Biomass for Biofuels in the Michigan Upper Peninsula

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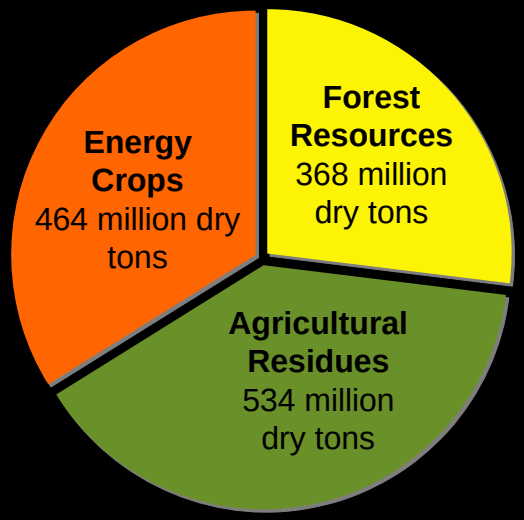
How much gasoline could biofuels replace?

The "Billion Ton Vision"

Enough biomass is available in the US to replace 30% of current gasoline consumption



The "1.8 Million Ton Vision"

If on average the 315,000 UP residents use 482 gal/yr, this corresponds to:

- 151.7 mil gal gasoline
- 182.7 mil gal E85
- 155.3 mil gal ethanol
- **1.8 mil dry tons of lignocellulosic biomass**

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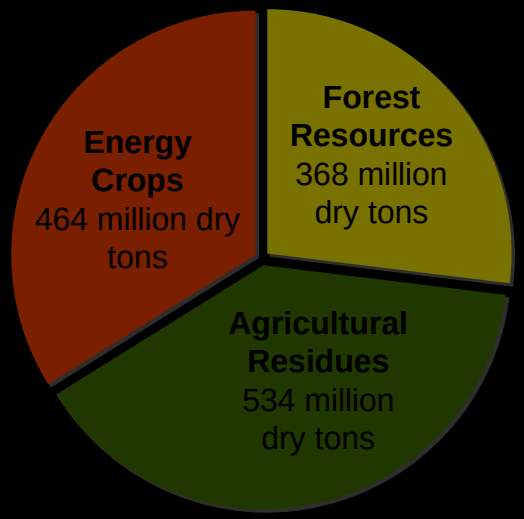

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Forest residues are alone sufficient to replace 75% of U.P. gasoline consumption with E85

Biomass Feedstock Supply in the Michigan Upper Peninsula, in dry tons per year and $2005

Biomass Feedstock		Potential Supply	Currently Available and Unutilized	Available at $25/ton Farmgate Price
Forestry	Sawmill and pulp mill residues	1,493,601	Negl.	343,528
	Logging residues	503,243	503,243	65,422
	Thinning residues	853,800	853,800	110,994
Forestry Total		2,850,644	1,357,043	519,944
Urban Wood Waste		41,962	41,962	5,455
Dedicated Energy Crops		606,219	Negl.	6,062
Grand Total		3,498,825	1,399,005	531,461

Sources: USDA, DOE, Walsh (2006, unpublished) and MTU Forest Resources and Environmental Science

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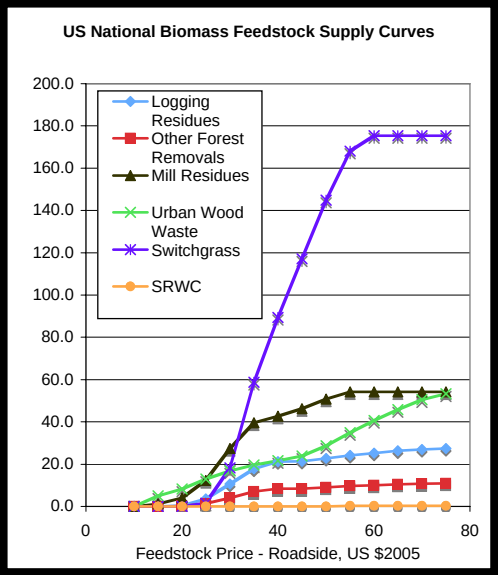
A successful biofuel industry depends on a reliable and sustainable feedstock supply

"The lack of credible data on price, location, quality and quantity of biomass creates uncertainty for investors and developers of emerging biorefinery technologies."

