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# Sources of Wood and Wood Residues for Energy Production in Indiana

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# BioEnergy

*Fueling America Through Renewable Resources*

## Sources of Wood and Wood Residues for Energy Production in Indiana

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### Introduction

As energy prices rise and there is a push for energy to be produced from renewable resources, the contribution of Indiana's corn and soybean industry often overshadows the impact that wood residues can have in response to these demands.

Reports show that the wood products industry is the largest, by paid wages, of any agricultural industry in Indiana and employs 47,000 Hoosiers (Biocrossroads 2005). In fact, Indiana has more than 4.5 million acres of forest land (USDA FS, FIA 2005) compared to about 12.3 million acres of crop land (NASS 2006). In addition to the millions of acres of forestland, Indiana has more than 1600 wood products companies in the primary and secondary sector (Biocrossroads 2005).

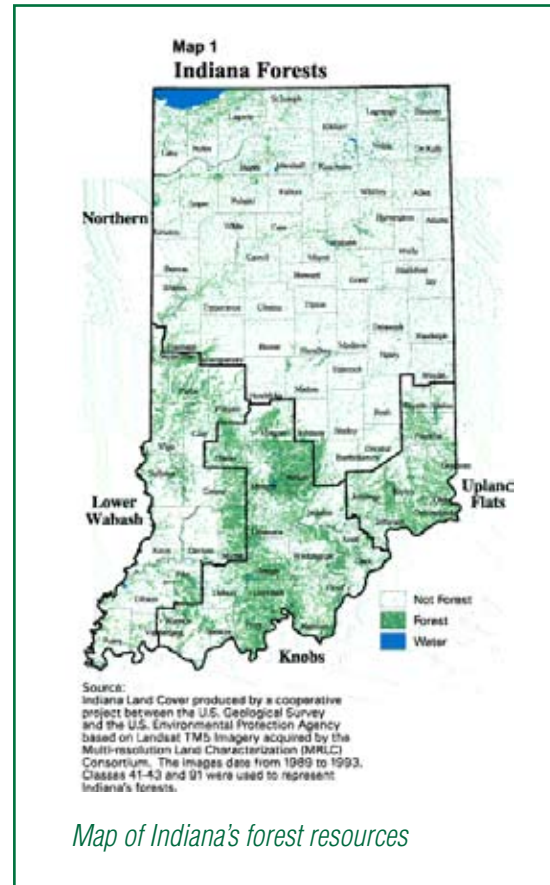
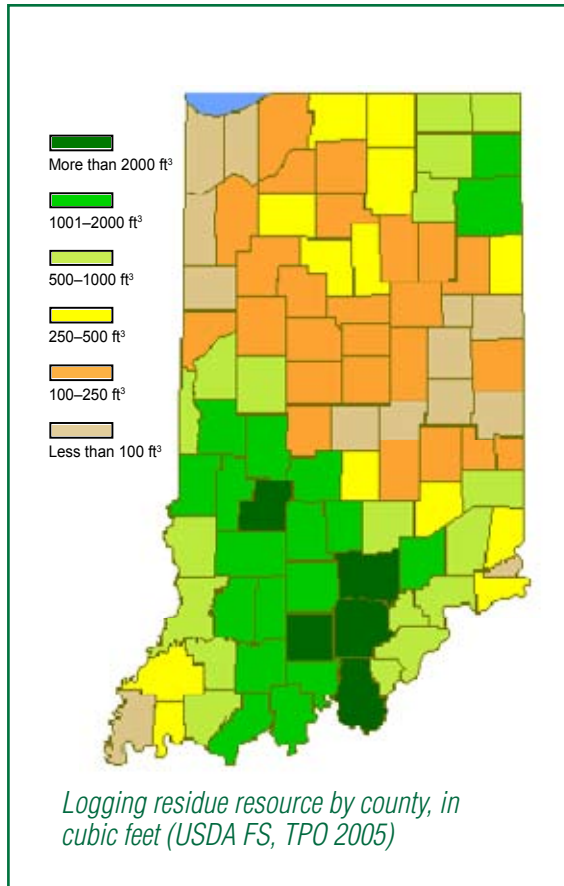
Because the wood products industry does not use the same resources, markets, or technology as many industries in the grain and livestock agricultural sectors, it is sometimes excluded in agricultural discussions. However, the discussion of lignocellulosic (plant-based) materials for use as a bioenergy feedstock would be incomplete without mentioning the contribution that wood and wood residues can add. In fact, of the six strategies to expand and strengthen Indiana's agricultural economy that were laid out in *A Strategic Plan for Indiana's Agricultural Economy* (Biocrossroads 2005), two were related to growing Indiana's wood and wood products industry and one to bioenergy.

