WOOD to ENERGY

Case Study

Innovative Fuel Sources Generate Success

Lindsey McConnell, Martha C. Monroe, & David E. (Ted) Hill

When most people picture Florida, they imagine the sandy beaches of Miami or the theme parks of Orlando. Thirty miles west of Tallahassee, Liberty County does not fit this image. In fact, most of the northern part of the Sunshine State is very different from the south. The rolling hills and expansive pine forests of the Panhandle more closely resemble the landscapes of neighboring Georgia and Alabama. Florida's Apalachicola National Forest covers much of Liberty County and the forest is home to the largest population of endangered Red-cockaded Woodpecker in the world. Also located in Liberty County, Telogia Power, LLC (TP) is just north of the national forest and forty-five miles west of Tallahassee, Florida's capital city.

Originally, the TP site was home to a turpentine manufacturer, Reichold Chemical. When Reichold closed its operation, a local entrepreneur named James Bailey acquired the site with the idea of creating an industrial park. Taking advantage of many energy tax credits available at the time, Mr. Bailey decided to develop a power plant and in 1986, hired Ted Hill (then with General Electric) to design, procure, and construct one of Florida's first commercial biomass-to-energy facilities. The plant, originally named Timber Energy Resources, Inc., was planned as the cornerstone of the industrial park, but no other tenants were attracted to build on the site, so the larger development concept was eventually dropped. Today, the TP facility combusts about 190,000 tons of fuel per year, generating approximately 14 megawatts (MW) of energy per hour, a bit of which is used to run the plant and most of which is sold to Seminole Electric Cooperative (SEC) (Figure 1). Annually, TP sells approximately 94,000 MW of net electrical energy to SEC.

Waste wood residuals from harvesting operations and land-clearing activities, as well as secondary wood product wastes, are transported to TP from within a seventy-mile radius of the plant. The waste wood includes bark, wood shavings, and limbs generated from management or harvesting of local forests. TP has one- to five-year contracts with a few large vendors and also acquires fuel from smaller local and regional suppliers, as they are available. In 2007 TP paid up to $14 per ton for biomass fuels, depending on quality. TP is also permitted to accept a broad range of fibrous non-recyclable materials, which include diaper tailings, wax-coated and waterproofed paper and cardboard, unfit currency, and confidential documents, and is paid a tipping fee to destroy these

Figure 1. *Telogia Power, LLC produces up to 14 MW of electrical energy each hour.*
Photo courtesy of CQ Specialty Materials Group.

materials. Flexible enough to take advantage of a variety of fuels, TP even burned large quantities of potentially tainted peanut butter early in 2007. In addition, TP burns approximately 50,000 tons of processed yard waste. The waste is shredded and trucked nearly 500 miles from Miami-Dade County; limited landfill space has increased disposal costs in Miami-Dade so much that TP pays an average of only $3.00 per ton for this waste.

Over the years, the cost and availability of fuels has shifted notably, causing TP to change its business and combustion plans in order to remain competitive in the marketplace. For the most part, these changes were precipitated by the need to manage costs through expanding the fuels mix. The data below illustrate these changes:

2003 Fuels Mix and Average Costs Scenarios:

- 97 percent conventional biomass fuels
- 3 percent alternate fuels
- Average cost of fuel = $10.50 per ton

2006-2007 Fuels Mix and Average Costs Scenarios:

- 55 percent conventional biomass fuels
- 25 percent processed yard waste
- 10 percent storm debris materials
- 10 percent alternate fuels
- Average cost of fuel = $6.93 per ton year to date.

Before waste wood is transported to TP, it is size reduced by shredding or chipping with a tub grinder. The wood and fibrous fuel is burned in a high-pressure steam generator and boiler operating at 700 pounds per square inch gauge and 800 degrees Fahrenheit. The steam resulting from this process powers a 14 MW capacity turbine generator. The air pollution control system consists of a cyclone separator and electrostatic precipitator and incorporates a constant emissions monitoring system. TP routinely operates at about 50 percent of the emissions threshold.

