



## Biofuels from Wood Part I

Exciting technological developments and rising petroleum costs have stimulated interest in biofuels, especially for transportation. This will breathe economic life into rural America, which can both grow and manufacture biofuels. New, high quality jobs will be created for everyone involved from production to distribution and marketing, from loggers and engineers to truckers and commodity brokers.

Corn ethanol has become highly profitable, but accelerating production has raised corn prices and hurt the livestock and other food industries. Corn ethanol also requires relatively high fossil fuel inputs in the form of fertilizer and processing energy. Critics have questioned the long-term viability of depending on the same crops for both food and energy. They also cite the advantage of reduced fossil energy inputs for biofuels produced from cellulosic biomass (tree and crop residues such as corn stalks).

The development of biomass supplies and energy technologies will generate financial and management opportunities for forest owners by creating a new market for poor quality wood and forest thinnings. These opportunities will be strengthened if forest farmers follow the lead of corn growers and invest cooperatively in processing and manufacturing facilities to reap the value-added returns.

Such facilities are just around the corner as pilot commercial plants are being constructed in the U.S. and elsewhere. The technology exists, but it is expensive to commercialize in the initial stages.

Cellulosic ethanol plants are estimated to cost three times as much as corn ethanol plants, with a small plant (10 million gallons per year) coming in around \$30 million. The good news

is that production cost per gallon is expected to be similar to corn ethanol.

To make transportation fuel from biomass, complex molecules like cellulose must be broken down biochemically or thermochemically and reformed into useful products like ethanol or diesel. Most yield estimates for the two processes are similar, but the thermochemical approach is better able to handle a mixture of biomass types and has already been proven commercially with coal. Biomass has a low energy: weight ratio compared with oil and grain crops so biofuel plants need to be located near low-cost biomass supplies.

Using biomass to heat conventional boilers and produce combined heat and power could substantially reduce fossil fuel inputs for corn ethanol and soy diesel. A Minnesota corn ethanol plant has converted to a wood energy system to economically comply with stack emission standards. This approach could provide a stepping stone to pure cellulosic biofuels by promoting development of the required biomass harvesting and processing infrastructure.

The forest products industry is already among the most energy self-sufficient in the U.S.

With increased, but sustainable use of biomass, we could displace one third of our current national petroleum consumption. Wood could provide about one quarter of this biomass, with the remainder coming from other agricultural sources.

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