### Sustainability

The available wood residues can be broken into two major types: sustainable and non-sustainable. Sustainable sources have a constantly regenerating supply over the course of a year. These sustainable sources (e.g., organic municipal waste) can exhibit seasonality, but regenerate nonetheless.

Non-sustainable sources occur one time. These sources can provide a spike in the overall wood residue availability, but are short-lived and do not produce a constant stream of material. Examples of non-sustainable sources might include a large-scale demolition project, clearing a site for development, or clearing a site to prevent invasions of harmful insects.





## Sources of Wood and Wood Products

Indiana's wood products economy can provide wood residues from a variety of sustainable sources. Waste is created at all points on the wood product supply chain. Logging residues can be partially collected at logging sites. Sawdust and wood cut-offs are perpetual residues from sawmills and pallet plants in the primary wood products industry. The secondary industry provides sawdust, sander dust, and cut-offs, all of which are typically kiln-dried.

Outside the wood product supply chain, wood waste is generated by municipalities and right-of-way clearing. Most municipalities, small and large, have a program to collect yard waste, such as grass clippings, and often the trimmings from trees and woody bushes. Many cities and towns also have tree-trimming programs of their own that produce large amounts of woody waste. Commonly, when the municipalities collect this waste, they burn it or pay to have it removed.

Utility companies, another source of wood residue, have an obligation to maintain an open area around their utility

infrastructure. Annually, these companies clear vegetation to a minimum distance from the infrastructure. In most cases, the woody vegetation is removed and chipped prior to transportation and small logs are left for the landowners' use.

## Supply Chain and Markets for Wood and Wood Products

The densest forests in Indiana are located in the south-central part of the state. However, Indiana forests are spread throughout the state. The USDA Forest Service maintains the Forest Inventory and Analysis database. This database has information regarding the locations and volume of U.S. forestlands. It also provides estimates, from the Timber Product Output section of the database, for the residues left from logging and mill operations.

Primary industries, such as sawmills and pallet factories, produce large amounts of green waste, that is, waste that has a moisture content above 15%. In many cases, sawmills use the material for on-location boilers. The boilers provide the steam and heat necessary for dry kiln operations and

**Table 1.** NASS Data Set of Indiana Wood Products

Forest and Grain Statistics		
Indiana Crop Land <sup>1</sup>	12,345,000	Acres
Indiana Forestland <sup>2</sup>	4,500,000	Acres
Grain agriculture 2003 paid wages <sup>3</sup>	795 million	US\$
Wood products 2003 paid wages <sup>3</sup>	1357 million	US\$

1) NASS 2006; 2) USDA FS, FIA 2005; 3) Biocrossroads 2005

heating. Some locations do not use their waste, and others have more waste than they have capacity to burn in their boilers. Most of the waste is sawdust, but there is also a substantial quantity of cut-offs from the ends of boards at these facilities.

Secondary industries, such as millwork, cabinet, furniture, and flooring companies, produce kiln-dried sawdust and sander dust. Cut-off material is also produced, but is, in general, smaller in size than what sawmills might produce. Some locations put their cut-offs through a grinder to reduce the amount of space necessary for storage and to facilitate the flow of the materials in handling.

Markets exist for many wood and wood industry residues. These markets include, but are not limited to, wood pellets, charcoal, fuel wood, fiberboard, feed industry, and animal bedding. Further markets are emerging for the biofuel industry. These biofuel markets include co-firing with coal and/or direct combustion for heat and power generation; gasification for heat, power and/or liquid transportation fuels; fast-pyrolysis for bio-oil production; and pretreatment/combined saccharification and fermentation for cellulosic ethanol production.

## Conclusion

Indiana definitely has the ability to become a national leader in wood and wood residues utilization for biofuels and biopower production. Sustainable utilization of this resource will revitalize the wood and wood products industry and give momentum to the rapid growth of the biofuels industry in Indiana. When lignocellulosic biomass feedstocks become traded in the commodity market as bioenergy feedstocks, it is likely that wood and wood residues may be one of these traded feedstock

commodities. For people and companies in these existing and emerging markets, developing a program to market and consume wood and wood residues as a sustainable, clean, renewable energy resource will ensure long-term success for wood feedstock utilization, and thus expand one of Indiana's agricultural markets.

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