

WOOD BIOMASS RESOURCES IN MICHIGAN



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Department of Natural Resources Forest Resource Management

- Gather, Analyze & Disseminate Relevant Information
- Make the tie to Sustainable Management & Community Economic Growth
- Management Responsibilities for 3.9 Million Acres of State Forest Lands



Partners in Promoting Wood Biomass Energy in Michigan

- Michigan State University
- USDA Forest Service
- Michigan Technological University
- Michigan Biomass Energy Program
- SE Michigan RC&D Council
- UP RC&D Council
- Industry and Other Interested Parties



Biomass Energy from Wood

- Renewable
- Local
- Reliable
- Sustainable
- Affordable
- Low carbon emission
- Minimal ash
- Very low metals and sulfur



- Good option for schools, hospitals, and other institutions facing high energy costs
- Can be used through new construction or boiler retrofit

Compared to other bioenergy feedstocks, forestry sources have best outlook for feasibility and environmental sustainability.

- Corn = extensive cultivation, fertilization, and pest control
- Forests = extensive availability, largely unutilized, lower-impact harvesting

From –
Biomass, Biofuels and Bioenergy: Feedstock Opportunities in MI
Robert E. Froese, Ph.D.; February 2007



Presentation Overview

- What is Woody Biomass
- Sources & Availability of Woody Biomass
- Current Uses & Markets for Woody Biomass
- Other Issues Related to Woody Biomass
- The Future



What is Woody Biomass

- Biomass is simply any organic material
 - living or dead
- Woody biomass includes entire living & dead trees, brush, stems, logs & residue material generated throughout various forest product processing



Woody Biomass Sources

- Tops, limbs, & brush after timber harvests
- Small diameter & noncommercial timber
- Wood manufacturing residues
- Urban wood (including tree removals and clean sources of industrial wood residues and construction debris)



Factors Affecting Woody Biomass Availability

- Landowner Values (over half is private)
- Price
- Sustainability Requirements
- Competing Uses
- Changing Markets



Best Sources for Institutions?

- It all depends on where you are –
 - Urban area? Look for urban sources – city tree removals, pallet recycling operations, clean crates and dunnage
 - Rural area? Look to local forestland owners, forest products companies
- Always keep fuel quality and dimensions in mind when securing wood sources (chip vs. ground, etc.)



POTENTIAL PRODUCTION OF VARIOUS BIOFEEDSTOCKS
IN MICHIGAN

Source	Land Area (million acres)	Annual Yield (in millions of dry tons)
Woody energy crops on idle land	3.2	7.2
Woody energy from excess forest growth	19.3	6.5
Wood biomass from urban trees (annual yield based on 1.5% mortality rate for standing trees)	2.0	0.2
Mill Residues	--	1.4
Logging Residues	--	1.3
Switchgrass from CRP lands	0.3	1.5
Crop residues	8.0	3.6
Manure, Landfill, & Other	--	Less than 0.6

Sources: USDA Forest Service – Forest Inventory and
Analysis for Michigan; USDA Agriculture Statistics Service;
Michigan State University; National Renewable Energy
Laboratory (compiled by Ray Miller, MSU)



Table 3—Annual Biomass Quantities in Michigan (est. dry tons), by Type and Delivered Price⁴⁷

Biomass Type	< \$20/dry ton	< \$30/dry ton	< \$40/dry ton	< \$50/dry ton
Urban Wood Residue	495,734	826,224	826,224	826,224
Mill Residue	10,000	932,000	1,248,000 (est)	1,564,000
Forest Residue	0	710,000	1,034,000	1,327,900
Energy Crops	0	0	1,154,228	4,179,308
Ag Residues	0	0	680,783	4,265,671

Simpkins, Dulcey. 2006. Clean Energy from Wood Residues in Michigan.
Michigan Biomass Energy Program.



Forecast Bioenergy Feedstock Supply in Michigan in dry tons per year.

