Powering the Grid with Waste

Lindsey McConnell & Martha C. Monroe

Florida is one of the fastest-growing states in the nation. Growth and development are spreading rapidly around the perimeters of its big cities, creeping into formerly rural areas. For example, suburban expansion is filling the geographic gap between two of the state's largest cities—Tampa, on the west coast, and Orlando, in the center of the state. Greenspace that once existed between the areas was bisected with the construction of a major highway in the 1970s, and that same highway has since undergone frequent expansion and improvements to serve the region's increasing population.

Figure 1. *The Ridge Generating Station uses a variety of fuels including tree trimmings, railroad ties, and pallets.* Photo by Martha C. Monroe.

Ridge Generating Station opened in 1994 to satisfy the energy needs of these growing communities. Ridge is located in Auburndale, between Tampa and Orlando. Energy made at Ridge is sold to Progress Energy, which supplies power to both cities.

Because the cost of traditional fuels was on the rise during the station's development stages, Ridge looked to alternative fuels such as wood. But wood sources, found mainly in the northern part of the state, are uneconomical to transport. A survey by city developers found that Central Floridians generate around 1.5 million tons of usable waste per year. Disposal of this ever-increasing waste generated by an ever-increasing population is a major concern. Existing landfills have limited space and pose a possible threat to the Floridan Aquifer, the primary source of the state's drinking water.

Ridge's 31.4-acre facility can process and store a variety of fuels (Figure 1). Plant Manager Phil Tuohy estimates 75 percent of the fuel used by the plant is wood waste. These wastes include municipalities' and utility crews' tree trimmings, poles, and railroad ties as well as industrial waste like pallets and reels. Demolition debris, construction waste, and local yard waste are also used. Palm tree wood, which is very fibrous, is the only wood resource that is rejected.

The plant operates as part of the region's waste management system. County landfill personnel, seeking a way to conserve space, sort and deliver waste to the station. Materials are screened to remove sand and dirt, and most are ground or chipped first enabling a greater quantity to be transported at one time.

Scrap tires are another waste source. Abandoned tire dumps have been known to impair the state's water quality. Tires have a high energy content and generate around 20 percent of the fuel used by Ridge. Tires may be

delivered shredded or whole, and an on-site shredder will reduce them to the necessary two-inch particle size.

At the Ridge plant, fuel passes over a traveling grate in a waterwall boiler capable of producing 345,000 pounds of steam per hour. The steam turns a condensing turbine generator. It takes 4.4 megawatts (MW) to run the plant and the remaining 40 MW are sold to the grid. Along with tires and wood, Ridge uses methane gas from an adjacent landfill to supply about 5 percent of the plant's total fuel use.

The stacks on the facility's boiler are equipped with multiple systems for controlling or removing pollutants. Sulfur dioxide (SO_2) and other trace contaminants are removed by a spray-dryer lime scrubber, and fly ash is removed with a fabric filter bag house. Urea is used to control nitrogen oxide (NO_x) emissions.

Mr. Tuohy admits that the economics of using waste for fuel can be challenging. High sand content in the wood waste is Ridge Generating Station's biggest problem. Florida's sandy soils cause a bigger problem than those faced by facilities in the North. The excess sand causes significant maintenance problems and expensive equipment repairs.

The keys to the Ridge Plant's success include flexibility and location. Using a system that can process and combust a large combination of fuels enables Ridge to recycle the vast amounts of scrap tires and waste wood within its fifty-mile operating radius (Figure 2). Being located adjacent to a landfill also helps; it was easier to obtain permits and the local roads were already being used for truck traffic.

The generating plant employs forty full-time workers and ten laborers. Managers estimate the plant has a regional economic impact of more than $6 million per year. While operations and maintenance are an ongoing struggle, the benefits of turning waste into energy continue to outweigh the costs at Ridge Generating Station.

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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Figure 2. *The ability to process and combust a variety and combination of fuels is a key to the Ridge Generating Station's success.* Photo by Martha C. Monroe.

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