS, JUNE 1974. 71P.
NSF-74-22

THE BIBLIOGRAPHY CONTAINS 218 LISTINGS OF DOCUMENTS ON SOLAR ENERGY HEATING AND COOLING OF BUILDINGS; SOLAR THERMAL CONVERSION; WIND ENERGY CONVERSION; SOLAR ENERGY BIOCONVERSION TO FUELS; OCEAN THERMAL ENERGY CONVERSION; PHOTOVOLTAIC ENERGY CONVERSION; GEOTHERMAL ENERGY; ENERGY CONVERSION AND STORAGE; ENERGY SYSTEMS; ENERGY RESOURCES; AND ENERGY AND FUEL TRANSPORTATION.

74-0273 HELMHOLZ G
HOMEMADE WINDGENERATOR.
ALTERN. SOURCES ENERGY NO. 13: 27, FEBRUARY 1974.

74-0274 HERONEMUS W E
A SURVEY OF THE POSSIBLE USES OF WINDPOWER IN THAILAND AND THE PHILIPPINES.
AMHERST, MASSACHUSETTS, UNIVERSITY OF MASSACHUSETTS, DEPARTMENT OF CIVIL ENGINEERING, U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, 1974.

74-0275 HERONEMUS W E
WINDPOWER DEVELOPMENT; A PROGRAM APPROPRIATE FOR JOINT CANADIAN AND UNITED STATES EFFORTS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 37-54.

DISCUSSED ARE THE POSSIBILITIES OF LARGE SCALE WIND GENERATED ELECTRICITY, WITH EMPHASIS ON COOPERATIVE RESEARCH AND DEVELOPMENT PROGRAMS OF CANADA AND THE U.S.A. ALSO DESCRIBED ARE POSSIBLE SITES, APPLICATIONS, AND STORAGE METHODS.

74-0276 HEUSELER H
HOFFEN AUF WASSER, WIND AND WAERME. (HOPING FOR WATER, WIND, AND HEAT).
BILD DER WISSENSCHAFT NO. 4: 99-102, 1974.

74-0277 HEWSON E W
WIND-POWER POTENTIAL IN THE PACIFIC NORTHWEST.
CITIZENS' FORUM ON POTENTIAL FUTURE ENERGY SOURCES, PROCEEDINGS. PORTLAND STATE UNIVERSITY, OREGON, JANUARY 17, 1974. P. 7-24.

74-0278 HITCHINGS B
WIND WORKSHOP.
ALTERN. SOURCES ENERGY NO. 14: 7-9, MAY 1974.

A TWO WEEK WORKSHOP AT TUNSTALL HILL, SUNDERLAND, ENGLAND IN SEPTEMBER 1973 IS DESCRIBED. PARTICIPANTS BUILT A HORIZONTAL AXIS CONVENTIONAL JIB SAIL TYPE WINDMILL.

74-0279 HOLTEN T VAN
SAMENVATTING VEN EEN VOORONDERZOEK AAN WINDMOLENS MET HULPVLEUGELS BEVESTIGD AAN DE BLADTIPPEN. (SUMMARY OF A PRELIMINARY INVESTIGATION ON WINDMILLS WITH TIPVANES).
DELFT, DELFT UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF AERONAUTICAL ENGINEERING, 1974. (IN DUTCH)

74-0280 HOLTEN T VAN
PERFORMANCE ANALYSIS OF A WINDMILL WITH INCREASED POWER OUTPUT DUE TO TIPVANE INDUCED DIFFUSION OF THE AIRSTREAM.
DELFT, DELFT UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF AERONAUTICAL ENGINEERING, MEMO 224, 1974. 52P.

BETZ'S FORMULA FOR THE MAXIMUM POWER OUTPUT OF WINDMILLS IS VALID ONLY FOR WINDMILL TYPES CAUSING A STEADY, AXIAL FORCE TO BE APPLIED TO THE AIR. TYPES NOT COVERED BY BETZ'S ANALYSIS, SUCH AS WINDMILLS APPLYING RADIAL AS WELL AS AXIAL FORCES TO THE AIR, MAY HAVE A MUCH LARGER POWER OUTPUT. THIS REPORT DEALS WITH A TYPE OF WINDMILL WHERE RELATIVELY SMALL VANES, ATTACHED TO THE TIPS OF THE MILLBLADES, DEFLECT THE AIR RADIALLY OUTWARDS. THE RESULTING INCREASED MASS FLOW OF AIR THROUGH THE DISC PLANE OF THE WINDMILL CAUSES A LARGER POWER OUTPUT PER UNIT AREA SWEPT BY

THE MILL BLADES. THE PHYSICAL PRINCIPLES OF THE SYSTEM ARE EXPLAINED, AND A THEORETICAL ASSESSMENT OF ITS POTENTIAL PERFORMANCE IS GIVEN. THE ANALYSIS IS BACKED UP BY EXPERIMENTS. ACCORDING TO THE QUANTITATIVE ANALYSIS THE POWER OF A WINDMILL MIGHT AT LEAST BE DOUBLED FOR A GIVEN FRONTAL AREA. AREAS WHERE FURTHER RESEARCH IS NEEDED ARE INDICATED.

74-0281 HUGHES E E
CONTROL OF ENVIRONMENTAL IMPACTS FROM ADVANCED ENERGY SOURCES.
NTIS, MARCH 1974, 339P.
PB-239450

THE TECHNOLOGY AND ENVIRONMENTAL EFFECTS ASSOCIATED WITH PRODUCTION OF ENERGY FROM NEW OR ADVANCED SOURCES ARE REVIEWED. THESE INCLUDE SOLAR, GEOTHERMAL, OIL SHALE, SOLID WASTES, UNDERGROUND COAL GASIFICATION, AND HYDROGEN ENERGY SOURCES. PROJECTIONS TO THE YEAR 2000 OF LEVELS OF ENERGY PRODUCTION FROM THE FIRST FOUR OF THESE SOURCES ARE PRESENTED. ENVIRONMENTAL IMPACTS ON AIR AND WATER QUALITY, AND LAND USE ARE DERIVED PER UNIT OF ENERGY. LEVELS OF POLLUTANT EMISSIONS AND OTHER ENVIRONMENTAL EFFECTS OF THE DEVELOPMENT OF THESE ADVANCED ENERGY SOURCES ARE PROJECTED. IMPACTS LIKELY TO REQUIRE CONTROL MEASURES ARE IDENTIFIED. SUBJECTS FOR RESEARCH AND DEVELOPMENT DIRECTED TOWARD CONTROL OF ENVIRONMENTAL IMPACTS ARE RECOMMENDED. THESE RECOMMENDATIONS ARE INCORPORATED INTO A RESEARCH AND DEVELOPMENT PLAN. APPROXIMATE PRIORITY ASSIGNMENTS DERIVED FROM CONSIDERATION OF THE TIMING OF DEVELOPMENT AND THE IMPORTANCE AND DEGREE OF DEFINITION OF THE IDENTIFIED ENVIRONMENTAL EFFECTS ARE GIVEN.

74-0282 HUGHES W L, PARKER J D, ALLISON H J, RAMAKUMAR R, LINGELBACH D D
BASIC INFORMATION ON THE ECONOMIC GENERATION OF ENERGY IN COMMERCIAL QUANTITIES FROM WIND.
WIND ENERGY. HEARING BEFORE SUBCOMMITTEE ON ENERGY OF COMMITTEE ON SCIENCE AND ASTRONAUTICS. 93D CONG., 2D SESS., NO. 49. WASHINGTON, D.C., GOV'T. PRINT. OFFICE 1974. P. 3.

74-0283 HUGHES W L, PARKER J D, ALLISON H J, RAMAKUMAR R G, LINGELBACH D D
SURVEY OF OKLAHOMA STATE UNIVERSITY WORK IN ENERGY STORAGE, VARIABLE SPEED-CONSTANT FREQUENCY GENERATORS, AND WIND GENERATION SYSTEMS.
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, REP. NO. ER75-EL2, AUGUST 15, 1974. 60P.

74-0284 IGRA O
DESIGN AND PERFORMANCE OF A FUTURE TURBINE SUITABLE FOR AN AEROGENERATOR.
BEERSHEVA, ISRAEL, UNIVERSITY OF NIGEV, DEPARTMENT OF MECHANICAL ENGINEERING, REP. NO. 1, 1974. 55P.

74-0285 JOHNSON L
A COST COMPARISON BETWEEN LARGE SCALE WIND-ELECTRIC SYSTEMS; GAS, OIL, COAL, AND NUCLEAR FISSION.
STATEMENT PREPARED FOR PUBLIC HEARING ON PROJECT INDEPENDENCE FOR THE FEDERAL ENERGY ADMINISTRATION, PORTLAND, OREGON, SEPTEMBER 1974.

74-0286 JOHNSON M
WINDMILL WONDERS FOR REMOTE AREAS.
CITIZEN P. 8-9, APRIL 13, 1974.

THE VERTICAL AXIS WIND TURBINE BUILT BY THE NATIONAL RESEARCH COUNCIL, OTTAWA, CANADA IS DESCRIBED.

74-0287 JURKSCH G
THE WIND REGIME IN THE FEDERAL REPUBLIC OF GERMANY.
SEMINAR WINDENERGIE, JULICH, GERMANY, 12 SEPTEMBER 1974. JULICH, GERMANY F. R., KERNFORSCHUNGSANLAGE, 1974. P. 7-26. (IN GERMAN)

74-0288 KENTFIELD J A C
A MODIFIED SAVONIUS WIND TURBINE WITH GOOD LOW VELOCITY-RATIO TORQUE CHARACTERISTICS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 168-187.

THE ADVANTAGES OF VERTICAL AXIS WIND TURBINES ARE DISCUSSED BRIEFLY AND ATTENTION IS DRAWN TO THE IMPORTANCE OF GOOD LOW SPEED TORQUE

CHARACTERISTICS FOR SOME APPLICATIONS. DETAILS ARE GIVEN OF THE DESIGNS OF TWO MODEL SAVONIUS ROTORS: ONE OF THE CONVENTIONAL TYPE; THE OTHER INCORPORATING, IN ADDITION, LEADING EDGE SLOTS, TRAILING EDGE FLAPS AND OTHER FLOW GUIDING SURFACES. THE RESULTS OF COMPARATIVE TESTS CARRIED OUT IN A LOW-SPEED WIND TUNNEL SHOWED THAT THE HIGHEST EFFICIENCY, 55 PERCENT, WAS ACHIEVED WITH THE CONVENTIONAL ROTOR; THIS OCCURRED AT A VELOCITY RATIO OF 0.85. THE MAXIMUM EFFICIENCY WITH THE MODIFIED ROTOR WAS 43 PERCENT AT A VELOCITY RATIO OF 0.5. HOWEVER, THE MODIFIED ROTOR EXHIBITED A MUCH SUPERIOR TORQUE CHARACTERISTIC COMPARED WITH THAT OF THE CONVENTIONAL DESIGN. PROBABLE REASONS ARE GIVEN FOR THE OBSERVED PERFORMANCE CHARACTERISTICS. AN EVALUATION OF THE ANNUAL OUTPUT PER UNIT PROJECTED AREA, FOR EACH TYPE OF MACHINE, UNDER LIKELY WORKING CONDITIONS SHOWED THAT, FOR CONSTANT TORQUE OPERATION, THE SUPERIOR TORQUE CHARACTERISTIC OF THE MODIFIED ROTOR VIRTUALLY CANCELLED THE INFLUENCE OF ITS LOWER PEAK EFFICIENCY.

74-0289 KINDEREN W J G J DER, MEEL J J E A VAN
WIND MEASUREMENT AND DATA ANALYSIS IN A WINDMILL PLANT.
THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPT. OF PHYSICS, WIND ENERGY GROUP, REP. R-203-S, JULY 1, 1974. 5P.

AT THE EINDHOVEN UNIVERSITY OF TECHNOLOGY A FEW PERSONS IN THE SECTION OF FLUID DYNAMICS (PHYSICS DEPT.) ARE ENGAGED IN A WINDMILL PROJECT. THE OBJECT IS AN EXPERIMENTAL PLANT IN OPEN-AIR WITH THE PROPERTIES THAT ONE CAN: 1. MEASURE THE CHARACTERISTICS OF A MILL IN A SHORT TIME. 2. STUDY THE INFLUENCE OF FLUCTUATIONS IN THE WIND. 3. TRY OUT MATHEMATICAL MODELS. INVESTIGATIONS ON WIND MEASURING EQUIPMENT AND A DATA-ANALYZING SYSTEM ARE IN AN INITIAL STAGE. A FEW EXPERIMENTS HAVE BEEN CARRIED OUT ON THE ROOF OF THE BUILDING, THE PLACE WHICH IS CHOSEN FOR A WINDMILL PLANT - FOR THE TIME BEING. THE MOST PRACTICAL WINDMETER IN AN EXPERIMENTAL PLANT SEEMS TO BE A CUPANEMOMETER. FIRST, HOWEVER, ONE HAS TO DETERMINE ITS PROPERTIES ACCURATELY; FOR INSTANCE, WITH A HOT-WIRE-ANEMOMETER AS REFERENCE. THE RESULTS OF THE MEASUREMENTS ARE ANALYZED BY MEANS OF A DIGITAL COMPUTER. A SYSTEM HAS BEEN DEVELOPED WHICH TRANSFERS THE INFORMATION BY PUNCH-TAPE TO THE COMPUTER. SUGGESTIONS ARE GIVEN FOR A MORE RAPID REGISTRATION SYSTEM.

74-0290 LAPEYSEN E H
UNCONVENTIONAL ENERGY SOURCES. A SELECT BIBLIOGRAPHY.
NTIS, FEBRUARY 1974. 64P.
N78-14626

A TOTAL OF 680 REFERENCES TO ARTICLES COVERING ECONOMICS, STATISTICS, AND PROSPECTS; GEOTHERMAL ENERGY; PROSPECTS TOWARDS NEW POLICIES; SOLAR ENERGY; AND TIDAL ENERGY AND WIND POWER ARE LISTED. THERE ARE NO SUBJECT OR AUTHOR INDEXES.

74-0291 LAW A D
WALTHAMSTOW WINDMILL AND ESSEX WINDMILLS TODAY.
LONDON, WALTHAMSTOW ANTIQUARIAN SOCIETY VERTRY HOUSE MUSEUM, MONOGRAPH (NEW SERIES) NO. 10, REVISED EDITION, 1974. 17P.

THIS IS A BRIEF HISTORICAL DESCRIPTION OF POSTMILLS, TOWERMILLS AND SMOCKMILLS IN ESSEX. CONSTRUCTIONAL DETAILS WITH PICTURES ARE GIVEN.

74-0292 LAWAND T A
THE POTENTIAL OF WINDPOWER IN MEETING CANADIAN ENERGY NEEDS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 6-36.

74-0293 LEK A C
EXPERIMENTAL INVESTIGATION OF THE SAVONIUS ROTOR.
BRACE RES. INST. PUBL. EP7, APRIL 1974. 78P.

74-0294 MCCARTHY C D, ROSEN G
WIND ENERGY -- COST EFFECTIVENESS IS THE KEY.
WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, AUGUST 29-30, 1974. 9P.

74-0295 MCHUGH B
THE APPLICATIONS OF WIND POWER.
GOETEBORG, INST. FOER ENERGITEKNIK, CHALMERS TEKNISKA HOEGSKOTA. REPT.

NO. A74-53, 1974. 22P. (IN SWEDISH)

74-0296 MARIER D
SOME NOTES ON WINDMILLS.
ALTERN. SOURCES ENERGY NO. 13: 28, FEBRUARY 1974.

74-0297 MEEL J J E A VAN
WINDMETINGEN VOOR ONTWIKKELINGSLANDEN. (WIND MEASUREMENTS FOR DEVELOPING COUNTRIES).
THE NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, REP. NO. R-221-D, NOVEMBER 1974. (IN DUTCH)

PRESENTED ARE METHODS TO EVALUATE WIND DATA FOR SELECTING FAVOURABLE SITES AND PREDICTING THE ENERGY PRODUCTION BY A WIND MACHINE. A NUMBER OF WIND MEASURING METHODS ARE DISCUSSED. INFORMATION ON COMMERCIALLY AVAILABLE EQUIPMENT IS INCLUDED.

74-0298 MERCADIER Y
UN PROTOTYPE DE CHAUFFAGE HYDRO-THERMIQUE A PARTIR DE L'ENERGIE EOLIENNE. (A PROTOTYPE OF HYDRO THERMAL HEATING, BASED ON WIND ENERGY).
CANADA, UNIVERSITY OF SHERBROOKE, DEP. GENIE MEC., RAPP. TECH. MEC/74/1, 1974. (IN FRENCH)

74-0299 MOORE J E C
THE POTENTIAL CONVERSION OF WIND POWER TO ELECTRICAL ENERGY.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 214-235.

DESCRIBED ARE AN EXPERIMENTAL 100 W DARRIEUS WINDMILL, STORAGE IN LEAD/ACID BATTERIES, AND PROBLEMS WITH STARTING AND ANCHORING. PICTURES OF THE INSTALLATION ARE INCLUDED.

74-0300 MORSE F H
THE NATIONAL SOLAR ENERGY PROGRAM.
NTIS, 1974.
N75-24102

THE MAJOR EFFORTS WITHIN THE NATIONAL SOLAR ENERGY PROGRAM ARE DESCRIBED. THE FOLLOWING AREAS ARE INCLUDED: HEATING AND COOLING OF BUILDINGS, SOLAR THERMAL ENERGY CONVERSION, PHOTOVOLTAICS, BIOCONVERSION, WIND ENERGY CONVERSION, AND OCEAN THERMAL ENERGY CONVERSION.

74-0301 NATIONAL POWER SURVEY: ENERGY CONVERSION RESEARCH.
THE REPORT AND RECOMMENDATIONS OF THE TASK FORCE ON ENERGY CONVERSION RESEARCH TO THE TECHNICAL ADVISING COMMITTEE ON RESEARCH AND DEVELOPMENT.
WASHINGTON, D.C., GOV'T. PRINT. OFFICE, JUNE 1974. 311P.

THIS REPORT CONTAINS THE 1974 DISCUSSIONS AND RECOMMENDATIONS OF THE FEDERAL POWER COMMISSION REGARDING ENERGY CONVERSION RESEARCH. AREAS OF CONSIDERATION INCLUDE FOSSIL FUEL TECHNOLOGY, NUCLEAR TECHNOLOGY, AND SOLAR, GEOTHERMAL, TIDAL, AND OCEAN THERMAL ENERGIES. ALSO INCLUDES ENERGY CONVERSION CYCLES AND EQUIPMENT (FUEL CELLS, MAGNETOHYDRODYNAMICS, ETC.), SUBSTITUTE FUELS, SITING AND ENVIRONMENTAL RESEARCH DEVELOPMENT, BY-PRODUCT APPLICATIONS, AND ENERGY STORAGE.

74-0302 NATIONAL POWER SURVEY: ENERGY SOURCES RESEARCH.
THE REPORT AND RECOMMENDATIONS OF THE TASK FORCE ON ENERGY SOURCES RESEARCH TO THE TECHNICAL ADVISORY COMMITTEE ON RESEARCH AND DEVELOPMENT.
WASHINGTON, D.C., GOV'T. PRINT. OFFICE, JULY 1974. 125P.

EVALUATIONS OF RESEARCH AND DEVELOPMENT PROSPECTS, GOALS, AND RECOMMENDED FUNDING LEVELS FOR THE NEXT FIVE YEARS ARE CONTAINED IN THE 1974 NATIONAL POWER SURVEY REPORT. CONSIDERS THE ENERGY SOURCES OF COAL, PETROLEUM AND NATURAL GAS, OIL SHALE AND TAR SANDS, SOLAR ENERGY, GEOTHERMAL ENERGY, NUCLEAR FUELS, AND CONVERSION OF ORGANIC WASTES. INCLUDES AN APPENDIX ON SOLAR ENERGY.

74-0303 NEWMAN B G
MEASUREMENTS ON A SAVONIUS ROTOR WITH VARIABLE GAP.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 115-136.

RESULTS OF WIND TUNNEL TESTS ON SIX MODELS OF SAVONIUS ROTORS (WITH VARIABLE GAPS) ARE GIVEN GRAPHICALLY. THEY ONLY GIVE AN INDICATION OF FULL SCALE PERFORMANCE BUT CAN BE USED TO COMPARE THE VARIOUS DESIGNS. THE S-ROTOR, IF SIMPLY CONSTRUCTED, IS USABLE IF POWER REQUIREMENTS ARE SMALL.

74-0304 AN OVERVIEW OF ALTERNATIVE ENERGY SOURCES FOR LDCS.
NTIS, AUGUST 7, 1974. 372P.
PB-239465

THE REPORT PRESENTS AN OVERVIEW OF ALTERNATIVE ENERGY SOURCES OF TYPES WHICH COULD BE OF SIGNIFICANT VALUE TO LESSER-DEVELOPED COUNTRIES IN ADJUSTING TO THE IMPACT OF SHARPLY HIGHER WORLD MARKET PRICES OF PETROLEUM. IT PRESENTS A HIGHLY CONDENSED REVIEW OF NON-CONVENTIONAL ENERGY TECHNOLOGIES, TOGETHER WITH SOME LIMITED COMMENTARY ON THE RELEVANCE OF THE MORE CONVENTIONAL TECHNOLOGIES IN NEW LESSER-DEVELOPED COUNTRY (LDC) ECONOMIC SETTINGS. IT ALSO PROVIDES A SUMMARY ON A COUNTRY-BY-COUNTRY BASIS OF THE CURRENT ECONOMIC POSTURE AND ENERGY RESOURCES ARRAY IN FIFTEEN LDC'S SELECTED AS BEING BROADLY REPRESENTATIVE--GEOGRAPHICALLY AND IN TERMS OF PETROLEUM-PRICE IMPACTS--OF THE QUITE WIDE RANGE OF SITUATIONS THAT NEED TO BE CONSIDERED.

74-0305 PARKES M E
THE USE OF WINDMILLS IN TANZANIA.
TANZANIA BUREAU OF RESEARCH ASSESSMENT AND LAND USE PLANNING, UNIVERSITY OF DAR ES SALAAM, RESEARCH PAPER NO. 33, SEPTEMBER 1974. 75P.

BOTH GENERAL USE AND PARTICULAR USE OF WINDMILLS IN TANZANIA ARE REVIEWED. CHARACTERISTICS OF WIND PHENOMENA ARE DESCRIBED WHERE RELEVANT TO THE UNDERSTANDING OF WINDMILL SITE SELECTION, VARIOUS TYPES OF WINDMILLS ARE MENTIONED AND THEIR EXPECTED PERFORMANCES ARE PRESENTED. FROM AN ANALYSIS OF RELEVANT WIND DATA, THE POTENTIAL FOR WINDMILL USE IS ASSESSED AND PREDICTIONS ARE GIVEN FOR EXPECTED PERFORMANCE IN TWO GENERAL LOCATIONS. RECOMMENDATIONS FOR WINDMILL USE IN RURAL WATER SUPPLY, CATTLE WATERING AND IRRIGATION ARE DERIVED FROM CONSIDERATION OF APPROPIATE DESIGN CRITERIA. ANNUAL COSTS FOR THE LARGEST SIZE WINDMILL AND FOR THE EQUIVALENT DIESEL POWERED UNIT ARE COMPARED FOR WIND DATA ASSOCIATED WITH THE COASTAL AREAS. DESIGNS FOR WINDMILLS WHICH COULD BE LOCALLY MADE ARE DISCUSSED, AS WELL AS THE POSSIBILITY OF LOCAL MANUFACTURE OF CONVENTIONAL WINDMILLS.

74-0306 PASYMOWSKI Z
WIATRAK JAKC ZABYTEK POLSKIEGO BUDOWNICTWA DRECONIANEGO. (WINDMILLS AS RELICS OF PCLISH WOODEN ARCHITECTURE).
PRZEGI. ZBOZ. MLYN. 18(12): 31-32, DECEMBER 1974. (IN POLISH)

74-0307 PETERSON E W
WIND POWER.
SCIENCE 185(4150): 480, 1974.

THIS LETTER TO THE EDITOR DISCUSSES A METHOD OF ESTIMATING THE COST AND MAGNITUDE OF A WIND POWER PROJECT SUGGESTED BY M. WOLF IN SCIENCE, APRIL 19, 1974, P. 382. THE AUTHOR CONCLUDES THAT LARGE SCALE GENERATION OF POWER BY WIND IS NOT FEASIBLE ECONOMICALLY.

74-0308 RANGI R S, SOUTH P, TEMPLIN R J
WIND POWER AND THE VERTICAL-AXIS WIND TURBINE DEVELOPED AT THE NATIONAL RESEARCH COUNCIL, OTTAWA, CANADA.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL . SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 55-74.

A MAP WITH CONTOURS OF THE ESTIMATED WIND POWER AVAILABLE IN CANADA IS PREPARED. IT SHOWS LARGE AREAS WITH HIGH POWER POTENTIAL. A COMPARISON OF WIND ENERGY COST WITH ALTERNATE SOURCES SHOWS THAT THE CAPITAL COST OF CURRENT WIND MACHINES HAS TO BE REDUCED CONSIDERABLY IN ORDER TO MAKE WIND POWER COMPETITIVE WITH EXISTING SOURCES. THE DESIGN FEATURES, PERFORMANCE AND ECONOMICS OF A VERTICAL-AXIS WIND TURBINE, DEVELOPED AT THE NATIONAL RESEARCH COUNCIL, OTTAWA, ARE DESCRIBED. A CASE IS MADE THAT WITH THIS TURBINE DESIGN CONSIDERABLE CAPITAL COST SAVINGS ARE POSSIBLE.

74-0309 REY H A
A CHAT WITH A FIRETOWER.
ALTERN. SOURCES ENERGY NO. 14: 15-16, MAY 1974.

THE AUTHOR "CHATS" WITH AN OLD FIRETOWER WHO DAYDREAMS ABOUT BEING CONVERTED TO A WINDMILL TOWER.

74-0310 SHERMAN M M
A LOW COST--HIGH CAPACITY SAILWING WINDMILL.
J. NEW ALCHEM. NO. 2, 1974.

74-0311 SHERMAN M M
WIND POWERED WATER PUMPS IN INDIA. PAST, PRESENT AND FUTURE DEVELOPMENTS.
ALL INDIA WORKSHOP ON FARM MACHINERY RESEARCH AND DEVELOPMENT, 7TH, PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA, APRIL 8-11, 1974. 26P.

WITH EMPHASIS ON INDIA, THE WORLD HISTORY OF NON-ELECTRIC GENERATING WINDMILLS IS SKETCHED. IT IS RECOMMENDED THAT APPROVAL AND ASSISTANCE BE GIVEN BY THE GOVERNMENT OF INDIA FOR WIDE SCALE RESEARCH AND IMPLEMENTATION OF LOW COST WINDMILLS DURING THE FIFTH FIVE YEAR PLAN.

