Woody Biomass Resource

Mohammed Iddrisu, MN DNR

Fueling the Future:
The Role of Woody Biomass for Energy Workshop
March 26, 2009
Ponsford

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University of Minnesota Extension, White Earth Tribal College, Natural Resource Conservation Service, Soil and Water Conservation District – Becker County

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Biomass for Local Renewable Energy and Economic Development

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Availability of Biomass

- OECD – commercial, industry-led
- Asia and Latin America – modern, commercial
- Africa – harvested informally

Biomass in the United States

- Domestic energy production
- 9% renewable: 47% biomass: 72% wood-based

Source: Energy Information Administration 2004
Woody Biomass Sources
Logging Residue

*Logging Residue*: Unmerchantable tops, branches, and stumps of felled trees, and logs and standing trees that are too small or defective to be removed economically from the woods during a logging operation

- Largest and most economically available woody biomass source
- 10-19 Green tons/acre depending upon cover type (Sorensen et al. 2007)
- Not all available must leave about 30% on site
Sawmill Residue

Much already is utilized by local mills through self-generating energy
Other Industrial Sources
Pre-commercial Thinning (TSI)

- Importance source of woody biomass
- Improve forest and wildlife habitat
- Increased productivity by up to 50% or more
- Costly operation
- Aspen: 4.5 dry tons/acre at age 10 and 24 at age 30 (Demchik, 2006)
Brushland Harvest

- Brushy areas are sometimes “sheared”, piled and burned for wildlife management
- Harvested brush material sold for biomass market
- Estimated yield of 12-17 dry tons/acre on well stocked sites (Berguson, 1997)
Dedicated Energy Crops: Hybrid poplar

- Average of 17.11 tons over 6 years
- Approx. 3 tons/ac/yr
- Some improved clones yielding nearly 6 tons/ac/yr
Hybrid Poplar has been found to be an excellent substitute for aspen fiber in papermaking and Oriented Strand Board (OSB) production.

- Hybrid Poplar can reach merchantable size in 7 to 12 years.
- Intensive culture is required for the first 3 years in order to grow hybrid poplar.
- It is commonly grown on marginal agricultural fields.
Land Clearing Projects

Significant resource from powerline clearing and road projects
Fire Hazard Reduction Operations

- Forest health
  - USFS pays ~$600/acre for fuel removal
  - Biomass harvest for energy could reduce cost of treatment
  - Reduced mortality due to insect and disease
  - Reduce wildfire risk
Urban Wood Waste

- Construction and demolition
- Post-consumer used wood waste
- Tree removal and trimmings
Marketing Biomass

Limiting factors:
► Chip size
► Chip quality
► Percent bark
► Amount of dirt
► Processing efficiency
► End product
## Biomass Availability-MN

<table>
<thead>
<tr>
<th></th>
<th>Available</th>
<th>Utilized</th>
<th>Net Available</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forest total</strong></td>
<td>2,924,500</td>
<td>748,900</td>
<td>2,175,600</td>
</tr>
<tr>
<td><strong>Primary Industry</strong></td>
<td>1,840,800</td>
<td>1,730,000</td>
<td>110,800</td>
</tr>
<tr>
<td><strong>Secondary Industry</strong></td>
<td>466,870</td>
<td>380,910</td>
<td>85,960</td>
</tr>
<tr>
<td><strong>Urban</strong></td>
<td>925,000</td>
<td>225,900</td>
<td>699,100</td>
</tr>
<tr>
<td><strong>Total all sources</strong></td>
<td>6,157,170</td>
<td>3,085,710</td>
<td>3,071,460</td>
</tr>
</tbody>
</table>
Woody Biomass: End products

**Engineered wood:** Georgia Pacific-Duluth International Bildrite in International Falls

**Landscape Mulch:** Markets vary by region – mostly urban tree trimming, land clearing, and sawmill bark residue.

**Animal Bedding:** Dairy and poultry industry utilize sawdust and shavings, processed from mill residue and usually not roundwood.

**Energy:** Mills and processors have used residue for heat, steam, and electricity for decades.

**Special Forest Products:** Small, but growing market.
Biomass Utilization & Marketing Issues

- Lack of consistent market for biomass
- Transportation costs are causing a limited procurement range
- Prices paid are a concern for the supplier
- Lack of efficiency in harvesting biomass – individual and multiple sites
## Biomass Markets

### Large Woody Biomass Consumers in Minnesota

<table>
<thead>
<tr>
<th>Company</th>
<th>City</th>
<th>Fuel source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minnesota Power</strong></td>
<td>Grand Rapids, Duluth</td>
<td>Mill and logging residue</td>
</tr>
<tr>
<td>Boise</td>
<td>International Falls</td>
<td>Mill and logging residue</td>
</tr>
<tr>
<td>Verso Paper</td>
<td>Sartell</td>
<td>Mill and logging residue</td>
</tr>
<tr>
<td>SAPPI</td>
<td>Cloquet</td>
<td>Mill and logging residue</td>
</tr>
<tr>
<td>Woodcraft Industries</td>
<td>Foreston</td>
<td>Mill residue</td>
</tr>
<tr>
<td>Valley Forest Wood Products</td>
<td>Marcell</td>
<td>Logging residue</td>
</tr>
<tr>
<td><strong>St. Paul District Energy</strong></td>
<td>St. Paul</td>
<td>Urban and logging residue</td>
</tr>
<tr>
<td>Laurentian Energy Authority</td>
<td>Virginia, Hibbing</td>
<td>Logging residue</td>
</tr>
<tr>
<td>Central Minnesota Ethanol</td>
<td>Little Falls</td>
<td>Mill and logging residue</td>
</tr>
<tr>
<td>Minntac Taconite Kiln</td>
<td>Mountain Iron</td>
<td>Mill residue</td>
</tr>
<tr>
<td>FibroMinn</td>
<td>Benson</td>
<td>Wood chips, turkey manure</td>
</tr>
<tr>
<td>Chippewa Valley Ethanol</td>
<td>Benson</td>
<td>Wood chips</td>
</tr>
</tbody>
</table>
What is the Future for Biomass?

• Who knows! Higher Energy prices - $4/gal gas may be a driving force?
• Competitiveness of paper industry will have an influence
• Great public interest in renewable energy
• Timber harvest rates will be key as well
Biomass is piling up.

Questions?

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