Wood Fuel Supply and Distribution Business

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Executive Director
Sustainable Resources Institute
Outline

- Fuel types
- Woody biomass types/source
- Wood pellets
- Wood fuel availability
- Supply/resource needs
Types of Fuel

- Manufacturing residue (sawdust, bark, chips)
- Logging residue (chips)
- Cord wood (8’ lengths or less)
- Pellets
Woody Biomass Categories

- Forest Industry Residue
- Manufacturing Industry Residue (e.g. pallets)
- Non-Forest Tree Residue/Waste
- Logging Residue
- Woody Biomass Crops
Markets for Woody Biomass

- Hog Fuel
  - Direct Burn
- Wood Energy Product
  - Pellets
  - Briquettes
  - Ethanol
  - Biodiesel
  - Etc.
- Animal Bedding
  - Mulch
    - Landscaping
- Firewood
- Composting
Forest Industry Residue - WI

90% Utilized ~ 2 million tons of residue

- Best use/best price
- Transportation distance
Mill Residue - WI

Green (Sawmill)

- Sawdust (many different markets)
- Bark (mulch or boiler fuel)
- Clean chips (pulp mill or boiler fuel)
Mill Residue - WI

Dry (Secondary Manufacturers)

- Sawdust
- Chips
Forest Industry Residue - WI

- Once considered waste, it is now in demand for various products
- Decline in the forest industry as a whole has reduced the amount of residue available
Urban/Suburban Wood - WI

- A lot of potential
- 292,000 tons estimated – minority is utilized
Urban Logging - WI

- Lower cost of removal
- High efficiency
- Marketable volumes
- Potential cost offset by marketing wood products
WI manufacturers (non-wood Industry)

Generate an estimated 375,000 tons of wood residue annually, of which:

- 230,000 tons are utilized
- 145,000 tons are disposed of
- Disposal costs WI businesses approximately $2,100,000 annually
Thirteen trees cut, processed, & ready for removal
Taking down a tree near a powerline
Starting to cut an Ash in front of an office
Same Ash on the ground
Forwarder moving wood
WI - Landfills - 372

- Most do <500 tons of wood per year
- 247,000 estimated tons
## WI - Green Ton Availability – Logging Residue

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Green Tons Potentially Available Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>138,657</td>
</tr>
<tr>
<td>State</td>
<td>85,750</td>
</tr>
<tr>
<td>County</td>
<td>635,178</td>
</tr>
<tr>
<td>Private Tax-Law</td>
<td>773,557</td>
</tr>
<tr>
<td>Private Non-Tax Law</td>
<td>773,557</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,406,699</strong></td>
</tr>
</tbody>
</table>
Logging Residue

Logging Residue (Green chips)
- Cut-to-length
- Whole tree skidded
## Types of Harvesting – Lake States

<table>
<thead>
<tr>
<th>State</th>
<th>Whole Tree-Mech.</th>
<th>CTL-Mech.</th>
<th>CTL-Hand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td>40</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Minnesota</td>
<td>50</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>15</td>
<td>75</td>
<td>10</td>
</tr>
</tbody>
</table>
Cut-to-Length Mechanized

- Products are cut and piled in woods
- Forwarder takes product out
- Piled tops could be removed in separate trips
Cut-To-Length Biomass Removal

- In a cut-to-length operation with traditional equipment, the cost of delivered woody biomass is in the $25 to $45 per green ton range (depending on a number of variables)
Whole Tree Cutting and Removal

- Mechanized felling and bunching
- Grapple skidding
- Process on landing
  - Slasher
  - Chainsaw
  - Chipper
Logging Residue
Timber Sale Method Influence

Lump Sum vs. Scaled

Pros: Logger has control of the product

Cons: Pay up-front

Pros: Pay for what you take out

Cons: Can’t deviate from product specifications
Raw Material Supply

Sustainable Raw Material

- Ownership of Forest Land
- Supply Chain (Loggers)
- Willingness to Commit to Long-Term Contracts
Benefits of Logging Residue Removal

- High fire hazard areas benefit from fuel reduction
- Many landowners prefer “park like” appearance
- Local economy is stimulated
- Improved utilization
Potential Negatives of Residue Removal

- Loss of cover for wildlife
- Nutrient depletion
- Increased browsing
- Conflict with trail armoring
Logging Residue Potential

Biomass is, and will be, an increasing product from our forests. Various factors will affect how and when this happens:

- Stumpage prices
- Regulations/guidelines
- Distance to market(s)
- New and emerging markets
- Decline/increase of competing markets
- New technology for harvesting, transporting, and processing
Woody Biomass Harvesting Guidelines

- Developed by Wisconsin’s forestry community in recognition of an emerging interest in wood-based bio-energy.
Woody Biomass Harvesting Guidelines

- Woody biomass offers Wisconsin woodland owners a potential market for a previously underutilized product – small diameter trees and the branches, tops and limbs of harvested trees.
Woody Biomass Harvesting Guidelines

Emergence of this new market has raised concerns about sustainability including the potential loss of soil nutrients, reduced wildlife habitat, and compaction of forest soils.
Woody Biomass Harvesting Guidelines

- Wisconsin Council on Forestry recognized the need for harvesting guidelines to ensure that woody biomass harvest does not compromise the long-term productivity of Wisconsin’s forestland and that woody biomass is a sustainable, reliable forest product for landowners and timber producers.
How long has biomass harvesting been occurring in Wisconsin?