74-0312 SHINYANGA WATER SUPPLY SURVEY. DRAFT FINAL REPORT.
AMERSFOORT, NETHERLANDS, D.H.V. CONSULTING ENGINEERS AND ARNHEM, NETHERLANDS, ILACO INTERNATIONAL LAND DEVELOPMENT CONSULTANTS, APRIL 1974. P. 9-17, 43-56, AND 211-218.

THE REPORT DEALS FOR THE MAJOR PART WITH THE PLANNING AND DESIGN OF RURAL WATER SUPPLIES FOR DOMESTIC CONSUMPTION, OF THE SHINYANGA REGION'S POPULATION. METEOROLOGICAL DATA ARE GIVEN FOR A NUMBER OF STATIONS. THE USE OF MULTI-BLADE WINDMILLS FOR RURAL WATER SUPPLY IS STUDIED. IT IS CONCLUDED THAT ONLY SMALL CAPACITIES OF PUMPED WATER IN THE RANGE OF 20-15 CU M/DAY CAN BE OBTAINED IN THE SHINYANGA REGION, IF LESS RELIABLE OPERATION (FLUCTUATING WATER PRODUCTION) IS NOT A DISADVANTAGE.

74-0313 SMIT J
ALTERNATIVE SOURCES OF ENERGY.
POLYTECH. TIJDSCHR. ELEKTROTECH. ELEKTRON. 29(14): 443-451, JULY 10, 1974.

74-0314 SMITH G E
WINDMILL MANUFACTURERS. REVISED ED.
CAMBRIDGE, UNIVERSITY OF CAMBRIDGE, DEPARTMENT OF ARCHITECTURE, MARCH 1974.

74-0315 SMITH K
.75 KW WINDCYCLE.
ALTERN. SOURCES ENERGY NO. 14: 2-4, MAY 1974.

DESCRIBED IS THE WIND-CYCLE, A DESIGN CONCEIVED TO BE BUILT WITH A MINIMUM OF TOOLS, MATERIALS AND COST. IT REQUIRES NO WELDING, FIBERGLASSING OR MACHINE WORK, AND USES A SAILWING TURBINE AND A BICYCLE TRANSMISSION.

74-0316 SOLAR ENERGY. STORAGE: MAKING H WHILE THE SUN SHINES.
MOSAIC 5(2): 23, SPRING 1974.

THE PRODUCTION OF HYDROGEN BY SOLAR AND WIND POWER PLANTS AS A MEANS OF ENERGY STORAGE IS MENTIONED.

74-0317 SOLAR ENERGY. WINDPOWER: A NEW LOOK AT AN OLD DRAFT.
MOSAIC 5(2): 20-21 SPRING 1974.

A BRIEF DISCUSSION IS PRESENTED ON THE POTENTIAL OF THE WIND FOR ELECTRIC POWER GENERATION.

74-0318 STAVEREN P VAN
LARGE WIND POWER PLANT IN THE NORTH SEA, DEVELOPMENT AND CONSTRUCTION PROPOSAL.
IND. COUNC. OCEANOLOGY, IRO, WIND ENERGY GROUP. REPORT. JULY 1, 1974. 26P.

AFTER A BRIEF HISTORICAL REVIEW OF APPLICATIONS AND DEVELOPMENT OF WIND

TURBINES, FUTURE POSSIBILITIES OF HARNESSING WIND ENERGY ARE CONSIDERED, AND ESPECIALLY THE REALIZATION OF LARGE WIND POWER PLANTS IN THE NORTH SEA. FROM RESULTS OF THIS STUDY IT IS CONCLUDED THAT THE SET UP OF A RESEARCH AND DEVELOPMENT PROGRAMME WILL BE ECONOMICALLY FEASIBLE. THE START ON CONSTRUCTING THESE PLANTS IS TO BE EXPECTED IN 1983.

74-0319 STAVEREN P VAN
SUMMARY OF WIND ENERGY STUDIES WITH WHICH TNO IS CONCERNED.
ORGANIZATION FOR INDUSTRIAL RESEARCH TNO, PROJECT GROUP TURBOMACHINES.
REPORT. AUGUST 1974. WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, SWEDEN, AUGUST 29-30, 1974. 1P.

74-0320 STEINHART C E, STEINHART J
THE FIRES OF CULTURE: ENERGY YESTERDAY AND TOMORROW.
N. SCITUATE, MASSACHUSETTS, DUXBURY PRESS, 1974. 273P.

THIS NON-TECHNICAL DISCUSSION OF THE HISTORY AND FUTURE OF ENERGY ADDRESSES BIOLOGICAL ENERGY; FOSSIL FUELS; NUCLEAR ENERGY; WIND, HYDROELECTRIC, GEOTHERMAL, SOLAR, AND OTHER ALTERNATIVE ENERGY SOURCES; ELECTRICITY; AND FUTURE ENERGY PROSPECTS AND POLICY.

74-0321 STEYN R VAN
BIBLIOGRAPHY ON WIND ENERGY.
EINDHOVEN, NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, DEPARTMENT OF PHYSICS, WIND ENERGY GROUP, AUGUST 1974. WORKSHOP ON ADVANCED WIND ENERGY SYSTEMS, STOCKHOLM, SWEDEN, AUGUST 29-30, 1974. 303P.

74-0322 STODDARD F
WINDPOWER DEVELOPMENT PROGRAM AT THE UNIVERSITY OF MASSACHUSETTS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS.
UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 75-78.

74-0323 STOLPE H
SURVEY OF ENERGY RESOURCES--OIL, GAS, COAL, WOOD, PEAT, WATER, WIND, SUN, NUCLEAR POWER, ETC.
KEM. TIDSKR. 86(1): 26, 1974.

74-0324 SWANSON R K, JOHNSON C C, SMITH R T
WIND POWER DEVELOPMENT IN THE UNITED STATES.
SAN ANTONIO, TEXAS, SOUTHWEST RESEARCH INSTITUTE, FEBRUARY 15, 1974.

74-0325 TAGG J R
BRIEF SURVEY OF THE HISTORY AND PRESENT STATE OF KNOWLEDGE OF THE USE OF WIND POWER.
ENERGY AND HUMANITY, PPL SERIES ON MANKIND AND THE ENGINEER. STEVENAGE, HERTS, PETER PEREGRINUS, 1974. P. 82-92.

74-0326 TARVER S C
WIND POWER.
ENV. SCI. TECHNOL. 8(4): 294, 1974.

74-0327 TEMPLIN R J
AERODYNAMIC PERFORMANCE THEORY FOR THE NRC VERTICAL-AXIS WIND TURBINE.
NTIS, JUNE 1974. 38P.
LTR-LA-160, N76-16618

A THEORY SUITABLE FOR DIGITAL COMPUTATION WAS DEVELOPED THAT ACCOUNTS FOR THE MAIN FEATURES OF THE PERFORMANCE OF THE NRC VERTICAL AXIS WIND TURBINE. THE THEORY TAKES INTO ACCOUNT THE CURVED BLADE SHAPE AND THE EFFECTS OF AIRFOIL STALLING ON PERFORMANCE. A COMPARISON IS MADE BETWEEN THEORETICAL AND EXPERIMENTAL POWER COEFFICIENT AND ROTOR DRAG COEFFICIENT. NUMERICAL RESULTS ARE PRESENTED TO SHOW THE THEORETICAL EFFECTS OF GEOMETRIC VARIABLES SUCH AS BLADE SOLIDITY AND ROTOR HEIGHT-DIAMETER RATIO, AND OF VARIATIONS IN AEROFOIL AERODYNAMIC CHARACTERISTICS.

74-0328 THRING M W, CROOKES R J
ENERGY AND HUMANITY.
STEVENAGE, ENGLAND, PETER PEREGRINUS, 1974. 195P.

PROBLEMS OF MEETING THE INCREASING DEMANDS FOR ENERGY WITH REGARD TO EXISTING SOURCES OF ENERGY AND THEIR ASSOCIATED PROBLEMS. AVAILABILITY

OF FUTURE SOURCES, AND DETERMINATION OF REALISTIC OBJECTIVES FOR THE YEAR 2000 ARE PRESENTED. WORLD ENERGY RESOURCES AND DEMANDS, NON-RENEWABLE RESOURCES (HYDROCARBON FUELS, LIQUID FUELS, AND SOLID FUELS), AND NUCLEAR ENERGY ARE DISCUSSED.

74-0329 VAN GOOL W
SOME ASPECTS OF ENERGY GENERATION AND ENERGY STORAGE.
ELEKROTECHNIEK 52(13): 714-719, OCTOBER 1974.

74-0330 VANSANT J H
A WIND POWERED ELECTRICAL SYSTEM FOR REMOTE AREAS.
WIND ENERGY: ACHIEVEMENTS AND POTENTIAL. SYMPOSIUM PROCEEDINGS. UNIVERSITY OF SHERBROOKE, MAY 29, 1974. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974. P. 199-213.

AN IREQ SEARCH FOR NEW METHODS OF SUPPLYING ELECTRICAL POWER TO REMOTE REGIONS OF QUEBEC HAS LED TO A DESIGN STUDY OF A WIND POWERED GENERATING SYSTEM. IN ORDER TO SATISFY THE DESIGN REQUIREMENTS AND TO MAKE USE OF EXISTING TECHNOLOGY, A WIND POWERED SYSTEM WITH COMPRESSED AIR STORAGE WAS SELECTED FOR THE STUDY. OBJECTIVES ARE TO SELECT SPECIFIC COMPONENTS, ESTIMATE THE SYSTEM PERFORMANCE AND MAKE ECONOMIC EVALUATIONS OF POSSIBLE FUTURE INSTALLATIONS. THIS PRESENTATION REVIEWS SOME OF THE CONSIDERATIONS INCLUDED IN THE DESIGN STUDIES.

74-0331 VANSANT J H
A WIND POWERED ELECTRICAL SYSTEM FOR REMOTE AREAS.
VARENNES, QUEBEC, HYDRO-QUEBEC RES. INST. REPORT, MAY 1974. 7P.

SEE 74-0330

74-0332 VRIES O DE
AERODYNAMISCHE ASPECTEN WINDGEDREVEN GENERATOREN; ENIGE ORIENTERENDE BESCHOUWINGEN. (AERODYNAMICAL ASPECTS OF WINDDRIVEN GENERATORS; SOME PRELIMINARY CONSIDERATIONS).
THE NETHERLANDS, NATIONAL AEROSPACE LABORATORY, REP. NO. NLR TR 74130 L, 1974. 104P. (IN DUTCH)

THIS REPORT INVESTIGATES THE POSSIBILITIES FOR THE NLR TO CONTRIBUTE TO AERODYNAMICAL RESEARCH ON WIND ROTORS. VERTICAL AXIS ROTORS ARE COMPARED TO HORIZONTAL AXIS ROTORS. ALSO THE MUTUAL INTERFERENCE DUE TO THE WIND SHADE OF MANY WINDMILLS PLACED TOGETHER IS DISCUSSED, BASED ON AERODYNAMICAL CALCULATIONS. NLR CAN CONTRIBUTE TO DEVELOPMENT OF CALCULATION METHODS AND WINDTUNNEL INVESTIGATION.

74-0333 WAGSTAFF H R
A GEOGRAPHY OF ENERGY.
DUBUQUE, IOWA, WM. C. BROWN, 1974. 122P.

THIS BOOK BRIEFLY DISCUSSES THE FACTORS INVOLVED IN THE PRODUCTION, TRANSPORTATION AND CONSUMPTION OF ENERGY, AND THE IMPACT OF THESE ACTIVITIES ON THE ENVIRONMENT. COAL MINING AND TRANSPORT; PETROLEUM PRODUCTION AND TRANSPORT; MANUFACTURED AND NATURAL GAS PRODUCTION AND TRANSPORT; HYDROPOWER; NUCLEAR, GEOTHERMAL, SOLAR, AND WIND POWER; ELECTRICITY TRANSMISSION; AND ENERGY CONSUMPTION ARE INCLUDED.

74-0334 WEGENER SLEESWYK A
SOLUTION OF THE DIMENSIONAL PROBLEM OF LARGE WIND TURBINES.
GRONINGEN, UNIVERSITY OF GRONINGEN, LAB. FYSICHE METAALKUNDE, TECH. REP., 1974. 24P. (IN FRENCH)

74-0335 WENDELL L L
PROGRAM DESCRIPTIONS. SUPPLEMENT TO MESOSCALE WIND FIELDS AND TRANSPORT ESTIMATES DETERMINED FROM A NETWORK OF WIND TOWERS.
NOAA TECH. MEM. ERL ARL-43, MAY 1974. 52P.

A COMPUTER PROGRAM HAS BEEN DEVELOPED TO ANALYZE OBJECTIVELY TWO-DIMENSIONAL WIND DATA FROM A MESOSCALE NETWORK OF STATIONS. THE RESULT IS A GRAPHIC DISPLAY OF THE NETWORK WIND FIELD AT ANY PARTICULAR TIME AND A PLOT OF COMPUTED AIR TRAJECTORIES AS A FUNCTION OF TIME AND POINT OF ORIGIN. A BRIEF DESCRIPTION, A LIST OF INPUT VARIABLES, AND PROGRAM LISTINGS FOR THE COMPUTER PROGRAM ARE PROVIDED.

74-0336 WIERINGEN J S VAN

WIND POWER: A LITERATURE SURVEY.
EINDHOVEN, NETHERLANDS, PHILIPS RESEARCH LAB., NAT. LAB. TECH. NOTE NO. 72/74, MARCH 1974. 19P.

THE MOST IMPORTANT LITERATURE ON WIND ENERGY IS REVIEWED. THE POSSIBILITIES AND LIMITATIONS OF POWER EXTRACTION ARE GIVEN. IT IS CONCLUDED THAT WIND POWER IS A SERIOUS CANDIDATE FOR MEETING PART OF THE FUTURE POWER DEMANDS.

74-0337 WIND ENERGY: ACHIEVEMENTS AND POTENTIAL.
SYMPOSIUM PROCEEDINGS. SHERBROOKE, CANADA, UNIVERSITY OF SHERBROOKE, 1974.
SYMPOSIUM ON WIND ENERGY: ACHIEVEMENTS AND POTENTIAL, UNIVERSITY OF SHERBROOKE, MAY 29, 1974.

FOURTEEN PAPERS ARE INCLUDED IN THIS PROCEEDINGS.

74-0338 WIND GENERATORS.
ARCH. DES. 3: 189, 1974.

DESCRIBED ARE TWO SMALL COMMERCIAL WIND GENERATORS MANUFACTURED BY AIR CITY LTD., LONDON.

74-0339 WIND POWER.
SWEDEN, SWEDISH STATE POWER BOARD, 1974.

74-0340 WIND POWER.
WHOLE EARTH EPILOG (ACCESS TO TOOLS). 1ST. ED. N.Y., PENGUIN BOOKS, SEPTEMBER 1974. P. 536-537.

PRACTICAL INFORMATION ON WIND POWER UTILIZATION, WINDMILLS, WINDMILL DESIGNERS, MANUFACTURERS AND DEALERS IS GIVEN.

74-0341 WIND POWER IN SWEDEN. A PRELIMINARY FEASIBILITY STUDY.
STOCKHOLM, SWEDEN, STU WIND ENERGY GROUP, AUGUST 1974.

74-0342 WINDMILLS FOR ENERGY SUPPLY.
ELEKTROTECH. Z. AUSG. B 26(20): 515, 1974. (IN GERMAN)

THIS SHORT ARTICLE DESCRIBES RECENT WIND ENERGY PROGRAMS IN GREAT BRITAIN (DR. BRUCKNER) AND IN THE USA (NASA/NSF).

73-0120 AERO ENGINEERS BUILD BETTER WINDMILLS--WINDMILLS, THE CHIMES OF FREE ELECTRICITY.
NEW SCI. 57(827): 24, JANUARY 4, 1973.

THIS IS A SHORT NOTE WITH ILLUSTRATIONS ON THE VERTICAL AXIS TURBINE OF THE NATIONAL RESEARCH COUNCIL OF CANADA AND ON THE PRINCETON SAILWING. A BRIEF SUMMARY OF WINDMILL HISTORY IS INCLUDED.

73-0121 ALLISON H J, RAMAKUMAR R, HUGHES W L
A FILED MODULATED FREQUENCY DOWN CONVERSION POWER SYSTEM.
IEEE TRANS. IND. APPL. IA9(2): 220-226, 1973.

A NEW CONCEPT IN POWER GENERATION HAS BEEN THEORETICALLY DEVELOPED AND EXPERIMENTALLY TESTED AT OKLAHOMA STATE UNIVERSITY. THE GENERATOR DESIGN INCORPORATES NEW TECHNIQUES IN FIELD MODULATION AND SOLID STATE ALTERNATOR OUTPUT PROCESSING. THE RESULTING GENERATOR IS SMALLER AND LIGHTER THAN COMPARABLE COMMERCIAL MODELS PRESENTLY AVAILABLE, AND IT WILL OPERATE SO THAT FREQUENCY OUTPUT IS INDEPENDENT OF THE SHAFT SPEED OF THE PRIME MOVER.

73-0122 BARNHART E
WIND POWER.
J. NEW ALCHEM. NO. 1: 12-14, 1973.

THIS IS A SHORT DESCRIPTION OF THREE SMALL WINDMILLS, HOME-MADE FROM WASTE MATERIALS: 1) WIND TUBINE GENERATOR, 2) BICYCLE WHEEL GENERATOR AND 3) SAVONIUS ROTOR WATER PUMP.

73-0123 BODEK A
HOW TO CONSTRUCT A CHEAP WIND MACHINE FOR PUMPING WATER.
BRACE RES. INST. PUBL. L.5, REVISED FEBRUARY 1973.

73-0124 BRAND R VAN DEN
GENERATION OF ELECTRICAL ENERGY WITH A SMALL WINDMILL.
EINDHOVEN, NETHERLANDS, EINDHOVEN UNIVERSITY OF TECHNOLOGY. REPORT EM73-11, NOVEMBER 1973. 79P. (IN DUTCH)

THIS REPORT TREATS OF SOME PROBLEMS WHICH CAN ARISE AT DESIGNING A SMALL WIND DYNAMO, I.E. A WINDMILL WITH A GENERATOR (AUTO DYNAMO) FOR GENERATION OF ELECTRICAL ENERGY. THE (D.C.) SYSTEM ALSO INCLUDES AN ENERGY BUFFER IN THE FORM OF A SIZABLE ACCUMULATOR BATTERY. BECAUSE OF THE SERIOUS LACK OF RELEVANT TECHNICAL DATA ABOUT AUTO DYNAMOS, PRESENTED FIRST OF ALL ARE MEASUREMENTS ON TWO AUTO DYNAMOS. TO ILLUSTRATE A POSSIBLE USE OF THE MEASURING RESULTS, A CALCULATION EXAMPLE IS GIVEN, THAT ALSO INTENDS TO BE AN EFFORT TO MAKE A CONTRIBUTION TO THE OPTIMIZATION PROBLEM OF THE MILL-GENERATOR SYSTEM.

73-0125 BUDGEN H P
A COMMENT ON TOWERS FOR WINDMILLS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J. M., ED. NTIS, DECEMBER 1973. P. 204-205.
PB-231341

THIS IS A SHORT NOTE ON THE DESIGN AND PRICES OF WINDMILL TOWERS USED BY THE BRACE RESEARCH INSTITUTE. A BRIEF HISTORICAL REVIEW OF WINDMILL CONSTRUCTION IS INCLUDED.

73-0126 ENERGY GENERATION BY WINDMILLS.
IHO, GUSTO B V, A F D PRODUKTON-TWIKKELING, FEASIBILITY STUDY OW67305, SCHIEDAM, MAY 1973. (IN DUTCH)

73-0127 ENERGY ENVIRONMENT PRODUCTIVITY.
SYMPOSIUM ON RANN: RESEARCH APPLIED TO NATIONAL NEEDS, 1ST., WASHINGTON, D.C., NOVEMBER 18-20, 1973. PROCEEDINGS. NTIS, 1973. 248P.
SYMPOSIUM ON RANN: RESEARCH APPLIED TO NATIONAL NEEDS, 1ST., WASHINGTON, D.C., NOVEMBER 18-20, 1973.
PB-252603

THIS REPORT RECORDS THE PRESENTATIONS MADE AT THE FIRST RANN SYMPOSIUM AND PROVIDES EXAMPLES OF WHAT CAN BE ACHIEVED WHEN THE CAPABILITIES OF SCIENTISTS AND ENGINEERS ARE DIRECTED TOWARD NATIONAL PROBLEMS. THE ENERGY SECTION COVERS SUCH AREAS AS CONSERVATION PROGRAMS, ENERGY UNDER THE OCEANS, COAL GASIFICATION, GEOTHERMAL ENERGY, WIND ENERGY CONVERSION

AND SOLAR ENERGY. ENVIRONMENT IS CONCERNED WITH DISASTER MITIGATION, ENVIRONMENTAL THREATS TO MAN, THE MISSOURI LEAD BELT PROJECT, HUMAN HEALTH AND MERCURY, WEATHER MODIFICATION AND MANAGEMENT OF TEXAS COASTAL RESOURCES. PRODUCTIVITY INCLUDES SUCH AREAS AS RESOURCE ALLOCATION IN PUBLIC SAFETY SERVICES, TELECOMMUNICATIONS IN HEALTH CARE DELIVERY, ENZYNME ENGINEERING IN THE FOOD AND CHEMICAL INDUSTRIES, AUTOMATION IN MECHANICAL MANUFACTURING INDUSTRIES AND MAGNETIC SEPARATION IN THE MINING AND PROCESSING INDUSTRIES.

73-0128 FREE ELECTRICITY FROM THE WIND.
ADELAIDE, AUSTRALIA, DUNLITE ELECTRICAL CO., 1973.

73-0129 GALANIS N, DELISLE A
THEORIE DE L'HELICE AEROMOTRICE. (THEORY OF THE WINDSCREW).
UNIVERSITE DE SHERBROOKE, CANADA, DEPARTMENT DE GENIE MECHANIQUE, RAPP TECH MEC/73, 1973. (IN FRENCH)

73-0130 GWYNNE P
WIND AND SUN BRING POWER TO THE PEOPLE.
NEW SCI. 60: 571, 1973.

73-0131 HAUSZ W
USE OF HYDROGEN AND HYDROGEN-RICH COMPONENTS AS A MEANS OF STORING AND TRANSPORTING ENERGY.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 130-134.
PB-231341

THE AUTHOR CONCLUDES THAT USING HYDROGEN FOR TRANSPORT AND STORAGE CAN LEAD TO VERY CLEAN, FLEXIBLE SYSTEMS THAT WITH IMPROVING TECHNOLOGY AND DEPLETION OF NATURAL FUEL RESOURCES CAN BECOME COMPETITIVE. WHILE THE PRIMARY RESOURCE OF ENERGY IS SHOWN HERE AS NUCLEAR, THE BASIC CONCEPT CAN APPLY FOR ANY THERMAL SOURCE, OR FOR WIND ENERGY, ETC.

73-0132 HERONEMUS W E
A PROPOSED NATIONAL WIND POWER R + D PROGRAM.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS, SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 197-203.
PB-231341

73-0133 HUTTER U
SOME EXTEMPORANEOUS COMMENTS ON OUR EXPERIENCES WITH TOWERS FOR WIND GENERATORS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 206-207.
PB-231341

73-0134 ODUM H T
ENERGY, ECOLOGY, AND ECONOMICS.
AMBIO 2(6): 220-227, 1973.

THE ENERGY CONTROL OF THE ECONOMY AND THE RELATIONSHIP TO THE ENVIRONMENT ARE DISCUSSED. THE TRUE VALUE OF ENERGY TO SOCIETY IS THE NET ENERGY, WHICH IS FOUND AFTER THE ENERGY COSTS OF GETTING AND CONCENTRATING THAT ENERGY ARE SUBTRACTED. WORLDWIDE INFLATION IS DRIVEN IN PART BY THE INCREASING FRACTION OF FOSSIL FUELS THAT HAVE TO BE USED IN GETTING MORE FOSSIL AND OTHER FUELS. MANY CALCULATIONS OF ENERGY RESERVES WHICH ARE SUPPOSED TO OFFER YEARS OF SUPPLY ARE EXPRESSED AS GROSS ENERGY RATHER THAN NET ENERGY AND THUS MAY BE OF MUCH SHORTER DURATION THAN OFTEN STATED. SOCIETIES COMPETE FOR ECONOMIC SURVIVAL BY LOTKA'S PRINCIPLE, WHICH SAYS THAT SYSTEMS WIN AND DOMINATE THAT MAXIMIZE THEIR USEFUL TOTAL POWER FROM ALL SOURCES AND FLEXIBLY DISTRIBUTE THIS POWER TOWARD NEEDS AFFECTING SURVIVAL. ENERGY SOURCES WHICH ARE NOW MARGINAL, BEING SUPPORTED BY HIDDEN SUBSIDIES BASED ON FOSSIL FUEL, BECOME LESS ECONOMIC WHEN THE HIDDEN SUBSIDY IS REMOVED. INCREASING ENERGY EFFICIENCY WITH NEW TECHNOLOGY IS NOT AN ENERGY SOLUTION, SINCE MOST TECHNOLOGICAL INNOVATIONS ARE REALLY DIVERSIONS OF CHEAP ENERGY INTO HIDDEN SUBSIDIES IN THE FORM OF FANCY, ENERGY-EXPENSIVE STRUCTURES. AN ECONOMY MUST MAXIMIZE ITS USE OF ENERGY FROM SUN, WIND, WATERS, AND WAVES. ENVIRONMENTAL TECHNOLOGY WHICH DUPLICATES THE WORK AVAILABLE FROM THE ECOLOGICAL SECTOR IS AN ECONOMIC HANDICAP. USE OF SOLAR ENERGY HAS ALREADY BEEN MAXIMIZED BY FORESTS AND FOOD PRODUCING PLANTS. THE ABILITY TO DO WORK DEPENDS ON THE ENERGY QUALITY AS WELL AS QUANTITY. MANY KINDS

OF GROWTH-PRIMING ACTIVITIES MAY FAVOR ECONOMIC VITALITY DURING PERIODS OF EXPANDING ENERGY AVAILABILITIES. THE MANY HIGH DENSITY AND GROWTH PROMOTING POLICIES AND STRUCTURES BECOME AN ENERGY LIABILITY DURING PERIODS WHEN EXPANSION OF ENERGY SOURCES IS NOT POSSIBLE, BECAUSE THEIR HIGH ENERGY COST IS NO LONGER ACCELERATING ENERGY YIELD.

73-0135 POWE R E
TECHNICAL FEASIBILITY STUDY FOR THE DEVELOPMENT OF A LARGE CAPACITY WIND POWERED ELECTRICAL GENERATING SYSTEM.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 177-179.
PB-231341

THIS DESCRIBES A PROJECT STUDY AT MONTANA STATE UNIVERSITY USING VERTICAL AIRFOILS MOVING ALONG A CLOSED HORIZONTAL TRACK EXTRACTING 10-20 MW POWER FROM WIND.

