



Forest County Potawatomi Community's Biogas Facility Brings Renewable Energy to Region

by Charles Opferman



The Forest County Potawatomi Community (FCPC) committed themselves towards achieving energy sovereignty when they built a two megawatt renewable energy plant powered with biogas created by anaerobic digestion. The digesters operate on liquid (pumpable) food waste. This feedstock comes from Potawatomi Bingo Casino as well as byproducts of local and regional food processing resources.

Potawatomi elders, culture, and traditions confirm a duty to protect and enhance environmental resources, both on and near the reservation and throughout the world. Development of this plant was mission driven, not as a response to regulatory or economic issues, and benefits both the tribe and regional community. It is also a significant step in FCPC's reduction of its carbon footprint. This project offsets a portion of the electricity that the FCPC utilizes and does so with non-polluting renewable resources. Much of the feedstock processed by the plant was slated for land application, which has the potential for runoff issues and microbial degradation which releases significant amounts of methane

gas. Methane has twenty times the impact as a greenhouse gas compared to carbon dioxide. This plant abates that methane release and offsets the need for coal fired electricity generation. Methymercury pollution from coal fired electricity production and climate change from greenhouse gasses affect the Potawatomi directly, as well as the world at large. The Wisconsin community benefits by having material diverted from landfill and recovered into energy. Food processors and their contractors benefit from a competitive disposal option, reducing trucking and other costs.

In 2010, FCPC obtained \$2.6M of competitive funding through the U.S. Department of Energy's (DOE) Community Renewable Energy Deployment program, which underwrote the initial development of this project. Challenges for the project included permitting, siting, timing, funding, and ownership entity selection.

Permitting proved to be one of the largest challenges to starting the project. FCPC attempted to get ahead of the process with an application for a construction air permit prior

"The traditional values of the Forest County Potawatomi Community teach us to respect all living things, to take only what we need from mother earth, and to preserve the air, water, and soil for our children. Reflecting these values, we take leadership in creating a sustainable and healthy world. We resolve to reduce our own environmental impacts and to take steps to remedy the impacts of others. We encourage others to do the same. We also seek legislative and policy changes that protect the environment for all people, including generations to come."

- FCPC Environmental Mission Statement formalized in 2008

to hiring the design/build team. Subsequent layout revisions rendered the initial application sufficiently inaccurate and the entire process, including public comment period, had to be repeated.

The project is located west of the Potawatomi Bingo Casino between an employee parking lot and a storm water retention basin. The project was built on 90 feet of fill in a former tamarack swamp. Located within the Menomonee River Valley, the water table is five feet below grade at river/Lake Michigan level. Surrounded by active rail yards and an employee parking lot, access and execution required close coordination.

Work on site started in October, 2012. The \$20 million project consists of a 15,236 sq. ft. building housing two enclosed unloading bays, an on-site lab and office, process equipment rooms, and two 1.0 megawatt engine generators. The plant has a biological odor control system to capture and abate any malodorous fumes released within the plant or process equipment. The project has five feedstock tanks to sort supply, an equalization tank to mix and hold supply, two 1.3 million gallon anaerobic digesters, and a membrane filtration system to keep active "bugs" and undigested feedstock within the digesters. The plant is designed to process 132,000 gallons of liquid a day, or about 20 tankers.

Biogas is piped from the digesters through gas treatment that filters, cleans and compresses the gas for the engine generators. The two megawatts they generate is enough electricity to power about 1,600 average homes. Heat for process and plant use is recovered from the engine cooling systems and exhaust. The digester tanks are maintained at 98° F to sustain the microbial colonies at optimum temperature. Excess heat from the plant will be piped under a separate project to Potawatomi Bingo Casino to offset domestic water heating requirements. The plant delivered electricity to the grid in October of 2013.

Anaerobic digestion is the same process that takes place in the human gut. This plant completes the digestion process with the breakdown of carbohydrates (sugars/starches), proteins (meat and complex dairy and vegetable) and lipids (fats) into a methane and carbon dioxide mixture (biogas).

Solids are extracted from the membrane and reduced to cake consistency in a centrifuge. FCPC is still looking to market the solids to a local soil amendment business.

Additional funding for the project came from a Focus on Energy Incentive. Focus on Energy is Wisconsin utilities' statewide energy efficiency and renewable resource program. In addition, FCPC is in the final stages of securing a Section 1603 Grant under the American Recovery and Reinvestment Act (ARRA). Section 1603 of ARRA promoted the development of renewable energy resources. A taxable ownership entity, FCPC Renewable Generation, LLC, was established to obtain a grant under this program in lieu of having to monetize tax credits. This allowed FCPC to benefit from this program without having to surrender ownership control to an outside developer or losing significant value of the tax incentives in transactional costs in sale of the tax credits. Initial application and purchase of the engine generators took place prior to the end of 2011 to safe harbor for Section 1603.

Revenue for the plant comes from electricity sales and from tipping fees. The local utility, WE Energies, uses this energy to help fulfill its renewable energy portfolio requirements under State of Wisconsin Public Service Commission tariffs. Tipping fees are paid by the material generators and/or their haulers for processing their material. The plant continues FCPC's diversification of its economic base and control of its economic destiny.

The design/builder was Miron Construction Co. Inc. of Neenah, WI. Symbiont Science, Engineering and Construction, Inc. of West Allis, WI served as the engineer of record. Biothane, LLC of Pennsauken, NJ, a Veolia Water Solutions company was the process engineer and technology provider. Greenfire Management Services LLC, a business owned by FCPC, served as the Owner's representative. Natural Systems Utilities, LLC is the operator. ♣

Charles Opferman, AIA is owner's representative at Greenfire Management Services, LLC, a construction management, owner representation and property management firm wholly-owned by the Forest County Potawatomi. He can be reached by calling (414) 290-9400 or email copferman@greenfirellc.net.