NYSERDA
New York State Energy Research and Development Authority

Town of Lewiston

Biogas-Driven Micro-Turbine System

DG/CHP Program **Project Profile**

Combined heat and power for Wastewater Treatment Plant

Quick Facts

Location:
Lewiston, NY (National Grid)

Installation Date:
December 2010

Operating Experience:
8 months

CHP Equipment:
2x 30 kW (on biogas) Micro-Turbine (Capstone C-30)

Contracted Capacity: 30 kW (one of the turbines)

Heat Recovery Application:
Digester Heat, Space Heating

Type of Fuel: Digester Gas

Overview

The Town of Lewiston Water Pollution Control Center (WPCC) is located in Lewiston, NY and is a 2.75 million gallon per day conventional activated sludge wastewater treatment plant that services the Towns of Lewiston and Porter, and the Villages of Lewiston, and Youngstown.

Lewiston WPCC is a municipal wastewater treatment plant located in Niagara County. The digesters have been in place since the plant began operation in 1978. The Lewiston WPCC has been involved with using biogas, produced from the digesters, in cogeneration or combined heat and power since 1985. They have had a number engines and generators over the past 25 years until installing the two 30 kW Capstone micro-turbines currently in use.

The Application

The sludge generated by the treatment process is digested in two anaerobic digesters. The primary is heated and mixed while the secondary is unheated and unmixed. The majority of digestion occurs in the primary digester, while the secondary is mainly for settling the thickened sludge while the floating cover acts as biogas storage. Biogas is produced as a byproduct of the digestion process. If the biogas wasn't run in the engine or flared it would just be released to the atmosphere.

30 kW Micro-Turbine

CHP System and Equipment

Biogas from the digesters is either used in the micro-turbines, used in the boiler, or flared. The boiler is only used during the coldest of winter months where recovered heat can only supply up to 95% of the heat required by the digester. The digester pressures are maintained between 7.8 and 8.8 inches WC. Biogas is piped from digester #1, dewatered, filtered, and pressurized to 70 psi in the Copeland pressure boosters (one per turbine). After the pressure boosters, the biogas receives further dewatering and cooling as it passes through the long section of pipe leading to the micro-turbines. Only one of the micro-turbines will be receiving incentives through the ADG-to-Electricity Program.

**The various system schematics can be seen attached at the end of the document.*

Economics and Environmental Benefits

The single micro-turbine receiving incentives from the ADG program daily converts approximately 14,400 cubic feet of natural gas to nearly 600 kWh daily. Since biogas is produced naturally in the digestion process, Lewiston WPCC is basically receiving free resources in addition to reducing the amount of biogas released into the atmosphere. Assuming a cost of 11.5 ¢ / kWh, Lewiston WPCC is saving approximately $2,000 a month in electricity bills. Hourly performance data from the site are available on NYSERDA's DG/CHP data system beginning March 2010.

Summary of Benefits

- Digester already in place, being used, and producing biogas.
- System (2 micro-turbines) consistently produces 60 kW or approx. 30% of the WPCC's needs
- One (1) 30 kW micro-turbine receives incentive payments from NYSERDA
- Reduces electric bill by approx. $2,000 / month.

"The installation of microturbines, with fewer moving parts, is anticipated to reduce the level and costs of maintaining biofuel cogeneration while maintaining the same electrical generation and heat recovery for use in the treatment plant."

~Timothy Lockhart,
Town of Lewiston
WPCC

Web Links and Further Information:

Designer

http://www.ghdinc.net/

Engine Manufacturer

www.martinmachinery.com

Other DG/CHP Resources

chp.nyserda.org
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