# Woody Biomass for Energy in Michigan

*TOPICS FOR DISCUSSION AND INQUIRY*

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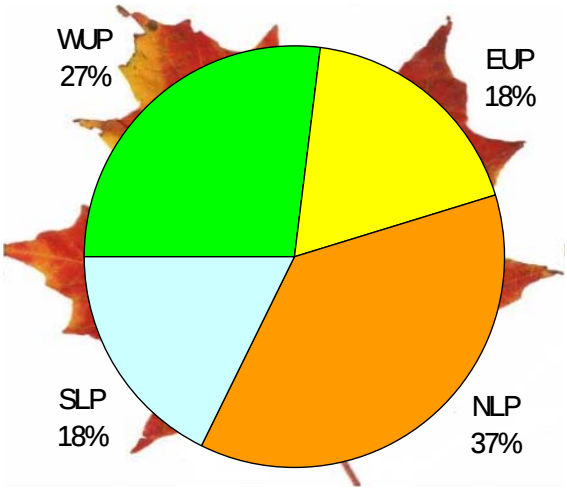
## *Where Does Michigan's Wood Supply Grow?*

Wood in Michigan's forests is an abundant *potential* source of bioenergy and renewable fuels. There is substantial unused, or annual volume, accumulation in Michigan, but there are questions about *how much* is *available* and at *what cost*. Feedstock supply variables are one of the largest challenges in locating bioenergy businesses in Michigan. The variables include:

- How much woody biomass is "out there"?
- How does that fit into Michigan's energy context?
- How much wood can be produced from native forests?
- Who owns Michigan forest land?
- Can woody biomass be harvested, transported, and delivered at a profit?
- Will woody biomass harvesting compete with existing forest industries?
- How does the woody biomass potential compare to agriculture, wind, and solar?




*Forest Volume by Michigan Region[3]*
*WUP-Western U.P. EUP-Eastern U.P.*
*SLP-Southern L.P. NLP-Northern L.P.*

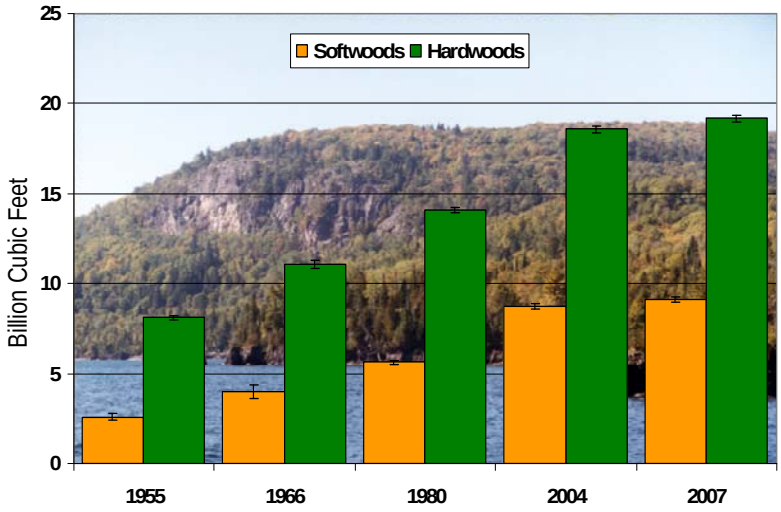
Michigan forests grow over 700 million cubic feet of wood each year. That's about 20 million dry tons,[1] or about the amount of wood on 500,000 acres of Michigan forest, or if converted to cords laid side-by-side would stretch over 13,000 miles, nearly around the world at the equator. How should we use that growth?

Current forest industry uses some of that growth, one of the largest economic sectors in Michigan, especially in rural areas. Some of the forest land will be withdrawn from timber production for a number of environmental, legal, or administrative reasons. About 60 percent of the annual growth[2] resides on forest land owned by about 438,000 individuals and families.[3] The collective decisions of these owners have a large impact on the Michigan wood supply, for any product line, including woody biomass for energy (heat, electricity, and transportation fuels).