73-0136 LINES C W
PERCY THOMAS WIND GENERATOR DESIGNS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 11-18.
PB-231341

THE AUTHOR PRESENTS AND DISCUSSES THE WIND GENERATOR DESIGNS OF PERCY H. THOMAS: "ELECTRIC POWER FROM THE WIND", MARCH 1945, "THE WIND POWER AEROGENERATOR-TWIN WHEEL TYPE", MARCH 1946, "AERODYNAMICS OF THE WIND TURBINE", JANUARY 1949, AND "FITTING WIND POWER TO THE UTILITY NETWORK", FEBRUARY 1954.

73-0137 LISSAMAN P B S
WIND MACHINES.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 208.
PB-231341

THIS IS A BRIEF SUMMARY OF THE AIAA SYMPOSIA: "THE ANCIENT INTERFACE, BLACKBOARD TO BLUEWATER."

73-0138 MARIER D
SOME NOTES ON WINDMILLS.
ALTERN. SOURCES ENERGY NO. 12: 2-3, OCTOBER-NOVEMBER 1973.

73-0139 MEYER H
THE USE OF PAPER HONEYCOMB FOR PROTOTYPE BLADE CONSTRUCTION FOR SMALL TO MEDIUM-SIZED WIND DRIVEN GENERATORS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 73-74.
PB-231341

73-0140 REPORT OF THE COMMITTEE ON APPLICATIONS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 222-224.
PB-231341

73-0141 REPORT OF THE COMMITTEE ON ENERGY STORAGE AND ENERGY CONVERSION SYSTEMS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 218-221.
PB-231341

73-0142 REPORT OF THE COMMITTEE ON ROTOR CHARACTERISTICS.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 213-217.
PB-231341

73-0143 REPORT OF THE COMMITTEE ON WIND CHARACTERISTICS AND SITING.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED. NTIS, DECEMBER 1973. P. 209-212.
PB-231341

73-0144 REPORT OF THE NCST EXPERT COMMITTEE ON WIND POWER. PART 1. (MAIN REPORT, RECOMMENDATIONS AND CONCLUSIONS).
GOVERNMENT OF INDIA, DEPARTMENT OF SCIENCE AND TECHNOLOGY, JUNE 1973. 26P.

RECOMMENDATIONS ARE GIVEN FOR THE DEVELOPMENT OF WIND ENERGY CONVERSION SYSTEMS IN INDIA.

73-0145 ROSE W
THE VILLAGE CARPENTER.
YORKSHIRE, ENGLAND, E.P. PUBLISHING LTD., 1973. 146P.

CHAPTER XI IS ON WIND-MILL REPAIRS. THE OLD POST-AND-TOWER-MILLS OF ENGLAND ARE THOSE DISCUSSED.

73-0146 SHERMAN M M
A SAIL WING WINDMILL IN INDIA.
J. NEW ALCHEM. NO. 1, 1973.

73-0147 SHERMAN M M
LOW COST SAIL WING WINDMILL - MADURAI PROTO TYPE.
WOODS HOLE, MASS., NEW ALCHEMY INSTITUTE, 1973.

73-0148 SHERMAN M M
SAIL WINDMILL IN INDIA.
ALTERN. SOURCES ENERGY NO. 12: 4-5, OCTOBER-NOVEMBER 1973.

73-0149 SMITH B E
SMITH-PUTNAM WIND TURBINE EXPERIMENT.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 5-7.
PB-231341

A BRIEF HISTORICAL REVIEW IS GIVEN OF THE DEVELOPMENT, CONSTRUCTION AND OPERATION OF THE SMITH-PUTNAM WIND TURBINE.

73-0150 SWEENEY T E, NIXON W B
AN INTRODUCTION TO THE PRINCETON SAILWING WINDMILL.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 70-72.
PB-231341

73-0151 TAYLOR P A
SOME COMPARISONS BETWEEN OBSERVED WIND PROFILES AT RISO AND THEORETICAL PREDICTIONS FOR FLOW OVER INHOMOGENOUS TERRAIN.
R. METEOROL. SOC. Q. J. 99(420): 329-336, APRIL 1973.

73-0152 THOMAS R L
NASA PRESENTATION.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 244-253.

73-0153 TITTERINGTON W A
STATUS AND APPLICABILITY OF SOLID POLYMER ELECTROLYTE TECHNOLOGY TO ELECTROLYTIC HYDROGEN AND OXYGEN PRODUCTION.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 135-136.
PB-231341

THE GENERAL ELECTRIC COMPANY SOLID POLYMER ELECTROLYTE (SPE) WATER ELECTROLYSIS TECHNOLOGY IS PRESENTED AS A POTENTIAL ENERGY CONVERSION METHOD FOR WIND-DRIVEN GENERATOR SYSTEMS. UNDER DEVELOPMENT SINCE 1967, THIS TECHNOLOGY IS RELATIVELY NEW, AND FURTHER SIGNIFICANT IMPROVEMENTS ARE PROJECTED OVER THE NEXT 5 TO 15 YEARS. ELECTROLYSIS LIFE AND PERFORMANCE DATA ARE PRESENTED FROM LABORATORY-SIZED SINGLE CELLS WITH HIGH CELL CURRENT DENSITY SELECTED (1000 ASF) FOR NORMAL OPERATION.

73-0154 TRY AND CATCH THE WIND.
TECHNOL. REV. 51-52, MAY 1973.

THIS ARTICLE BRIEFLY DESCRIBES THE DESIGN AND TESTING OF A SMALL DARRIEUS TYPE VERTICAL AXIS WIND TURBINE AT THE NATIONAL RESEARCH COUNCIL OF CANADA.

73-0155 WILCOX C
MOTION PICTURE HISTORY OF THE ERECTION AND OPERATION OF THE SMITH-PUTNAM WIND GENERATOR.

WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 8-10.
PB-231341

SUMMARIZED IS A DISCUSSION REFERRING TO A COLOR MOVIE PRESENTING SCENES AT VARIOUS STAGES IN THE ASSEMBLY OF THE MAJOR SUBSYSTEMS OF THE SMITH-PUTNAM WIND GENERATOR.

73-0156 WOLF M
THE POTENITAL IMPACTS OF SOLAR ENERGY.
IEEE ELECTRON AND AEROSPACE SYSTEM CONVENTION, WASHINGTON, D.C., SEPTEMBER 17-19, 1973. RECORD. N.Y., IEEE, 1973. P. 95-106.

73-0157 MOSHER C A
WHERE THERE IS A WIND, THERE IS A WAY.
WIND ENERGY CONVERSION SYSTEMS, WORKSHOP PROCEEDINGS. SAVINO, J.M., ED.
NTIS, DECEMBER 1973. P. 27-32.
PB-231341

72-0050 BEURSKENS J
PROBLEMEN BIJ ONTWERPEN VAN WINDMOLENS. BEVEILIGING EN REGELING VAN WINDMOLENS. (PROBLEMS OF DESIGNING WINDMILLS. SAFEGUARDING AND CONTROLLING WINDMILLS).
BUXTEL, THE NETHERLANDS, DE KLEINE AARDE IN VIER SEIZOENEN, 1972. P. 68-75 (IN DUTCH)

DESCRIBED ARE THE IMPORTANT ELEMENTS OF WIND TURBINE SYSTEMS AND OF THE DATA ONE SHOULD KNOW WHEN DESIGNING A SMALL WIND TURBINE IN THE NETHERLANDS. REVIEWED ARE DIFFERENT TYPES OF CONTROLLING MECHANISMS SAFEGUARDING THE WIND TURBINE.

72-0051 DELITTLE R J
THE WINDMILL, YESTERDAY AND TODAY.
LONDON, JOHN BAKER, 1972. 101 P.

THIS IS A BOOK ON ENGLISH WINDMILLS INCLUDING A DISCUSSION OF VARIOUS TYPES, CONSTRUCTION, AND MANY PHOTOGRAPHS.

72-0052 GALANIS N, DELISLE A
L'ENERGIE EOLIENNE ET LA CHAUFFAGE DOMESTIQUE. (WIND ENERGY AND DOMESTIC HEATING).
UNIVERSITE DE SHERBROOKE, CANADA, DEPARTMENT DE GENIE MECANIQUE, RAPP. TECH. MEC/72/4, 1972. (IN FRENCH)

72-0053 LATIF K
WIND POWER POTENTIAL AND ITS UTILIZATION IN COASTAL AREAS OF WEST PAKISTAN.
INDUS 14(5): 6-27, JUNE 1972.

72-0054 MACPHERSON R B
DESIGN DEVELOPMENT AND TESTING OF A LOW HEAD HIGH EFFICIENCY KINETIC ENERGY MACHINE - AN ALTERNATIVE FOR THE FUTURE.
ANNUAL CONFERENCE AND EXPOSITION ON APPLICATIONS OF MARINE TECHNOLOGY TO HUMAN NEEDS, 8TH, WASHINGTON, D.C., SEPTEMBER 1972.

72-0055 MERCADIER Y
ETUDE AERODYNAMIQUE DES HELICES AEROMOTRICES. (AERODYNAMIC STUDY OF WIND SCREWS).
CANADA, UNIVERSITE DE SHERBROOKE, DEP. GENIE MEC., RAPP. TECH. MEC/72/5, 1972. (IN FRENCH)

72-0056 NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 1973: HEARING BEFORE THE SPECIAL SUBCOMMITTEE ON THE NATIONAL SCIENCE FOUNDATION, MAY 4, 1972.
WASHINGTON, D.C., GOV'T. PRINT. OFF., 1972. 636 P.

THE 1973 NATIONAL SCIENCE FOUNDATION BUDGET, INCLUDING ENERGY RESEARCH FUNDS, IS EXAMINED. REPORTS ON WIND AND SOLAR POWER SYSTEMS ARE INCLUDED.

72-0057 POWER FROM THE WIND.
ELK RIVER, MINNESOTA, UNITED POWER ASSOCIATION, UNITED POWER NEWS, JANUARY 1972.

72-0058 ROTH R
MODELS FOR WIND PROFILES OVER ROUGH AND SMOOTH SURFACES.
NTIS, UCRL-TRANS-10721, 1972. 48 P.

72-0059 SALIEVA R B
BASIC PRINCIPLES FOR CHOOSING OPTIMUM ACCUMULATOR PARAMETERS IN UTILIZING SOLAR AND WIND ENERGY.
REPORTS TO FIRST ALL-UNION CONFERENCE ON REPLENISHABLE ENERGY SOURCES, ENERGIYA, MOSCOW, NO. 2. 1972.

72-0060 WINDMILL TURBINE DEVELOPED AT PRINCETON.
AVIAT. WEEK SPACE TECHNOL. 97(20): 47, NOVEMBER 13, 1972.

71-0030 AILLERET P
L'ENERGIE EOLIENNE DANS 25 ANS DE VIE TECHNIQUE ET ECONOMIQUE D'EDF. (WIND ENERGY DURING 25 YEARS OF TECHNICAL AND ECONOMICAL ACTIVITIES OF THE EDF).
CHATOU, FRANCE, ELECTRICITE DE FRANCE, 1971. (IN FRENCH)

71-0031 BABARYKINE V
AUTOMATED OBSERVATION - SOVIET AUTOMATED WEATHER STATIONS.
MPI BULL. NO. 12: 18-21, 1971.

71-0032 BREIPOHL A M
BAYESIAN DECISION THEORY: PROMISE AND PROBLEMS.
RELIABILITY AND MAINTAINABILITY CONFERENCE, 10TH, ANAHEIM, CAL., JUNE 27-30, 1971. PROCEEDINGS. P. 49-52.

ELEMENTARY EXAMPLES WITH GROSS ABSTRACTIONS OF REAL PROBLEMS ARE TREATED TO ASSESS THE QUALITIES OF THE BAYESIAN DECISION THEORY IN TREATING DECISION PROBLEMS. THE CONSTITUENTS OF A DECISION PROBLEM ARE DISPLAYED IN DISCUSSING THE CHOICE OF THREE POSSIBLE SYSTEMS TO CONVERT WIND INTO ELECTRIC ENERGY. THE CURRENT POWER VS. POLLUTION PROBLEM IS ABSTRACTED INTO A DECISION THEORY CONTEXT TO ILLUSTRATE SOME OF THE DIFFICULTIES INVOLVED IN THE DECISION THEORY.

71-0033 CALVERT N G
WIND POWER IN EASTERN CRETE.
NEWCOMEN SOC. TRANS. 44: 137-144, 1971/72.

THE AUTHOR CLASSIFIES THE AEGEAN TYPE WINDMILL OF EASTERN CRETE ACCORDING TO CONSTRUCTION AND USAGE (WHEEL DESIGN, TOWER DESIGN, ETC.). FIELD MEASUREMENTS BY THE AUTHOR WERE LIMITED TO WIND SPEED AND ROTATIONAL SPEED. CUT-IN VELOCITIES OF 2.2 M/SEC WERE OBSERVED. IN MODEL TESTS IN ENGLAND, A POWER COEFFICIENT OF 0.3 WAS MEASURED.

71-0034 DELISLE J F
STRUCTURE OF THE WIND OVER NEW ZEALAND.
NEW ZEALAND METEOROLOGICAL SERVICE TECH. INF. CIRC. NO. 144, MAY 1971.

71-0035 FATEEV E M
WIND ENERGY AND ITS USE.
AKADEMIIA NAUK SSSR. INSTITUT GEOGRAFII. NATURAL RESOURCES OF THE SOVIET UNION: THEIR USE AND RENEWAL. EDITED BY I. P. GERASIMOV, D. L. ARMAND, AND K. M. YEFRON. TRANSLATED FROM THE RUSSIAN BY JACEK I. ROMANOWSKI. ENGLISH EDITION EDITED BY W. A. DOUGLAS JACKSON. SAN FRANCISCO, W. H. FREEMAN, 1971.

71-0036 HAGEN L J, SKIDMORE E L
TURBULENT VELOCITY FLUCTUATIONS AND VERTICAL FLOW AS AFFECTED BY WINDBREAK POROSITY.
ASAE TRANS, 14(4): 634-637, JULY-AUG., 1971.

71-0037 HIRSJAERVI A, WAILES R
FINNISH MILLS PART III. HOLLOW POST MILLS.
NEWCOMEN SOC. TRANS. 44: 99-118, 1971/72.

71-0038 LAAK F VAN DE
THE USE OF WIND POWER IN RURAL WATER SUPPLIES.
RURAL WATER SUPPLY CONFERENCE, PROCEEDINGS. BRALUP RES. PAP. NO. 21, 1971.

71-0039 MERCADIER Y A P
CONVERSION DE L'ENERGIE EOLIENNE EN ENERGIE CALORIFIQUE; CONCEPTION D'UNE TURBINE EOLIENNE. (CONVERSION OF WIND ENERGY INTO THERMIC ENERGY; DESIGN OF A WIND TURBINE).
CANADA, UNIVERSITY OF SHERBROOKE, MASTER'S THESIS, AUGUST 1971.

71-0040 SIPMAN A
DE MOLENS SOAIS ZE WAREN EN SOALS IK HEN HEB GEKEND; VANG. VOERING EN PAL. (WINDMILLS, PAST AND PRESENT; STAY, LINING AND RATCHET).
ZUTPHEN, NETHERLANDS, DE WALBURG PERS., 1971. 57 P. (IN DUTCH)

71-0041 TITOV L F
WIND DRIVEN WAVES.
JERUSALEM, ISRAEL. PROGRAM FOR SCIENTIFIC TRANSLATIONS, 1971. 244 P.

(TRANSLATION FROM RUSSIAN)

A SURVEY OF THEORY AND COMPUTATION OF WIND WAVES IN THE SEA IS PRESENTED. EXISTING TECHNIQUES FOR CALCULATING WIND-WAVE ELEMENTS ARE DISCUSSED, AND ATTENTION IS GIVEN TO THEIR PRACTICAL UTILIZATION.

71-0042 WEAFER K F
THE SEARCH FOR TOMORROW'S POWER.
NAT. GEOGR. MAG. 142(5): 650-681, 1972.

71-0043 WIND-BLOWN GENERATORS.
PARIS, AEROWATT S.A., REPORT AW9.71, 1971. 23 P.

THIS REPORT OUTLINES THE OPERATING CHARACTERISTICS OF SOME OF THE SHELF WINDMILLS MADE BY AEROWATT. THESE GENERATORS ARE SMALL SIZE 4.1 KW MAXIMUM. THESE MACHINES ARE IN USE FOR POWER GENERATION AT REMOTE LOCATIONS SUCH AS A LIGHTHOUSE.

70-0022 BARON T H, REPOLE K
A SIMPLE ELECTRIC TRANSMISSION SYSTEM FOR A FREE RUNNING WINDMILL.
QUEBEC, CAN., BRACE RES. INST., MCGILL UNIV., AUGUST 1970. 29 P.

70-0023 BENNING M L
NOVEL AERODYNAMIC WIND-POWERED PUMPS.
BARNSTORF, GERMANY, LUBING, MASCHINENFABRIK, 1970.

70-0024 HANSEN E
PUMPEN MIT MAUI - UND WINDANTRIEB. (PUMPS WITH MOLE AND WIND POWER).
UBERSICHT 21(7): 516-520, 522, JULY 11, 1970. (IN GERMAN)

70-0025 HEMAR D, PRUNIERAS J
CONTRIBUTION A LA DEFINITION D'UNE STATION D'AEROGENERATEUR.
(CONTRIBUTION TO THE DEFINITION OF A WIND GENERATING PLANT).
ANNALES DES PUNTS ET CHAUSSEES 6: 305-326, 1970. (IN FRENCH)

70-0026 HIRSJAERVI A, WAILES R
FINNISH MILLS PART II. MAMSEL OR SMOCK MILLS.
NEWCOMEN SOC. TRANS. 43: 113-128, 1970/71.

70-0027 KADIVAR M S
POTENTIAL FOR WIND POWER DEVELOPMENT IN EASTERN CANADA.
BRACE RES. INST. PUBL. CP48, JANUARY 1970.

70-0028 MOSALEV V F
ON BENDING OF A FLEXIBLE BLADE BY A GYROSCOPIC MOMENT DURING ORIENTATION OF A ROTATING HEAD INTO THE WIND WITH A TAIL.
TRUDY VNIIEM (ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF ELECTROMECHANICS) 34: 1970.

70-0030 "DE TRAANROEIER", ENERGIE - MONUMENT VAN HET VERLEDEN. ("DE TRAANROEIER", ENERGY MONUMENT OF THE PAST).
THE NETHERLANDS, N.V. TEXELSCHE ELECTRICITEITS MAATSCHAPPIJ DEN BURG TEXEL, 1970. 54 P. (IN DUTCH)

THIS IS A COLLECTION OF ARTICLES AND PUBLICATIONS CONCERNING THE RECONSTRUCTION OF AN OLD DUTCH CORNGRINDING WINDMILL FOR GENERATING ELECTRICITY FOR THE LOCAL NETWORK. THE MILL IS EQUIPPED WITH A FULLY AUTOMATIC REGULATING SYSTEM AND A 50 KW 380 V ELECTRICITY GENERATING PLANT.

70-0031 YABUKI K, MIYAGAWA H
STUDIES ON THE EFFECT OF WIND SPEED UPON THE PHOTOSYNTHESIS. 2. THE RELATION BETWEEN WIND SPEED AND PHOTOSYNTHESIS. WIND POWER GENERATION.
SOC. AGRIC. METEOROL. JAP. J. AGRIC. METEOROL. 26(3): 137-141, DECEMBER 1970. (IN JAPANESE)

70-0032 LAMBAIGEN L VAN
NEDERLANDSE MOLENS; IN OUDE ANSICHTEN. (DUTCH WINDMILLS IN OLD PICTURES).
ZALTBOMMEL, NETHERLANDS, EUROPEESE BIBLIOTHEEK., 1970. 160 P. (IN DUTCH)

69-0016 BAUER A B
FASTER THAN THE WIND.
AIAA SYMPOSIUM ON THE AERO-HYDRONAUTICS OF SAILING, MARINA DEL RAY CALIFORNIA YACHT CLUB, APRIL 26, 1969. PROCEEDINGS. P. 113-132.

THIS ARTICLE DESCRIBES A WINDDRIVEN VEHICLE ON LAND OR WATER THAT IS ABLE TO RUN DOWNWIND FASTER THAN THE WIND SPEED. MATHEMATICAL ANALYSIS OF THE PERFORMANCE IS GIVEN. TRIAL RUNS IN WINDWARD AND DOWNWIND DIRECTION SHOW THE PRACTICABILITY OF SUCH A SYSTEM.

69-0017 EASTER B H
COMPUTER AIDED DESIGN OF POWER SYSTEMS USING ENERGY STORAGE.
PH.D. THESIS. ANN ARBOR, UNIVERSITY MICROFILMS, ORDER NO. 70-21,377, 1969. 130 P.

SCOPE AND METHOD OF STUDY: THE OBJECTIVE OF THIS STUDY IS THE DEVELOPMENT OF A DESIGN TECHNIQUE FOR THE COMPUTER-AIDED DESIGN OF POWER SYSTEMS WHICH HAVE ENERGY STORAGE UNITS AS AN INTEGRAL PART OF THE SYSTEM. AN INTRODUCTION TO UNCONVENTIONAL POWER SOURCES REVEALS THE NEED FOR AN ENERGY STORAGE DEVICE AS AN INTEGRAL PART OF A POWER SYSTEM WHICH UTILIZES AN UNCONVENTIONAL SOURCE. THE SYSTEM TO BE MODELED IS THE ONE CURRENTLY UNDER INVESTIGATION BY OKLAHOMA STATE UNIVERSITY. THIS SYSTEM CONSISTS OF A WIND-POWERED GENERATOR SUPPLYING POWER TO AN ELECTROLYSIS CELL WHICH IN TURN STORES HYDROGEN AND OXYGEN AT HIGH PRESSURES. AN APPROPRIATE BACKGROUND STUDY IS MADE OF WIND GENERATION STUDIES AND SIMULATION SYSTEMS. THE SUITABILITY OF THE SIMULATION LANGUAGE, GPSS (GENERAL PURPOSE SIMULATION SYSTEM), IS PRESENTED IN DETAIL. AN INTRODUCTION TO THE FUNDAMENTALS OF GPSS IS GIVEN FOR THOSE WHO ARE UNFAMILIAR WITH THIS SIMULATION LANGAUGE. THE COMPUTER-AIDED DESIGN PROCEDURE IS OUTLINED AND EACH PORTION IS DISCUSSED. THE APPLICABILITY OF THIS DESIGN PROCEDURE TO A VARIETY OF NONLINEAR DESIGN PROBLEMS IS STRESSED. AN EXAMPLE POWER SYSTEM IS CARRIED THROUGH EACH STAGE OF THE DESIGN PROCEDURE AND THE FINAL COMPONENTS OF THE SYSTEM ARE SELECTED. THIS SAMPLE DEMONSTRATES THE VARIOUS STEPS IN THE DESIGN PROCEDURE. FINDINGS AND CONCLUSIONS: THE COMPUTER-AIDED DESIGN PROCEDURE THAT WAS DEVELOPED IS APPLICABLE TO ANY NONLINEAR PROCESS WHOSE NONLINEAR TRANSFER FUNCTIONS OCCUR SEQUENTIALLY. THESE NONLINEARITIES MAY BE TIME-INVARIANT, TIME-VARYING, OR STATISTICAL. THIS PROCEDURE STRESSES THE INTERPLAY BETWEEN COMPUTER SOLUTIONS AND ENGINEERING JUDGEMENT. A TECHNIQUE IS DEVELOPED FOR OBTAINING SOLUTIONS AT MANY POINTS ON A SEARCH GRID BY REPEATED GPSS SIMULATIONS IN ONE PROGRAM. THUS, ONE OF THE HYBRID COMPUTER TECHNIQUES IS NOW AVAILABLE TO USERS OF DIGITAL SIMULATION PROGRAMS.

69-0018 GLUSHCHENKO V P
PRIMENENIE VETRODVIGATELEI V SEL'SKOM KHOZIAISTVE. (APPLICATION OF WINDMILLS IN AGRICULTURE).
MOSKA, MASHGIZ, 1969. 97 P. (IN RUSSIAN)

69-0019 O'MALLEY M J
ELECTRIC POWER GENERATING SYSTEMS.
U.S. PATENT NO. 3,426,214, FEBRUARY 4, 1969.

69-0020 SHEFTER Y I
WAYS AND TECHNICAL MEANS OF AN EFFECTIVE EXPLOITATION OF WIND POWER IN LIVESTOCK HUSBANDRY.
TEKHNOL. PROIZVOD MOLOKA I MIASA V EVR. CHASTI SSSR, 1969. P. 334-339.

69-0021 TRACTON M
SANTA BARBARA WINDMILL.
PEACE CORPS REPORT, SANTA BARBARA WINDMILL, OFFICE OF THE MAYOR. SANTA BARBARA, ILOILO, PHILIPPINES, 1969. 19 P.

68-0015 CHILCOTT R E
NOTES SUR L'UTILISATION DE L'EOLIENNE RAPID BRACE COMME SOURCE MOTRICE.
BRACE RES. INST. PUBL. NO. T38, 1968. 11P. TRANSLATION OF T37.

68-0016 CHILCOTT R E
REPORT ON VISIT TO ST. KITTS-NEVIS, FEBRUARY 12-17, 1968 TO INITIATE A WINDMILL WATER PUMPING PROJECT.
BRACE RES. INST. PUBL. I40, FEBRUARY 1968. 7 P.

68-0017 CHILCOTT R E, LAKE E B
PROPOSAL FOR THE ESTABLISHMENT OF A 10 HP WINDMILL WATER PUMPING PILOT PLANT IN NEVIS, WEST INDIES.
BRACE RES. INST. PUBL. NO. I45, JUNE 1968. 8 P.

68-0018 CHILCOTT R E, WEYTS R H
SPECIFICATION OF THE BRACE 10 HP AIRSCREW WINDMILLS; 15 ASSEMBLY AND 70 DETAIL DRAWINGS.
BRACE RES. INST. PUBL. T43, SEPTEMBER 1968.

