

# Forest Biomass: Linking Energy to Forest Health



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# Discussion Topics

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- Sources of forest biomass
- Uses for forest biomass
- Forest biomass energy applications
- Why now?

## Colorado Forest Biomass Supply: How is it generated?



Mechanical Removal  
(timber harvesting)

# Sources of Colorado Forest Biomass Supply

## Forest management activities

- Conventional timber sales
- Hazardous fuels reduction
- Forest health
- Ecological restoration



**Forest Restoration Thinning**



**MPB Salvage**

# Forest Management for Fuels Reduction

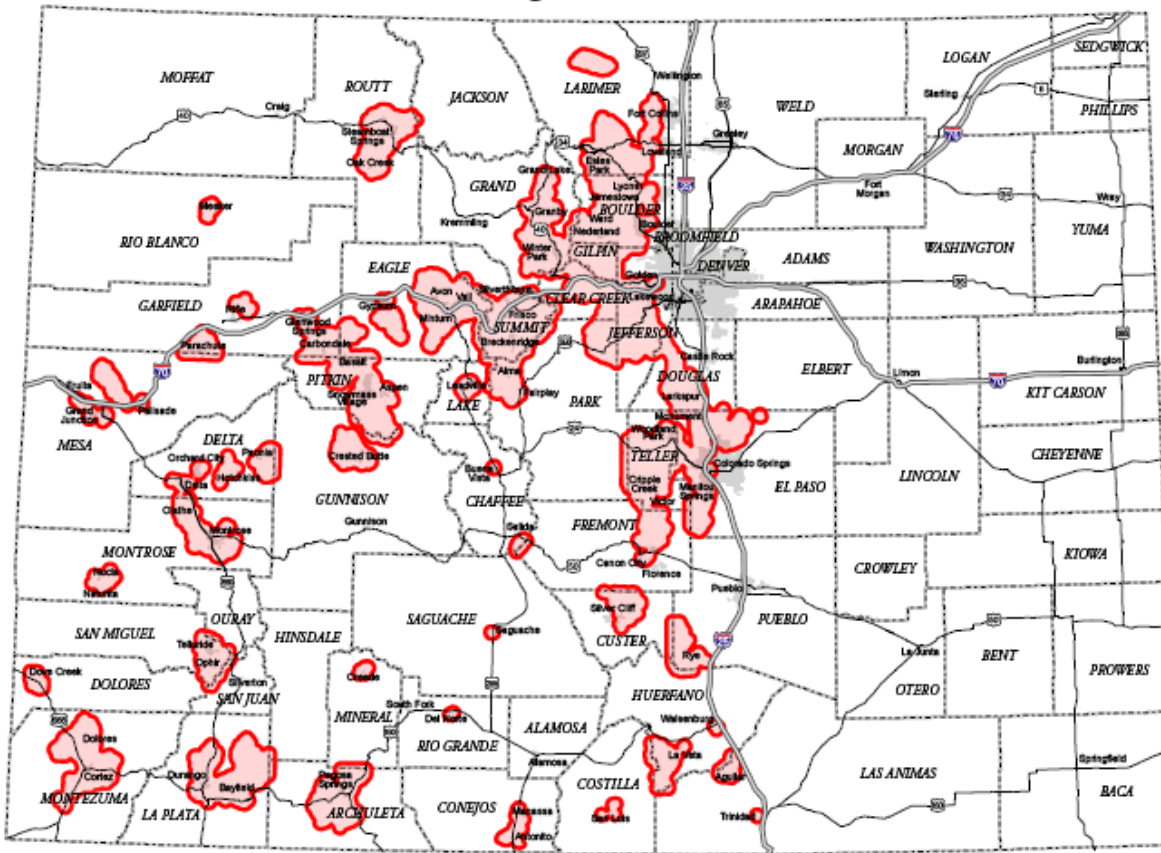
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Defined: Treating forest vegetation at the appropriate landscape scale to significantly reduce large fire potential. Or, in other words:

*What about all that biomass?*

# Colorado "Red Zone"

Interface Areas of High Wildfire Risk in Colorado



- 6.3 million acres at high risk of catastrophic fire.
- 2.4 million acres at high risk along the Colorado Front Range.

# Management Priorities

## By National, Regional and Local Direction

- Key municipal watersheds
- Important wildlife habitat
- High-risk insect and disease areas
- Fire Regime I & II, Condition Class 2 & 3
- Wildland Urban Interface

# Ponderosa Pine

Easily tolerates mechanical and fire use applications



Common existing condition



Desired existing condition



## Thinning in Ponderosa Pine Zones - Size and Form of Trees Removed



- 80 to 96% of commercial size trees removed to improve ecological conditions were between 5 and 11.9 inches
- Trees larger than 12 inches comprised up to 18%
- They're small "but limby"
- Suppressed growth, juvenile and reaction wood

## The Impact of Mountain Pine Beetle on Biomass Supply

Approximately 1.7 million acres of mature lodgepole will succumb to bark beetles in Colorado in the next 3 to 5 years. These trees will in turn present a serious fire hazard risk.

(Source: Denver Post 15-Jan-2008)



## Lodgepole Pine (MPB) Salvage - Size and Suitability of Trees Removed



- MPB-killed trees are typically greater than 8 inches DBH
- Most MPB-killed trees are currently suitable for saw timber and some are being salvaged
- MPB-killed trees are usually suitable for saw timber 2 to 3 years after death of tree
- Standing dead timber is suitable for other uses for a considerably longer period of time.

# Ponderosa Pine



Low residual stocking can promote understory development and the need for maintenance treatments in the future. Again, fire use is constrained in these cover types.



## Wood Products That Can Be Produced From Forest Biomass

- **Christmas trees**
- **Post and poles**
- **House logs**
- **Mine props**
- **Lumber and timbers**
- **Outdoor structures**
- **Millwork**
- **Landscape timbers**
- **Railroad ties**
- **Oriented strandboard**
- **Wood Pulp**
- **Wood Pellets**
- **Firewood**
- **Landscape mulch**
- **Animal bedding**
- **Compost**

# Biomass Utilization

- Mulch
- Compost
- Chemicals
- Bio-energy



# Bioenergy Applications

- Electric power generation
- Co-firing with coal
  - Power plants
  - Cement kilns
- Cogeneration of steam and/or electric
- Direct-firing wood for heat
- Liquid fuels



## The Case for Using Biomass to Produce Liquid Fuels

- As petroleum becomes increasingly scarce, liquid fuel prices will increase, especially if demand continues to increase
- Biomass is currently the only renewable energy source that can be used to produce liquid fuels
- Billion Ton Study (Joint USDA & DOE Study)
  - Almost 1.4 billion tons of fuel available annually on a sustainable basis in the U.S.
  - With current conversion technologies, this biomass could be used to produce at least 30% of our current liquid fuel requirements nationally



# Why now?

- A unique policy push is emerging due to two series of events:
  1. Greater attention paid to large-scale, catastrophic wildland fire events in close proximity to increasing human populations pushes demand for improved forest health
  2. Increasing prices for non-renewable energy sources pushes demand for alternative fuels

# Conclusion

- Colorado is facing serious forest management challenges that could generate large quantities of biomass
- This biomass could potentially be used for a variety of energy applications that could provide a partial solution to future shortages of fuels currently derived from non-renewable sources.

# Colorado Wood Utilization and Marketing Program



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# Questions?



# Thank you!