Woody Biomass for Energy in Michigan

TOPICS FOR DISCUSSION AND INQUIRY

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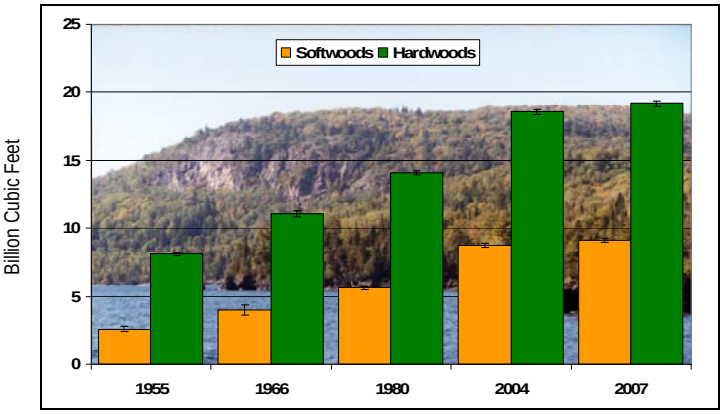
EXTENSION BULLETIN E-3087
JANUARY 2010

Why Might Wood be a Good Energy Feedstock?

Renewable energy sources will become increasingly important over the next few decades. Fossil fuel prices have recently been highly variable and are likely to rise after the end of the current global economic recession. We see variation most directly with electricity and gasoline prices. Indirectly, rises in fossil fuel prices affect the cost of almost everything, including food. For many, climate change and energy independence have caused an increased interest in renewable energy and other non-fossil fuel energy sources.

Trees contain one of the largest potential pools[1] of energy among renewable sources in Michigan. They are solar factories, converting light energy into chemical energy through photosynthesis. This stored energy accumulates annually, building a wood inventory that has been increasing for decades. Globally and historically, societies have long tapped into this energy source, but researchers are closely examining the possibility of using more of this pool in Michigan.



Michigan wood volume on timberland, 1955 to 2007. USDA Forest Service

Trees for energy have some distinct advantages:

- Trees are available year round.
- Little or no energy inputs are required to establish and grow fiber (except for energy plantations).
- Trees are an abundant resource in the Great Lakes region.
- Wood can be a source of heat and electricity, and conceivably transportation fuel and high-value chemicals.
- Wood produces the least amount of ash and residue among cellulosic materials.
- Forests are natural ecosystems, unlike agriculture, petroleum, and coal-based systems.
- Forests provide many products and ecosystem services in addition to energy.
- Wood remains the raw material with the fewest negative environmental impacts.[2,3]
- Added value to forests may reduce the pressure to convert forest to other land uses.
- Using more local energy sources strengthens rural economies across northern Michigan.
- Society can build on existing forest industries and infrastructures.

Wood energy presents an opportunity, but a number of cautions and challenges must be considered:

- Exercise caution when harvesting on environmentally sensitive sites.
- Maintain forest health, vigor, and other forest services.
- Harvest technologies are emerging.
- The technology for commercial production of transportation fuels (second-generation fuels) is new and yet to be proven (although one of the

world's first wood-to-fuel facilities is planned for Michigan's eastern Upper Peninsula).
- Feedstock supply chains (getting wood from the forest to the facility in adequate amounts at workable prices) need to be better understood.
- Harvests are limited by forest owner reluctance to harvest and land use trends.
- Potential exists for competition with existing forest industries.

Extensive knowledge about forest soils and nutrient cycles will help support the sustainable use of wood in a bioeconomy. Michigan, Minnesota, and Wisconsin have each published biomass harvesting guidelines applicable to forest resources. A recent study on the Superior National Forest suggests that northern forests should be able to sustain increased biomass removal, but the economics of harvest may be an issue.

Willow energy plantation.

A Note About Energy Plantations

Much of the woody feedstock from countries with more advanced renewable energy programs comes from energy plantations--crops grown specifically for energy use. Michigan has about 2 million acres of retired agricultural land,[4] some of which could be used for energy plantations if markets and technical assistance were made available. Hybrid poplar and willow show the most promise. Though plantations require energy inputs, research and practice in Swedish willow plantations show that outputs exceed inputs, and willow provides a significant portion of Sweden's domestic energy raw material.

Wood feedstock for a large pellet plant.

Wood holds great promise as a renewable and sustainable energy source. Michigan could use more renewables—wood, wind, solar, agricultural residues, manure, and municipal solid waste--to meet energy demands. Conservation and efficiency practices could also contribute to a much reduced reliance on coal, oil, and natural gas. Most likely, society and the marketplace will determine how far and how fast we engage an expanded bioeconomy.

Small district energy plant.

1 Miller,R.O. (personal communication). Michigan State University Upper Peninsula Tree Improvement Center, Escanaba, Michigan. About 24 million dry tons, based on calculations using USDA Forest Service data.
2 Bowyer, J. et al. 2008. The Green Movement. Forest Products Journal, Vol 58:7/8, p.6-13.
3 Bowyer, J. 2001. Alternatives to Forest Harvest and Wood Use: Environmental Aspects Are Substantial. Michigan Forests Forever Website [*http://mff.dsisd.net/Products/Bowyer.htm*].
4 Miller, Raymond (personal communication). Michigan State University Upper Peninsula Tree Improvement Center, Escanaba, Michigan. Changes in cropland acreage between 1945 and 2002, based on calculations using data from the Michigan Department of Agriculture and the U.S. Census Bureau.

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