WOOD to ENERGY

Fact Sheet

Common Concerns

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As a community considers whether or not to use wood for energy, residents and leaders must weigh various factors, such as existing energy sources, existing facility permits, air quality, available supplies of wood, the environment, and economics. This fact sheet explores common questions about wood-to-energy technology to help communities with this decision.

Question 1: Will a wood-to-energy facility produce a lot of air pollution?

Many people worry that burning wood will affect air quality. They might associate burning wood with burning coal, believing that both sources of energy produce more emissions than natural gas. Indeed, the American Lung Association reports that burning wood in fireplaces, wood stoves, and campfires is the largest source of particulate matter emissions generated by residences, and the U.S. Environmental Protection Agency has linked particulate matter emissions to respiratory illnesses, such as asthma (American Lung Association 2000).

However, unlike the process of combustion of wood in a fireplace or campfire, which is uncontrolled and sends unfiltered smoke directly into the air, a modern power plant that uses wood controls the combustion temperature, the moisture level, and the size of the wood particles, all of which reduce air pollutants. In addition, air emission control devices can capture and filter pollution. These processes greatly reduce the amount of pollution produced by the wood-burning facilities. See the fact sheet, *Impacts on Air Quality,* for more information. All of our materials can be found at http://www.interfacesouth.org/woodybiomass.

Question 2: If we use wood for electricity, will we lose all our forests?

Unlike fossil fuels, wood is a renewable resource and with proper management local forests can produce wood for centuries. See the fact sheet, *Sustainable Forest Management*. In some communities, waste wood from utility line trimmings or from forest operations can be used to supply wood-to-energy facilities so that additional trees are not harvested. Our community economic profiles include estimates of wood supplies based on current forest harvesting practices and urban waste resources. Residents would not notice any loss of nearby forests if extracting these amounts of wood. For sample calculations of supply and cost, please see any of the community economic profiles.

Some people are concerned that if wood is such a good solution to providing energy, everyone will start harvesting and burning wood. Indeed, competition for wood within a region is an important factor when considering a wood-burning facility. From an economic perspective, however, an increase in competition should drive the price of wood higher, which could encourage more forest landowners to plant trees for future energy needs. This could also eventually make it uneconomical to burn wood. No facility wants to use up its fuel source faster than fuel can be provided, so it is not likely to propose a risky endeavor. Still, there can be differences of opinion about how much harvesting will negatively impact soil, water, and wildlife resources.

Moreover, wood-to-energy facilities may in some situations help maintain forests by increasing their economic value. As a result of increased competition from international wood suppliers and increased land values here at home, the markets for small-diameter, low quality wood have been declining in some parts of the South over the last decade. Providing a new market for wood and increasing the price of wood could allow forest landowners to make a living from their land and resist offers to sell their property to developers (Figure 1). Their working forests, if sustainably harvested, can provide a green landscape for both aesthetic and conservation purposes, which may be for many communities a preferable alternative to the addition of more subdivisions and shopping plazas.

Figure 1. *Wood-to-energy facilities can provide a new market for wood.* Photo by Larry Korhnak.

Question 3: If we use the waste wood from logging operations for fuel, will we deplete the forest of all its nutrients?

Whenever trees are harvested, the branches, leaves and stumps unsuitable for pulp or lumber are left behind as waste. While leaves and stumps are generally not removed, the wood from branches and other residue can be collected and used as fuel in a wood-to-energy facility.

It is possible to reduce soil nutrients over time through intensive agriculture if nutrients are removed faster than they are replaced. In these agricultural systems, nutrient-rich plants are harvested annually. Harvesting corn, for example removes 120 kilograms per hectare (kg/ha) of nitrogen every year, which is typically restored by adding fertilizer.

Nutrient removal from harvesting trees, however, is low in comparison (5 kg/ha per year for loblolly pine trees) because most of a tree's nutrients are contained in the leaves, not the wood. Leaves fall off branches and are difficult to collect. By minimizing the removal of leaves when harvesting wood, nutrient loss can be kept very low.

Question 4: Will the cost of energy from a wood-to-energy facility be too high?

If a new facility is needed, the cost of construction is likely to be significant, as it would be for any energy generating complex. The annual operating cost associated with facilities that use wood depends largely upon the size of the facility, fuel sources, and proximity of fuel wood available. By using waste wood, sizing the facility to match available resources, and choosing a site that minimizes transportation costs, a wood-to-energy plant can be an attractive alternative to one that burns fossil fuels. Vast fluctuations in the cost of fossil fuels coupled with large increases in cost have also made alternative fuel sources, such as wood, economically attractive.

