

MICHIGAN'S WOOD BIOMASS INVENTORY



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Michigan Department of Natural Resources

Forest Mineral and Fire Management

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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

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



Why Wood Resource Inventories are Needed



Will show:

- Best economic options for processing & recycling wood
- Data for long-term, sustainable ecological & business plans
- Opportunities for new markets



Presentation Overview

- What is Woody Biomass
- Sources 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

Forest product industries normally focus on a portion of the forest resource – sawlogs & pulpwood – without looking at other value added markets, such as:

- Tops, limbs, & brush
- Small diameter & noncommercial timber
- Wood manufacturing residues
- Urban wood

These are key opportunities for biomass energy.



Woody Biomass Sources



Diversifying age classes to create more ruffed grouse activity centers



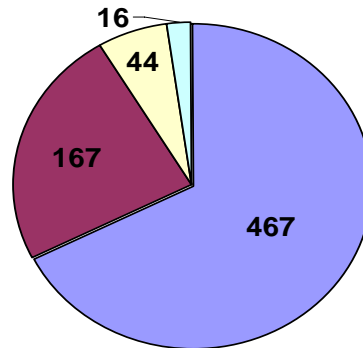
3. Slash Utilization



Inventory

- One of the best USDA Forest Service Forest Inventory Assessments in the nation (total standing biomass, does not address availability)

WOODY BIOMASS ON TIMBERLAND IN MICHIGAN (million tons)
(2005 FOREST INVENTORY ANALYSIS)

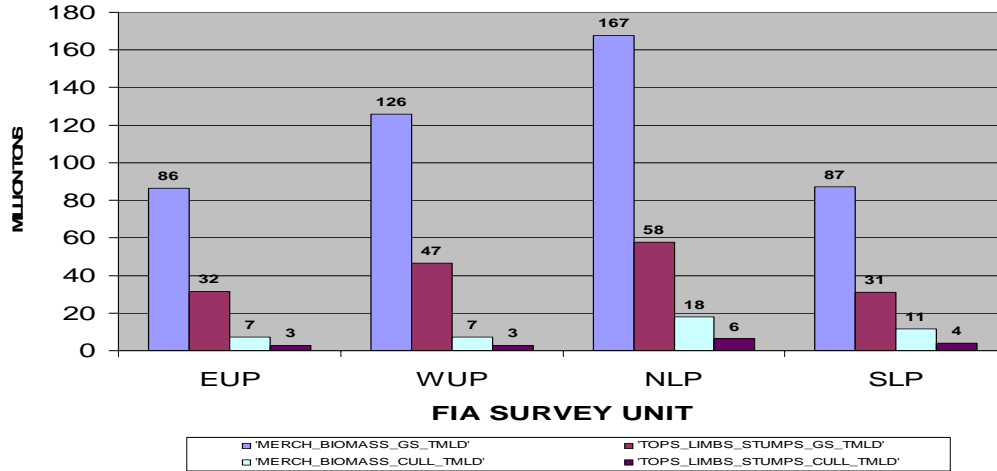


- MERCHANTABLE BIOMASS ON GROWING STOCK ON TIMBER LAND' (MILLION TONS)
- TOPS LIMBS STUMPS ON GROWING STOCK ON TIMBER LAND' (MILLION TONS)
- MERCHANTABLE BIOMASS ON CULL ON TIMBER LAND' (MILLION TONS)
- TOPS LIMBS STUMPS ON CULL ON TIMBER LAND' (MILLION TONS)



