



Advantages of Woody Biomass Utilization

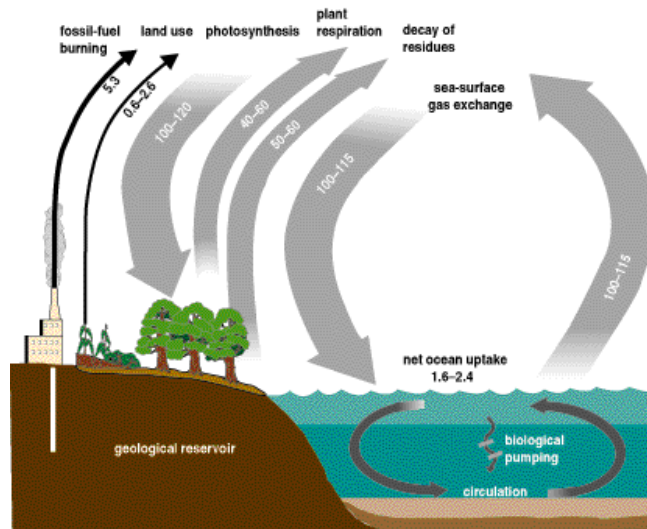
FACT SHEET 1.3

The benefits of utilizing woody biomass for bio-based products, particularly energy and biofuels, are many and varied. These benefits are environmental, economic, social, and energy related. Utilization of woody biomass for bioenergy, for example, can help mitigate greenhouse gases, contribute to the development of healthier forests, bolster rural economies, and reduce the nation's dependency on foreign oil.

ENVIRONMENTAL BENEFITS. There are several environmental benefits associated with the utilization of woody biomass for bioenergy and other bio-based products. In addition to being a sustainable renewable energy source, woody biomass can help to mitigate greenhouse gas emissions, to create healthier forests, and to reduce the risk of wildfires.

While global climate change is no longer under debate, the underlying reasons behind climate change are still in question. Research conducted all over the world indicates that our climate is indeed changing. Although a number of factors contribute to this change, burning of fossil fuels is perceived to be a major contributor to increased atmospheric CO₂. The global climate change initiative is a promising platform whereby renewable technologies can receive support. Bioenergy offers an alternative to fossil fuels. In addition to being quite plentiful, an increase in biomass utilization helps reduce greenhouse gas emissions.

Greenhouse gas emissions can be mitigated through the process of carbon sequestration, or removing carbon dioxide from the atmosphere into long-lived carbon pools. The process of photosynthesis combines atmospheric CO₂ with water, releasing oxygen into the atmosphere and incorporating the carbon atoms into the plant cells. As a result, this carbon neutral process can help displace CO₂ emissions from burning fossil fuels (*Figure 1*). About 40 million dry tons of logging residues are available for bioenergy production in the United States annually. Utilizing these residues would displace about 19.4 million tons of carbon, or 3 percent of the total current carbon emissions from the electricity sector¹. The cost of using logging residues for carbon displacement is \$60 to \$70/ton¹, considerably less than other mitigation options of \$83 to \$164/ton². More information about the costs



source: Oak Ridge National Laboratory

Figure 1. Burning biomass is a carbon neutral process.

Foster, C.D.; J. Gan; C. Mayfield. 2007. Advantages of Woody Biomass Utilization. Pages 35–38.

In: Hubbard, W.; L. Biles; C. Mayfield; S. Ashton (Eds.). 2007. Sustainable Forestry for Bioenergy and Bio-based Products: Trainers Curriculum Notebook. Athens, GA: Southern Forest Research Partnership, Inc.



related to carbon displacement can be found in Fact Sheet 6.2 — The Economics of Forest Biomass/Bioenergy Production and Use.

Besides alleviating greenhouse gas emissions, the use of forest biomass for bio-based products can help improve forest health and reduce the risk of wildfires. Markets are key components of the biomass value chain. Viable markets aid in creating healthier forests by encouraging the removal of brush, small diameter and damaged trees, and other fuel sources. This action lessens the possibility of large, high intensity wildfires as well as decreasing mortality caused by insects and disease. Using woody biomass for fuel and other bio-products can bring about other environmental benefits, including the recovery of degraded land, reduction of soil erosion, and protection of watersheds.

ECONOMIC AND SOCIAL BENEFITS. Forest landowners and rural communities can benefit economically from the utilization of biomass for bioenergy production. During the recent past, southern forest landowners have faced declining pulpwood markets (*Figure 2*) which use small diameter and low value trees. As a

result of this declining market, forest thinnings are often delayed. In addition, about 20 million dry tons of logging residues are available annually across the South for bioenergy production¹. Using these materials as feedstock for bioenergy production creates additional markets and provides additional income to forest landowners.

For communities that depend on timber, market changes can have dramatic impacts on employment, stability, and viability. Many of these rural communities need additional markets in which to trade timber products. Utilizing logging residues, building processing facilities, and marketing the products created can bolster economic conditions in southern rural communities. In east Texas, the development of the bioenergy industry would create 1,338 jobs. The value-added would be about \$215 million, while output would be \$352 million³. These increases would be realized in logging procurement and electricity production from biomass salvaged from logging residues. More information about the impact of bioenergy development is in Fact Sheet 6.3 — Forest Bioenergy Production and Rural Economic Development. An economic analysis in Georgia demonstrated that a biorefinery using 440 tons of biomass daily would generate 95 jobs and state tax revenue of \$991,000 per year. Direct and indirect impacts from the goods and services produced at the plant would be about \$33 million⁴.

