



WOOD^{to} ENERGY

Case Study

Co-firing with Wood and Sugarcane Waste

Martha C. Monroe & Lindsey McConnell

Joan Hourican has lived in South Florida for most of her life. She loves the open marshes of the Everglades and the diversity of birds that live there. She knows that the electricity that powers her West Palm Beach home comes from a number of different power plants, most of which are located along the heavily populated ocean corridor, where sea breezes disperse air pollutants. One, however, is farther to the west, at the edge of the Everglades. About all she knows about that power plant is that it does not burn coal.

The Okeelanta Cogeneration Facility near Lake Okeechobee is not where you would expect to find the nation's largest woody biomass power plant. There are no forests as far as the eye can see. There is no rail service. Human settlement is sparse. But what it has, it has in abundance, and that is sugarcane.

The power plant is located next to Florida Crystal's largest sugar mill, operated by the Okeelanta Corporation. The company farms approximately 168,000 acres of sugarcane to produce, refine, and market more than 385,000 tons of sugar a year. The first priority of the power plant is to provide steam power to the sugar mill during sugarcane processing season, which is October through March. The power plant is permitted to generate 140 megawatts of electricity year round that is sold under contract to regional utilities (Figure 1).

During grinding season, the mill provides two-thirds of the power plant's fuel needs with squeezed, used sugarcane, known as bagasse. Because the shredded bagasse fibers are high in moisture

and relatively low in energy, the bagasse is mixed with wood chips to improve the quality of the combustion and efficiency of the boiler. When it is not processing season, a greater percentage of wood is used because bagasse cannot be stored for long periods of time.

The wood chips are purchased from land clearing and urban tree trimming activities across South Florida, usually from the east (Miami, Fort Lauderdale, and West Palm Beach), but sometimes from Naples and Fort Myers. Contracts and long-term relationships with vendors help ensure that the supply of chips meets the facility's specifications: no pressure-treated wood, no stumps, just clean chipped wood. There is a chipper on-site if whole wood is delivered, but most arrives already chipped. For example, truckloads of melaleuca trees, an invasive species, removed by the South Florida Water Management District are also a part of the facility's fuel supply. The trees were introduced to South Florida decades ago to make the Everglades more suitable for development. Each tree is capable of soaking up fifty gallons of water a day, but also reproduces quickly and displaces



Figure 1. The Okeelanta Cogeneration Facility produces steam power to run Florida Crystal's largest sugar mill and sells surplus energy to the power grid. PHOTO BY MARTHA C. MONROE.

native plant species. Now, these harmful exotic trees are being removed from the Everglades National Park and management areas, and this waste wood is being used at Okeelanta as fuel for generating energy.

Wood fuel is stored, but not dried, until it is ready to be used in one of three water-cooled vibrating grate stoker boilers (Figure 2), which are designed to produce 440,000 pounds of steam per hour. As the wood travels into the boiler, it is heated and dried. Each boiler also has a selective non-catalytic reduction system that injects urea at two levels to control nitrogen oxide (NO_x) emissions. The fuel for this facility is so clean that there is no need for scrubbers and other air pollution control devices usually found at coal-burning plants. The air and water emissions fall below the permitted levels; the ash can be buried in a municipal landfill. An electrostatic precipitator on each boiler removes fine particles of unburned carbon and other materials from the air.

“Materials handling and storage is the key to a biomass facility,” claims Rodney Williams, the Okeelanta plant manager. “The volume of material we burn is three times greater than coal would be, to get the same amount of power. That means we need to think about significantly larger piles, longer conveyor lines, and more efficient dumping and moving patterns than the traditional coal plant.” The facility has forty-four full-time employees and creates even more employment associated with the wood harvesting, chipping, and transporting process.

Converting two waste products—bagasse and woody debris—into a valuable commodity, power, is an important service the Okeelanta Cogeneration Facility provides



Figure 2. The Okeelanta Cogeneration Facility also burns invasive exotic melaleuca trees for fuel. PHOTO BY MARTHA C. MONROE.

South Florida. There aren't enough landfill sites to accommodate all the wood waste that the area produces, and burning this wood in open piles would generate far more air pollution. The power plant at Okeelanta has been successful at meeting a need for power and doing so in an environmentally friendly way. This little fact helps Joan Hourican feel better about turning on her lights at night.

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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