68-0019 FONSECA H D
BARRAGEM ANEMOMOTRIZ. (WIND BARRAGE, AN INSTALLATION TO CAPTURE WIND ENERGY).
LUANDA, ANGOLA, SERVICO METEOROLOGICA DE ANGELO, SEPTEMBER 1968. (IN PORTUGUESE)

DESCRIBED IS A SPECIAL TYPE OF A WIND AUGMENTING SYSTEM THAT CLAIMS TO CONVERT WIND ENERGY IN A MORE SIMPLE AND EFFICIENT WAY THAN CONVENTIONAL SYSTEMS WITH THE SAME CROSS AREA. THE AUGMENTOR CONSISTS OF A BARRAGE CLOSING A VALLEY, COMPOSED OF CYLINDRICAL FRAMES, PILED UP SO THAT WIND TUNNEL-LIKE APERTURES ARE FORMED IN WHICH WIND TURBINES ARE PLACED. DIMENSIONS AND POWER OUTPUT CHARACTERISTICS ARE GIVEN. WIND DATA ARE GIVEN OF THE (LATE) PORTUGUESE TERRITORIES AND APPROPRIATE SITES ARE INDICATED WHERE THIS METHOD COULD BE USED EFFECTIVELY.

68-0020 GLADWELL J K
A FIXED VENTURI WIND GENERATOR.
ELECT. REV. 182: 585, APRIL 19, 1968.

DESCRIBED IS A SMALL WIND GENERATOR USED FOR CHARGING BATTERIES FOR AUTOMATIC MARINE BEACONS HAVING A 12 V 32 W LAMP. THE WIND GENERATOR IS MOUNTED IN THE SAME NON-CORROSIVE ALUMINIUM STRUCTURE AS THE BEACON. IN THIS STRUCTURE A VENTURI IS BUILT TO FUNNEL THE WIND INTO THE FAN. THE VENTURI WAS SHOWN TO BE 100 PERCENT EFFICIENT WITH WINDS VARYING IN A DIRECTION 50 DEGREES EITHER SIDE OF THE FIXED AXIS.

68-0021 GUILLOT P
POWER SOURCES THAT CAN BE USED IN TELECOMMUNICATIONS. PART 2.
TELECOMMUN. J 35(10): 533-543, 1968.

IN THE FIRST PART OF THIS ARTICLE, PUBLISHED IN THE SEPTEMBER ISSUE OF THE TELECOMMUNICATION JOURNAL, CONVENTIONAL SOURCES OF ENERGY WERE DESCRIBED CLOSING WITH THE STUDY OF ENGINE-GENERATING SETS. THE DESCRIPTION OF CONVENTIONAL SOURCES OF ENERGY WILL CONCLUDE WITH SOME CONSIDERATIONS ON WIND-DRIVEN GENERATORS; THE SECOND PART OF THE ARTICLE WILL THEN GO ON TO DESCRIBE SOME NEWLY DEVELOPED SOURCES OF ENERGY.

68-0022 LANTAGNE M, WARD G T
L'UTILISATION DE L'ENERGIE EOLIENNE DANS LA VALLEE DU SAINT-LAURENT: ETUDE DES DONNES METEOROLOGIQUES DISPONIBLES.
BRACE RES. INST. PUBL. NO. I51, 1968. 7 P.

68-0023 LANTAGNE M, WARD G T
WIND POWER STUDY OF THE ST. LAWRENCE LOWLANDS: SURVEY OF AVAILABLE WIND DATA.
BRACE RES. INST. PUBL. NO. I52, OCTOBER 1968. TRANSLATION OF I51.

68-0024 MANUEL K
CORRELATING THE DRAINAGE NEEDS WITH AVAILABILITY OF WIND POWER IN QUEBEC.
BRACE RES. INST. PUBL. CP58, 1968.

68-0025 RAPHE J
14 SIMPLE WINDMILL CONSTRUCTIONS.
PARIS, SOC. PARISIENNE D'EDITION, 1968. 64 P. (IN FRENCH)

67-0016 CHILCOTT R E
NOTES ON THE DEVELOPMENT OF THE BRACE AIRSCREW WINDMILL AS A PRIME MOVER.
BRACE RES. INST. PUBL. NO. T37, SEPTEMBER 1967. (SUPERCEDED BY R38, 69-0002)

67-0017 DEVELOPING UNCONVENTIONAL ENERGY SOURCES FOR USE IN DEVELOPING COUNTRIES.
RESEARCH PROPOSAL.
STILLWATER, OKLAHOMA, OKLAHOMA STATE UNIVERSITY, OFFICE OF ENGINEERING RESEARCH, 1967.

67-0018 LAWAND T A
NOTES ON THE SELECTION OF A SUITABLE WATER PUMPING SYSTEM FOR THE GREENLAND WINDMILL.
BRACE RES. INST. PUBL. NO. I36, MAY 1967.

67-0019 SHEFTER Y I
ON METHODS AND LEVELS OF AUTOMATION OF WIND POWER-PRODUCING STATIONS.
DOKL. VASKNIL. NO. 1, 1967.

67-0020 ZLOTZKY J
WIND ENERGY APPLIED TO THE GENERATION OF ELECTRICITY.
REV. ELECTROTEC. 53(5): 202-210, 1967.

THIS ARTICLE IS A GENERAL REVIEW ON THE POSSIBILITIES OF GENERATING ELECTRICITY BY WIND ENERGY IN ARGENTINA. A LIST OF PUBLICATIONS ON VARIOUS ASPECTS OF THE PROJECT IS FOLLOWED BY A BRIEF DESCRIPTION OF A PROTOTYPE 50 KVA WIND GENERATOR. THE USE OF THIS GENERATOR FOR DIRECT PUMPING FROM WELLS AND WORKING IN PARALLEL WITH THE EXTERNAL NETWORK IS DESCRIBED. THE LOADING IS VARIED DEPENDING ON THE VELOCITY OF THE WIND. SUBJECTS DISCUSSED GENERALLY ARE THE QUALITY OF WIND GENERATED ELECTRICITY, LOW POWER GENERATORS FOR BATTERY CHARGING AND DOMESTIC PURPOSES, MEDIUM POWER GENERATORS MAINLY FOR IRRIGATION, AND HIGH POWER GENERATORS FOR SUPPLYING ENERGY TO CONVENTIONAL ELECTRICAL MACHINERY.

66-0015 FARRIES K G, MASUN M T
WINDMILLS OF SURREY AND INNER LONDON.
EDINBURGH, CHARLES SKILTON, 1966.

66-0016 HALITSKY J, MAGONY G A, HALPERN P
TURBULENCE DUE TO TOPOGRAPHICAL EFFECTS, REPORT NO. 2. 1 JANUARY 1965 TO 30 JUNE 1965.
BRONX, NEW YORK UNIVERSITY, DEPARTMENT OF METEOROLOGY AND OCEANOGRAPHY, GEOPHYS. SCI. RES. LAB. REP. NO. TR66-5, FEBRUARY 14, 1966. 74P.

WIND TUNNEL TESTS WERE UNDERTAKEN TO EXPLORE REYNOLDS NUMBER AND BACKGROUND FLOW TURBULENCE EFFECTS ON THE FLOW FIELD IN THE LEE OF A MOUNTAIN RIDGE ORIENTED NORMAL TO THE AIR STREAM. THREE TYPES OF TUNNEL AIR STREAMS WERE USED. THE RESULTS WERE COMPARED AMONG THEMSELVES AND WITH THE RESULTS OF FULL SCALE PIBAL OBSERVATIONS OVER THE PROTOTYPE OF THE MODEL RIDGE.

66-0017 LAWAND T A
THE EVALUATION OF A WINDMILL WATER PUMPING IRRIGATION SYSTEM.
QUEBEC, BRACE. RES. INST., APRIL 1966. 4 P.

66-0018 SEN GUPTA R N
WIND DRIVEN MACHINES FOR DEVELOPING SMALL SCALE POWER UNITS TO SERVE REMOTE REGIONS NOT COVERED BY NATIONAL OR REGIONAL POWER GRIDS.
SEMINAR ON THE ROLE OF ENGINEERS IN THE 4TH FIVE YEAR PLAN, PATNA, INDIA, JANUARY-FEBRUARY 1966.

66-0019 SMALL-SCALE POWER GENERATION--WIND-DRIVEN GENERATING PLANTS.
NEW YORK, U.N. DEPT. ECON. SOC. AFF., SALES NO. 1966. II. B. 7., 1966.
P. 58-61.

65-0012 CAILLEUX A
L'ENERGIE EOLIENNE EN FRANCE ET DANS LE MONDE. (WIND ENERGY IN FRANCE AND IN THE WORLD).
ANN. GEOGR. NO. 403: 257-270, 1965.

65-0013 CLAUSNIZER R
IMPORTANCE OF WIND POWER FOR GERMAN ELECTRICITY SUPPLY.
ELEKTRIZITAETSWIRTSCHAFT 64(7): 180-183, 1965. (IN GERMAN)

VARIOUS TEST INSTALLATIONS HAVE PROVED THE PRACTICABILITY OF PARALLEL OPERATION WITH THE SUPPLY SYSTEM. FURTHER, TO INCREASE THE POWERS OF SINGLE STATIONS TO 1000 KW APPEARS TECHNICALLY POSSIBLE. BUT FOR GERMAN CONDITIONS IT DOES NOT APPEAR POSSIBLE TO ACHIEVE ECONOMIC EFFICIENCY, EVEN IF LARGE NUMBERS WERE PRODUCED. THE REASONS FOR THIS ARE THE LARGE DIMENSIONS, THE REQUISITE RESERVES OF APPARATUS, THE LOW VALUE OF THE POWER, AND THE SHORT LIFE EXPECTATION.

65-0014 DASH J, SYDNEY D B E
THE WINDMILLS AND COPPER WALLS OF BARBADOS.
J. BARBADOS MUS. 31(2): 1965.

65-0015 DELISLE J F
EXTREME SURFACE WINDS IN NEW ZEALAND.
N. Z. J. SCI. 8: 422-430, 1965.

65-0016 LAZARESCU E
CHARACTERISTICS OF WIND POWER UTILIZATION AT SUITABLE SITES IN THE MOLDAU REGION.
ENERGETICA 13(1): 29-32, 1965. (IN RUMANIAN)

65-0017 NEEDHAM J
POWER-SOURCES AND THEIR EMPLOYMENT. III. WIND FORCE, THE WINDMILL IN EAST AND WEST.
SCIENCE AND CIVILIZATION IN CHINA. VOL. 4: PHYSICS AND TECHNOLOGY, PART II: MECHANICAL ENGINEERING, CAMBRIDGE UNIVERSITY PRESS, LONDON, 1965. P. 555-568.

65-0018 VISWANATH R, SEN GUPTA R N
WIND POWER POTENTIALITIES AND WIND MACHINES SUITABLE FOR USE IN INDIA.
SYMPOSIUM INDUSTRIES AND INDUSTRIAL POTENTIALS IN JAMMU AND KASHMIR, INDIA, 1965.

64-0074 ANGELINI A M
REFLECTIONS ON THE ECONOMIC VALUE OF GEOTHERMAL ENERGY, WIND POWER AND SOLAR ENERGY, ESPECIALLY AFTER CONVERSION TO ELECTRICAL ENERGY.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 40-44.

64-0075 BREUVERY E S DE
NEW SOURCES OF ENERGY AND ENERGY DEVELOPMENT.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 10-15.

64-0076 GOLDING E W
POWER FROM LOCAL ENERGY RESOURCES.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 149-155.

TO AID DEVELOPMENT AND TO IMPROVE LIVING CONDITIONS IN MANY REMOTE, THINLY POPULATED AREAS A SUPPLY OF ENERGY IS A VERY IMPORTANT REQUIREMENT. IMPORTATION OF THIS ENERGY, EITHER THROUGH ELECTRICAL TRANSMISSION OR IN THE FORM OF FUEL, IS OFTEN PROHIBITIVELY EXPENSIVE. AN ALTERNATIVE, WHICH MAY BE MORE ECONOMICAL, IS THE EXPLOITATION OF LOCAL ENERGY RESOURCES SUCH AS WIND POWER, SOLAR ENERGY OR ORGANIC WASTES. THESE RESOURCES HAVE INDIVIDUAL CHARACTERISTICS WHICH NEED SPECIAL CONSIDERATION IN RELATION TO THE POSSIBLE POWER LOADS; AND THE LOADS SHOULD BE PLANNED TO MATCH THE UNCONVENTIONAL METHODS OF POWER PRODUCTION. THE USE OF LOCAL ENERGY RESOURCES IN COMBINATION MAY OFFER THE BEST PROSPECT OF SUCCESS IN PROVIDING A VALUABLE SERVICE TO REMOTE COMMUNITIES AND EXPERIMENTAL SCHEMES SHOULD BE ESTABLISHED TO TEST THE POSSIBILITIES UNDER PRACTICAL CONDITIONS.

64-0077 HUTTER U
PRACTICAL EXPERIENCE GAINED FROM THE DEVELOPMENT OF A 100 KW WIND POWER INSTALLATION.
BRENNSTAFF-WAERME-KRAFT 16(7): 333-341, JULY 1964. TRANSLATION: BRACE RES. INST. PUBL. T42, MAY 1966.

64-0078 NETSCHIRT B C, LOF G O G
NEW SOURCES OF ENERGY IN THE WORLD ENERGY ECONOMY.
UNITED NATIONS CONFERENCE ON NEW SOURCES OF ENERGY. PROCEEDINGS. NEW YORK, UNITED NATIONS, 1964. VOL. 1. GENERAL, P. 89-102.

63-0030 ALADAR L K
THE BIG MODERN WINDMILLS.
BUDAPEST, MOESZAKI KOENYVKIADO, 1963. 164 P. (IN HUNGARIAN)

63-0031 ARGAND A
L'ENERGIE EOLIENNE. (WIND ENERGY).
PARIS, PROGRES-SCIENCES-TECHNIQUES, 1963. (IN FRENCH)

63-0032 CHERET I
STUDY OF WIND IN WEST AFRICA - POSSIBILITY OF USING WINDPUMPS FOR WATER ELEVATION.
INTERAFRICAN COMMITTEE FOR HYDRAULIC STUDIES, 1963.

63-0033 GIUDICE G L
UNA STAZIONE EOLICA A PALERMO. (A WIND POWER PLANT AT PALERMO).
TERMOTECNICA 17: 44-48, 1963. (IN ITALIAN)

THIS REPORT IS ON 2 YEARS OPERATION OF AN EXPERIMENTAL WIND POWER PLANT IN WHICH A D-C MOTOR DROVE AN ALTERNATOR FOR CONNECTION.

63-0034 GLAUERT H
WINDMILLS AND FANS.
DURAND, W.R., ED. AERODYNAMIC THEORY IV: 324-332. NEW YORK, DOVER PUBL., 1963.

63-0035 REPORT ON WIND ENERGY PREPARED BY INTERNATIONAL EXPERT.
UPPER VOLTA. MINISTRY OF PUBLIC WORKS. INTERAFRICAN COMMITTEE FOR HYDRAULIC STUDIES, 1963.

63-0036 RAO M S P, RADHAKRISHNAN S R
A STUDY OF THE HOURLY WIND SPEEDS AT CALCUTTA (DUM DUM) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., JUNE 1963.

THE HOURLY WIND SPEED DATA OF CALCUTTA (DUM DUM) FOR THE YEARS 1958 TO 1960 HAVE BEEN ANALYZED. THE FREQUENCY DISTRIBUTION AND THE CUMULATIVE FREQUENCIES OF THE HOURLY WIND SPEEDS WERE COMPUTED AND USED TO WORK OUT THE ENERGY EXTRACTABLE FROM WIND. THE NUMBER OF HOURS OF LOW WIND, THE SPELLS OF SUCH LOW WINDS, AND THE DIURNAL VARIATION ARE DISCUSSED. THE ANNUAL MEAN WIND SPEED WORKS OUT TO 9 KM/HR. THE ANNUAL ENERGY OUTPUT OF A WIND ELECTRIC GENERATOR WITH 30 M2 SWEPT AREA, AND 12 PERCENT OVERALL POWER COEFFICIENT IS 1009 KWH. THE WATER PUMPING CAPACITY OF A WP-2 TYPE WINDMILL IS 30 500 KL (6,710,000 GAL) PER ANNUM OR 18,400 GAL PER DAY.

63-0037 STOCKHUYZEN F
THE DUTCH WINDMILL.
NEW YORK, UNIVERSE BOOKS, 1963.

63-0038 WARD G T
PROPOSAL SUBMITTED TO THE FREEDOM FROM HUNGER CAMPAIGN, FAO, FOR THE DEVELOPMENT OF A LOW COST TWO-BULLOCK POWER WIND-ROTOR WIND MACHINE FOR WATER PUMPING IN UNDERDEVELOPED ARID AREAS.
BRACE RES. INST. PUBL. I26, NOVEMBER 1963. 10 P.

62-0024 ARAVINDKSHANAN P S
STRESS ANALYSIS FOR 32 FT. 4 POST TOWER FOR WINDMILLS.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, ENG. REP. NO. ER-10-62, 1962.

62-0025 CHERET I
ETUDE DE REGIME DES VENTS EN AFRIQUE OCCIDENTALE, POSSIBILITIES D'UTILISATION DES EOLIENNES POUR L'EXHAURE DE L'EAU. (STUDY OF THE WIND REGIME IN WESTERN AFRICA, POSSIBILITIES OF UTILIZING WINDMILLS FOR WATER PUMPING).
NANCY, FRANCE, BERZEN-LEVRAULT, SERVICE DE L'HYDRAULIQUE DE L'A. U. F., 1962. (IN FRENCH)

62-0026 CLAUSNIZER G
WIND POWER.
BRENNSTAFF-WAERME-KRAFT 14(7): 321-326, 1962. (IN GERMAN)

THIS ARTICLE IS A REVIEW OF THE PAPERS ON WIND POWER PRESENTED TO THE UNITED NATIONS CONFERENCE ON NEW ENERGY SOURCES, ROME, 1961. THEY DISCUSS THE PROBLEMS ENCOUNTERED IN HARNESSING AND USING THE ENERGY OF THE WIND AND DESCRIBE THE INVESTIGATIONS MADE IN MANY PARTS OF THE WORLD HAVING WIDELY-DIFFERENT CLIMATIC, GEOGRAPHICAL AND ECONOMIC CONDITIONS. THE COUNTRIES INTERESTED INCLUDED GREAT BRITAIN, FRANCE, DENMARK, WESTERN GERMANY, SPAIN, GREECE, HUNGARY, U.S.A., ALGERIA, EGYPT, ISRAEL, INDIA, ARGENTINA AND JAPAN. WIND POWER STUDIES CAN BE BROADLY DIVIDED INTO FOUR CATEGORIES: WIND MEASUREMENTS AND WIND BEHAVIOUR WITH THE OBJECT OF SELECTING SUITABLE SITES FOR WIND-DRIVEN PLANT; THE DESIGN OF THE PLANT AND THE MECHANICAL PROBLEMS INVOLVED; THE SMALL-SCALE GENERATION OF ELECTRICITY BY AUTONOMOUS PLANT; AND THE LARGE-SCALE GENERATION OF ELECTRICITY TO BE FED INTO A NETWORK. MANY COUNTRIES HAVE MADE EXTENSIVE WIND SURVEYS AND DENMARK, IN PARTICULAR, HAS INSTALLED, AT GEDSER, A 200 KW WIND DRIVEN GENERATOR WHICH SUPPLIES ELECTRICITY TO THE NETWORK.

62-0027 EKBATE M S, VARADAPAJAN R, GUPTE C G
CRITERIA FOR DESIGN OF WINDMILLS FOR LOW TO MODERATE WIND VELOCITIES.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB. TECH. NOTE TN-WP-10-62, AUGUST 1962. 25 P.

THE CRITERIA FOR THE DESIGN OF WINDMILLS FOR LOW TO MODERATE WIND VELOCITIES HAVE BEEN EXAMINED AND TWO DESIGNS OF WINDMILLS FOR PUMPING WATER ARE DESCRIBED. THE ELEMENTARY THEORIES OF WINDMILLS - THE MOMENTUM THEORY AND THE BLADE ELEMENT THEORY - GENERAL REQUIREMENTS AND OPTIMUM VALUES OF DESIGN VARIABLES ARE DISCUSSED. DIFFERENT DESIGNS OF ROTORS FOR BLADES HAVE BEEN STUDIED AND THE THEORETICAL VALUES OF TORQUE AND POWER DEVELOPED HAVE BEEN DETERMINED. FROM AN ANALYSIS OF THE PERFORMANCE CHARACTERISTICS, THE SPECIFICATIONS FOR TWO TYPES OF WINDMILLS, WHICH WOULD BE MOST SUITABLE FOR CONDITIONS IN INDIA, HAVE BEEN DRAWN UP.

62-0028 HABERMAN W L, CASTER E B
PERFORMANCE OF VERTICAL AXIS (CYCLOIDAL) PROPELLERS ACCORDING TO ISAY'S THEORY.
INT. SHIPBUILD. PROGR. 9(90): 81-90, 1962.

A THEORETICAL METHOD PROPOSED BY ISAY FOR EVALUATING THE PERFORMANCE OF VERTICAL AXIS PROPELLERS WAS PROGRAMMED BY THE DAVID TAYLOR MODEL BASIN FOR USE ON HIGH-SPEED COMPUTERS. THE RESULTS OF NUMERICAL COMPUTATIONS OF THRUST AND TORQUE COEFFICIENT AND EFFICIENCY ARE PRESENTED FOR A SIXBLADED VERTICAL AXIS PROPELLER FOR A WIDE RANGE OF ADVANCE COEFFICIENTS AND MAXIMUM BLADE ANGLES. FROM THE RESULTS, IT IS CONCLUDED THAT, DUE TO CERTAIN ERRONEOUS ASSUMPTIONS, THE THEORETICAL METHOD AS PRESENTED BY ISAY CANNOT BE UTILIZED TO PREDICT THE PERFORMANCE OF VERTICAL AXIS PROPELLERS IN A QUALITATIVE WAY.

62-0029 HUET Y, PRUNIERAS J
CONTRIBUTION A LA MISE AU POINT D'AEROGENERATEURS DANS LES ESTABLISSEMENTS DE SIGNALISATION MARITIME. (CONTRIBUTION TO THE INSTALLATION OF WIND GENERATORS AT SEA SIGNAL POSTS).
REVUE AISM, JULY-OCTOBER 1962. (IN FRENCH)

62-0030 JUUL J
D. E. F. WIND POWER COMMISSION REPORT.
ELEKTROTEKNIKEREN 58(14): 326-330, 1962. (IN DANISH)

A COMMISSION OF THE DANISH POWER STATIONS ISSUED A REPORT ON THE USES OF WIND POWER FOR THE GENERATION OF ELECTRICITY. IT IS SHOWN THAT CURRENT OBTAINED FROM EXISTING WIND POWER STATIONS IS SLIGHTLY MORE EXPENSIVE THAN THAT OBTAINED FROM THE SWEDISH WATER POWER STATIONS, BUT CHEAPER THAN THAT OBTAINED FROM EXISTING STEAM POWER STATIONS IN DENMARK. BY USING MORE EFFICIENT EQUIPMENT, THE COST OF CURRENT OBTAINED FROM THIS POWER STATION CAN BE REDUCED EVEN MORE, TO A LEVEL OF 3.8 OERE PER KWH.

62-0031 KOGAN A, NISSIM E
SHROUDED AEROGENERATOR DESIGN STUDY. PART 1 -- TWO-DIMENSIONAL SHROUD PERFORMANCE.
ANNUAL CONFERENCE ON AVIATION AND ASTRONAUTICS, 4TH. PROCEEDINGS.
JERUSALEM, WEIZMANN SCIENCE PRESS OF ISRAEL, 1962. P. 67-82.

THIS IS A PRELIMINARY STUDY OF THE PERFORMANCE OF A SHROUDED WINDMILL. A ONE-DIMENSIONAL APPROXIMATION ANALYSIS REVEALS THE DEPENDENCE OF GENERATOR POWER COEFFICIENT ON TURBINE LOAD FACTOR CD, DIFFUSER PRESSURE RECOVERY CPR, AND OVERALL PRESSURE COEFFICIENT CP. THE PERFORMANCE OF TWO DIMENSIONAL AND "HALF-MODEL" CONFIGURATIONS IS TESTED BY SIMULATING A TURBINE ROTOR BY AN ENERGY-DISSIPATING SCREEN. THE SMALL DEPENDENCE OF CPR AND CP UPON CD IS DEMONSTRATED EXPERIMENTALLY. A MAXIMUM POWER COEFFICIENT AND A CORRESPONDING OPTIMUM LOAD FACTOR ARE CALCULATED ON THIS BASIS AS FUNCTIONS OF CPR AND CP; COCPT IS A FUNCTION CPR ONLY.

62-0032 RAMAKRISHNAN K P, JANARDHAN S
A STUDY OF THE HOURLY WIND SPEED OF VERAVAL (GUJARAT) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0033 RAMAKRISHNAN K P, SIVARAMAN K R
THE CONTRIBUTION FROM WIND POWER TO THE ENERGY REQUIREMENTS OF INDIA.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0034 RAMANATHAN R, NARASIMASWAMY K N
A STUDY OF THE HOURLY WIND SPEEDS AT BOMBAY (COLUBA) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0035 RAMANATHAN R, NARASIMASWAMY K N
A STUDY OF THE HOURLY WIND SPEEDS AT POONA FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0036 RAMANATHAN R, VISHWANATH S
ESTIMATED ANNUAL ENERGY OUTPUT OF TWO TYPES OF WIND ELECTRIC GENERATORS.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962. 20P.

62-0037 RAMANATHAN R, VISHWANATH S
A STUDY OF THE HOURLY WIND SPEEDS AT MADRAS (MEENAMBAKKAM) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0038 RAO M S P, RADHAKRISHNAN S R
A STUDY OF THE HOURLY WIND SPEEDS AT HYDERABAD FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LAB., 1962.

62-0039 REVIEW OF PROGRESS ON THE UTILIZATION OF WIND POWER FROM MARCH 1961 TO JANUARY 1962.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, SCIENTIFIC REVIEW NO. SR-WP-3-62, 1962.

62-0040 RHODES P S
BALLYCOPELAND WINDMILL.
BELFAST, IRELAND, COUNTY DOWN, 1962.

62-0041 VENKITESHWARAN S P, RAMAKRISHNAN K P
HARNESSING THE WINDS OF INDIA.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, REP. NO. SR-WP-4-62, 1962.

62-0042 VINDKRAFTUDVALGETS BETAENKNING.

COPENHAGEN, DENMARK, DANSKE ELVAERKES FORENNING, 1962. (IN DANISH)

62-0043 VISWANATHAN R, JANARDHAN S
A STUDY OF THE HOURLY WIND SPEEDS AT AHAMADABAD FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, TECH. NOTE NO. TN-WP-18-62, DECEMBER 1962.

62-0044 VISWANATHAN R, JANARDHAN S
A STUDY OF THE HOURLY WIND SPEEDS AT BANGALORE (CENTRAL OBSERVATORY) FROM THE POINT OF VIEW OF WIND POWER UTILIZATION.
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, TECH. NOTE NO. TN-WP-15-62, DECEMBER 1962. 20 P.