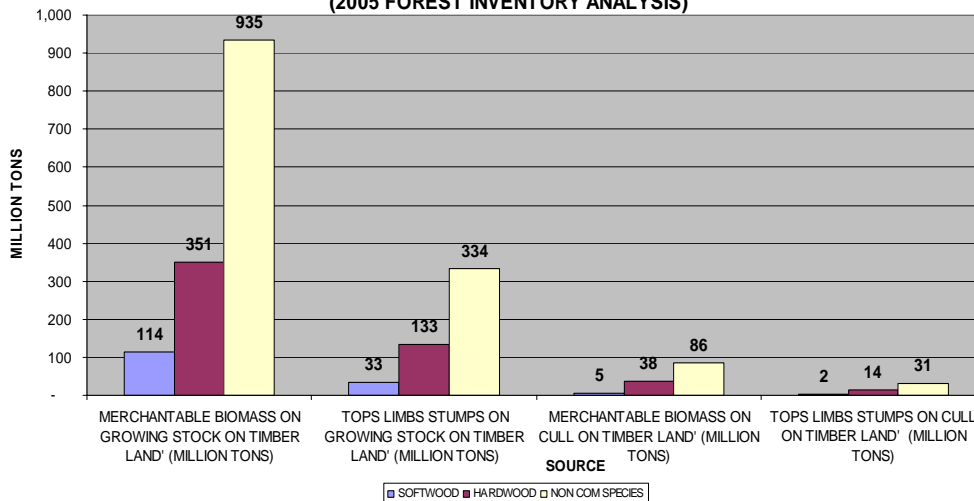
Inventory

TOTAL WOODY BIOMASS ON TIMBERLAND IN MICHIGAN
(2005 FOREST INVENTORY ANALYSIS)



- Growing stock (commercial)
- Cull
- Species
- Possible at county level
- Does not address availability

SOURCES OF WOODY BIOMASS BY CATEGORY IN MICHIGAN
(2005 FOREST INVENTORY ANALYSIS)



Woody Biomass Availability

- Land owner Values (over half is on private lands)
- Price
- Sustainable requirements
- Competing Uses
- Changing Markets



Additional Biomass Potential

- Utilization of Non-Commercial Species
- Hybrid Plantations (e.g. hybrid poplar, willow)

FIA Data Base Access

– <http://ncrs2.fs.fed.us/4801/fiadb/index.htm>



New and Emerging Technology



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.