The boiler uses a stationary pinhole grate as opposed to the more conventional traveling grate technology. While cost efficient, this system has also created some unique technological challenges. For example, ash must be removed by hand raking rather than by an automated system. This means one of five fuel feeder chutes has to shut down to accommodate ash removal, thus reducing steam and electrical production by 20 percent for that period of time. In addition, because under- and over-fire combustion air comes from the same source, the mechanics of managing proper air balance in the furnace relates more to experience than to actual operating science. Because increasing over-fire air can result in exceeding design limitations and damaging the inside of the boiler, all fibrous products are shredded and packed into a fuel cube. This assures that the now dense material will fall onto the grate instead of being caught in the furnace air turbulence and carried into the emissions system, where it could cause fire damage.

TP's innovative strategies for producing energy from wood waste have been successful. Senior Vice President Ted Hill believes that a dynamic and fluid fuel supply has helped create this success. He says that it would be a mistake to commit to one specific fuel source, because it fails to accommodate the ebb and flow of seasonality and downward market trends, both of which tangibly impact fuel cost and availability. Using multiple fuel sources also recognizes that fuel supplies are directly tied to the economy. When fuel supplies consist of residues from some form of production, such as making paper, clearing property to build homes, or manufacturing wood products, if any activity is in decline, so is fuel supply. Hill's experience helps him make deals with fuel suppliers to acquire a variety of fuel types at a range of costs. His experience also explains why, while the market price for biomass fuel presently stands at $14.00 per ton in the region, TP pays an average of only $6.93 per ton on a year-to-date basis. Moreover, the Atlanta-based Biomass Gas and Electric Company, which is currently developing plans to construct a 35 MW wood-fueled gasification facility near Tallahassee, Florida, has recognized the advantages of having a single "gatekeeper" manage the fuel supply and price for both facilities and is negotiating for TP to assume this role.

Along with a diverse fuel supply, Hill recommends investigating lessons learned by other biomass-to-energy facilities and suggests that creating a more collegial environment will promote greater feedback and success. Hill believes it is important for biomass-to-energy facilities to be functional businesses that can stand on their own rather than depend on grant money to support operations. Increasing the amount that utilities pay for green energy is the single most important aspect to the success of biomass-to-energy facilities.

Furthermore, Hill says that several factors, in combination, will assure that biomass-to-energy facilities are successful over the long term:

- Expand the permitted fuels menu to include urban wood and treated wood wastes that are accepted for destruction under a tipping fee arrangement, thus lowering the overall cost of fuel.

- As an industry, proactively lobby for longer-term green energy incentives in order to sustain existing facilities and encourage new growth.
- Lobby for broader utility incentives; green energy costs more to generate, therefore, utilities should receive regulatory compensation that permits them to pay more to acquire it.
- Coordinate several variables in unison, such as managing fuel costs, maximizing sales revenues, and managing the business for the current market environment, in order for the business to prosper.

TP and four other independent biomass-to-energy facilities in Florida are pioneers in the energy industry. A general lack of incentives, including low paying utility Power Purchase Agreements (PPA), has precluded growth in this particular renewable energy sector for at least a decade. More recently, with utilities actively encouraged to build tangible green energy portfolios, PPA rates have increased drastically. For example, in 2000, PPA rates averaged $40.00 per megawatt hour; current rates often exceed $60.00 per megawatt hour. In addition, green energy incentives, including renewable energy credits and energy production credits, have stimulated interest in the developer community and have created traction in an industry where little existed before.

TP is investigating the feasibility of expanding the current facility to accommodate a second, larger capacity, biomass-to-energy unit. Recognizing that the site is already permitted for power generation, TP is studying the pros and cons of owning the second unit outright, partnering with an interested equity participant, or leasing a portion of the site to others.

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.

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