

Biomass Power in Michigan



Michigan Forest Management
Advisory Committee
Gary Melow 3/5/14

Terminology

- Megawatt (MW) 1 million watts / 1,000 kilowatts
- Megawatt hour (MWh) Unit of electrical energy
- MW capacity Generation capability
- MWe MW equivalent (fuel-based)
- GHG Greenhouse gas
- CO₂e Unit of greenhouse gas (tons)
- Torrefaction Charring process, “bio-coal”
- Biogenic Non-geological; non-fossil

Biomass definition

- Energy Information Administration

Wood and Wood Derived Fuels includes paper pellets, railroad ties, utility poles, wood chips, bark, red liquor, sludge wood, spent sulfite liquor, and black liquor, with other wood waste solids and wood-based liquids.

Biomass in Michigan

- 12 facilities
- 294 MWe capacity
 - 205,000 average homes
 - Appx. 765 FTEs
- Capacity: 3.7 million green tons
- Offset 2.3 million MWh system power
 - Nearly 1.4 million tons coal CO_{2e}
- \$103 million annual economics
 - 70% to 80% production costs = fuel

Michigan Biomass

- | | | |
|----|---------------------------|-------|
| 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. | Lincoln Power Sta. | 18 MW |
| 6. | McBain Power Sta. | 18 MW |

Totals **162 MW**

1.6 million tons

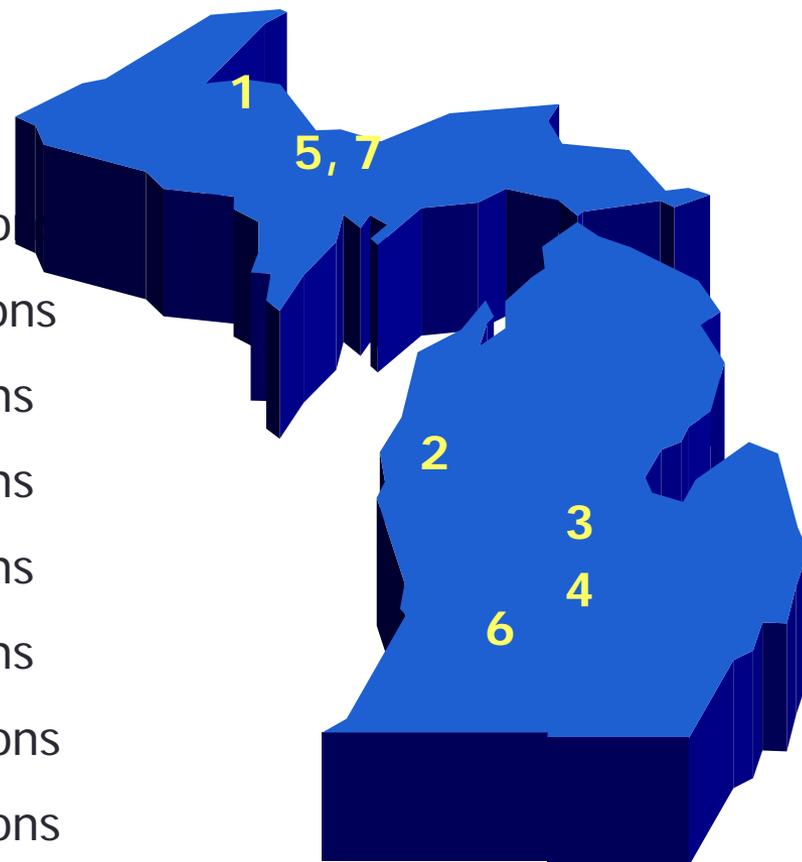
(2013)



Other biomass power

1.	L'Anse Warden Electric	234,000 tons
2.	TES Filer City	117,000 tons
3.	CMU	39,000 tons
4.	MSU	18,200 tons
5.	NMU	39,000 tons
6.	Battle Creek VA	26,000 tons
7.	Biogenic Reagent (comm.)	150,000 tons
8.	Other pellets (res.)	120,000 tons
9.	Industrial CHP	1.1 million tons

