Wood for power generation

Michigan Biomass
Michigan Biomass Group

- 6 facilities
- 162 MW
  - >30% of all Michigan renewables
  - < 1% of all grid power
- 2.5 million tons waste wood
- Offset 1.2 million MWh coal
  - 3.8 million tons CO₂ reduction
- $68 million annual economics
Electricity sources

Electricity sources in Michigan:

- Coal: 59%
- Natural gas: 26%
- Nuclear: 11%
- Petroleum: 3%
- Other: 3%
- Renewables: 3%

Source: Energy Information Agency 2007
Electricity sources

Renewable Power Sources

- Wood/Wood derivatives: 46%
- Hydro: 34%
- Others*: 20%
- Wind < 1%

Source: Energy Information Agency 2007
* Landfill gas, poultry litter, manure digestion, etc.
Data & information

- All wood = green tons
  - Ave. 2 GT/MWh
- Maximum potential
  - Installed capacity
  - 90% capacity factor
Biomass demand

- Commercial generation
  - Power delivered to the grid
- Self-service generation
  - Mills & manufacturing
- Other
  - Pellets
  - Biofuels
Current biomass sources

- Wood chips 33%
- Forest residue 40%
- Mill residue 20%
- Urban wood sources 7%
  - Recycled wood
  - Brush, yard debris, land clearing

Existing demand: Commercial

1. Cadillac Renewable Energy 36 MW
2. Genesee Power Sta. 36 MW
3. Grayling Generating Sta. 36 MW
4. Hillman Power Co. 18 MW
5. L’Anse Warden Electric 18 MW
6. Lincoln Power Sta. 18 MW
7. McBain Power Sta. 18 MW

Totals 182 MW

2.9 million tons
Existing demand: Self-service

- 712,316 MWh
- 90 MW
- 1.4 million tons

Source: Energy Information Agency 2007
Existing demand: Other

Pellet producers

1. Maeder Brothers 25,000 tons
2. Fiber By-Products 20,000 tons
3. Michigan Wood Pellet 50,000 tons
4. Vulcan Wood Products 8,000 tons

Totals 103,000 tons

Source: Telephone survey
Current demand

- Commercial: 2.9 million tons
- Self-service: 1.4 million tons
- Other: 103,000 tons

TOTAL: 4.4 million tons
Future demand: Commercial

1. CMU expansion 17 MW
2. Gwinn 20 MW
3. Detroit Edison ~400 MW
4. Escanaba 25 MW
5. NMU 10 MW
6. Newberry 24 MW
7. Mancelona 36 MW
8. White Pine 40 MW
9. Wolverine Power 120 MW
10. Traverse City L&P 20 MW

TOTAL 712 MW
11.2 million tons

24-Feb-10
Future demand: **Self-service**

LaFarge Cement (?) 213,000 tons

**Totals** 213,000 tons
Future demand: Other

1. RenewaFuel (briquettes) 300,000 tons
2. Frontier (ethanol) 1 million tons
3. Kirkland Products (pellets) 71,000 tons
4. POET (ethanol) ????

TOTAL 1.4 million tons
Biomass demand

Current potential
- Commercial: 2.8 million tons
- Self-service: 1.4 million tons
- Other: 103,000 tons

**SUBTOTAL**: 4.4 million tons

Potential future
- Commercial: 11.2 million tons
- Self-service: 213,000 tons
- Other: 1.4 million tons

**SUBTOTAL**: 12.8 million tons
Biomass demand

- Total potential
  - Commercial: 14.0 million tons, ^391%
  - Self-Service: 1.6 million tons, ^15%
  - Other: 1.5 million tons, ^1443%

Potential
Grand Total: 17.1 million tons, ^292%
Michigan forest stats

- 19.3 million acres (53%)
  - Incr. 6%, 1980
- 65% private
  - 57% non-industrial (ave. <27 acres)
  - 8% forest industry
- 35% public
  - 14% national
  - 20% state

Source: Michigan Forest Products Council
MCAC report

- Unutilized* woody biomass**
  - Unharvested fiber (<5") 13.4 million tons
  - Saw timber 10.6 million tons
  - Pulpwood 9.4 million tons
  - Urban wastes 2.2 million tons
  - Logging residue 1.5 million tons
  - Roads, ROW, clearing 160,000 tons
  - Secondary mill waste 158,000 tons
  - Primary mill waste 75,000 tons

**TOTAL 37.5 million tons**

Source: Michigan Climate Action Council Report, Table J-1., pg J-7

* Adjusted for other, higher-value uses (see report footnote 2)
** Woody biomass only, adjusted to green tons
Uncertainties

- Supply chain infrastructure
  - Producers
    - Loss/change of primary markets
    - Economic impacts

- Regional supply
  - Accessibility
  - Availability
  - Affordability
Uncertainties

- Forest health
  - Slowed regeneration
  - Increased disease, mortality
- Market development
  - Energy = higher value market?
  - Impact on users
    - Social, biological, environmental
Initiatives

- Forest Biomass Information System
  - MSU, MTU, MEDC, MFPC
  - Data extrapolations
    - FIA and TPO data
  - Logger, mill, generator surveys (MSU)
Summary

- Current demand: 4.4 million tons
- Potential total demand: 17.1 million tons

- “High altitude” data suggests feasibility
  - MCAC report
  - Lacks regional/detailed data
    - Forest Biomass Inventory System

- Forest status
  - Regeneration slowed, health deteriorated
  - Majority owner: small, private, non-industrial
  - State ownership: 20%, most timber sales
Thank you

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