Biomass Feedstock		Potential Supply	Currently Available and Unutilized	Available at \$25/ton Farmgate Price
	Sawmill and pulp mill residues	1,764,796	Negl.	405,903
Forestry	Logging residues	869,468	869,468	113,031
	Thinning residues	1,875,978	1,875,978	243,877
Forestry Total		4,510,243	2,745,447	762,811
Urban Wood Waste		1,311,382	1,311,382	314,732
Dedicated Energy Crops		4,418,226	Negl.	44,182
Grand Total		10,239,851	4,056,829	1,121,725

Sources: USDA, DOE, Walsh (2006) and Michigan Technological University.

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Woody Biomass Sources



Urban Tree Removals

Woody Biomass Sources



Urban Wood Residue Sources

- Tree removals & trimmings (logs, limbs, stumps)
- Manufacturing byproducts (edgings, cutoffs, chips, shavings)
- Discarded packaging (pallets, skids, crates, dunnage)
- Construction/demolition
- Railroad ties
- Telephone poles



Traditionally, communities pay large amounts for BOTH heating fuel and disposal of removed trees.

For example:

City X pays –

\$25,000/yr to heat city hall

AND

\$25,000/yr for wood disposal

What happens to these figures if they get a wood boiler?



MI Urban Wood Estimates

2007 SEMIRCD Study – Sherrill & MacFarlane

- Studied green & brown urban wood residues
- 4.4 million cubic yards of wood residues were discarded as waste in 2005 (over half of all wood generated in area)

1994 Public Policy Associates study –

Urban Wood Waste in Michigan Supply & Policy Issues

- 659,328 tons, 45% utilized
- 8,848,527 MBtus

1999 Oak Ridge National Laboratory study –

Biomass Feedstock Availability in the U.S.

- Estimated 826,224, dry tons/yr
- Delivered price of <\$30/dry ton



Urban Wood Residue Generation in 13 Counties of SE Michigan for 2005

Residue	Total Amount Generated (cubic yards)	Percent Used	Total Amount Used (cubic yards)	Percent Discarded	Total Amount Discarded (cubic yards)	Of Total Amount Discarded, Amount Sent to Landfills (cubic yards)	Percent of Total Discarded Residue Sent to Landfills
Pallets, Skids, Shipping Crates	505,000	84%	424,000	16%	81,000	15,000	19%
Edgings and Cutoffs	2,646,000	40%	1,058,000	60%	1,588,000	675,000	43%
Chips, Shavings, Sawdust	480,000	48%	230,000	52%	250,000	108,000	43%
Construction Debris	3,828,000	37%	1,416,000	63%	2,412,000	1,302,000	54%
Tree Trunks, Limbs, Stumps	84,000	53%	45,000	47%	39,000	5,000	13%
Totals	7,543,000	42%	3,173,000	58%	4,370,000	2,105,000	48%

Measures of Wood Resources in Lower Michigan: Wood Residues and the Saw Timber Content of Urban Forests (Sherrill & MacFarlane, 2007)