A. 5 years
B. 10 years
C. 50 years
# Regeneration Harvests

<table>
<thead>
<tr>
<th>Dry Tons per Acre</th>
<th>Timber Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>A</td>
</tr>
<tr>
<td>18.6</td>
<td>A</td>
</tr>
<tr>
<td>13.4</td>
<td>A</td>
</tr>
<tr>
<td>25.7</td>
<td>MR</td>
</tr>
<tr>
<td>18.8</td>
<td>MR</td>
</tr>
<tr>
<td>28.2</td>
<td>OR</td>
</tr>
<tr>
<td>29.1</td>
<td>PJ</td>
</tr>
<tr>
<td>18.9</td>
<td>PJ</td>
</tr>
</tbody>
</table>
## Selective Harvests

<table>
<thead>
<tr>
<th>Dry Tons per Acre</th>
<th>Timber Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.4</td>
<td>NH</td>
</tr>
<tr>
<td>10.9</td>
<td>NH</td>
</tr>
<tr>
<td>10.6</td>
<td>NH</td>
</tr>
<tr>
<td>10.2</td>
<td>NH</td>
</tr>
<tr>
<td>8.2</td>
<td>NH</td>
</tr>
<tr>
<td>7.6</td>
<td>NH</td>
</tr>
<tr>
<td>7.2</td>
<td>NH</td>
</tr>
<tr>
<td>5.1</td>
<td>NH</td>
</tr>
<tr>
<td>4.7</td>
<td>NH</td>
</tr>
<tr>
<td>4.1</td>
<td>NH</td>
</tr>
</tbody>
</table>
## Thinning Harvests

<table>
<thead>
<tr>
<th>Dry Tons per Acre</th>
<th>Timber Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>OR/PW</td>
</tr>
<tr>
<td>9.9</td>
<td>PR</td>
</tr>
<tr>
<td>7.2</td>
<td>PR</td>
</tr>
</tbody>
</table>
## Woody Biomass Availability

<table>
<thead>
<tr>
<th>Type of Harvest</th>
<th>Mean Dry Tons per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regeneration</td>
<td>22.1</td>
</tr>
<tr>
<td>Selective</td>
<td>8.1</td>
</tr>
<tr>
<td>Thinning</td>
<td>9.4</td>
</tr>
</tbody>
</table>
Biomass Processor Head
Bundler
Bundles being forwarded
Baler
Eagle Claw Forwarder
Eagle Claw Forwarder
Eagle Claw Forwarder & Chipper
Loading the Chipper
Chipper
Chipper
Chipper Loading the Trailer
Distribution Systems
Chip Distribution
Chip Distribution – Walking Floor Trailer
Chip Distribution – Dump Station
Woody Biomass Crops
Cordwood

- Direct from loggers (usually 10 cord loads)
- Green (40-50% moisture)
- Dried for a year (25-40% moisture, diameter and species dependent)
- Price ($80-$120/cord, dependent on time of year, other demand markets)
- A list of loggers can be obtained from the local DNR office
Pellets

Residential/Premium
- Bagged
- Totes
- Bulk

Commercial
- Totes
- Bulk
Pellet Raw Material
Premium Pellets
Which pellet produces more BTUs?

A. Hardwood

B. Softwood
Pellet Distribution

- 40 lb bags
- 1 ton totes
- Bulk delivery
Pellets Being Bagged
Shrink Wrapping
One-Ton Pallet of Bags
Totes
Determining availability and price for wood chips
Amount of Fuel Used

- <5000 tons
- 5,000 – 20,000 tons
- 20,000+ tons
Seasonal or Year-round

- Continuous
- Sporadic
Fuel Specifications

- Species
- Size
- Ash Content
Ash Content

- Clean chips <1%
- Biomass chips (CTL) 3-5%
- Biomass chips (whole tree) 4-8%
- Contaminated 8%+
Reality

- Procurement radius
- What's available in that radius?
- At what price?
Potential Sources of Woody Biomass
WE Domtar Plant

50 Megawatt

500,000 tons of biomass annually
WE Domtar Plant

Sources

- Wood from land cleared of trees for development
- Residue from saw mills & paper mills
- Urban wood
WE Domtar Plant

“Rothschild biomass plant only getting 10% of fuel from forest waste”

stevenspointjournal.com
Manufacturing and Other

- Identify sources and develop a procurement plan
Facility Location

- Need a specific radius/county analysis
- Need analysis by ownership
- Need to identify existing and project competition
Resource Analysis For a Biomass Facility

- Potentially available
- Really available
- At what price?
Summary

- Raw material is available – price is the driver
- Source of wood fuel is location dependent
- Pellets are readily available in Wisconsin Fuel
- Knowing sources and prices is essential before installing a wood energy system
Questions?
Resources

- Statewide Wood Energy Team: www.wisconsinwoodenergy.org
- Wisconsin Forest Products Services Team
  www.dnr.wi.gov;
  steven.hubbard@wiscosnin.gov
- US Forest Service Forest Products Lab:
  www.fpl.fs.fed.us
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