61-0020 CLAUSNIZER R
WIND AND WATER AS A SOURCE OF ENERGY - COMPARISON.
ELEKTRIZITAETSWIRTSCHAFT 60(15): 536-539, 1961. (IN GERMAN)

AN ECONOMIC COMPARISON IS MADE OF WATER AND WIND ENERGY, IN ORDER TO INDICATE IN WHICH CONDITIONS WIND ENERGY CAN BE COMPETITIVE.

61-0021 REVIEW OF PROGRESS ON THE UTILIZATION OF WIND POWER (1 DECEMBER 1960 - 28 FEBRUARY 1961).
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, SCIENTIFIC REVIEW NO. SR-WP-2-61, 1961.

60-0017 GOLDING E W
WIND AS A SOURCE OF ENERGY IN SCOTLAND.
SYMPOSIUM ON NATURAL RESOURCES IN SCOTLAND, EDINBURGH, OCTOBER 31 - NOVEMBER 2, 1960. 16 P.

THE FACTORS INFLUENCING THE COST OF SUPPLYING ENERGY TO ANY PARTICULAR AREA ARE DISCUSSED IN RELATION TO BOTH CONVENTIONAL AND UNCONVENTIONAL SOURCES OF ENERGY. WIND POWER CHARACTERISTICS ARE THEN CONSIDERED AND DATA FOR WIND POWER POTENTIAL IN SCOTLAND ARE GIVEN. THESE ARE BASED ON A WIND POWER SURVEY MADE, A FEW YEARS AGO, BY THE ELECTRICAL RESEARCH ASSOCIATION. THE CONCLUSION REACHED IS THAT THE TOTAL WIND POWER CAPACITY WHICH MIGHT BE INSTALLED ECONOMICALLY IN SCOTTISH COASTAL AREAS IS RATHER GREATER THAN THAT FOR HYDRO-ELECTRIC POWER IN THE WHOLE COUNTRY. DIFFERENT SIZES OF WIND POWER PLANTS ARE CONSIDERED WITH THREE FORMS OF UTILIZATION AND SUGGESTIONS FOR WORK TO BE DONE TO FURTHER WIND POWER DEVELOPMENT ARE MADE.

60-0018 JAROSZEWICZ Z
PROBLEMS OF WIND POWER EXPLOITATION IN POLAND AND IN THE WORLD.
PRZEGL. ELEKTROTECH. 36(3): 103-106, 1960. (IN POLISH)

EXHAUSTION OF COMBUSTIBLE FUELS MAY OCCUR IN THE FORESEEABLE FUTURE AND ATOMIC POWER PLANTS STILL PRESENT CONSIDERABLE PROBLEMS. WIND POWER IS UNIVERSALLY AVAILABLE AND RECENT PROGRESS IN CONSTRUCTION OF WIND-DRIVEN ELECTRIC GENERATORS HAS PROVED THAT IT CAN BE ECONOMICALLY EXPLOITED, EITHER BY SMALL LOCAL UNITS 0.5-10 KW OR BY A SYSTEM OF LARGE UNITS 50-500 KW, OPERATING DIRECTLY ON NET. STABILITY IS ACHIEVED FOR VARIABLE WIND SPEEDS AND LOADING CONDITIONS IF THE RATINGS OF INDIVIDUAL UNITS ARE SMALL COMPARED WITH THE NET POWER. COST COMPARISON WITH COMBUSTIBLE AND NUCLEAR FUEL CELLS IS SHOWN TO BE FAVOURABLE. FURTHER STABILITY AND RELIABILITY CAN BE ACHIEVED BY COMBINING WIND AND DIESEL SETS AND BY USING WIND STORAGE PUMPING IN HYDRAULIC STATIONS.

60-0019 POWER RESOURCES OTHER THAN THOSE REGARDED AS BASIC.
WORLD POWER CONFERENCE, SECTIONAL MEETING, MADRID, JUNE 1960.
PROCEEDINGS. VOL. 5. P. 2785-2969.

60-0020 REVIEW OF PROGRESS ON UTILIZATION OF WIND POWER (16 SEPTEMBER, 1959 - 30 NOVEMBER, 1960).
BANGALORE, INDIA, NATIONAL AERONAUTICAL LABORATORY, SCIENTIFIC REVIEW NO. SR-WP-1-60, NOVEMBER 1960. 43 P.

DESCRIBED ARE PROJECTS IN INDIA: MANUFACTURE AND DISTRIBUTION OF WATER PUMPING WINDMILLS, AVAILABILITY OF WIND ELECTRIC GENERATORS, AND A SURVEY OF INACCESSIBLE AREAS (WITH WIND DATA).

60-0021 VERBATIM RECORD OF THE DISCUSSION ON POWER RESOURCES OTHER THAN THOSE REGARDED AS BASIC.
WORLD POWER CONFERENCE. SECTIONAL MEETING, MADRID, JUNE 1960. VOL. 5, SECTION II C, P. 2937-2939.

60-0022 WARD G T
REPORTS ON VISITS TO EDUCATIONAL AND RESEARCH ESTABLISHMENTS STUDYING WATER RESOURCE UTILIZATION, SOLAR ENERGY AND WIND-POWER IN ISRAEL, EGYPT, USSR AND ITALY.
BRACE RES. INST. PUBL. I4, DECEMBER 1960.

60-0023 WIND-DRIVEN DEVICES FOR PUMPING WATER AND GENERATING ELECTRIC POWER.
WASHINGTON, D.C., U.S. DEPT. OF COMMERCE. REPORT, OFFICE OF TECH. SERVICES, FOR AGENCY FOR INTERNATIONAL DEVELOPMENT, 1960. 50 P.

BASIC INFORMATION IS GIVEN FOR THE USE OF WIND POWER IN AREAS REMOTE FROM A UTILITY NETWORK WHERE FUEL PRICES ARE HIGH. A DESCRIPTION IS GIVEN OF WIND MEASUREMENT INSTRUMENTS. NOTES ON WORKING PRINCIPLES AND ECONOMICS OF WATER PUMPING AND ELECTRICITY GENERATING WIND DRIVEN MACHINES ARE GIVEN. DESCRIBED ARE A 1/10 HP 6 FT AND A 1/4 HP 10 FT WIND TURBINE.

59-0022 BERNFELD D
THE UTILIZATION OF WIND POWER IN ROUMANIA.
ENERGETICA 7(7): 278, 1959. (IN GERMAN)

59-0023 HUTTER U
WIND POWER FOR REMOTE MICROWAVE STATIONS.
AUTOMATIC POWER, 1959. 16 P.

THIS PAPER PUTS SOME OF HUTTER'S AERODYNAMIC CONCEPTS AND EXPERIENCE IN AN EASILY UNDERSTOOD FORMAT. THE SUBJECTS DEALT WITH INCLUDE WIND BEHAVIOR, TIP SPEED RATIOS, MATCHING THE POWER OUTPUT TO THE LOAD, AND A DESCRIPTION OF HUTTER'S OWN DESIGN, THE WE-10. THE WE-10 WAS A 10 METER, 10 KW WIND GENERATOR THAT WAS IN PRODUCTION FROM 1950-1960 AND DISTRIBUTED IN THE UNITED STATES BY AUTOMATIC POWER INC., HOUSTON TEXAS.

59-0024 VASHKEVICH K P
REGULATIN OF HIGH-SPEED WIND MOTORS WITH ROTATION OF BLADES BY AERODYNAMIC FORCES.
PROMYSHLENNAYA AERODINAMIKA (INDUSTRIAL AERODYNAMICS) NO. 8, MOSCOW, OBORNGIZ PUBLICATIONS, 1959.

58-0021 DIRSCHKA A
WIND POWER PLANTS.
WASSER UND BODEN 12: 1958.

58-0022 THE LIGHT ALLOY WIND TURBINE PROPELLERS OF ELECTRICITE DE FRANCE.
REV. ALUMINIUM 35: 1229-1236, 1958. (IN FRENCH)

WIND POWER BEING MUCH MORE ABUNDANT THAN HYDRO POWER AND MOREOVER PRACTICALLY UNLIMITED, SPECIALISTS HAVE PAID, IN THE VARIOUS COUNTRIES, A PARTICULAR ATTENTION TO THE FINDING OF SOLUTIONS WHICH WOULD BE APPROPRIATE TO GET IT HARNESSED. ELECTRICITE DE FRANCE TOOK AN ACTIVE PART IN THIS RESEARCH. AFTER HAVING COLLECTED THE ESSENTIAL STATISTICAL DATA THROUGH ANEMOMETRIC MEASURES, THEY FOSTERED THE BUILDING OF TWO AEROGENERATORS WITH LIGHT ALLOY PROPELLERS, AT PRESENT UNDER EXPERIMENTATION AT NOGENT-LE ROI (EURE-ET-LOIR) AND AT SAINT-REMY-DES-LANDES (MANCHE). THE DIAMETERS OF THE PROPELLERS ARE 99 FT AND 69 FT 7 INCH. THEIR POWER CAPACITY IS RESPECTIVELY 640 KW AT 52 FT/SEC AND 132 AT 39 FT/SEC.

57-0026 SABININ G K
ON A NEW SCHEME FOR A WINDMILL GENERATOR WITH PNEUMATIC POWER TRANSMISSION.
PROM. AERODINAMIKA NO. 8: 197-205, 1957. (IN RUSSIAN)

57-0027 WINDMILL 'DE HOOP', WERVERSHOOF, NOORD HOLLAND.
ELEKTROTECHNIEK 35(16): 376-379, 1957. (IN DUTCH)

AN OLD-FASHIONED DUTCH WINDMILL HAS BEEN EQUIPPED WITH A 40 KW ASYNCHRONOUS ELECTROMOTOR CONNECTED WITH THE UTILITY NETWORK, IN FEEBLE WINDS BOTH THE WIND ROTOR AND THE ELECTROMOTOR WILL SUPPLY ENERGY TO THE GRINDING MILLSTONES. IN STRONG WINDS THE WIND-DRIVEN ELECTROMOTOR ACTS AS AN ASYNCHRONOUS GENERATOR, PROVIDING THE UTILITY NETWORK WITH ENERGY. A CIRCUIT DIAGRAM AND SOME OPERATION CHARACTERISTICS OF THE PLANT ARE GIVEN.

56-0039 ABE S
ON THE THEORY OF WINDMILLS.
INST. HIGH SPACE MECH. REP. 7(67): 135-148, 1956.

THE THEORY OF THE CHARACTERISTICS OF WINDMILLS UNDER THE CONSTANT WIND SPEED IS STATED WITH SPECIAL REFERENCE TO (I) THE EFFECT OF THE NUMBER OF BLADES, (II) THE MUTUAL INTERFERENCE OF THE BLADE ELEMENTS TO THE LIFT COEFFICIENT, (III) THE EFFECT OF THE INDUCED ROTATIONAL VELOCITY IN THE SLIPSTREAM AND (IV) THE STARTING CHARACTERISTICS. THE POWER COEFFICIENT CURVE OF THE MODEL WINDMILLS CALCULATED OUT BY THIS THEORY IS SHOWN TO COINCIDE FAIRLY WELL WITH THE EXPERIMENTAL RESULTS. THE BEST DISTRIBUTION OF THE CIRCULATION WHICH GIVES THE MAXIMUM POWER COEFFICIENT IS THEN FOUND FOR THE GIVEN BLADE NUMBER, FOR THE GIVEN RATIO OF THE TIP SPEED TO THE WIND SPEED, AND FOR THE GIVEN RATIO OF THE DRAG COEFFICIENT. SEVERAL DIAGRAMS ARE ALSO DRAWN UP FOR THE PURPOSE OF THE DESIGN.

56-0040 MEDIUM OUTPUT WIND GENERATOR.
ELECTR. TIMES 130: 606, 1956.

56-0041 MULLETT L F
WIND AS A COMMERCIAL SOURCE OF ENERGY.
ENGINEERING CONFERENCE, CANBERRA, 1956.

56-0042 SMALL POWER WIND TURBINES.
PARIS, ASS. FR. NORMALISATION, FASC. DE DOCUMENTATION FDE NO. 50-001, 1956. 5 P. (IN FRENCH)

55-0032 CHIPLONKAR M W, NANDGAONKAR M L
A WIND SURVEY FOR WIND POWER.
UNIV. POONA J., SCI. TECH. SECT. 10: 112-124, 1952-1955.

INCLUDED IS A DETAILED WIND SURVEY OF WESTERN AND CENTRAL INDIA. THE WIND REGIME SHOWS A STABLE PATTERN OF AN ANNUAL CYCLE, A MAXIMUM IN JUNE, JULY AND A MINIMUM AROUND DECEMBER. ENERGY PATTERN FACTORS AND VELOCITY DURATION CURVES HAVE BEEN CALCULATED FOR VARIOUS DISTRICTS. IT IS CONCLUDED THAT THE BOMBAY STATE AND THE DISTRICTS OF HYDERABAD ARE FAVOURABLE AREAS.

55-0033 GOLDING E
THE GENERATION OF ELECTRICITY BY WIND POWER.
BATH, GT. BRITAIN, PITMAN PRESS, 1955. (AVAILABLE UNIVERSITY MICROFILMS, ANN ARBOR, MICHIGAN).

55-0034 GOLDING E W
POWER FOR THE ARID ZONES. THE HARNESSING OF WIND POWER AND SOLAR ENERGY.
DISCOVERY 16(3): 120-124, 1955.

55-0035 GOLDING E W
RESEARCH PROJECT EXPERIMENTAL DEVELOPMENT SCHEME UTILIZING LOCAL ENERGY SOURCES.
UNESCO, ADVIS. COMM. ARID ZONE RES., 10TH SESS. UNESCO/NS/AZ/256.
NOVEMBER 7, 1955. 27 P.

THE ADVANTAGES OF MANDERA IN SOMALILAND AS A SUITABLE SITE FOR AN EXPERIMENTAL PROJECT ON THE UTILIZATION OF WIND, SOLAR RADIATION AND WASTE MATERIALS AS A SOURCE OF ENERGY ARE DISCUSSED. DATA ON AVAILABLE AMOUNTS OF ENERGY ARE GIVEN. PRESENT AND FUTURE NEEDS OF THE INHABITANTS ARE STUDIED AND SUGGESTIONS ARE MADE FOR THE EQUIPMENT TO BE INSTALLED FOR THE PRODUCTION AND UTILIZATION OF ENERGY. A DETAILED ESTIMATE OF COST IS ADDED IN AN APPENDIX.

55-0036 THOMAS P H
THE ECONOMIC AVAILABILITY OF WIND ENERGY.
WATER POW. 7: 419-421, 1955.

55-0037 WIND POWER GENERATION. 100 KW PLANT ERECTED AT COSTA HEAD.
ELECTR. REV. 156: 1131, 1955.

55-0038 WIND POWER IN THE ORKNEYS.
ELECTR. TIMES 127: 1018, 1955.

54-0038 ARGAND A, GOLDING E W, SERRA L, STODHART A H
WIND POWER TERMINOLOGY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 44. LONDON, H.M.S.O., 1954. P. 417-423.

THE AUTHORS GIVE A LIST OF VARIOUS TERMS IN ENGLISH AND FRENCH REFERRING TO WIND POWER UTILIZATION.

54-0039 ARGAND A
CLASSIFICATION OF DOCUMENTS RELATING TO WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 43. LONDON, H.M.S.O., 1954. P. 413-416.

THIS PAPER IS A PROPOSAL FOR CLASSIFICATION OF WIND POWER DOCUMENTS.

54-0040 ARGAND A
NOTE ON MR. ANDREAU'S TRIAL PLANT.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 32. LONDON, H.M.S.O., 1954. P. 273-274.

THIS IS A SMALL NOTE ON RESULTS OF SOME PRELIMINARY TESTS OF THE PERFORMANCE OF A HOLLOW PROPELLER, USED IN THE ANDREAU TYPE WIND TURBINE.

54-0041 ARGAND A
NOTE ON THE RATED WIND SPEED FOR AN AEROMOTEUR PLACED ON A GIVEN SITE.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 31. LONDON, H.M.S.O., 1954. P. 271-272.

THIS IS A SMALL NOTE ON CHOICE OF RATED WIND SPEED TAKING INTO ACCOUNT EFFICIENCY OF THE WIND TURBINE, GENERATOR, TRANSMISSION AND THE SHAPE OF VELOCITY DURATION CURVE. NO ANALYSIS IS GIVEN. IT CONCLUDES THAT THE LOWEST KWH PRICE IS NOT OBTAINED WITH AN INSTALLED CAPACITY FOR MAXIMUM ENERGY EXTRACTION.

54-0042 CASPAR W
DATA FOR DISTRIBUTION OF WIND VELOCITY IN GERMANY FOR WIND POWER GENERATION.
BAD KISSINGEN, CLIMATE DIVISION OF THE GERMAN WEATHER SERVICE, 1954.

54-0043 CASPAR W
WIND DISTRIBUTION DATA IN GERMANY FOR THE UTILIZATION OF WIND ENERGY.
STUDIENGESELLSCHAFT WINDKRAFT, STUTTGART, NO. 3, 1954. 107 P.

A GRAPHICAL PRESENTATION OF WIND VELOCITY AND WIND ENERGY DISTRIBUTION, AND SEASONAL AND DAILY VARIATIONS OF MEAN WIND SPEEDS FOR SOME 50 RECORDING INSTRUMENTS IN 40 METEOROLOGICAL STATIONS IN WESTERN GERMANY ARE PRESENTED. INCLUDED ARE A TOPOGRAPHICAL MAP AND LOCATION OF WINDMEASURING INSTRUMENTS FOR EVERY STATION.

54-0044 CHAPLIN S
ENFIELD ANEMO-ELECTRIC POWER PLANT DEVELOPMENTS IN GREAT BRITAIN.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 33. LONDON, H.M.S.O., 1954. P. 275-280.

THE AUTHOR GIVES A DETAILED DESCRIPTION OF THE ENFIELD 100 KW PLANT, TO BE BUILT ACCORDING TO THE PRINCIPLES PROPOSED BY ANDREAU (FRANCE). THE WIND TURBINE HAS HOLLOW PROPELLERS, WHICH ON ROTATING DRAW UP AIR THROUGH THE HOLLOW TUBULAR TOWER SHAFT, IN WHICH IS INSTALLED AN AIR TURBINE COUPLED TO A SYNCHRONOUS GENERATOR.

54-0045 CHRISTALLER H
INSTRUMENTS AVAILABLE IN GERMANY FOR MEASURING WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 25. LONDON, H.M.S.O., 1954. P. 189-191.

THIS IS A SURVEY OF THE BEST AVAILABLE GERMAN INSTRUMENTS FOR MEASURING WIND POWER.

54-0046 CHRISTALLER H
THE PRESENT DEVELOPMENT AND THE EXISTING POSITION OF THE UTILIZATION OF WIND POWER IN GERMANY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 4. LONDON, H.M.S.O., 1954. P. 11-16.

THIS IS A GENERAL NOTE ON THE UTILIZATION OF WIND POWER, SPECIFICALLY IN GERMANY. THE COASTS AND NORTHERN GERMAN PLAINS OFFER THE BEST POTENTIALITIES FOR WIND POWER UTILIZATION. THE AUTHOR STATES THE NEED FOR EVALUATING EXPERIMENTALLY THE FLUCTUATING MECHANICAL STRESSES IN BLADES AND TOWER. HE ALSO CONSIDERS GENERATORS RUNNING AT CONSTANT SPEED BY ADJUSTING BLADE PITCH MORE FAVOURABLE THAN THE COMBINATION OF VARIABLE FREQUENCY GENERATORS (AC OR DC) WITH RECTIFIERS. HE MEMORATES THE COMBINED RESEARCH ACTIVITIES OF THE 'VEREINIGUNG DEUTSCHER ELEKTRIZITAETSWERKE' AND THE RESEARCH ASSOCIATION FOR WIND POWER, STUTTGART. THE LATTER INTENDS TO ERECT A 100 KW INSTALLATION, FEEDING INTO THE UTILITY NETWORK.

54-0047 CHRISTALLER H
WIND VELOCITY AND ECONOMIC ROTATIONAL SPEED OF WINDMILLS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 35. LONDON, H.M.S.O., 1954. P. 285-292.

DISCUSSED ARE SOME PRACTICAL QUESTIONS LINKED WITH THE FIXING OF THE ROTATIONAL SPEED OF A WINDMILL.

54-0048 CRESCENT C
NOTE ON THE UTILIZATION OF WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 8. LONDON, H.M.S.O., 1954. P. 47-48.

THIS SMALL NOTE DESCRIBES RESEARCH ACTIVITIES AND PARTICIPATING ORGANIZATIONS IN FRANCE. THE AUTHOR STATES THAT A HUNDRED MEASURING INSTRUMENTS, EVALUATING WIND ENERGY DENSITY, HAVE BEEN SET UP IN FRANCE, NORTHERN AFRICA AND OTHER CERTAIN TERRITORIES OF THE FRENCH UNION. HE SUMMARIZES SOME ATTRACTIVE DISTRICTS FOR WIND POWER UTILIZATION.

54-0049 FRANKENBERGER E
THE DAILY REGIME OF USABLE WIND ENERGY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 18. LONDON H.M.S.O., 1954. P. 133-136.

SOME RESULTS ARE GIVEN OF THE METEOROLOGICAL OBSERVATIONS NEAR QUICKBORN/HOLSTEIN MADE BY THE METEOROLOGICAL OFFICE FOR NORTH WESTERN GERMANY IN 1951. THEY CONTAIN THE MAGNITUDE AND SEASONAL CHANGES OF THE DAILY COURSE OF THE USABLE WIND ENERGY.

54-0050 GOLDING E W
MEMORANDUM ON THE MEASUREMENT OF WIND VELOCITY AND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 26. LONDON, H.M.S.O., 1954. P. 193-205.

THE AVAILABLE ENERGY IN A CERTAIN WIND REGIME CAN BE CALCULATED FROM VELOCITY DURATION CURVES OBTAINED BY HOURLY MEAN VELOCITY RECORDINGS. IT CAN EASILY BE SHOWN THAT THE ACTUAL ENERGY IN FLUCTUATING WINDS ALWAYS EXCEEDS THIS CALCULATED VALUE. THE ENERGY TO BE EXTRACTED, HOWEVER, HAS BEEN LIMITED BY THE ACTUAL WIND TURBINE CHARACTERISTICS, SUCH AS CUT-IN SPEED, FURLING VELOCITY, AND THE INERTIA OF THE MACHINE IN FOLLOWING QUICK VELOCITY FLUCTUATIONS. A DISCUSSION OF THIS MATTER INCLUDING EXAMPLES HAS BEEN PRESENTED IN THIS ARTICLE.

54-0051 GOLDING E W
NOTE ON THE ESTIMATION OF THE TOTAL PRACTICABLE INSTALLED CAPACITY OF WIND POWER PLANT IN ANY COUNTRY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 1. LONDON, H.M.S.O., 1954. P. 1-3.

IN THE UNITED KINGDOM AN ATTEMPT IS BEING MADE TO ESTIMATE THE TOTALLY POSSIBLE WIND ENERGY CAPACITY THAT CAN BE INSTALLED IN ALL SITES WHICH ARE HILLS OR RIDGES, CHOSEN BY STUDY OF WIND CHARTS OR BY ACTUAL INSPECTION. THE STUDY IS BASED ON STANDARD WIND TURBINES OF 50 M PROPELLER DIAMETER, MUTUALLY SPACED AT 400 M.

54-0052 GOLDING E W
POSSIBILITIES OF WIND POWER.
LECTURE DELIVERED BEFORE INSTITUTION OF EGYPTIAN ENGINEERS, CAIRO, NOVEMBER 22, 1954.

54-0053 HALDANE T G N
PROBLEMS IN LARGE SCALE WIND POWER GENERATION.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 2. LONDON, H.M.S.O., 1954. P. 5-7.

THIS NOTE IS ON PROBLEMS IN LARGE-SCALE ELECTRICITY GENERATION BY WIND POWER IN GREAT BRITAIN. THE PRESENT RESEARCH IS AIMED AT SAVING COAL RATHER THAN PRODUCING FIRM POWER. A FEW 100 KW WINDMILLS HAVE BEEN TESTED IN GREAT BRITAIN AS A PROTOTPYE FOR 1000 TO 2000 KW PLANTS TO BE CONSTRUCTED.

54-0054 HALDANE T G N
THE LOCATION AND OPERATION OF WIND-DRIVEN PLANT.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 21. LONDON, H.M.S.O., 1954. P. 147-148.

IN THIS SHORT NOTE THE AUTHOR ASSUMES THAT RESULTS OF A STUDY OF CORRELATION BETWEEN WIND REGIMES AND RAINFALL COULD BE QUITE SUFFICIENT TO COMBINE UTILIZATION OF WIND POWER AND HYDRO-ELECTRIC SYSTEMS.

54-0055 JONES R L
WIND-POWER POTENTIAL; A SMALL-SCALE EXPERIMENT.
NEW ZEALAND, DOMINION PHYS. LAB., DEPT. SCI. IND. RES., REP. NO. R 200, JUNE 29, 1953. 10 P. ALSO: O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 45. LONDON, H.M.S.O., 1954. P. 423-433.

A SMALL-SCALE EXPERIMENT WAS CARRIED OUT AT MOORE'S VALLEY GEOPHYSICAL FIELD LABORATORY TO INVESTIGATE THE RELATIONSHIP BETWEEN WIND VELOCITY AND ELECTRIC POWER GENERATED BY A PROPELLER-DYNAMO UNIT OVER A PERIOD OF 17 MONTHS. THE RESULTS FOR FOUR MONTHS ARE ANALYZED IN DETAIL.

54-0056 JUUL J
CONVERSION OF WIND POWER PLANT FROM DIRECT CURRENT TO ALTERNATING CURRENT OUTPUT.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 39. LONDON, H.M.S.O., 1954. P. 371-379.

THIS REPORT IS ON RECONSTRUCTION OF THE DISMANTLED SMIDTH BOGOE DC PLANT INTO A 40 KW AC POWER PLANT CONNECTED TO THE SEAS UTILITY NETWORK. DISCUSSION ON OPERATING EXPERIENCE ILLUSTRATED WITH PERFORMANCE CHARACTERISTICS AND A DETAILED CIRCUIT DIAGRAM OF THE PLANT IS INCLUDED.

54-0057 JUUL J
WIND POWER PLANTS IN DENMARK.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 40. LONDON, H.M.S.O., 1954. P. 381-387.

THIS REPORT IS ON THE ACTIVITIES OF THE DANISH SOUTH EAST ZEALAND ELECTRICITY COMPANY SEAS, CONCERNING DESIGN, ERECTION, AND OPERATION OF THE 8 M PROPELLER DIAMETER VESTER EGESBORG TRIAL MILL. IN A PRELIMINARY STAGE WIND MEASUREMENTS WERE CARRIED OUT AND A LARGE NUMBER OF WING PROFILES HAD BEEN TESTED IN A WIND TUNNEL.

