

Sources of wood & 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 the State's 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 Indians.¹ In fact, Indiana has more than 4.5 million acres of forest land,² compared to about 12.3 million acres of cropland.³ In addition to the millions of acres of forestland, Indiana has more than 1,600 wood products companies in the primary and secondary sector.¹

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*,¹ two were related to growing Indiana's wood and wood products industry and one to bioenergy.

Sustainability

Available wood residues can be broken into two major types: sustainable and nonsustainable. 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.

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



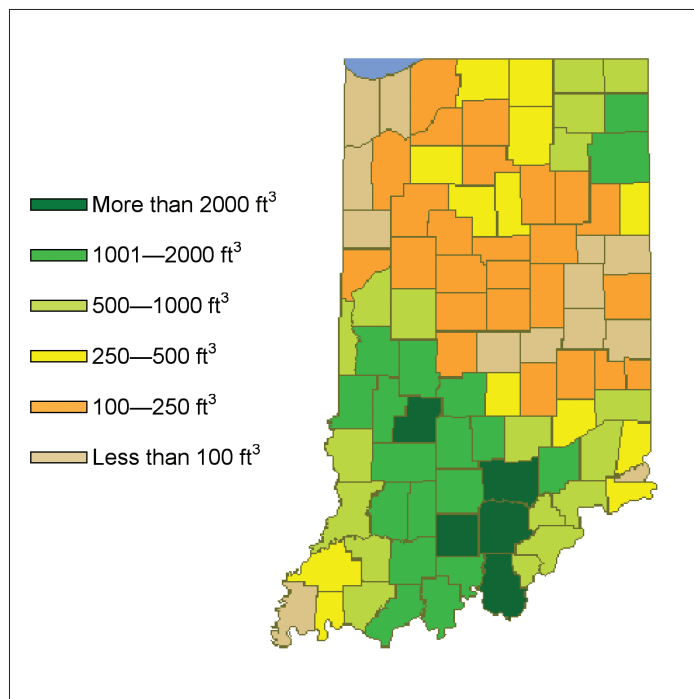


Figure 1. Logging residue resource by county, in cubic feet⁴

Sources of wood & 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 cutoffs are perpetual residues from sawmills and pallet plants in the primary wood products industry. The secondary industry provides sawdust, sander dust, and cutoffs, 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 as well. 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 infrastructures. Annually, these companies clear vegetation to a minimum distance from the infrastructure. In most cases, the woody vegetation is

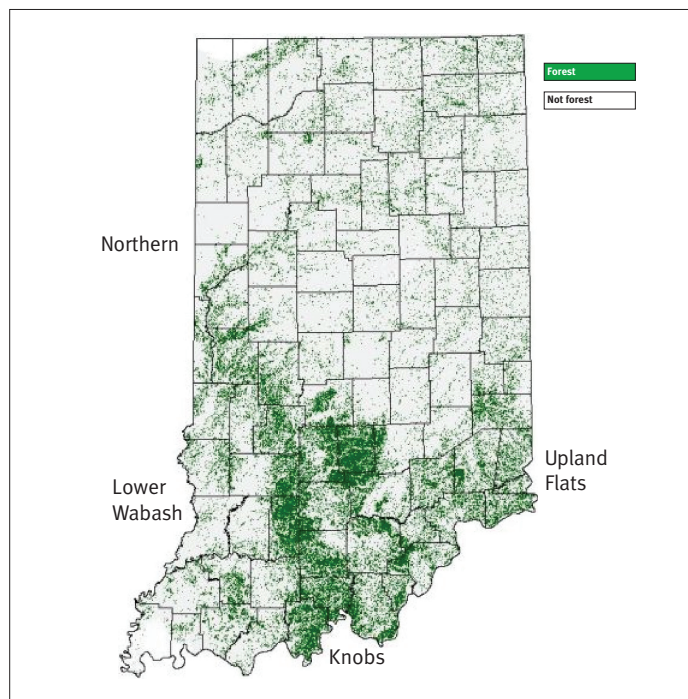


Figure 2. Map of Indiana's forest resources. Indiana Land Cover produced by a cooperative project between the US Geological Survey and the US Environmental Protection Agency based on Landsat TM5 Imagery acquired by the Multi-resolution Land Characterization (MRLC) Consortium. Images date from 1989–1993. Classes 41–42 and 91 were used to represent Indiana's forests.

removed and chipped prior to transportation, and small logs are left for the landowners' use.

Supply chain & markets for wood & wood products

The densest forests in Indiana are located in the southcentral 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 US 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 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 cutoffs 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. Cutoff material is also produced but is, in general, smaller in size than what sawmills might produce. Some locations put their cutoffs 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,

Table 1. NASS data set of Indiana wood products

FOREST AND GRAIN STATISTICS		
Indiana cropland ³	12,345,000	Acres
Indiana forestland ²	4,500,000	Acres
Grain agriculture 2003 paid wages ¹	795 million	US\$
Wood products 2003 paid wages ¹	1357 million	US\$

fast-pyrolysis for bio-oil production, and pretreatment/combined saccharification and fermentation for cellulosic ethanol production.

Conclusion

Indiana has the ability to become a national leader in the US 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 individuals 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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