Biomass Marketing Opportunities

Mark Linquist, Biofuels Coordinator, MN DNR

Fueling the Future:
The Role of Woody Biomass for Energy Workshop

April 2, 2009

Brainerd

Sponsored by:
University of Minnesota Extension, WesMin and Onanegozie RC&Ds, Natural Resource Conservation Service – Baxter, MN, Soil and Water Conservation District – Crow Wing County

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Biomass Marketing Opportunities

By: Mark Lindquist
Biofuels Program Manager

To: Fueling the Future — The Role of Woody Biomass for Energy

April 2, 2009
DNR Mission

- Work with citizens to conserve/manage state’s natural resources
- Provide outdoor recreation opportunities
- Provide for commercial uses of natural resources to create sustainable quality of life
It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us. - Charles Dickens, A
Biomass – Always a part of the energy system

Source: US Energy Information Agency
Woody Biomass - Current Industry

- Mill Residue
  ~ 1.5 million tons

- Green chips from forest operations
  ~ 0.6 million tons

- Other resources
  ~ 0.6 million tons
Non-Woody Biomass

- Agricultural Processing by-products
  - Koda Energy
  - Corn-Plus Ethanol
  - Northern Quality Seeds
- Waste Water Treatment
- Manure
  - FirboMin
Energy Market – Current Prices

Price Drivers

- Competing energy prices
- Relative efficiency of fuel
- Capital investment requirements
- Ease of use
- Permitting / regulatory issues
# Energy Price Comparisons

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Unit Price</th>
<th>Unit</th>
<th>$/mmbtu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal MN Ave ’07</td>
<td>$43</td>
<td>ton</td>
<td>$2.39</td>
</tr>
<tr>
<td>Natural Gas City Gate ‘08</td>
<td>$8.37</td>
<td>mmbtu</td>
<td>$8.37</td>
</tr>
<tr>
<td>Nat. Gas: Henry Hub 5/08</td>
<td>$3.80</td>
<td>mmbtu</td>
<td>$3.80</td>
</tr>
<tr>
<td>Premium Wood Pellets – retail</td>
<td>$250</td>
<td>ton</td>
<td>$15.63</td>
</tr>
<tr>
<td>Premium Wood Pellets - wholesale</td>
<td>$150</td>
<td>Ton</td>
<td>$9.38</td>
</tr>
<tr>
<td>Green chips</td>
<td>$25</td>
<td>ton</td>
<td>$3.33</td>
</tr>
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<td>$150</td>
<td>Ton</td>
<td>$9.38</td>
</tr>
<tr>
<td>Corn, So MN – elevator price</td>
<td>$3.50</td>
<td>bu.</td>
<td>$9.09</td>
</tr>
<tr>
<td>Propane Midwest 07</td>
<td>$1.78</td>
<td>gallon</td>
<td>$19.49</td>
</tr>
<tr>
<td>Fuel Oil Residential 07</td>
<td>$2.59</td>
<td>gallon</td>
<td>$18.50</td>
</tr>
<tr>
<td>Fuel Oil Residential 3/09</td>
<td>$1.85</td>
<td>gallon</td>
<td>$13.21</td>
</tr>
<tr>
<td>Green chips</td>
<td>$25</td>
<td>ton</td>
<td>$3.33</td>
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<td>$40</td>
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</table>
Woody Biomass Market
## Major Wood Biomass Consumers

<table>
<thead>
<tr>
<th>Market</th>
<th>Scale</th>
<th>Forest Biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP – Grant Rapids</td>
<td>300,000 GT</td>
<td>Yes</td>
</tr>
<tr>
<td>MP – Duluth</td>
<td>200,000 + GT</td>
<td>Yes</td>
</tr>
<tr>
<td>Laurentian Energy</td>
<td>200,000 + GT</td>
<td>Yes</td>
</tr>
<tr>
<td>St. Paul Dist. Energy</td>
<td>300,000 GT</td>
<td>Yes</td>
</tr>
<tr>
<td>Boise – I-Falls</td>
<td>200,000 + GT</td>
<td>Yes</td>
</tr>
<tr>
<td>SAPPI Cloquet</td>
<td>200,000 + GT</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: MN DNR, Forestry Biomass User Directory
<table>
<thead>
<tr>
<th>Market</th>
<th>Scale</th>
<th>Forest Biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>FibroMin Benson</td>
<td>50,000 – 200,000 GT</td>
<td>Yes</td>
</tr>
<tr>
<td>Valley Forest Products Marcell</td>
<td>50,000 – 200,000 GT</td>
<td>Yes - some</td>
</tr>
<tr>
<td>Verso</td>
<td>50,000 – 200,000 GT</td>
<td>Potentially</td>
</tr>
<tr>
<td>CVEC –Benson</td>
<td>50,000 – 200,000 GT</td>
<td>Yes - transition to corn cobs</td>
</tr>
</tbody>
</table>

Source: MN DNR, Forestry Biomass User Directory
Non-Woody Biomass Facilities

- Koda Energy: 176,000 tons
  Mostly sourced from internal resources
  Seeking additional supplies
- University of MN Morris: 9,000 tons
  Technical challenges with gasifier
- FibroMin: Turkey Litter 300,000 tons
  Augmented with woody biomass
Future Driving Factors

- Long term price trends for oil and gas
- Federal Cellulosic Fuel Standard
- Greenhouse Gas Regulations
  - Cap and Trade
  - EPA – Clean Air Act
Biomass – Ill-Defined Development Path

**Feedstock**
- Grain
- Crop residue
- Timber
- Slash
- Mill Residue
- Manure
- Urban Wastes
- SRWC
- Prairie grass

**Technology**
- Combustion
- Gasification
- Pyrolysis
- Fermentation
- Combined Heat and Power

**Market**
- Electric Power
  - Utility
  - On-Site
- Industrial Process Heat
- Home Heating
- Transportation Fuels
- Chemicals
Biomass – Well-Defined Development Path

**Feedstock**
- Corn

**Technology**
- Dry Mill Ethanol Plant

**Market**
- Gasoline extender
Key Observations

- Biomass prices are benchmarked against coal or natural gas
- Biomass supply is small compared to energy market (MN Btus used = 120 million DRY tons)
- Just a few large projects could drive significant price shifts
Where is the market going?

- Biomass development path is not well defined – competing visions
- Better broad-based understanding of the size of the biomass supply
- Need more definition of the most strategic and beneficial use of biomass
Key Observations

- High and rising nat gas prices drove interest
- Volatility and uncertainty in nat gas market impedes biomass
- Densification improves fuel value, but adds significant cost
Questions?
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