Woody Biomass Resource Current Uses & Markets



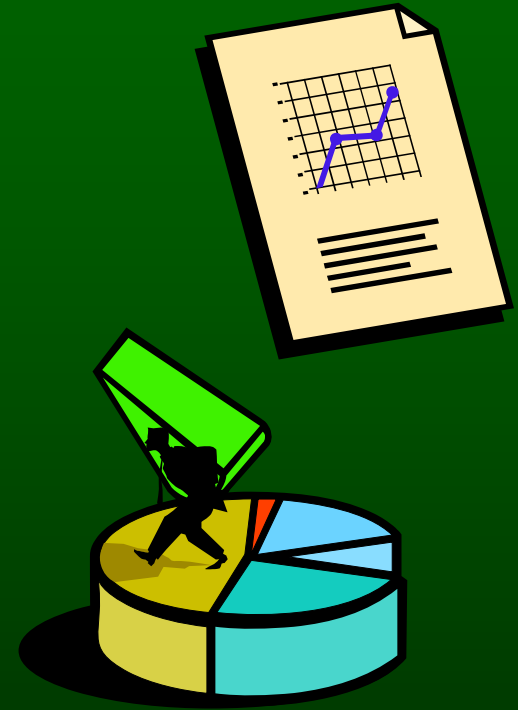
Slash Utilization Wildlife Implications

Slash offers habitat for some species,
but too much can inhibit reforestation



Trends

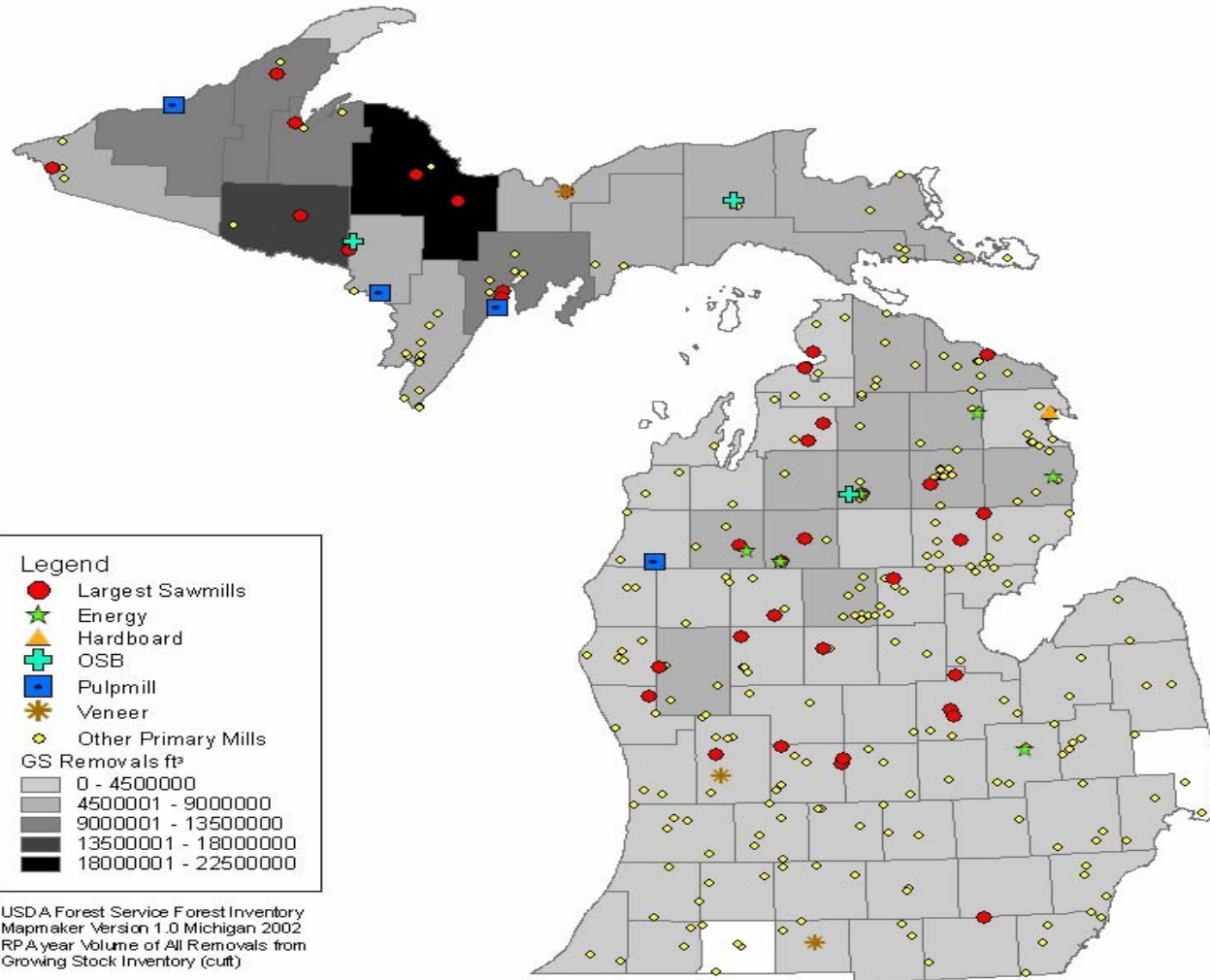
- Housing decline and new OSB capacity have weakened structural panel markets
- Rising imports of furniture from Asia undermine markets for hardwood lumber and non-structural panels
- Weaker pulp and paper demand
- North American pulp and paper producers facing pressure from international competition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



Source: RISI 2007



Forest Product Primary Mills and Growing Stock Removals



Michigan Primary mill closures from 2003 to the present:

<u>Pulpmills</u>	<u>Location</u>	<u>Volume</u>	<u>Species</u>
Menasha Corporation	Otsego	200MCDS	Mix hardwoods, Sawmill chips Sawmill chips
Aspen Bay Pulp and Fibre	Menominee	200MCDS	Softwoods, Aspen & Maple
SAPPI Fine Paper	Muskegon	250MCDS	Aspen & Mix
<u>Particle Board Mills</u>			
GFP Strandwood Molding Corp	Hancock	10MCDS	Aspen
Georgia-Pacific Corp	Gaylord	300MCDS	Mixed hardwoods Aspen, R & J Pine Mill residues
<u>Sawmill</u>			
Buskirk Lumber Co.,	Freeport	25MCDS	Hardwoods Ash, Cherry Red & White Oak Maple