54-0058 MASTERSON C E
LABORATORY EXPERIMENTS ON THE TECHNIQUE OF SITE SELECTION USING AN ELECTROLYTIC TANK.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 20. LONDON, H.M.S.O., 1954. P. 145-146.

54-0059 MONTAGNON P E
GENERATION OF ELECTRICITY FROM WIND POWER.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 9. LONDON, H.M.S.O., 1954. P. 49-50.

THIS SMALL NOTE ON THE POSSIBILITY OF GENERATING ELECTRICITY FROM WIND POWER MENTIONS EXPERIENCE WITH PLANTS IN THE U.S.A., DENMARK AND GREAT BRITAIN.

54-0060 MUNRO H
WIND-POWER DIVERSITY AROUND THE IRISH COAST.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 19. LONDON, H.M.S.O., 1954. P. 137-143.

FROM THE EXAMINATION OF WIND DATA IN IRELAND IT WOULD APPEAR THAT, AT BEST, THE FIRM VALUE EQUAL TO 10 PERCENT RATED VALUE COULD BE ALLOTTED TO NETWORK-FEEDING WIND POWER STATIONS.

54-0061 NILAKANTAN P, VARADARAGAN R
STUDIES ON THE UTILIZATION OF WIND POWER IN INDIA. PRELIMINARY SURVEY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 6. LONDON,
H.M.S.O., 1954. P. 27-41.

THIS IS AN ECONOMIC STUDY ON THE USE OF WIND POWER IN INDIA FOR WATER SUPPLY, BASED ON THE MULTIBLADE WINDMILL TYPE. VELOCITY AND POWER DURATION CURVES, AS WELL AS OUTPUT CHARACTERISTICS ARE SUPPLIED FOR SEVERAL SITES IN INDIA. DESIGN SPECIFICATIONS ARE GIVEN FOR AN EXPERIMENTAL MODEL OF A DOUBLE WHEEL WINDMILL PUMPING PLANT WITH AUXILIARY WIND GENERATOR.

54-0062 PRINSENMOLEN-COMMISSIE: WIND VELOCITY MEASUREMENTS IN HOLLAND.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 27. LONDON,
H.M.S.O., 1954. P. 129-131.

54-0063 SANTORINI P
DIRECT METHOD OF MEASURING WIND ENERGY USED BY THE ATHENS NATIONAL TECHNICAL UNIVERSITY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 30. LONDON,
H.M.S.O., 1954. P. 259-269.

EXPERIMENTS DURING ALMOST ONE YEAR WITH A SMALL WIND POWER PLANT SHOWED THAT THE ENERGY PRODUCED WAS NOT PROPORTIONAL TO THE CUBE OF THE WIND SPEED BUT MUCH LOWER. SOME OBJECTIONS ARE MADE TO DEVELOPMENT AND CONSTRUCTION OF LARGE PLANTS.

54-0064 SERRA L
ESTIMATION OF THE QUANTITY OF WIND ENERGY ANNUALLY UTILIZABLE IN FRANCE.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 5. LONDON,
H.M.S.O., 1954. P. 17-26.

FROM AVAILABLE DATA ON THE WIND REGIME IN FRANCE, A STUDY IS MADE TO ESTIMATE THE TOTALLY UTILIZABLE QUANTITY OF WIND ENERGY, BASED ON 50 M DIAMETER WIND POWER UNITS GENERATING ANNUALLY 4000 KWH PER KW INSTALLED.

54-0065 SERRA L
NOTE ON THE WIND REGIME IN FRANCE COMPARED WITH THAT OF SOME OF THE WATER COURSES.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH PAP. NO. 12. LONDON,
H.M.S.O., 1954. P. 91-94.

THIS NOTE IS ON A LONG RANGE STUDY ON AVAILABLE POWER FROM DIFFERENT WIND REGIMES IN FRANCE COMPARED WITH LOCALLY AVAILABLE HYDRO-ELECTRIC ENERGY. FOR THE PYRENEES AND THE ALPS IT IS CONCLUDED THAT, USING INTERCONNECTED SYSTEMS, WIND POWER CAN PROVIDE AN APPRECIABLE ENERGY CONTRIBUTION DURING THE WINTER PERIOD.

54-0066 SERRA L
VARIATIONS OF THE WIND WITH LOCAL RELIEF. RESULTS OF WIND TUNNEL TESTS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 14. LONDON,
H.M.S.O., 1954. P. 103-111.

THIS PAPER REPORTS RESULTS OF AN INVESTIGATION ON MODELS IN A WIND TUNNEL.

54-0067 SERRA L
WIND REGIMES IN FRANCE.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 13. LONDON,
H.M.S.O., 1954. P. 95-101.

RESULTS OF WIND DATA RECORDED DURING THREE YEARS AT 90 STATIONS IN FRANCE COORDINATED BY ELECTRICITE DE FRANCE ARE GIVEN.

54-0068 STASTIK WIND POWER ELECTRICAL GENERATING STATION A.C.S., ITALY.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 34. LONDON,
H.M.S.O., 1954. P. 281-284.

THE STASTIK AEROGENERATOR CONSISTS OF A REINFORCED CEMENT BASE AND A

REVOLVING BASE AND IN THE CENTRE AN AXIAL AND RADIAL BEARING. THE CENTRE OF THE REVOLVING BASE SUPPORTS A SYSTEM OF VERTICAL COLUMNS AND A VARIABLE AND INDEFINITE NUMBER (ACCORDING TO THE DIMENSIONS, USE AND DESIRED CHARACTERISTICS) OF PARALLEL HORIZONTAL AXIS BLADE ROTORS. LATERAL SHAFTS ORIENT THE APPARATUS ACCORDING TO THE DIRECTION OF THE WIND. A SPECIAL SYSTEM OF REGULATORS ENABLES THE ROTORS TO TURN AT ALMOST CONSTANT SPEED IN SPITE OF VARIATIONS IN WIND SPEEDS. THIS REPORT DEALS WITH THE SPECIAL CHARACTERISTICS OF THE STASTIK INVENTION COMPARED WITH CONVENTIONAL WIND GENERATORS.

54-0069 STODHART A H
THE GENERAL REQUIREMENTS OF SITES FOR WIND-DRIVEN GENERATORS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 23. LONDON, H.M.S.O., 1954. P. 181-184.

DISCUSSED ARE REQUIREMENTS FOR SITE SELECTION. MAJOR REQUIREMENTS ARE: 1. THE DISTRICT SHOULD BE WINDY. 2. SMOOTHLY CONTOURED HILLS WITH GOOD EXPOSURE AND PREFERABLY RIDGE-SHAPED SHOULD BE SELECTED. 3. ACCESS TO THE HILL SHOULD BE SATISFACTORY AND THE NEAREST POWER LINE SHOULD BE AT NO GREAT DISTANCE. 4. THE POSSIBILITIES OF (A) COMBINING WIND AND WATER POWER AND (B) GROUPING THE WIND GENERATORS IN "WIND POWER AREAS".

54-0070 TAGG J R
METHODS OF MEASUREMENTS USED IN WIND VELOCITY SURVEYS.
O.E.E.C., P.R.A. WORKING PARTY NO. 2. TECH. PAP. NO. 24. LONDON, H.M.S.O., 1954. P. 185-188.

54-0071 TAYLOR F S
POWER TO-DAY AND TO-MORROW: THE APPLICATION OF ENERGY TO HUMAN NEEDS.
LONDON, FREDERICK MULLER, 1954. 192 P.

A SURVEY OF THE FUELS AND POWER THAT HAVE DETERMINED THE CHARACTER OF HUMAN CIVILIZATION IS PRESENTED. MINING, COMBUSTION AND USES OF COAL; THE EXPLORATION, TRANSPORTATION AND FUELS DERIVED FROM PETROLEUM; WIND POWER; WATER POWER; SOLAR ENERGY; HEAT PUMP; ROCKET FUELS; NUCLEAR ENERGY; AND ELECTRICAL POWER ARE DISCUSSED IN GENERAL TERMS.

54-0072 TECHNICAL PAPERS.
ORGANIZATION FOR EUROPEAN ECONOMIC CO-OPERATION O.E.E.C., COMMITTEE FOR PRODUCTIVITY AND APPLIED RESEARCH P.R.A., WORKING PARTY NO. 2. (WIND POWER). TECHNICAL PAPERS PRESENTED TO THE WIND POWER WORKING PARTY.
LONDON, H.M.S.O., 1954. 433 P.

54-0073 VEZZANI R
RESEARCHES ON THE UTILIZATION OF WIND POWER IN ITALY.
O.E.E.C., P.R.A. WOKRING PARTY NO. 2. TECH. PAP. NO. 7. LONDON, H.M.S.O., 1954. P. 43-46.

THIS ARTICLE SURVEYS THE ACTIVITIES ON WIND POWER UTILIZATION IN ITALY SINCE 1940.

53-0040 CASPAR W
WIND DATA FOR THE UTILIZATION OF WIND POWER IN WESTERN GERMANY.
STUDIENGESELLSCHAFT WINDKRAFT, STUTTGART, NO. 2: 11-21, 1953. (IN GERMAN)

A GRAPHICAL PRESENTATION OF WIND VELOCITY AND WIND ENERGY DISTRIBUTION, AND SEASONAL AND DAILY VARIATIONS OF MEAN WIND SPEEDS FOR SOME 50 RECORDING INSTRUMENTS IN 40 METEOROLOGICAL STATIONS IN WESTERN GERMANY ARE PRESENTED. INCLUDED ARE A TOPOGRAPHICAL MAP AND THE LOCATION OF WINDMEASURING INSTRUMENTS FOR EVERY STATION.

53-0041 FRANKENBERGER E
THE DAILY REGIME OF USABLE WIND ENERGY.
STUDIENGESELLSCHAFT WINDKRAFT, STUTTGART, NO. 1: 16-19, 1953. (IN GERMAN)

DAILY VARIATIONS OF AVAILABLE WIND ENERGY ARE DISCUSSED.

53-0042 GOLDING E W
THE ECONOMIC AND PRACTICAL ASPECTS OF UTILIZING WIND ENERGY IN ARID AREAS.
PARIS, UNESCO, UNESCO-NS/AZ/139, AUGUST 10, 1953. 40 P.

ARID AREAS OF THE WORLD, WITH THEIR USUALLY HIGH COST OF ENERGY DERIVED FROM CONVENTIONAL SOURCES, MAY, UNDER CERTAIN CONDITIONS, BENEFIT GREATLY FROM THE DEVELOPMENT OF WIND ENERGY.

53-0043 LACROIX G
UTILIZATION OF WIND ENERGY IN ARID AREAS. REPORT NO. 1: CONSTRUCTION OF WIND TURBINES.
PARIS, UNESCO, UNESCO/NS/AZ/143, 1953. (IN GERMAN)

INCLUDED IS AN EXHAUSTIVE REVIEW OF THE THEORETICAL AND PRACTICAL ASPECTS OF VARIOUS TYPES OF WIND MOTORS, A DESCRIPTION OF WIND MOTORS ALREADY BUILT OR PLANNED, AND A COMPREHENSIVE BIBLIOGRAPHY.

53-0044 100-KW WIND-DRIVEN ELECTRIC GENERATOR.
ENGINEERING 175: 213-214, 1953.

DESCRIBED IS THE CONSTRUCTION OF THE 100 KW ANDREAU TYPE WIND TURBINE OF ENFIELD CABLES LTD., LONDON.

53-0045 STEFANIAK H S
WIND WHEEL MAXIMUM POWER.
FORSCH. GEB. INGWES. 19(1): 24-27, 1953. (IN GERMAN)

THIS IS A THEORETICAL STUDY OF THE OPTIMUM AERODYNAMIC CONDITIONS FOR A WIND WHEEL.

53-0046 THERMAL PLANT AS A VITAL ALLY OF WIND POWER.
OIL ENG. GAS. TURB. 21(241): 89, 1953.

53-0047 WIND POWER. THE ANEMO-ELECTRIC ENFIELD EQUIPMENT.
ELECTR. REV. 152: 377-379, 1953.

THIS ARTICLE IS A DESCRIPTION OF THE 100 KW ANDREAU-ENFIELD WIND TURBINE.

53-0048 WINDMILL ELECTRIC POWER.
ELECTR. TIMES 87: 103, JANUARY 1953.

DESCRIBED, WITH AN ILLUSTRATION, IS A 3-PHASE, 220-V, 100-KW, WIND-OPERATED ASYNCHRONOUS GENERATING EQUIPMENT IN BALACLAVA. THE WHEEL HAS 3 BLADES EACH 11 M. LONG, CENTERED 25 M. ABOVE GROUND LEVEL AND RUNNING AT 30 R.P.M., THE MAXIMUM OUTPUT BEING REACHED WITH A WIND SPEED OF 11 M./SEC. ON REACHING SYNCHROUNOUS SPEED THE GENERATOR IS SWITCHED AUTOMATICALLY IN PARALLEL WITH THE LOCAL SUPPLY NETWORK. THE OUTPUT IS ABOUT 400,000 UNITS PER ANNUM; 5000-KW GROUPS OF THIS TYPE ARE SUGGESTED.

52-0034 AYRES E, SCARLOTT C A
ENERGY SOURCES -- THE WEALTH OF THE WORLD.
NEW YORK, MCGRAW-HILL, 1952. 344 P.

WORLD ENERGY RESOURCES, ENERGY CONVERSION PROCESSES, AND THE CHIEF SOURCES OF ENERGY WASTE ARE EXAMINED. AN ENERGY BALANCE SHEET IS PRESENTED TO OUTLINE THE DISTRIBUTION AMONG ENERGY SOURCES AND APPLICATIONS. CONTAINS PHOTOGRAPHS AND TABLES.

52-0035 BURLANDO F, VEZZANI R, ANASTASI A
WIND ELECTRIC ENERGY BASED ON AERODYNAMICS.
ELETTROTECNICA 39(1): 29, 1952. (IN ITALIAN)

52-0036 HOFFMEISTER J
ANGULAR WIND SPEED DISTRIBUTIONS AND VELOCITY HISTOGRAMS FOR WIND POWER PLANTS.
ANGEW. MET. 1(4): 121-127, 1952. (IN GERMAN)

52-0037 LUNGSTROM O
STUDIES OF NEW MOTOR-SAILING SHIP CONCEPTS FOR FREIGHT AND PASSENGER TRANSPORT.
GOTHENBURG, SWEDISH SHIP RES. INST., 1952.

52-0038 MARSHALL C W
SUPPLEMENTARY SOURCES OF POWER: WIND, VOLCANIC HEAT, SUN AND TIDE.
ROY. SOC. ARTS J. 100: 452-468, 1952.

52-0039 RAPPORT OMTRENT DE PROEFNEMINGEN IN DE BENTHUIZER MOLEN, BETREFFENDE TANDEMBEDRIJF EN ELECTRICITEITSOPWEKKING. (REPORT ON THE EXPERIMENTS WITH AN OLD DUTCH WINDMILL TO COMBINE PUMPING WITH GENERATING ELECTRICITY).
THE NETHERLANDS, DE HOLLANDSCHE MOLEN, AMSTERDAM AND TNO, 'S GRAVENHAGE, JANUARY 1952. 20 P.

DESCRIBED IS THE OPERATION OF A DUTCH WINDMILL PROVIDED WITH AN AUXILIARY ELECTRIC MOTOR, WHICH, IN SUFFICIENTLY STRONG WIND, FUNCTIONS AS A GENERATOR FEEDING ELECTRIC ENERGY INTO THE LOW-TENSION GRID. WITH A 10-HOUR WORKING DAY, THE WIND FURNISHES 34,000 TO 50,000 KILOWATT-HOURS A YEAR.

52-0040 STAMBACK E
WIND POWER PLANTS.
SCHWEIZ. BAUZTG. 70(12): 167, 1952.

52-0041 TANAKA Y
ON THE TIP LOSS OF WINDMILLS.
KOGOSHIMA PREF. JUN. COLL. MEM. REPORT NO. 3, 1952. P. 1-11. (IN JAPANESE)

51-0031 ANASTASI A
WIND ENERGY.
ELETTROTECNICA 38(9): 428-31, 1951. (IN ITALIAN)

51-0032 HOENISCH W
WIND ENERGY TODAY: IS THERE ANY DISCUSSION LEFT?
ENERGIE AND TECHNIK: 8-12, DECEMBER 1951. (IN GERMAN)

51-0033 KAZHINSKY B, KARMISHIN A V
WIND POWER MULTI-WHEEL PLANTS.
TECHNIKA MOLODEZHI NO. 12, 1951. (IN RUSSIAN)

51-0034 NUMACHI F, ABE S
ON ADAPTIBILITY OF WINDMILLS IN JAPAN.
JAP. SOC. APPL. MECH. J. 2(11): 111, 1949. (IN JAPANESE) ALSO: INST.
HIGH SP. MECH. MEM., TOHOKU UNIV. 5(41), 1951. (IN JAPANESE)

51-0035 PAKUSCH H W
ELECTRICITY SUPPLY BY WINDMILLS.
SCHWEIZ. ELEKTROTECH. VER. BULL. 45(25), 1951. (IN FRENCH) ALSO:
ELECKTRO-POST. NO. 17, 1951.

THESE ARTICLES REPORT ON THE WIND POWER PLANT ON THE NEUWERK ISLANDS IN THE NORTH SEA.

51-0036 WIND AS A SUPPLEMENTARY POWER SOURCE.
ELECTR. ENG. MERCH. 28: 67, 1951.

50-0027 CRESTA A
UTILIZATION OF WIND ENERGY.
TECH. IND., OCTOBER 1950. (IN ITALIAN)

50-0028 ENGLISH WIND POWER GENERATION PLANTS ON THE ORKNEY ISLANDS.
ELECTR. TIMES 117: 147, 1950.

50-0029 GOLDING E W
ELECTRICITY FROM THE WIND.
DISCOVERY, MARCH 1950.

50-0030 HUTTER U
CONSIDERATIONS ON WIND POWER UTILIZATION.
TECHNIK BAUERN GAERTN. NO. 1, 1950. (IN GERMAN)

50-0031 KUEPFER W
A WIND POWER PLANT FOR THE AUTOMATIC TELEPHONE EXCHANGE AT SIMPLON-DORF.
TECH. MITT. PTT 28(1): 38-39, 1950. (IN GERMAN)

50-0032 ORKNEY WINDMILL GENERATOR.
ELECTR. REV. 146 (3766): 173, 1950; ALSO ELECTR. TIMES 117: 147, 1950.

50-0033 SEIFERTH R
REMARKS ON THE ENERGY GENERATION BY WIND POWER AFTER E.R.A. REPORT W/T 16.
ARCH. ENERGWIRT 23, 1950. (IN GERMAN)

49-0029 ANDREAU J
WIND ENERGY AND THE AUTOMOBILE.
SOC. ING. AUTO. J., DECEMBER 1949. P. 413-424. (IN FRENCH)

49-0030 FATEEV E M
OSNOVY AGREGATIROVANIYA VETRUDVIGATELEY S RABOCHIMI MASHINAMI. (THE BASIS OF LINKING WINDMILLS WITH MACHINES).
TRUDY VSESOYUZNOGO NAUCHNO-ISSLEDOVATELSKOGO INSTITUTA MEKHANIZATSSI SELSKOGO KHOZYAYSTVA VOL. 12, 1949.

49-0031 GUILLOTON R
MAXIMUM POWER OF WIND GENERATORS.
REV. GEN. MEC., DECEMBER 1949. P. 509-516. (IN FRENCH)

49-0032 HALDANE T G N
POWER FROM THE WIND.
TIMES REV. IND. 3(33): 22-23, 1949.

49-0033 IYER D V
WIND DATA FOR WINDMILLS.
SCIENT. NOTES MET. DEP. INDIA, 1(63), 1949.

49-0034 LARGE-SCALE WIND POWER GENERATION.
ENGINEER 188(4900): 738, 1949.

THIS IS A BRIEF SURVEY OF THE ACTIVITIES OF THE BRITISH ELECTRICAL RESEARCH ASSOCIATION, E.R.A., ON LARGE-SCALE ELECTRICITY GENERATION BY WIND POWER.

49-0035 WIND POWER GENERATION.
ELECTR. TIMES, DECEMBER 15, 1949.

48-0027 CLARK H O, WAILES R
BRAKE-WHEELS AND WALLOWERS (SUMMARY).
ENGINEERING 165: 453-455, 1948.

THE AUTHOR DESCRIBES CONSTRUCTION OF BRAKES AND WALLOWERS IN OLD FASHIONED WINDMILLS.

48-0028 FATEEV E M
WIND ENGINES AND WIND INSTALLATIONS.
VETRODVIGATELLI I VETROUSTANOVKI, STATE PUBLISHING HOUSE OF AGRICULTURAL LITERATURE, MOSCOW, 1948. TRANSL: NTIS, MARCH 1975. 391 P.
NASA-TT-F-16170, N75-22904

A COMPREHENSIVE THEORETICAL TREATMENT OF AERODYNAMICS IS PRESENTED ALONG WITH A DESCRIPTION OF WINDTUNNELS, THE AERODYNAMIC CHARACTERISTICS OF WIND ENGINES, TOWERS, AND RELATED EQUIPMENT. METHODS OF ADJUSTMENT OF WIND ENGINES TO THE WIND ARE DESCRIBED ALONG WITH SEVERAL WAYS OF REGULATING THE NUMBER OF REVOLUTIONS AND THE POWER OF WIND ENGINES. WIND ENERGY, ANEMOGRAPHS, WIND ENGINES WORKING WITH PISTON AND CENTRIFUGAL PUMPS, AND VARIOUS AGRICULTURAL MACHINES ARE DISCUSSED ALONG WITH WINDMILLS AND WIND-POWER STATIONS.

48-0029 HONNEF H
WIND-POWER GENERATION. NEW DESIGN FOR HIGH SPEED TURBINE.
ELECTR. REV. 143 (3695): 433-434, 1948. ALSO: ELECTR. ENG. 67(12): 1159, 1948.

AS A RESULT OF RESEARCHES AND EXPERIMENTS CARRIED ON FOR MORE THAN TWENTY YEARS WITH SINGLE STEEL TOWER PLANTS, MODELS IN WIND TUNNELS AND OTHER METHODS, THE AUTHOR HAS DEVELOPED HIGH-SPEED 10 MW AIR TURBINES. THIS ARTICLE COVERS TOWER CONSTRUCTION, WIND WHEELS, PERFORMANCE AND ECONOMICS.

48-0030 POWER FROM THE WIND.
ENGINEER 186(4837): 364-365, 1948.

THE PRESENT STATE OF WIND POWER UTILIZATION AND SOME RUSSIAN AND GERMAN LARGE RESEARCH PROJECTS ARE DISCUSSED.

47-0023 HAMM H W
GERMAN WIND TURBINE PROJECTS PLANNED DURING THE HITLER ERA.
OFF. MILIT. GOV. OF GERMANY, FIAT FINAL REPORT NO. 1111, MAY 1947.

47-0024 ROBERTS C R
WIND-DRIVEN GENERATING PLANT.
ELECTR. ENG. MERCH., JUNE 16, 1947.

46-0016 ARSANDAUX L
CONSEQUENCES OF THE INCREASE OF WIND GENERATOR POWER.
CONGRESS DU VENT. PROCEEDINGS, 1946. P. 91-96. (IN FRENCH)

REFERRING TO A PROPOSAL BY LANAUD AND POGGI TO CONSTRUCT A 1000 KW WIND GENERATOR, THE AUTHOR CONSIDERS SOME CONSTRUCTIONAL AND ECONOMIC ASPECTS WHEN INCREASING THE (LINEAR) SIZE OF A MACHINE. FOR A GIVEN TYPE THE POWER INCREASES WITH THE SQUARE, THE WEIGHT (INCLUDING TOWER) WITH THE CUBE AND SO THE KWH PRICE WITH THE 2/3 POWER OF SIZE. THE AUTHOR COMPARES MAXIMUM POWER OUTPUT WITH FIXED BLADES (BETWEEN CERTAIN VELOCITY LIMITS) TO CONSTANT POWER OUTPUT IN THE UPPER VELOCITY RANGE, THE LATTER REDUCING AERODYNAMIC EFFICIENCY SOMEWHAT, BUT KEEPING THE LOADS ON BLADES AND STRUCTURE LIMITED. CONSIDERATIONS ARE GIVEN TO THE NON-UNIFORMITY OF THE FLOW, TO PROBLEMS OF THE INERTIA OF THE ROTOR INCREASING WITH THE FOURTH POWER OF SIZE, AND INSTALLATION AND MAINTENANCE OF HEAVY GENERATORS ON HIGH TOWERS.

46-0017 BASIAUX-DEFRANCE P
BENOIST TYPE WIND TURBINE.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 127-131. (IN FRENCH)

46-0018 BASIAUX-DEFRANCE P
LE CONGRES DU VENT, CARCASSONE, SEPTEMBER 1946. (THE CONGRESS ON WIND).
TECH. MOD. 39(516): 83, 1947. (IN FRENCH)

46-0019 BASIAUX-DEFRANCE P
WIND DRIVEN WATER PUMPING STATIONS. SMALL POWER SOURCES AND PRIVATE ENTERPRISE. SEARCH FOR WIND POWER SITES. AESTHETICS.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 84-90. (IN FRENCH)

THE AUTHOR DISCUSSES THE USE OF WIND ENERGY IN COMBINATION WITH PUMPED WATER STORAGE, IN CASE APPROPRIATE SITES EXIST. SEASONAL FLUCTUATIONS IN WATER DELIVERY BY RIVERS OFTEN NECESSITATE THE STORAGE OF WATER USED FOR IRRIGATION PURPOSES OR ELECTRICITY PRODUCTION. WIND ENERGY SYSTEMS OF INDIVIDUAL FARMERS CAN BE SUPPLEMENTED BY HYDRO SYSTEMS, AT THE SAME TIME ALLOWING EXCESS ENERGY TO BE STORED. SOME SUITABLE SITES IN FRANCE ARE DISCUSSED.

46-0020 BERTHOLON N
WIND GENERATOR GROUP ALTERVENT FOR ONE PHASE A.C. GENERATION.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 109-112. (IN FRENCH)

THE AUTHOR SUMMARIZES THE ADVANTAGES OF USING A SINGLE PHASE DC GENERATOR WITH PERMANENT MAGNETS IN COMBINATION WITH RECENTLY DEVELOPED RECTIFIERS TO THE TRADITIONAL USE OF DC GENERATORS, WHEN GENERATING DC WITH AN AEROGENERATOR. A DESCRIPTION IS GIVEN OF THE AEROGENERATOR, 'ALTERVENT': 2 M DIAMETER, 250 W, 3 VARIABLE PITCH BLADES, ROTOR DOWNSTREAM OF TOWER.