ENERGY BENEFITS. In the United States, 86 percent of the total energy consumed comes from fossil fuels, 6 percent from renewable energy sources, and 8 percent from nuclear power. Of the renewable energy, 34 percent is comprised of wood produced energy (*Figure 3*), most of which is used by the forest products industry as process heat⁵.

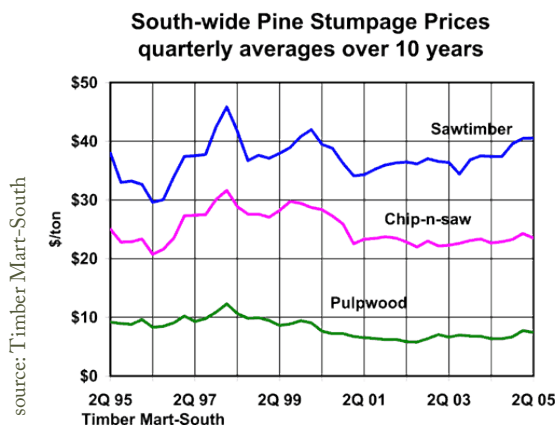


Figure 2. Pulpwood markets have been steadily declining.





In recent years, the nation's consumption of energy has drastically increased. About 100 quadrillion BTUs of energy were used by Americans in 2004 compared to 89 quadrillion BTUs in 1994⁶. As our consumption of energy increases, we must develop environmentally friendly alternatives to fossil fuels.

The United States is particularly vulnerable to oil supply disruptions or price increases since it imports more than 50 percent of its crude oil consumption⁷. More efficient and effective utilization of biomass will increase the amount of renewable energy sources used. It will also help to lessen dependence on foreign supplies of fossil fuels.

Biomass is an attractive modern energy source provided it can be economically utilized. All types of energy services are being provided today using biomass, with the reliability, safety, and efficiency required by the modern economy and society. Geopolitical considerations also play an important role in energy security. As a result, many countries, including Sweden and Finland, have realized the need to improve the efficiency of energy generation, distribution, and consumption. They have begun to harness

local resources as a way to increase the security of the energy supply, reverse fossil fuel dependency, and improve trade balance.

CONCLUSIONS

Climate change, forest health, rural development, and energy security are issues currently facing the United States. This fact sheet provides a brief description of some of the benefits related to the utilization of forest biomass for bioenergy and how it can help alleviate problems associated with these issues. The utilization of woody biomass is beneficial to the forest ecosystem, the environment, forest landowners, and society.

For more information, refer to the Encyclopedia of Southern Bioenergy (<http://www.forestencyclopedia.com/Encyclopedia/bioenergy>) or Forest Bioenergy (<http://www.forestbioenergy.net/>).

ENDNOTES

- 1 Gan, J.; Smith, C.T. 2006. Availability of Logging Residues and Potential for Electricity Production and Carbon Displacement in the U.S. *Biomass and Bioenergy*. 30(12): 1011–1020.
- 2 Intergovernmental Panel on Climate Change. 2001. *Climate Change 2001: Mitigation Summary for Policymakers*. www.ipcc.ch/. [Date accessed: October 24, 2005].
- 3 Gan, J. Smith, C.T. 2006. Co-benefits of Utilizing Logging Residues for Bioenergy Production: The Case for East Texas, USA. *Biomass and Bioenergy*. (In Press).
- 4 Das, K.C. and E.D. Threadgill. 2005. The Economic Potential of an Integrated Biorefinery Industry in Georgia: Conversion of Biomass to Fuels, Chemicals, and Value Added Products. Unpublished position paper provided to the Governor's Agricultural Advisory Committee, Office of the Governor of Georgia. Report available upon request to the University of Georgia, Faculty of Engineering, Athens GA 30602.

C. A. Mayfield, Texas Cooperative Extension;
Data Source: Energy Information Association 2004

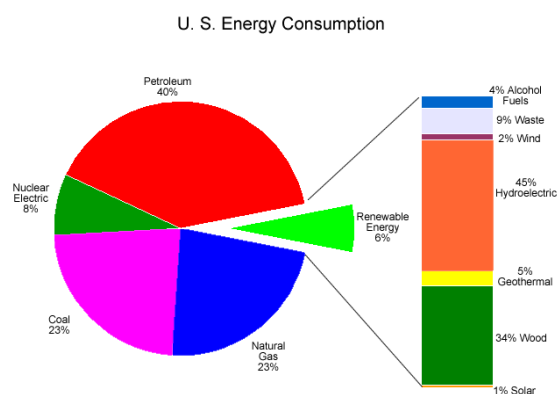


Figure 3. Approximately 6 percent of U. S. energy consumption is from renewable sources.



5 Energy Information Administration. 2004. Annual Energy Outlook 2003. Washington, DC: U.S. Department of Energy.

6 Energy Information Administration. 2005. Annual Energy Outlook 2004. Washington, DC: 397 pp. U.S. Department of Energy.

7 Energy Information Administration. 2002. Petroleum Supply Annual Energy Outlook 2002, Volume 1. Washington DC. U.S. Department of Energy.