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



MI Urban Wood Estimates

2007 SEMIRCD Study – Sherrill & MacFarlane

- Studied green & brown urban wood residues
- To be released in spring 2007

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



Biomass Energy from Wood

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



Table 2—Wood Energy Characteristics, Merits, and Technology Options

Resource	Energy Characteristics	Advantages	Disadvantages	Technology
Wood and wood residue	<ul style="list-style-type: none"> ▪ green wood: 4,800 Btu/lb (45% moisture content, wet basis) ▪ dry mill residue (brown wood): 6930 btu/lb (13% moisture content, wet basis) ▪ pellets or briquettes: 8000-9000 btu/lb (8% moisture content, wet basis) ▪ wood-to-ethanol life cycle fossil energy ratio: 14-29:1 	<ul style="list-style-type: none"> ▪ renewable, locally abundant ▪ dispatchable (storable), not intermittent (solar, wind) ▪ known technology for heating, boilers, co-firing ▪ much cleaner than coal, carbon neutral if harvested sustainably ▪ pollution prevention for wood industry and processing ▪ prevents landfilling of organics ▪ improved forest health, reduced impact of fires, insects, diseases 	<ul style="list-style-type: none"> ▪ lower energy content than non-renewable fossil fuels ▪ can be expensive to transport ▪ requires storage space ▪ must be dried for some energy applications ▪ can be contaminated ▪ lack of consensus on sustainability 	<p>NOW</p> <ul style="list-style-type: none"> ▪ wood fired boilers ▪ wood and coal co-fired boilers ▪ co-firing with other biomass ▪ pyrolytic oils (bio-oils) <p>FUTURE</p> <ul style="list-style-type: none"> ▪ wood-to-ethanol ▪ syn-fuels