46-0021 CARLEVARO E
RECENT PROGRESS IN WIND MOTORS AND FUTURE DEVELOPMENTS.
ELETTROTECHNICA 33, DECEMBER 10-25, 1946. (IN ITALIAN)

46-0022 BOUCHET R
NOTES SUR DES ESSAIS D'EOLIENNES.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 140-154. (IN FRENCH)

THE AUTHOR DESCRIBES 4 OUT OF 20 DIFFERENT MODELS OF 40 CM DIAMETER WHICH WERE BUILT BY HIM AND TESTED. LATER ON EXPERIMENTS WERE PERFORMED WITH 4 DIFFERENT MACHINES OF 4 METER DIAMETER, INCLUDING ONE WITH SPEED REGULATION BY BLADE CONING, AND ANOTHER WITH FEATHERING OF TWO OPPOSING BLADES FIXED ON ONE AXIS. DISCUSSED IN DETAIL ARE MERITS OF DIFFERENT CONTROL MECHANISMS.

46-0023 GAISSET E
TECHNICAL CONSIDERATIONS ON THE UTILIZATION OF WIND POWER.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 27-37. (IN FRENCH)

46-0024 GAISSET E
WIND TURBINE ELECTRICITY PRODUCTION.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 135-139. (IN FRENCH)

46-0025 GAYRARD D
HARNESSING WIND ENERGY AND AESTHETICS.

CONGRES DU VENT. PROCEEDINGS, 1946. P. 132-134. (IN FRENCH)

46-0026 LANAUD H
REPORT ON WIND ENERGY.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 38-48. (IN FRENCH)

46-0027 LAFOND J
SUMMARIZING REPORT ON WIND ENERGY.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 113-121. (IN FRENCH)

46-0028 LANOY H
THE AMERICAN 1000 AND 1500 KW LARGE WIND POWER PLANTS.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 105-108. (IN FRENCH)

46-0029 LANOY H
REPORT ON INTERESTING APPLICATIONS OF WIND POWERED GENERATORS.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 101-104. (IN FRENCH)

46-0030 MICANEL E
CONNECTION OF SMALL WIND POWER PLANTS WITH THE UTILITY NETWORK.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 49-57. (IN FRENCH)

46-0031 SAVONIUS S J
THE SAVONIUS ROTOR, APPENDIX C.
NEW YORK UNIVERSITY, COLLEGE OF ENGINEERING, JANUARY 31, 1946. P. 249-263.

46-0032 TYPE CONSTANTIN AND FORTIER-BEAULIEU WIND TURBINES.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 73-77. (IN FRENCH)

46-0033 VERTICAL-AXIS FORTIER-BEAULIEU TURBINE.
CONGRES DU VENT. PROCEEDINGS, 1946. P. 78-83. (IN FRENCH)

45-0010 ELECTRIC POWER FROM THE WIND - 1.
ELECTR. WORLD 123: 73-75, 1945.

DISCUSSED IS THE FEASIBILITY FOR USE OF WIND POWER AS AN ADJUNCT TO EXISTING POWER SOURCES FOUND IN A FEDERAL POWER COMMISSION STUDY. DETAILS OF THE DESIGN AND ADVANTAGEOUS OPERATION OF A 7500 KW TWIN-WHEEL UNIT ON A 500 FT TOWER ARE ALSO COVERED.

45-0011 ELECTRIC POWER FROM THE WIND - 2.
ELECTR. WORLD 123: 102-104, 1945.

EVIDENCE POINTS STRONGLY TO WIND AS A CONSISTENT AND RELIABLE POWER SOURCE IF APPROPRIATELY APPLIED. ANALYSIS OF WEATHER BUREAU RECORDS INDICATES THAT THE DEGREE OF VARIATION AND DURATION OF PERIODS OF DEFICIENCY MAY WELL PROVE LESS MARKED THAN FOR HYDRO POWER.

45-0012 THOMAS WIND-POWER UNIT.
ELECTR. TIMES VOL. 108, JUNE 21, 1945.

45-0013 WIND POWER. PLANS FOR 7500 KW UNITS.
ELECTR. REV. 137(3528): 18, 1945.

45-0014 WIND-POWER STUDIES SUGGEST FUTURE COMMERCIAL POSSIBILITIES.
POWER 89(6): 64-66, JUNE 1945.

ENGINEERING STUDIES MADE UNDER THE DIRECTION OF THE FEDERAL POWER COMMISSION SHOW THAT RECENT DEVELOPMENTS HAVE BROUGHT LARGE-SCALE ELECTRIC POWER GENERATION FROM THE WIND WITHIN OUR GRASP. DESIGNS FOR UNITS UP TO 7500-KW ON TOWERS 500 FT HIGH ARE SUGGESTED.

44-0005 SORENSEN E
THE MOST SUITABLE DESIGN OF WIND POWER PLANTS.
Z. VER. DT. ING. 88(9/10), 1944. (IN GERMAN)

44-0006 VEZZANI R
CALCULATION ON THE BLADES OF HIGH SPEED WINDMILLS.
ANNALI LAVORI PUBL. 22, 1944. (IN ITALIAN)

44-0007 WEINIG F
APPLICATION OF AERODYNAMICS FOR WIND WHEELS.
Z. VER. DT. ING. 88(9/10), 1944. (IN GERMAN)

43-0020 CAMERON BROWN C A
A PRACTICAL VIEW OF WIND POWER.
ELECTR. TIMES 104: 240-242, AUGUST 26, 1943.

43-0021 LANOY H
UTILIZATION OF WIND POWER FOR ELECTRICITY PRODUCTION.
J. ELECTR., DECEMBER 1943. (IN FRENCH)

43-0022 MODERN USES FOR WIND POWER; LATEST DEVELOPMENTS IN DIRECT DRIVEN AIR-SCREW-PLANT.
ELECTRICIAN 130: 487-488, MAY 14, 1943.

43-0023 TSCHANTER E
SYNCHRONOUS GENERATORS FOR LARGE WIND POWER PLANTS.
Z. VER. DT. ING. 87(21/22): 329, 1943. (IN GERMAN)

43-0024 WIND POWER.
ELECTR. REV. 133: 246, 1943.

42-0022 A REMARKABLE GROUP OF 500 W WIND GENERATORS.
AUTO-VOLT, OCTOBER/NOVEMBER, 1942. (IN FRENCH)

42-0023 AVRAMESCO M A, IOAN V
WIND POWER PLANTS.
BUL. A.P.D.E., ROMANIA, 11, APRIL/JUNE, 1942. 12 P. (IN RUMANIAN)

42-0024 FLEISCHMANN A
PRESENT STATE OF WIND POWER UTILIZATION. REPORT PRESENTED AT VDE-BEZIRK ESSEN, MAY 21, 1942. SUMMARY.
ELEKTROTECH. Z. 63: 283, 1942. (IN GERMAN)

THIS REPORT DISCUSSES THE PRESENT STATE OF WIND POWER UTILIZATION IN THE U.S.A., AND IN EUROPE, ESPECIALLY THE ACTIVITIES OF THE VENTIMOTOR G.M.B.H., WEIMAR, GERMANY.

42-0025 HARNESSING THE WIND.
OIL POWER 17, APRIL 1942, 6 P.

MANY ILLUSTRATIONS ACCOMPANY THIS DESCRIPTION OF THE ERECTION OF A LARGE ELECTRIC WIND POWER PLANT.

42-0026 MEYER G W
UTILIZATION OF WIND POWER. REPORT OF A LECTURE BEFORE KREIS TETSCHEN/BODENBACH, (SUDETENGAU), OCTOBER 8, 1942. SUMMARY. (IN GERMAN)
ELEKTROTECH. Z. 64(9/10): 139, 1943. (IN GERMAN)

42-0027 1000 KW WIND-POWER ELECTRIC GENERATING PLANT.
ENGINEERING 154: 81-83, 1942.

42-0028 POWER FROM WIND.
FLIGHT, MAY 12, 1942.

42-0029 PRINSENMOLENBOEK. (INVESTIGATION ON WINDMILL POWER).
WAGENINGEN, H. VEENMAN EN ZONEN, 1942. 206 P.

42-0030 ROGGE E
SMALL WIND POWER SETS AND PLANS FOR THE UTILIZATION OF WIND POWER FOR HEAT ACCUMULATION IN DENMARK.
ELEKTRIZITAETSVERWERTUNG 17(11/12): 197-203, 1942/43.

DENMARK, A FLAT COUNTRY WITH REGULAR, BUT RARELY STORMY WINDS, SEEMS PREDESTINED FOR THE INSTALLATION OF WIND POWER SETS FOR PRODUCING ELECTRIC ENERGY AND INDEED IN THE FIRST TWO DECADES OF THIS CENTURY A CONSIDERABLE NUMBER OF SUCH PLANTS WERE IN USE; SOME OF THEM ARE IN OPERATION UP TO THIS DAY. THE SCARCITY OF SOLID AND LIQUID FUEL IN RECENT TIMES HAS REVIVED THE INTEREST FOR THIS SOURCE OF ENERGY AND THE DANISH AUTHORITIES HAVE ARRANGED TESTS FOR THE MOST IMPORTANT MODELS OF WIND POWER SETS CONSTRUCTED IN DENMARK, PARTICULARS OF WHICH ARE GIVEN IN A TABLE AND A SERIES OF GRAPHS. IN THESE SETS A WELL CONSTRUCTED WOODEN AIR SCREW DIRECTLY DRIVES A SMALL DYNAMO. THE ENERGY PRODUCED IS MAINLY USED FOR LIGHTING, BUT WAR TIME DIFFICULTIES IN CONNECTION WITH ROOM HEATING HAVE CAUSED STUDIES TO BE MADE AS TO THE POSSIBILITY OF STORING THE ENERGY PRODUCED BY HEATING A GREAT MASS OF WATER WELL PROTECTED AGAINST HEAT LOSSES, USING THE WARM WATER PARTLY FOR GENERAL PURPOSES ALL THE YEAR ROUND, PARTLY FOR HEATING PURPOSES DURING THE WINTER. CALCULATIONS SHOW, HOWEVER, THAT STORING ELECTRICAL ENERGY IN THIS WAY, EVEN IF TECHNICALLY POSSIBLE, WOULD HARDLY BE ECONOMICAL.

42-0031 VEZZANI R
THE ITALIAN PROBLEM OF THE UTILIZATION OF WIND ENERGY.
ANNALI LARORI PUBL. 20(3): 136-171, 1942. (IN ITALIAN) ALSO: Z. VER. DT. ING. 87(1/2): 29, 1943. (IN GERMAN)

FROM WIND VELOCITY MEASUREMENTS DURING 1938-40 IT IS CONCLUDED THAT ITALY AND ITS COLONIAL TERRITORIES IN AFRICA CAN BE DIVIDED IN LOW AND HIGH VELOCITY REGIONS. IN THE LATTER AREAS THE UTILIZATION OF WIND POWER SEEMS TO BE ECONOMICALLY FEASIBLE. IN NORTHERN AFRICA IMPORTANT SAVINGS ON IMPORTED FUEL CAN BE MADE BY INTRODUCING MEDIUM WIND POWER PLANTS FOR IRRIGATION PURPOSES INSTEAD OF DIESEL UNITS. SPECIAL EMPHASIS IS LAID ON SIMPLE CONSTRUCTIONS, LOW MAINTENANCE COSTS AND PROTECTION AGAINST SAND-STORMS. ALSO A VERTICAL AXIS WIND TURBINE (SAVONIUS-ROTOR-TYPE) IS DESCRIBED.

42-0032 WILBUR J B
SMITH-PUTNAM WIND-TURBINE PROJECT.
BOSTON SOC. CIVIL ENG. J. 29(3): 211-228, 1942.

41-0021 FOTTINGER H, HERTWIG M, KLOSS M
BETRACHTUNGEN UBER DEN GROSSWINDKRAFTWERKENTWURF MAN/KLEINHENZUND VORSCHLAEGE FUER DIE WEIBERENTWICKLUNG. (DELIBERATIONS ON THE MAN-KLEINHENZ LARGE WIND POWER PLANT DESIGN AND RECOMMENDATIONS FOR FURTHER DEVELOPMENT).
2. TECHNISCHER BERICHT DER RAW. (SECOND TECHNICAL REPORT OF THE RAW).
BERLIN, 1941.

41-0022 HUTTER U
DEVELOPMENT OF HIGH POWER ROTORS.
BER. NO. 4, DER VENTIMOTOR G.M.B.H., WEIMAR, 1941. (IN GERMAN)

41-0023 MODERN WIND-POWER PLANT.
AM. SOC. NAVAL ENG. J. 53: 679-684, 1941.

41-0024 MOERCH D V
MODERN WIND POWER PLANTS.
INGENIOREN 40: 49-56, JUNE 14, 1941. (IN DANISH). ALSO: ROYAL DUTCH AIRLINES KLM, REPT. NO. TW555 GVC-R 128, JANUARY 5, 1949, APPL. 1, 8 P. (IN DUTCH). ALSO: TRANSLATION: NTIS, NASA-TT-F-15982, OCTOBER 1974.

THESE ARTICLES REPORT ON A LECTURE HELD BEFORE THE DANISH ENGINEERS SOCIETY, APRIL 23, 1941: "IS WIND POWER REVELANT FOR ELECTRICITY SUPPLY IN DENMARK?", DISCUSSING THE 17.5 M DIAMETER 60 KW FLS WIND TURBINE.

41-0025 1000 KW WINDMILL.
ENGINEER 172: 43, 1941.

41-0026 WARTENA R
WINDGENERATOREN.
DEVENTER, THE NETHERLANDS, KLUWER, 1941. 61 P.

41-0027 WIND-DRIVEN GENERATOR TO CAP GRANDPA'S KNOB.
ELECTR. WORLD 115(14): 1157, 1941. ALSO: ELEKTRIZITAETSWIRTSCHAFT 40(20): 330-331, 1941.

41-0028 WIND POWER PLANTS FOR THE TROPICS.
ELEKTRIZITAETSWIRTSCHAFT 40(1): 14, 1941. (IN GERMAN)

41-0029 WIND TURBINES.
SOCIETE S.K.F., NOTICE TSP NO. 107, APRIL 1941.

40-0006 PERLI S
WIND POWER PLANTS.
ELEKTRICHESTVO NO. 2: 47-52, 1940. (IN RUSSIAN) ALSO: ELEKTROTECH. Z. 61(50): 1154, 1940. (IN GERMAN)

40-0007 WITTE H
UTILIZATION OF WIND ENERGY FOR ELECTRICITY GENERATION.
ELEKTRIZITAETSWIRTSCHAFT 39(29): 392-393, 1940. (IN GERMAN)

AN INVESTIGATION BY THE "REICHSARBEITGE-MEINSCHAFT WINDKRAFT" ON THE ECONOMIC POSSIBILITIES OF ERECTION OF WIND POWER PLANTS IS SUMMARIZED.

39-0007 ACKERET J, CAILLE C
MODEL TESTS OF A WIND POWER STATION.
SCHWEIZ. BAUZTG. 114: 41-42, JULY 22, 1939. (IN GERMAN)

WIND TUNNEL TESTS ARE CARRIED OUT ON A MODEL OF A THREE BLADED VARIABLE PITCH PROPELLER. ESTIMATED RESULTS WITH A 50 M DIAMETER TURBINE ARE RELATED TO THE WIND REGIME OF BROCHEN (1142 M ALTITUDE) IN GERMANY.

39-0008 BEATT A W
POWER FROM THE WIND.
WIRELESS WORLD 45: 271-272, 1939.

39-0009 STRUBREITHER W
WIND TURBINE.
AUSTRIAN PATENT NO. 155,578, FEBRUARY 25, 1939.

38-0010 CAMERON BROWN C A
LIGHT FROM WIND-POWER.
J. MINIST. AGRIC. 45: 357-365, 1938.

38-0011 PEDDER J B R
WINDMILLS FOR PUMPING IN NIGERIA.
NIGERIA, PUBLIC WORKS DEPARTMENT, TECH. PAP. NO. 7, JANUARY 29, 1938. 25 P.

THIS ARTICLE REPORTS ON EXPERIENCE WITH TWO SMALL WIND POWERED WATER PUMPING PLANTS IN NIGERIA. WIND DATA AND WINDMILL TEST RESULTS ARE PRESENTED IN TABLES.

38-0012 ROGGE E
OVERALL EFFICIENCY OF WIND POWER PLANTS FOR ELECTRICITY GENERATION.
ELECTROTECH. Z. 59(1): 17-18, 1938. (IN GERMAN)

37-0011 CONRAD W
CALCULATIONS OF THE ARMS OF HIGH SPEED WINDMILLS.
FORSCH. GEB. INGWES. 8(1): 2-5, 1937. (IN GERMAN)

A MATHEMATICAL THEORY OF THE DESIGN AND EFFICIENCY OF HIGH-SPEED WINDMILLS IS DEVELOPED. RESULTS OBTAINED IN A WIND CHANNEL WITH A TWO-ARMED WINDMILL DESIGNED IN ACCORDANCE WITH THE THEORY AGREES WITH THEORETICAL DEDUCTIONS.

37-0012 GANDER J S
WIND ENGINE POWER.
MECH. WORLD 101: 1-2, 1937.

37-0013 KLEIN G J
THE DESIGN OF HIGH-SPEED WINDMILLS SUITABLE FOR DRIVING ELECTRIC GENERATORS.
OTTAWA, NAV. RES. LAB., N.R.L. REP. PAA-32, JUNE 14, 1937.

37-0014 MAYERSOHN M
UTILIZATION OF WIND ENERGY.
INST. ROM. ENERGY BUL., SEPTEMBER 1937. (IN RUMANIAN)

37-0015 OP DE HIPT H
WINDMUHLEN-PRAXIS.
LEIPZIG, VERLAG VER WOCHENSCHRIFT "DIE MUHLE", 1937. 127 P.

37-0016 OP DE HIPT H
PRACTICE OF WINDMILLS.
BERLIN, PAUL PAREY, 1937.

37-0017 PANUNZIO S
UTILIZATION OF WIND ENERGY IN TRIPOLI.
SOC. ITALIANA PROGR. SCI., RIUNIONE 25, 5(PT.1): 133-173, FEBRUARY/MARCH 1937. (IN ITALIAN)

THIS EXTENSIVE ARTICLE INCLUDES DIAGRAMS AND TABLES.

36-0007 DEBENHAM E
WIND POWER IN THE ANTARCTIC.
MECH. ENG. 58: 185, MARCH 1936.

A BRIEF SUMMARY IS PRESENTED OF A PAPER IN WHICH THE AUTHOR OUTLINES THE GREAT WIND POWER TO BE FOUND IN THE ANTARCTIC.

36-0008 FALES E N
PROPELLER DESIGN AS APPLIED TO WINDMILLS.
J. AERONAUT. SCI. 3: 278-281, 1936.

36-0009 POGGI L
ELEMENTARY AERODYNAMIC THEORY OF GYROPLANE TYPE OF WIND MOTOR.
AEROTECNICA 16: 723-731, OCTOBER 1936. (IN ITALIAN)

36-0010 POGGI L, STRINGARI A
STUDY ON A TYPE OF AIR MOTOR FOR GREAT POWER.
AEROTECNICA 16: 7-22, OCTOBER 19, 1936. (IN ITALIAN)

COVERED ARE THE GENERAL MATHEMATICAL THEORY OF AIR MOTORS AND THE AUTHOR'S DESIGN OF VERTICAL AXIS AIR MOTOR WITH AUTOMATICALLY ADJUSTABLE WINGS.

36-0011 SAUER T
PROJECT OF A 10,000 KW WIND POWER PLANT AT AI-PETRI/KRIM.
ELEKTRIZITAETSVERWERTUNG 11(4): 85, 1936/37. (IN GERMAN)

36-0012 WINDMILLS.
LUBRICATION 22: 105-108, SEPTEMBER 1936.

WIND MOTOR DESIGN, PARTS CONSTRUCTION AND LUBRICATION ARE DISCUSSED.

35-0008 BILAU K
THE GENERATION OF ELECTRICITY BY GIANT WIND POWER PLANTS.
ELEKTROTECH. Z. 56(18): 525-526, 1935. (IN GERMAN)

ELECTRICITY GENERATION BY LARGE WIND POWER PLANTS WILL BE ECONOMICALLY IMPOSSIBLE, AS THE AUTHOR STATES IN A LETTER TO THE EDITOR. COMMENTS ARE MADE ON ECONOMICAL ASPECTS AND ON CONSTRUCTION PROBLEMS TO BE FACED.

35-0009 HEYS J W VAN
WHAT EVERYONE SHOULD KNOW ABOUT WIND POWER.
BERLIN-STEGLITZ, F. MITTELBACK, 1933. 82 P. SUMMARY IN: ELEKTROTECH. Z. 56(11): 335, 1935.

35-0010 MADARAS J
ECONOMICAL POSSIBILITIES OF UTILIZATION OF WIND POWER IN BRAZIL.
REV. CLUB ENGENH., RIO DE JANEIRO 1: 523-527, AUGUST 1935. (IN SPANISH)

35-0011 TASSE Y R
WIND AS A PRODUCER OF ELECTRICITY.
REV. TRIMESTR. CAN. 21: 278-306, SEPTEMBER 1935. (IN FRENCH)

THIS ARTICLE REVIEWS AMERICAN AND EUROPEAN EQUIPMENT, WITH SPECIAL REFERENCE TO HEBCO AND SAVONIUS AEROMOTORS.

34-0007 CARTY J
ELECTRIC POWER FROM THE WIND.
INST. ELECTR. ENG. STUD. QUART. J. 4: 107-112, 1934.

34-0008 HAVINGA A
TESTS WITH WINDMILL MODELS.
INGENIEUR,'S-GRAV. 49(8): W17-23, 1934. (IN DUTCH)

THIS IS A REPORT FROM THE GOVERNMENT RESEARCH STATION OF AVIATION IN AMSTERDAM. IT GIVES RESULTS OF AERODYNAMIC MEASUREMENTS IN WIND TUNNELS OF SOME TYPES OF OLD DUTCH WINDMILLS.

34-0009 LEON G
TURBINE.
U.S. PATENT NO. 1,973,290, SEPTEMBER 11,1934.

34-0010 RONSE A
DE WINDMULENS. (THE WINDMILLS).
ANTWERP, AMSTERDAM, C. DE VRIES-BROUWERS P.V.B.A., 1976. 185 P. (IN DUTCH) REPRINT OF BOOK ORIGINALLY PUBLISHED IN 1934.

OLD DUTCH CORNGRINDING AND DRAINING MILLS IN FLANDERS AND HOLLAND ARE DESCRIBED.

33-0007 ELECTRICITY FROM THE WIND.
ELECTRICIAN 111: 649, 1933.

COVERED ARE THE MADARAS PROJECT IN NEW JERSEY AND SOME RUSSIAN WIND GENERATOR PROJECTS.

33-0008 SAVONIUS S J
M AND M READER INVENTS REVOLUTIONARY ROTOR.
MOD. MECH. 10: 64, OCTOBER 1933.

33-0009 SEKTOROV V R
DEVELOPMENT OF THE CONSTRUCTION OF WIND GENERATORS IN RUSSIA.
ELEKTRICHESTVO NO. 2, 1933. (IN RUSSIAN)

33-0010 SEKTOROV V R
REPORT ON THE OPERATING CHARACTERISTICS OF THE INITIAL 100 KW AERO-ELECTRIC GENERATOR AT BALAKLAVA.
ELEKTRICHESTVO, NO. 2, 1933. (IN RUSSIAN)

33-0011 BAUMHAUER A G VON
TESTS OF MODELS OF A WINDMILL.
INGENIEUR 48(35): W160-164, SEPTEMBER 1, 1933. (IN DUTCH)

A MODEL OF A DUTCH WINDMILL WAS TESTED IN THE WIND CHANNEL OF THE NATIONAL INSTITUTE FOR AERONAUTICAL RESEARCH. THE MEASUREMENTS COMPRISE TORQUE AND ROTATIONAL SPEED OF THE WINDMILL, SPEED OF THE AIR CURRENT, AND ALSO THE TEMPERATURE AND PRESSURE OF THE AIR. AT FIRST THE TORQUE WAS MEASURED BY A PRONY'S BRAKE. AN ELECTRICAL DYNAMOMETER WAS MORE SATISFACTORY AS IT ALLOWED FOR STABLE CONDITIONS EVEN IN THE RANGE WHERE THE TORQUE INCREASES WITH THE ROTATIONAL SPEED. THE RESULTS ARE EXPRESSED IN SO-CALLED PRESSURE HEAD COEFFICIENTS AS USED IN GOETTINGEN. THERE IS A GOOD AGREEMENT WITH SIMILAR MEASUREMENTS. IT IS FOUND THAT THE ENERGY COEFFICIENT IS APPRECIABLY INCREASED BY THE FAIRING OF THE BACK OF THE BLADES. THE MAXIMUM VALUE OF THE ENERGY COEFFICIENT DOES NOT DIFFER MUCH WITH THE RESULTS OF THE BEST MODERN WINDMILLS. THESE TESTS DO NOT ALLOW TO SAY WHETHER THE CONDITIONS OF THE TEST AND THE SMALL SCALE ON WHICH IT WAS CARRIED OUT CAUSE AN APPRECIABLE DIFFERENCE WITH FULL SCALE.

33-0012 WARRILOW W E
ELECTRICITY FROM WIND POWER.
ELECTRICIAN 111: 724-725, 1933.

THIS PAPER DESCRIBES THE 50,000 KW WIND POWER PLANT DESIGNED BY H. HONNEF. A PICTURE OF A 1:100 SCALE MODEL IS SHOWN.

32-0011 BILAU K
WIND GENERATED ELECTRICITY.
ELEKTROTECH. Z. 53(3): 65, 1932. (IN GERMAN)

PRESENTED ARE SOME ECONOMIC ASPECTS OF WIND POWER UTILIZATION. A LOT OF PROBLEMS HAVE TO BE SOLVED TO MAKE WIND POWER A FEASIBLE SOURCE OF ENERGY.

32-0012 HONNEF H
WINDKRAFTWERKE UND IHR INFLUSS AUF DIE DEUTSCHE WIRTSCHAFT. (WIND POWER PLANTS AND ITS INFLUENCE ON THE GERMAN ECONOMY).
BERLIN, ELGAWE-TAGESFRAGEN, 1932. 22 P. (IN GERMAN)

THE AUTHOR DESCRIBES HIS IDEAS OF WIND POWER PLANTS, WITH ILLUSTRATIONS.

32-0013 SERRAGLI G
THEORETICAL INVESTIGATION OF OPERATING PRINCIPLES OF AERODYNAMIC SHROUD FOR WINDMILLS.
AEROTECNICA 12: 34-44, JUNE 1932. (IN ITALIAN)

THE SELF-ADJUSTING REFLECTORS OF THE SHROUD PERMIT CONSTANT SPEED OPERATION OF THE WINDMILL.

32-0014 WILL TOWERS LIKE THESE DOT THE LAND?
ELECTR. WORLD 99: 914, 1932.

