



WOOD to ENERGY

Case Study

Co-firing with Wood and Switchgrass

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Like many states in the South, Alabama is home to thousands of acres of forest land that harbor tons of readily available woody biomass for use in energy production. One utility company tapping into this renewable resource is Alabama Power, a subsidiary of Southern Company. Southern Company has been involved with research and development of co-firing woody biomass and switchgrass at the Gadsden Steam Plant since 2001. The plant is located in northeast Alabama along the Coosa River. The company's efforts provide many valuable insights for others who are considering the use of co-firing systems to meet energy demands.



Figure 1. The Plant Gadsden uses coal, wood chips, sawdust, and switchgrass. PHOTO COURTESY OF SOUTHERN COMPANY.

Alabama Power's Plant Gadsden has two 70-megawatt (MW) pulverized coal units. Unit 1 is used to test co-firing coal with sawdust and wood chips; Unit 2 cofires coal with switchgrass (Figure 1). Early trials in Unit 1 demonstrated some problems with wood. Wood chips over one-quarter inch in length were too big for use in their pulverized coal system. Wood fibers clogged the intake system resulting in the shutdown of the unit. On-going research continues to look at efficient strategies for burning wood.

The few hundred tons of woody biomass used by Plant Gadsden each year are supplied by a sawmill; the switchgrass is supplied by a local farmer. Both sources of biomass are purchased directly from their respective suppliers. The price of each fuel source has recently increased due to higher transportation costs. Given that the tests are being conducted on a small scale, managers

express little concern over the cost and availability of the woody materials, though they caution that significant gains in biomass utilization could result in further price increases.

Once at the plant, sawdust and wood chips are stored outdoors in an open pile near the pulverized coal. A bulldozer is used to mix each type of fuel source with the coal. The composite material is then fed into the Unit 1 boiler through the existing pulverized coal system. Round switchgrass bales are ground and fed into the Unit 2 boiler through a pneumatic direct injection system (Figure 2). Steam from the boiler system turns a conventional turbine, which generates the usable energy. Switchgrass is used to generate only 5 percent of the unit's potential electrical output, equivalent to approximately 3 MW of energy. All electrical energy output is placed directly on the grid to supply retail customers.

The switchgrass co-firing system operates about 250 hours per year to support a small-scale renewable pricing program offered by Alabama Power.

Managers at Plant Gadsden urge those interested in pursuing the use of woody biomass to use waste wood products such as harvest residues, forest thinnings, and wood processing residues to help keep costs low. They also recommend having adequate on-site storage to maintain a sufficient inventory of biomass and utilizing forms of woody biomass that are compatible with boiler systems currently in use.

Efforts by Southern Company and Alabama Power are helping land managers faced with a depressed pulpwood market and increasing pressure for wildfire management understand how using woody biomass to generate energy can serve as an effective tool for managing forests. Southern Company is conducting feasibility studies to determine the most economical techniques to generate power from biomass at their existing plants. The lessons they learn through their research and development program will help shape the future of biomass utilization and emerging markets for biomass products in the southeastern United States.

For more information regarding specific concerns about wood-to-energy facilities, refer to the other fact sheets, case studies, and community economic profiles available in this series at <http://www.interfacesouth.org/woodybiomass>. Additional information is available at <http://www.forestbioenergy.net>.

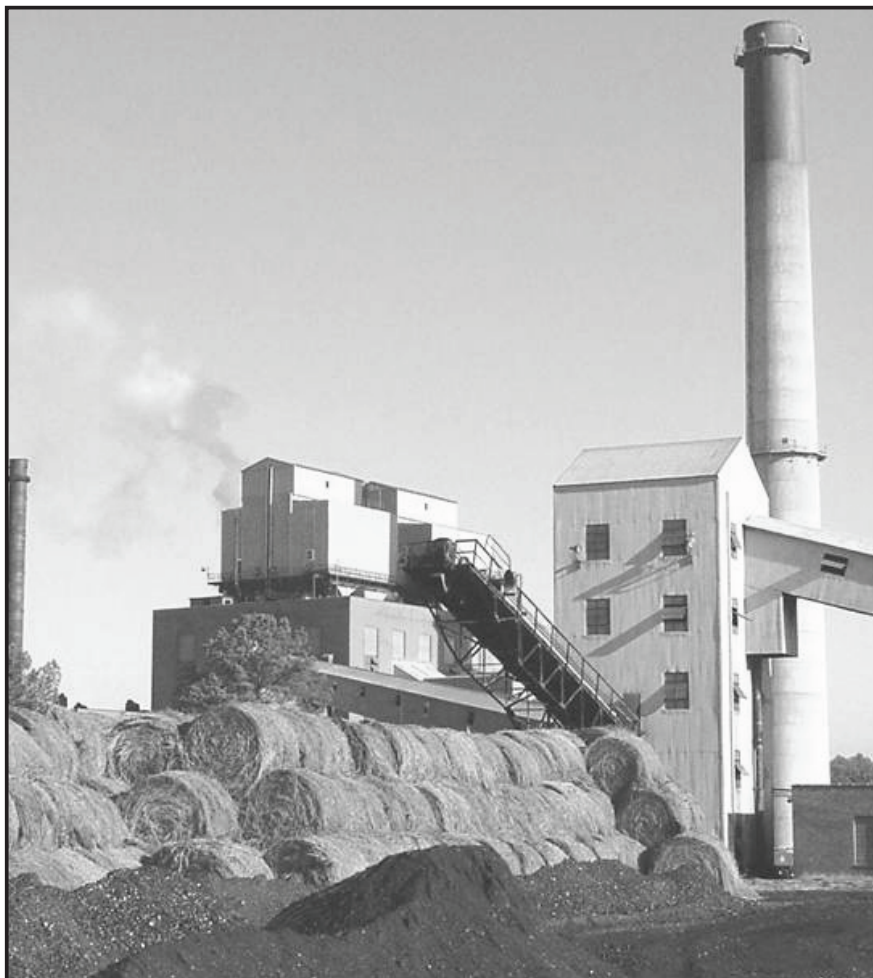


Figure 2. Switchgrass is delivered in round bales and fed into a boiler through a pneumatic direct injection system. PHOTO COURTESY OF SOUTHERN COMPANY.

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