When an owner (e.g. private, county, state, or federal) sells trees, there are many economic questions about harvesting and delivering wood, especially at prices a new bioenergy facility can afford. Traditional forest products, such as pulpwood and sawlogs, have a long history of use in Michigan and may compete with new bioenergy facilities. The collection, processing, and transport of non-traditional forest products currently have many unanswered questions and few North American models to follow. There exist large volumes of currently non-commercial wood fiber. Research and experience will be needed to determine how much of that fiber can be converted to commercial bioenergy uses.

What are some of the non-commercial woody fiber pools? Logging residue, or slash, may be a source. Roughly one unit of slash is created with each four units of currently merchantable forest products.[4] Much research suggests that slash removal will have little negative impact on soil quality and nutrient cycling.[5] Some sites will

need protection. Small diameter logs in regions of the state that have only sawlog markets might provide large volumes of fiber. Currently non-commercial species might be used, such as balsam poplar and most ashes (especially as a result of the emerald ash borer infestation). Urban forest removals and rights-of-way residues may have significant volumes to contribute. A recent study showed 442,009 dry metric tonnes per year may be available from a 13 county area around Detroit.[6]




*Growth in Michigan Timberland Volume Since 1955*[8]

More well-managed forest area could significantly increase wood production, which is a factor more difficult to measure but may have great potential. Better managed forests not only can produce more fiber but can also improve wildlife habitat, better protect soil and water quality, provide higher visual quality, and protect many threatened and endangered species.

Energy plantations may have a role in providing woody material. Clones of willow and hybrid poplar present the greatest potential, both producing about 3 to 4 dry tons per acre[9] per year in Michigan. This energy source is only beginning to develop in North America, but is well-established in many countries.

Among cellulosic sources in Michigan, woody biomass has, by far, the largest potential in terms of raw material volumes. If we wish to partially offset fossil fuel use, all renewable resources will be needed, including wind, solar, and other technologies. Conservation and efficiencies, such as better coal burning technology and modified consumer behavior, must also be considered. The gradual replacement of fossil fuels will take many years and come in many forms.


1 Pugh, Scott, et al. 2008. Michigan's Forest Resources, 2007. Research Note NRS-28. U.S. Department of Agriculture, Forest Service, Northern Research Station, 2 p. Conversion factors used: 80 cubic feet/cord, 2.3 green tons/cord, and 2 dry tons/green ton.

2 U.S. Department of Agriculture, Forest Service. 2008. Forest Inventory Mapmaker. Version 3.0. Newtown Square, PA. Northern Research Station. http://www.ncrs2.fs.fed.us/4801/fiadb/fim30/wcfim30.asp. 2008.

3 Butler, B.J. 2008. Family Forest Owners of the United States, 2006. Gen. Tech. ep NRS-27. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station, 72 p. [p. 52]

4 Becker, C. [personal communication]. 2008. Based on a presentation made to the Michigan Renewable Fuels Commission, 2007. Understanding Woody Biomass Yields From A Commercial Forest.

5 Hacker, Jan J. 2007. Effects of Logging Residue Removal on Forest Sites: A Literature Review. West Central Wisconsin Regional Planning Commission, Eau Claire, WI. 27 p.

6 MacFarlane, David W. 2008. Potential availability of urban wood biomass in Michigan: Implications for energy production, carbon sequestration, and sustainable forest management in the USA. Biomass and Bioenergy, doi:10.1016/j.biombioe.2008.10.004. (in press)

8 Pugh, Scott (personal communication). 2009. Derived from U.S. Department of Agriculture, Forest Service. 2008. Forest Inventory Mapmaker. Version 3.0. Newtown Square, PA. Northern Research Station.

9 Miller, Raymond O. 2008. Posters: "Growth and Yield of Poplar In the Central Upper Peninsula of Michigan" and "Growth and Yield of Willow In the Central Upper Peninsula of Michigan". Northeast Renewable Energy Conference, State College, Pa., August 2008.



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