— Office of the Biomass Program, U.S. Department of Energy (2005)



Feedstock cost and potential supply are very sensitive to tradeoffs among competing land uses and competing resource values, such as wildlife habitat.

(De La Torre Ugarte et al. 2006)

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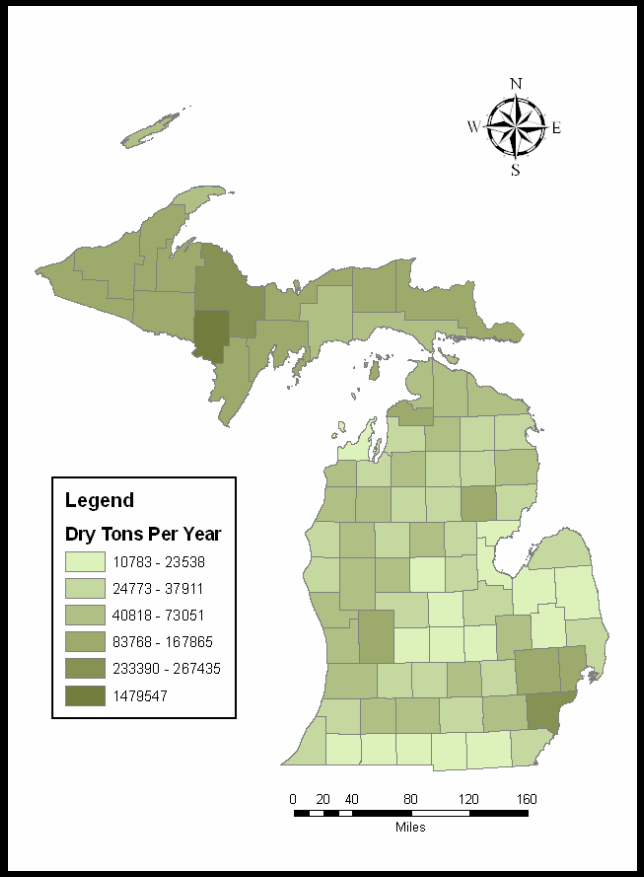
Forest resources initiatives at MTU include:



Geographic Information System (GIS) Analysis and Modelling

- Updated land use/cover maps
- Spatial inventory of available woody biomass
- Optimization and validation of forestry decision support models for biomass and carbon

Biotechnology

- Faster growing trees
- Optimized woody components for cellulose based enzyme consumption

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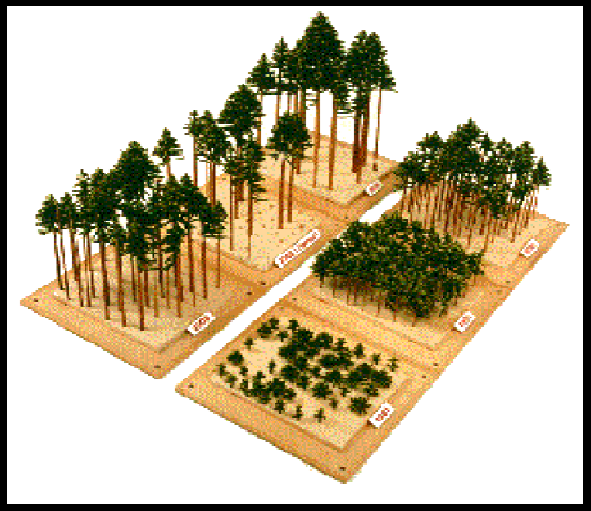

Biodiversity and Wildlife

- Assessment of switchgrass plantings on avian diversity
- Woody biomass harvesting impacts on avian diversity and forest structure
- Wildlife travel corridor evaluation

Management and Sustainability

- Develop options to maximize biomass production with environmental sustainability
- Increase habitat for threatened and endangered plants
- Manage invasive species and genes

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