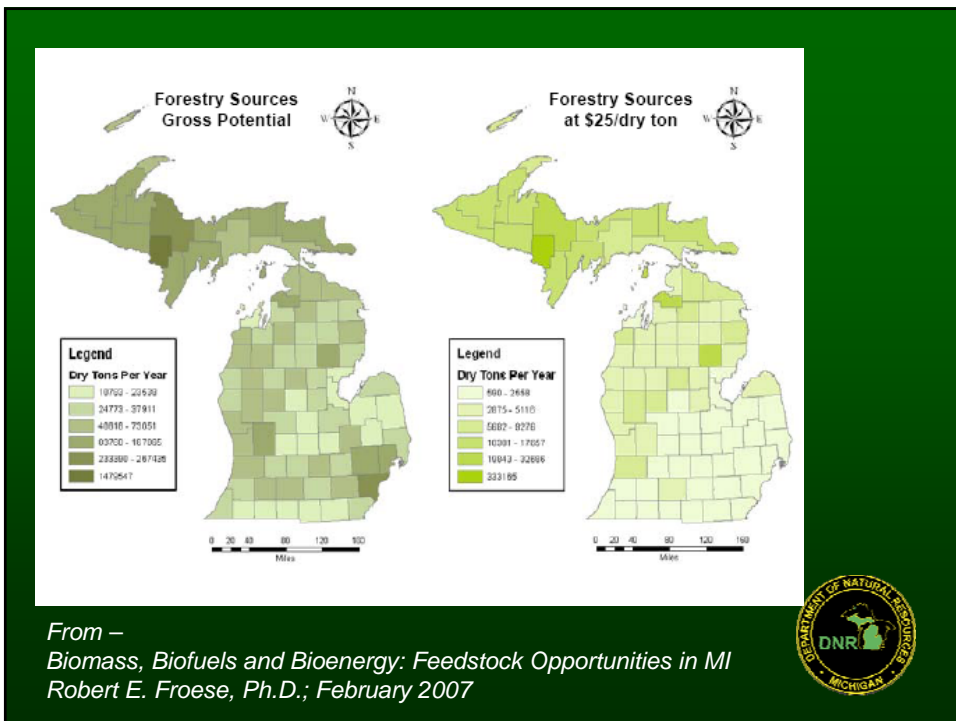
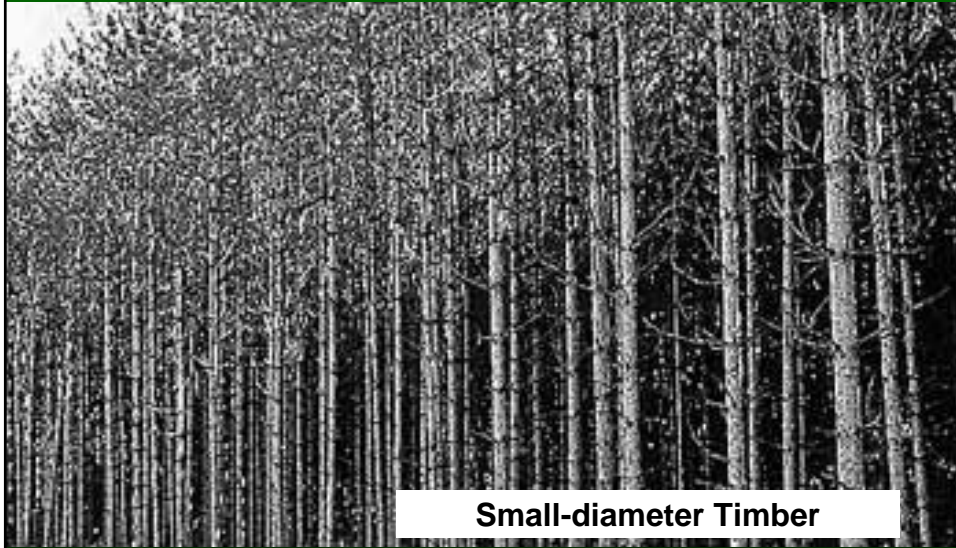


Woody Biomass Sources



Forest Slash & Thinnings

Woody Biomass Sources

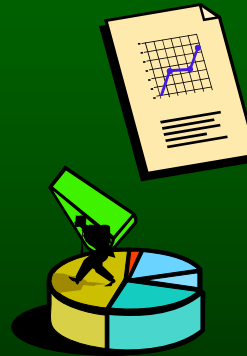


Woody Biomass Resource Current Uses & Markets



Trends

- Housing decline and new OSB capacity have weakened structural panel markets
- Rising imports of furniture from Asia undermine markets for hardwood lumber and non-structural panels
- Weaker pulp and paper demand
- North American pulp and paper producers facing pressure from international competition and trade



Source: RISI 2007



Due to Changes in Industry, More Wood is Now Available

Michigan Primary Mill Closures from 2003 to Present:

Mills	Location	Volume	Wood Type
Pulpmills		(cords)	
Menasha Corporation	Otsego	200,000	mixed hardwoods, sawmill chips
SAPPI Fine Paper	Muskegon	250,000	aspen & mix
Particle Board Mills		(cords)	
GFP Strandwood Molding Corp.	Hancock	10,000	aspen
Georgia-Pacific Corp.	Gaylord	300,000	mixed hardwoods, aspen, red & jack pine, mill residues



