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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The “Billion Ton Vision”

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- Energy Crops 368 million dry tons
- Forest Resources 464 million dry tons
- Agricultural Residues 534 million dry tons

Forest Resources 368 million dry tons
Agricultural Residues 534 million dry tons
Energy Crops 464 million dry tons

MichiganTech
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

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

Sources: USDA, DOE, Walsh (2006, unpublished) and MTU Forest Resources and Environmental Science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


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)
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
Forest resources initiatives at MTU include:

**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