FROM A DRAWING AN IDEA MAY BE HAD OF WHAT THE WIND-ROTOR GENERATING PLANT WHICH MAY BE BUILT AT WEST BURLINGTON, N.J., WILL LOOK LIKE IF THE PLAN BECOMES FACT. ONE OF THE PROPOSED TWENTY 90 FT CYLINDRICAL TOWERS IS NEARING COMPLETION FOR TRIAL PURPOSES.

31-0012 ARNDT L
WIND MOTORS.
DINGLERS POLYTECH. J. 346: 150-153, SEPTEMBER 1931. (IN GERMAN)

REVIEWED BRIEFLY ARE VARIOUS TYPES OF WIND MOTORS.

31-0013 CONSTANT-SPEED WINDMILL FOR AIRCRAFT GENERATORS.
ENGINEERING 131: 745, JUNE 5, 1931.

A MILL FOR SUPPLYING CURRENT FOR AN AIRCRAFT RADIO IS DESCRIBED.

31-0014 CONSTANT-SPEED WINDMILLS.
AEROPLANE, OCTOBER 28, 1931.

31-0015 DARRIEUS G J M
TURBINE HAVING ITS ROTATING SHAFT TRANSVERSE TO THE FLOW OF THE CURRENT.
U.S. PATENT NO. 1,835,018, DECEMBER 8, 1931.

31-0016 DETTMAR G
ELECTRICAL ENGINEERING IN CHINA.
ELEKTROTECH. Z. 52(7): 199-204, 1931. (IN GERMAN)

31-0017 A DEVICE FOR EXTRACTING POWER FROM FLOWING MEDIA.
SUWAG PROPELLER - ROTORENBAU G.M.B.H., BRITISH PATENT NO. 337,899, JULY 28, 1931.

31-0018 KRASOVSKIY N V
WIND POWER RESOURCES OF U.S.S.R.
ELEKTRICHESTVO, NO. 22(PART 2): 1250-1253, 1931. (IN RUSSIAN)

31-0019 SABININ G K
TEORIYA I AERODINAMICHESKIY RASCHET VETRYANYKH DVIGATELEY. (THEORY AND AERODYNAMIC CALCULATION OF WINDMILLS).
TRUDY TSENTRALNOGO AERO-GIDRONAMICHESKOGO INSTITUTA NO. 104, MOSCOW-LENINGRAD, 1931.

31-0020 SAVONIUS S J
ROTOR INVENTION MAY BRING BACK WINDMILL.
POP. SCI. MON. 119(2): 54, 1931.

31-0021 SAVONIUS S J
THE S-ROTOR.
SCIENCE (SUPPL.) 73: 14, 1931.

31-0022 SAVONIUS S J
WINDMILL OF THE ROTOR TYPE PROVIDES WATER SUPPLY.
POP. MECH. MAG. 56(1): 98, 1931.

31-0023 SERRAGLI G
AERODYNAMIC PROBLEMS OF WIND-DRIVEN MOTORS.
IL POLITECNICO NO. 5, 1931.

31-0024 SERRAGLI G
THE MOTION OF A WINDMILL WITH ORIENTABLE BLADES PLACED IN A VARIABLE CURRENT.
AEROTECNICA, MAY 1931.

30-0006 BARBACINI F
NEW TYPE OF ELECTRIC AIR MOTOR.
INDUSTRIA 54: 62-66, FEBRUARY 15, 1930. (IN ITALIAN)

THE PRINCIPLES OF GENERATING ELECTRIC POWER BY MEANS OF WINDMILLS ARE DISCUSSED, AS WELL AS THE FEATURES OF ELECTRIC POWER-GENERATING DARRIEUS "AEROMOTORS" WITH BLADES FROM 8-20 M IN LENGTH.

30-0007 NEVEUX V
MODERN WINDMILLS AND THEIR APPLICATIONS.
INDUSTRIE ELECTR. 39: 197-208, MAY 10, 1930. (IN FRENCH)
SAVONIUS, DARCHE TURBINES, MACMASTER TURBINES

MAC MASTER, DARCHE, CONSTANTIN AND DARRIEUS TYPES, WIND TURBINE G.D. OF SOCIETE DES APPLICATIONS AERODYNAMIQUES ET INDUSTRIELLES, AND THE SAVONIUS ROTOR ARE DESCRIBED.

30-0008 SEKTOROV V R
WIND POWER ACTIVITIES OF ZAGI IN RUSSIA.
WORLD POWER CONFERENCE, 2D., 1930. PAPER 307. (IN GERMAN)

30-0009 UTILIZING THE WIND AS A SOURCE OF POWER.
DUN'S INT. REV. 55: 30-33, 58, APRIL 1930.

THIS ILLUSTRATED ARTICLE GIVES A GENERAL DESCRIPTION OF USING WINDMILLS FOR POWER GENERATION.

30-0010 WINDMILL GENERATORS.
ELECTRICIAN 105: 121, JULY 25, 1930.

DESCRIBED IS A PLANT MANUFACTURED BY F.A. WILKINSON AND PARTNERS, HATFIELD ENGLAND.

30-0011 ZIMMERMAN R R
COMPUTATION OF WIND-POWER RESOURCES IN THE REGION OF NOVAYA, BUKHARA AND CHARJUG.
VESTNIK IRRIGATSII 8(5): 37-55, 1930. (IN RUSSIAN)

29-0005 NEU L
RATIONAL UTILIZATION OF WIND POWER.
SOC. FR. ELECTR. BULL. SERIES 4. 9(94): 570-574, 1929. (IN FRENCH)
ALSO: WORLD POWER CONFERENCE, TRANS. TOKYO, 1929. VOL. 1, P. 631-636.

29-0006 PAWLOWSKI A
UTILIZATION OF WIND POWER.
POLYTECH. WEEKBL. 23: 658-660, SEPTEMBER 12, 1929. (IN DUTCH)

A WIND TURBINE DEVELOPED BY CAPUZAC, AND OTHER TYPES LATELY DEVELOPED IN FRANCE, ARE DESCRIBED.

29-0007 SANCERY R
THE REMARKABLE STATUS OF WIND POWER UTILIZATION IN DENMARK.
SCI ET VIE NO. 146, AUGUST 1929. (IN FRENCH)

29-0008 SAVONIUS S J
ROTOR ADAPTED TO BE DRIVEN BY WIND OR FLOWING WATER.
U.S. PATENT NO. 1,697,574, JANUARY 1, 1929.

29-0009 SCHIFF M
WINDMILL GENERATORS.
SIBLEY J. ENG. 43: 330, 356, NOVEMBER 1929.

THIS ARTICLE GIVES A BRIEF DESCRIPTION OF WINDMILL GENERATORS USED BY THE U.S. AIR MAIL SERVICE.

29-0010 WINDMILL GENERATING SET.
ELECTRICIAN 102: 140, FEBRUARY 1, 1929.

A PLANT MANUFACTURED BY F.A. WILKINSON AND PARTNERS IS DESCRIBED.

28-0012 CONSTANTIN L
THE PROPULSION OF SHIPS BY WIND; FLETTNER ROTORS AND WIND TURBINES.
NATURE (PARIS) P. 14-17, JANUARY 18 1928. (IN FRENCH)

THE AUTHOR COMPARES FLETTNER ROTORS TO WIND TURBINES AS A RATIONAL MEANS FOR SHIP PROPULSION.

28-0013 LOCK C N H
A DISCUSSION OF: THE THEORY OF AN IDEAL WINDMILL BY G. SABININ.
A.R.C. R. + M. TECH. REP. NO. T2615, 1928.

28-0014 MORGAN W D
WIND POWER ELECTRIC GENERATOR.
POWER PLANT ENG. 32: 148, JANUARY 15, 1928.

THIS DESCRIBES BRIEFLY A WIND POWER GENERATOR IN SOUTHERN CALIFORNIA TO PRODUCE ELECTRICITY.

28-0015 A NEW MODEL WINDMILL USED AS A SOURCE OF ELECTRICITY.
DUN'S INT. REV. 51: 59-60, MARCH 1928.

THIS ARTICLE DESCRIBES A WINDMILL USED FOR GENERATING ELECTRICITY FOR A FARM IN INDIANA.

28-0016 SABININ G K
THE THEORY OF AN IDEAL WINDMILL.
MOSCOW, TRANSACTIONS OF THE CENTRAL AERO-HYDRODYNAMICAL INSTITUTE, MAY 1928.

27-0006 BETZ A
WINDMILLS IN THE LIGHT OF MODERN RESEARCH.
NACA TECH. MEM. TM474, AUGUST 1928, P. 29-47. ALSO NATURWISSENSCHAFTEN 15(46): 905-914, 1927.

THE INTRODUCTION DEALS WITH THE MAIN PROBLEMS CONCERNING WINDMILLS. THE THEORETICAL PROBLEM ON THE EXTRACTION OF POWER FROM AN AIR STREAM BY A WIND ROTOR IS TREATED IN EXTENSION. CONSIDERING A ROTOR HAVING A FIXED DIAMETER IT IS SHOWN THAT ONE CANNOT INCREASE THE GENERATED POWER BY INCREASING THE BLADE SURFACE. A RELATION BETWEEN THE BLADE SURFACE (OR THE NUMBER OF BLADES) AND THE TIP SPEED RATIO OF THE ROTOR IS GIVEN. THE TIP SPEED RATIO, HOWEVER, IS LIMITED BY INCREASING THE ENERGY LOSSES DUE TO HIGHER REVOLUTION FREQUENCIES.

27-0007 BILAU K
WINDMUEHLENBAU EINST UND JETZT.
LEIPZIG, VERLAG DER WOCHENGEITSCHRIFT "DIE MUEHLE", M. SCHAEFER, 1927.
72P.

27-0008 THE LYKKEGAARD WINDMILL MANUFACTURING COMPANY. REPORT.
COPENHAGEN, DENMARK, THE LYKKEGAARD WINDMILL MANUFACTURING COMPANY, 1927.
18 P.

THIS REPORT GIVES DESCRIPTIONS OF VARIOUS TYPES OF WINDMILLS MANUFACTURED BY THE LYKKEGAARD COMPANY, SUCH AS WIND-ELECTRIC PLANTS (0.1 TO 35 KW), WINDMILLS FOR HIGH CAPACITY GRAIN MILLS, WINDMILLS AS MOTIVE POWER FOR FARM MACHINERY, DRAINAGE PLANTS (CAPACITY 3 TO 4000 CU M/HOUR), AND WATER SUPPLY FOR TOWNS, VILLAGES AND FARMS.

26-0007 AMANS M
ON THE AERODYNAMIC THEORY OF WINDMILLS.
ACAD. SCI. PARIS. COMPTES RENDUS HEBD. SEANCES 182: 841-843, MARCH 29, 1926. (IN FRENCH)

THIS PAPER DESCRIBES EXPERIMENTAL WORK ON THE PROFILES AND THE ANGLES OF VANES.

26-0008 BETZ A
WIND ENERGY AND ITS UTILIZATION THROUGH WINDMILLS.
NATURWISSENSCHAFTEN 4(14): 338, 1927. (ANALYSIS) ALSO GOETTINGEN, VANDENHOECK AND RUPRECHT, 1926. 64 P. (IN GERMAN)

26-0009 LUBOWSKY K
WIND POWER DRIVES FOR SMALL POWER PLANTS.
Z. VER. FT. ING. 70: 31-32, JANUARY 2, 1926. (IN GERMAN)

26-0010 MARGOULIS W
CENTRAL AEROHYDRODYNAMIC INSTITUTE OF MOSCOW, RUSSIA. (SABININ WINDMILL).
NACA TECH. MEMO. TM NO. 386, 1926.

26-0011 PAGLIANI S
UTILIZATION OF WIND POWER.
NUOVO CIMENTO, NEW SERIES 3: 236-246, MAY 1926. (IN ITALIAN)

VARIOUS TYPES OF WIND MOTORS AND THE ORIGIN OF KINETIC ENERGY OF WIND ARE DISCUSSED.

26-0012 POWER FROM THE WIND.
SCI. AM. 134(2): 114-115, FEBRUARY 1926.

26-0013 PRYTZ K
TESTS WITH WINDMILLS AND WATER RAISING ENGINES BY THE STATE INSTRUMENT COMMITTEE.
TEKNISCKE FORENINGS TIDSSKRIFT 50: 113-145, APRIL 1926. (IN DANISH)

TESTS WITH VARIOUS TYPES OF WINDMILLS AND TURBINES DRIVING DYNAMOS OR PUMPS ARE DESCRIBED. ALSO COVERED ARE POWER TRANSMISSION AND CONSUMPTION, EFFICIENCY, ETC.

26-0014 SAVONIUS S J
IMPROVEMENT IN OR RELATING TO WIND ROTOR FOR PRODUCING ROTARY POWER AND GENERATING CROSS DRIVE.
BRITISH PATENT NO. 244,414, SEPTEMBER 9, 1926.

26-0015 SAVONIUS S J
THE WING ROTOR IN THEORY AND PRACTICE.
HELSINGFORS, FINLAND, SAVONIUS + CO., 1926.

26-0016 UTILIZING THE POWER OF THE WIND AS A SOURCE OF ELECTRICITY.
DUN'S INT. REV. 47: 57, JUNE 1926.

THIS ARTICLE DESCRIBES BRIEFLY A WINDMILL INSTALLED ON A FARM IN INDIANA FOR THE GENERATION OF ELECTRICITY.

26-0017 WINDMILL ELECTRICITY GENERATORS: REPORT BY THE INSTITUTE OF AGRICULTURAL ENGINEERING, UNIVERSITY OF OXFORD.
ELECTR. REV. 98: 885-886, JUNE 11, 1926.

SEVEN PLANTS WERE TESTED FOR COSTS PER KWH.

26-0018 WINDMILLS FOR THE GENERATION OF ELECTRICITY.
ENGINEER 141: 586-587, JUNE 4, 1926.

INVESTIGATIONS BY THE OXFORD INSTITUTE OF AGRICULTURAL ENGINEERING ARE DISCUSSED.

26-0019 WING ROTORS, SAVONIUS SYSTEM.
GENIE CIV. 88: 236, MARCH 6, 1926. (IN FRENCH)

26-0020 WIND-DRIVEN ELECTRIC GENERATORS.
ENGINEERING 122: 150, JULY 30, 1926.

THIS IS A BRIEF ACCOUNT OF TESTS CARRIED OUT BY THE OXFORD INSTITUTE OF AGRICULTURAL ENGINEERING.

25-0016 APPLIED AERODYNAMICS (PHOTO OF WINDMILL DESIGNED BY MAJ. BUELOVE).
AVIATION, APRIL 27, 1925.

25-0017 BILAU K
THE UTILIZATION OF WIND POWER.
ZENTRALBL. BAUVERW. 45(33): 393-395, 1925. (IN GERMAN)

THIS PAPER DISCUSSES THE EXTENT TO WHICH WIND POWER CAN BE UTILIZED FOR GENERATING ELECTRICITY.

25-0018 CONRAD W
POLITICAL ECONOMICAL IMPORTANCE OF WIND POWER IN GERMANY.
THESIS, UNIV. FRANKFURT, A.M., 1925.

25-0019 DELAUGHE G
MODERN THEORIES OF AERODYNAMICS ON THE MAGNUS EFFECT AND ROTATING FLETTNER SAILS.
GENIE CIV. 86: 425-433, MAY 2, 1925. (IN FRENCH)

25-0020 KLEMIN A
SAVONIUS WING ROTOR; A FURTHER APPLICATION OF THE MAGNUS EFFECT TO WINDMILLS AND TO BOAT PROPULSION.
MECH. ENG. 47(11): 911-912, 1925.

25-0021 NEVEUX V
WINDMILLS AND THEIR USE IN GENERATING ELECTRICITY.
ELECTRICIAN 56: 385-389, SEPTEMBER 1, 1925. (IN FRENCH)

25-0022 THOM A, SMALL J
VELOCITY OF WIND IN CONICAL DUCTS.
ENGINEER 139: 262-263, MARCH 6, 1925.

THE ARTICLE DESCRIBES EXPERIMENTS UNDERTAKEN TO SEE WHETHER USE OF A CONICAL DUCT INCREASES THE EFFICIENCY OF A WINDMILL.

25-0023 RAILWAY SIGNALS OPERATED BY WINDMILL.
ELECTR. WORLD 86: 1004-1005, NOVEMBER 14, 1925.

25-0024 SAVONIUS S J
SAVONIUS ROTOR.
MECH. WORLD 78: 149, 1925.

25-0025 SAVONIUS S J
THE WING ROTOR.
THE ENGINEER 140: 193, 1925.

25-0026 WINDMILLS GENERATE SIGNAL CURRENT.
RAILWAY REV. 77: 715, NOVEMBER 7, 1925.

25-0027 THE WING ROTOR.
POWER 62: 572, OCTOBER 13, 1925.

24-0009 BAUDISCH H
TURNING WINDMILLS INTO THE WIND.
ELEKTROTECH. MASCHBAU. 42: 617-620, OCTOBER 19, 1924. (IN GERMAN)

THIS PAPER DISCUSSES REGULATION, REVIEWS FORCES INVOLVED, AND GIVES FORMULAS.

24-0010 BOSSELMANN R
CONTROL METHOD FOR WINDMILLS.
Z. VER. DEUTSCH ING. 68: 48-52, JANUARY 19, 1924.

24-0011 CONSTANTIN L
AN INEXHAUSTIBLE AND CHEAP SOURCE OF ENERGY: THE WIND.
NATURE (PARIS), JUNE 21, 1924. P. 395-400. (IN FRENCH)

THE AUTHOR PROPOSES THE CONSTRUCTION OF 30 TO 40 M DIAMETER WIND TURBINES. HE DISCUSSES SHORTLY CENTRIFUGAL, BENDING AND GRAVITY FORCES ACTING ON THE BLADES. HE PROPOSES TO COMBINE WIND ENERGY PLANTS WITH STEAM PRODUCTION AND TURBO-ELECTRIC PLANTS.

24-0012 FLETTNER'S SAILLESS SHIP EXPLAINED.
POWER 60(27): 1056, DECEMBER 1924.

24-0013 HAMMEL L
WINDMUEHLEN UND WINDMOTOREN; IHRE KONSTRUKTION, AUSFUHRUNG UND VERWENDUNG IN GEWERBE UND LANDWIRTSCHAFT, SOWIE INSBESONDERE ZUR ELEKTRIZITATS- UND GEMEINDE- WASSERVERSORGUNG.
FRANKFURT A. MAIN, AKADEMISCH-TECHNISCHEN VERLAG, 1924. 35 P.

24-0014 HAMMEL L
DIE AUSNUTZUNG DER WINDKRAFTE UNTER BESONDERER BERUCKSICHTIGUNG DER LANDISCHEN GEMEINDE-WASSER-UND ELEKTRIZITATS-VERSORGUNG.
3. NEUBEARB. UND VERM. AUFL. BERLINE, P. PAREY, 1924. 119 P.

24-0015 LARSEN A
ELECTRICAL CONVERTERS FOR THE UTILIZATION OF THE WIND POWER.
INGENIOREN 33: 567-572, DECEMBER 16, 1924.

IN ORDER TO OBTAIN MAXIMUM POWER OUTPUT FROM A WINDMILL IT IS NECESSARY TO VARY ITS SPEED IN SAME PROPORTION AS SPEED OF WIND CHANGES.

24-0016 PANCRATZ F J
WIND POWER FOR FARM ELECTRIC PLANTS.
MECH. ENG. 46(11): 675-682, 1924.

THE ARTICLE COVERS TEST DATA ON A 15-FT WHEEL, LOSSES DUE TO AIR DRAG, BEST SIZE OF WHEEL FOR FARM ELECTRIC LIGHT PLANTS, AND A COMBINATION PLANT FOR GENERATING ELECTRIC POWER AND PUMPING.

24-0017 RIEFSTAHL L
ELECTRICITY FROM WIND POWER.
GEWERBEFLEISS 103: 165-172, OCTOBER 1924. (IN GERMAN)

THIS ARTICLE GIVES THE PARTICULARS OF AN A.E.G. WIND ELECTRIC PLANT AS INSTALLED ON AN ESTATE WITH A 60-CELL STORAGE BATTERY CAPACITY OF 580 AMPERE HOURS.

24-0018 RIEFSTAHL L
MODERN INSTALLATIONS FOR THE GENERATION OF ELECTRICITY BY WIND POWER.
PRAKT. MASCH. - KONSTR. 57: 49-51, FEBRUARY 15, 1924. (IN GERMAN)

THIS ARTICLE DISCUSSES THE USE OF THE A.E.G. SYSTEM FOR WIND POWER PLANTS WITH SPECIAL REFERENCE TO THEIR ECONOMIC ASPECTS.

24-0019 STERR P VAN DER
WIND POWER.
Z. VER. DEUTSCH ING. 68: 106-108, FEBRUARY 2, 1924. (IN GERMAN)

THIS ARTICLE DESCRIBES A PROCESS TO CALCULATE THE REGULARITY OF WIND POWER.

24-0020 THE BOAT WITH PROPULSIVE CYLINDERS, FLETTNER SYSTEM.
GENIE CIV. 85: 526-527, DECEMBER 6, 1924. (IN FRENCH)

24-0021 WIND-DRIVEN ELECTRICAL AND OTHER INSTALLATIONS.
ENGINEER 137: 318, MARCH 21, 1924.

THE BURNS WINDMILL IS DESCRIBED.

23-0003 BRANGWYN F, PRESTON H
WINDMILLS.
WISCASSEL, MAINE, SOCIETY FOR THE PRESERVATION OF OLD WINDMILLS, 1923.
126 P.

23-0004 CRABTREE J H
POWER FROM THE WIND.
POWER ENG. 18: 59-61, FEBRUARY 1923.

THE AUTHOR DESCRIBES THE MAIN TYPES OF BRITISH WINDMILLS AND THE OUTSTANDING FEATURES OF THEIR OPERATION.

23-0005 DELAMARRE A
WIND MOTORS AND THEIR APPLICATIONS.
OUTILLAGE 7: 694-699, JULY 7, 1923. (IN FRENCH)

23-0006 JOHANSEN I F
WIND POWER PLANTS.
TEKNISKE FORENINGS TIDSSKRIFT 47: 15-20, JANUARY 17, 1923. (IN DANISH)

23-0007 MUNK M M
GENERAL THEORY OF WINDMILLS.
NACA TECH. NOTE NO. 164, 1923.

23-0008 SCOTT A H
THE VALUE OF WINDMILLS FOR PUMPING WATER IN WESTERN AUSTRALIA.
PERTH, WESTERN AUSTRALIA, DEPARTMENT OF AGRICULTURE, BULL. NO. 115, 1923.

23-0009 STERLING W
WIND-DRIVEN GENERATORS.
INST. ELECT. ENG. J. 61: 1096-1099, OCTOBER 1923.

THE AUTHOR DESCRIBES A WIND-DRIVEN GENERATING SET AND GIVES ACTUAL RESULTS OF A PLANT OVER A PERIOD OF SEVERAL MONTHS.

23-0010 WALTER C
WIND POWER IN GERMANY.
Z. VER. DEUTSCH ING. 67: 1037-1041, NOVEMBER 10, 1923.

23-0011 WERREN A
THE CONNECTION OF ELECTRIC PLANTS WITH WINDMILLS.
Z. VER. DEUTSCH ING. 67: 1097-1099, DECEMBER 8, 1923. (IN GERMAN)

TOPICS COVERED ARE PROPERTIES OF WIND, INVESTIGATION OF YIELD OF ENERGY FROM WIND AND INFLUENCE OF AUTOMATIC REGULATION OF WIND WHEEL, AND PROPERTIES OF DIFFERENT TYPES OF D.C. AND THREE-PHASE MOTORS.

23-0012 WIND-DRIVEN ELECTRIC GENERATORS.
PRACT. ENG. 67: 123-124, MARCH 1923.

A WIND POWER PLANT MANUFACTURED BY THE GLASCOW ELECTRICAL ENGINEERING CO., LTD., IS DESCRIBED.

23-0013 WIND-DRIVEN ELECTRIC LIGHTING PLANT.
ENGINEERING 116: 571, NOVEMBER 2, 1923.

DESCRIBED IS A PLANT CONSTRUCTED BY THE LAMBERT ENGINEERING COMPANY, HARROW, ENGLAND.

22-0003 BOSSELMANN R
PROPOSALS FOR D.C. CENTRAL STATION DRIVEN BY WIND POWER.
ELEKTR. KRAFTBETR. BAHNEN 20: 261-263, DECEMBER 10, 1922. (IN GERMAN)

22-0004 FREE POWER.
POWER PLANT ENG. 26: 868, SEPTEMBER 1, 1922.

22-0005 HERZOG K
THE USE OF ASYNCHRONOUS GENERATORS IN WIND MOTORS.
ELEKTROTECH. Z. 43: 961-963, JULY 28, 1922. (IN GERMAN)

THIS ARTICLE PRINTS OUT THE ADVANTAGES AND DISADVANTAGES OF THREE-PHASE-CURRENT GENERATION BY MEANS OF WIND MOTORS IN MOUNTAINOUS REGIONS.

22-0006 JOCHUM M L
TURBINE A VENT. (WIND TURBINE).
SWISS PATENT NO. 96045, SEPTEMBER 10, 1922. (IN FRENCH)

22-0007 WINDMILL STORES ELECTRICITY FOR ELEVEN DAY'S USE.
POP. MECH. 37: 254, FEBRUARY 1922.

22-0008 WIND-POWER FOR THE GENERATION OF ELECTRICITY.
ELECTRICIAN 88: 509, APRIL 28, 1922.

BRIEFLY DESCRIBED IS A SYSTEM FOR THE GENERATION OF ELECTRICITY BY MEANS OF AUTOMATIC HIGH-SPEED WIND DYNAMOS, DESIGNED BY F.A. WILKINSON AND PARTNERS.

21-0003 BASIAUX-DEFRANCE P
SOME CONSIDERATIONS ON UTILIZING WIND ENERGY.
REV. GEN. ELECT. 9(7): 214-216, 1921. (IN FRENCH)

THE AUTHOR DESCRIBES IN GENERAL TERMS THE NECESSITY OF FINDING A PRACTICAL SOLUTION TO THE WIND POWER UTILIZATION PROBLEM AND GIVES SOME DIRECTIVES TO SOLVE THIS PROBLEM.

21-0004 HARNESSING THE WIND TO MAKE ELECTRICITY FOR FARM.
ELECTR. REV. 79: 662, OCTOBER 29, 1921.

THIS ARTICLE DESCRIBES THE "AEROELECTRIC" WINDMILL, GENERATOR AND STORAGE BATTERY COMBINATION MANUFACTURED BY THE PERKINS CORPORATION, MISHAWAKA, INDIANA.

21-0005 HOFF W
THEORY OF THE IDEAL WINDMILL.
NACA TECH. NOTE 46, 1921.

21-0006 LIEBE H
THE WIND TURBINE AND ITS USE FOR THE GENERATION OF ELECTRICITY.
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