1.6 million tons

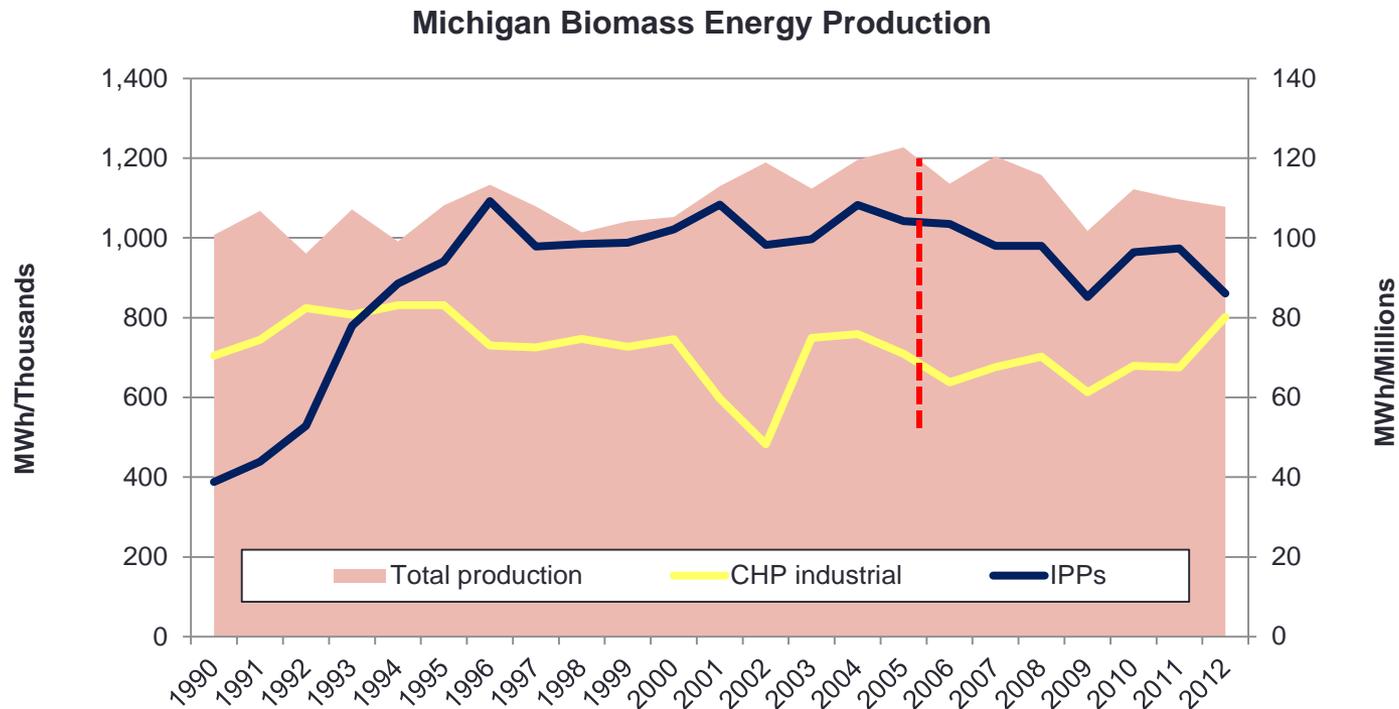


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Biomass power production



Source: Energy Information Administration

Note: Axes not to scale (1:100)

Renewable Portfolio Standards

- Michigan PA 295 of 2008
 - “Any organic matter that...”
 - “Is non-fossil fuel...”
 - “Replenishes in human, not geological time...including...”
 - “Paper and pulp products
 - “Precommercial wood thinning waste, brush, or yard waste
 - “Wood wastes and residues from the processing of wood products or paper

Eligible biomass (Michigan PA 295 of 2008)

- Crops and crop wastes
- **Short-rotation energy crops & herbaceous plant**
- Animal wastes
- Wastewater sludge or sewage
- Aquatic plants
- Food wastes
- **Bio-fuels organic byproducts**
- Pulp, paper and wood manufacturing wastes
- **Urban wood waste**
 - **Land clearing, landscape debris, power line trimming**

Eligible biomass (Michigan PA 295 of 2008)

- “**Trees and wood** only from sustainably managed forests or procurement systems* ...
 - The Sustainable Forestry Initiative (SFI)
 - The Forest Stewardship Council (FSC)
 - The American Tree Farm systems
 - The Canadian Standards Association
 - The Pan-European Forest Certification
 - The Finnish Forest Certification system
 - The UK Woodlands Assurance Scheme
 - ISO 14001 standards

* *Sec. 261c, 1984 PA 431, MCL 18.1261c, Management & Budget Act*

Woody biomass sources

- Mill waste as % of fuel supply*
 - 1998... 68.8%
 - 2008... 37.5%
 - 2009... 13.6%



**Source: Grayling Generating Station*

Supply chain

- Seasonality
- Aggregation
- Processing
 - Collection, harvest, storage, transportation
 - Sizing, drying
 - Torrefaction

Fuel resources

- Silviculture
 - Fuel load reduction – forest stewardship
 - Increased thinning – forest management plans
 - Invasive removal – sanitation, salvage
 - Methods & technologies – CHST efficiencies

Regulatory uncertainties

- US EPA regulations
 1. Boiler MACT
 2. NHSM / CISWI
 - Non-Hazardous Secondary Materials
 - “Fuel” vs. “solid waste”
 - Commercial and Industrial Solid Waste Incinerator
 - Stricter emission limits
 3. Tailoring Rule
 - Regulation of biogenic (non-fossil) GHG

Other uncertainties

- Carbon accounting methods (*Tailoring Rule*)
- Public perception
 - Forest impacts
 - Air quality
 - Human health

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