

Forest Biomass: Linking Energy to Forest Health



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Discussion Topics

- 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

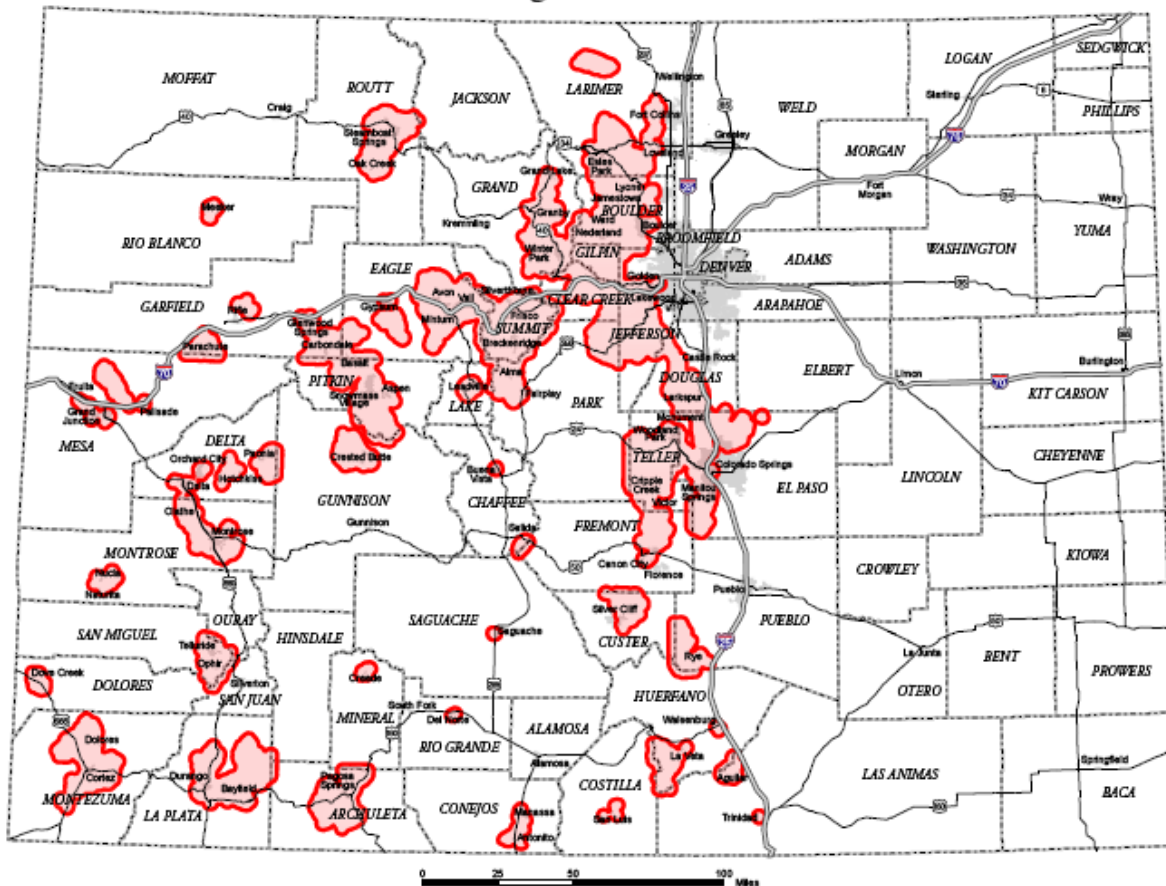
Forest Management for Fuels Reduction

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!