There are additional costs and benefits of a woody biomass energy facility that are not often included in an economic analysis that, nonetheless, make a big difference in quality of life. For example, the enjoyment one might get from viewing a forest on the way to work, the satisfaction that one's electricity is stimulating the local economy and not contributing to climate change, and the security of having a locally produced fuel source are all advantages not easily calculated in an economic analysis.

Question 5: Has the technology been tested? Should we wait until we know more?

There are already facilities in the South that use wood waste to run machinery and produce electricity. Sawmills and paper mills frequently use their own bark and wood debris to power their equipment, and have been doing so for decades (Figure 2). Other facilities purchase wood or accept waste wood and generate power (see the case studies *Co-firing with Wood and Sugarcane Waste* and *Powering the Grid with Waste*). The generation of this type of power is not a new concept; the technology is readily available and trustworthy. Additional technologies have not yet been tested on large scales or over a long time but are rapidly emerging, such as converting wood to gas, ethanol, and oil.

Question 6: Are we better off using other alternative energy sources, like solar and wind?

Many people consider solar or wind energy preferable because these sources are continuous and do not involve combustion. Indeed, both solar and wind energy represent promising approaches to meet current and future

energy needs. On a national level, shifting to sustainable sources of energy will involve a combination of solar, wind, *and* biomass. However, neither solar nor wind energy currently represents a viable option for large-scale power production in the South. With current technology, solar energy is best suited to supplying individual homes with hot water, heat, and electricity. It is currently too expensive to produce energy in a utility plant. Wind is a less consistent energy source in the South than in other areas of the country for large-scale facilities. Both solar energy and wind are available during limited times and therefore require energy storage systems. Wood is essentially a form of stored solar energy that is convenient to use.

Question 7: How does wood compare to coal and natural gas?

Coal and natural gas are fossil fuels widely used to generate electricity. Coal-fired power plants require air pollution control devices to keep sulfur and mercury out of the air. The combustion of natural gas and wood does not emit much sulfur and mercury, and tends to have smaller amounts of nitrogen oxides and carbon monoxide than coal. The combustion of wood from fast-grown trees, however, may emit some metals, but far less than coal. The fact sheets *Impacts on Air Quality* and *Comparing Wood and Fossil Fuels* have additional information.

Cost comparisons among the resources show that the cost of wood is dependent upon the source and distance from the facility (see community economic profiles) and other factors. Coal is relatively available and cheap (between $2 and $3 per million Btu), and the price of natural gas fluctuates considerably but has been high enough to cause utility operators to consider other fuels.

Because wood is locally available, the money that is spent to buy the wood stays in the local economy, supporting local jobs. If your community does not produce coal or natural gas, spending money to buy these fuels takes money out of your local economy. (See the fact sheet, *Economic Impacts of Generating Electricity,* for more information.)

Using local wood for energy is one step toward becoming more self-sufficient and sustainable. Using a locally available energy supply may help increase awareness and knowledge of how we produce, use, and conserve energy.

Finally, wood also differs from fossil fuels in terms of carbon and climate, which is explained in the answer to question 8.

Question 8: Doesn't wood put carbon in the air, just like fossil fuels?

Wood, coal, and natural gas are made of carbon-based compounds. Burning them releases carbon, which becomes carbon dioxide in the atmosphere. Decomposing wood releases the same amount of carbon, which eventually goes into the atmosphere or the soil. The big difference between wood and fossil fuels is that the carbon released by burning or decomposing wood has been recently circulating through the atmosphere. Growing plants and animals absorb and release carbon every day, and cycling this amount of carbon is a benefit that our ecosystems provide to us. Burning coal and natural gas releases fossilized carbon that has been out of the system for millions of years. This newly released carbon, when added to the atmosphere, is thought to be responsible for a significant amount of the changing global climate. See the fact sheet on *Climate Change and Carbon*. In addition, the newly planted trees that replace those harvested for energy will absorb the same amount of carbon during their lifetime.

Figure 2. *Wood has been used for on-site industrial power production for decades.*
Photo by Martha C. Monroe.

Summary

Many of the concerns about using wood for energy are based on elements of truth. Across the South, variations in topography, industrial forests, energy availability, harvesting practices, road networks, and population density affect projections about the possibility of using wood for energy. It is important to investigate local assumptions and factors in order to create a strategy that is best for your area. These fact sheets were created to provide a starting point for discussing whether or not a community should utilize wood for energy.

For more information about using wood to produce energy, visit http://www.interfacesouth.org/woodybiomass and read other fact sheets, community economic profiles, and case studies from this program, or http://www.forestbioenergy.net to access a number of other resources.

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