Wood Energy Facilities in Michigan

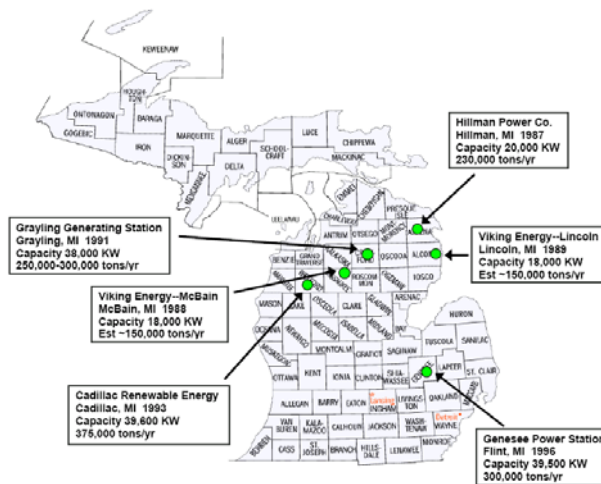


Table 1—Facilities Producing Wood Energy in Michigan

Source: REPS, online at <http://www.repsl.com/mid01-01-1999/>.

Type	Capacity (KW/year)
Michigan Total	368,170
Utility (six sites)	173,100
On-site Upper Peninsula	150,800
On-site Lower Peninsula	44,270



Competing Markets

- Mulch & hydromulch
- Pulp & paper
- Wood composites
- Landfill cover
- Bulking agents
- Soil amendments
- Animal bedding
- Biofilter media
- Refurbished pallets
- Solid wood milled products



Other Issues

- Location – distinguishing residues from waste
- Landfills and tipping fees
- Transportation
- Harvesting
- Collection
- Processing – drying, chip size requirements



The Future

Emerging Michigan Markets

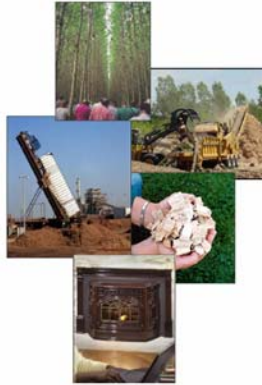
- Fuel pellets
- Liquid fuels
- Biorefineries



Other Resources



Clean Energy from Wood Residues
in Michigan



Michigan Biomass Energy Program
Dulcey Simpkins, Coordinator
Discussion Paper
June 2006



www.michiganwoodenergy.org

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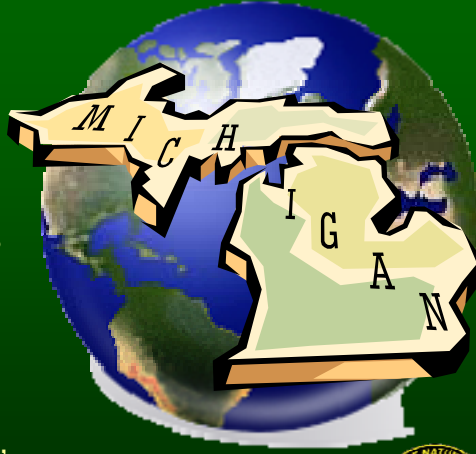
WOOD The local, clean, renewable,
affordable, **sustainable**
fuel choice. 

- Learn about wood energy options in Michigan
- See report of 2000 potential sites for wood boiler projects
- Use calculator to estimate savings at your site



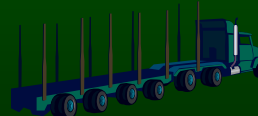
Michigan's Opportunities

- Existing forest businesses and infrastructure
- Productive forest
- High quality hardwoods
- Higher Gross Vehicle Weights
- Ingenuity
- Bioeconomy (liquid fuel, heat and electricity)



Bioeconomy Challenges

- Developing manufacturing technology for liquid fuel production
- Redesign harvest and transportation technologies
- Understand feedstock inventory & availability to support investor decisions



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Thank you



Great Lakes, Great Times, Great Outdoors

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