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



Wood Energy Facilities in Michigan

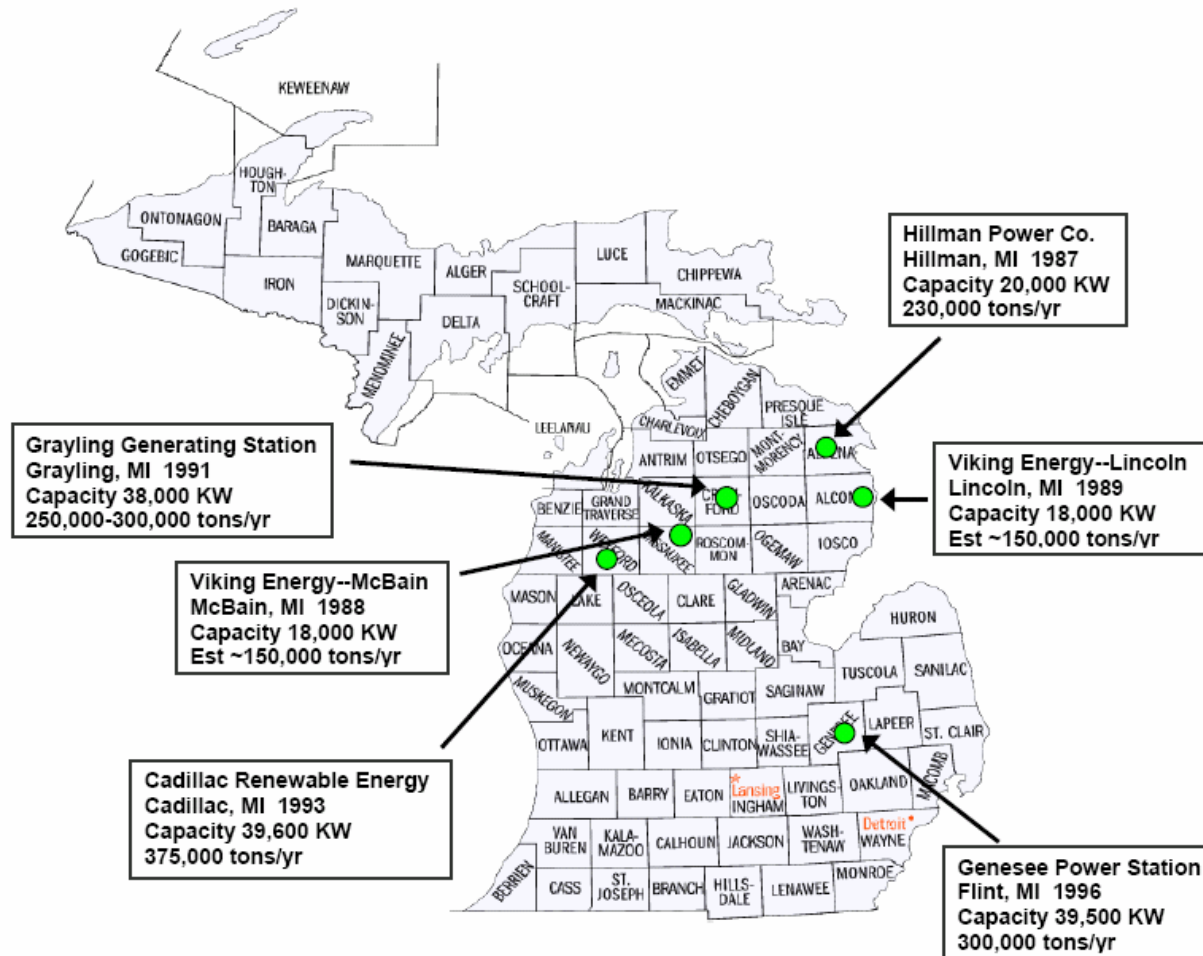


Table 1—Facilities Producing Wood Energy in Michigan

Source: REPIS, online at <http://www.nrel.gov/analysis/repis/>.

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



Analyzing Potential for Small, Local Projects: Statewide Boiler Assessment

Goal: Identify boilers in MI that could be converted to use woody biomass (by either retrofit or replacement)

- Develop database listing boiler characteristics statewide
- Categorize boilers by institution/industry type
- Assess owner interest in biomass energy/conversion and identify contacts
- Prioritize candidates for conversions

(Project of the SE Michigan RC&D, US Forest Service, Michigan DLEG Energy Office, and Michigan DNR)



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

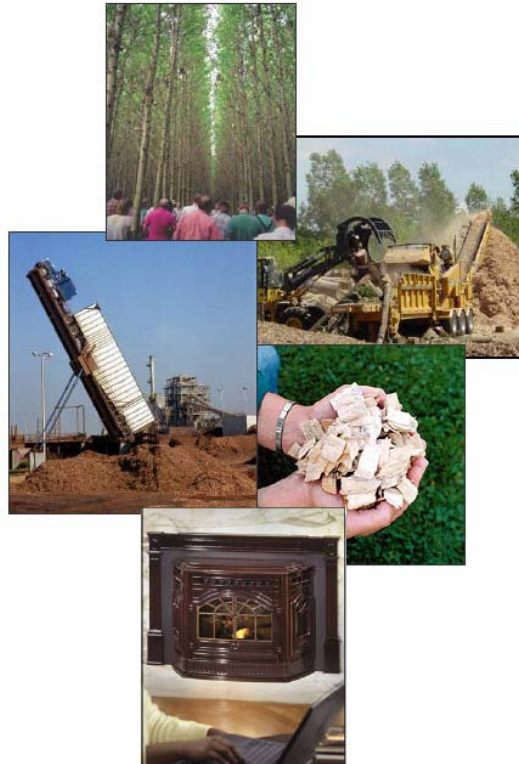
- Fuel pellets
- Liquid fuels
- Biorefineries



Other Resources



Clean Energy from Wood Residues in Michigan



Michigan Biomass Energy Program
Dulcey Simpkins, Coordinator

Discussion Paper
June 2006



Grant Opportunities & Events

- Woody biomass feasibility grants – funds for on-site engineering assessments in public institutions – see www.semircd.org/ash for more info - DEADLINE is April 16, 2007
- Woody biomass system installation grant (up to \$65k) will be announced in May 2007 on www.semircd.org/ash
- Forest Products Society event: “Expanding the Bioeconomy” at DeVos Center in Grand Rapids, May 15, 2007 – see www.fpsgreatlakes.org for more info



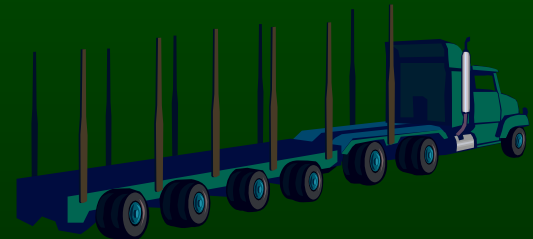
Michigan's Opportunities

- 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



Thank you



Great Lakes, Great Times, Great Outdoors

www.michigan.gov