



Joint Meeting of Essex & Union Counties

2.4-MW CHP System

*Resilient Municipal Wastewater Treatment Facility
Utilizing Anaerobic Digester Gas*



**Joint Meeting of Essex & Union Counties Wastewater Treatment Plant,
Elizabeth, NJ**

COURTESY OF Foley Cat, Inc.

Quick Facts

- LOCATION:** Elizabeth, New Jersey
- MARKET SECTOR:** Wastewater Treatment
- FACILITY SIZE:** Treats 85 million gallons of wastewater per day, servicing over 500,000 residential, commercial and industrial users
- EQUIPMENT:** 4 x 800kW Caterpillar G3516B Reciprocating Gas Engines
- FUEL:** Anaerobic Digester Gas and Natural Gas
- USE OF THERMAL ENERGY:** Heating of Wastewater Treatment Facility and Anaerobic Digesters
- CHP TOTAL EFFICIENCY:** 75%
- ENVIRONMENTAL BENEFITS:** Dramatically reduced the burning of fuel oil and release of excess methane on site
- TOTAL PROJECT COST:** \$18 Million
- YEARLY ENERGY SAVINGS:** \$2.2 Million
- PAYBACK:** 9 Years
- CHP IN OPERATION SINCE:** 2009
- NOTE:** CHP dramatically reduced emissions and operating costs, while providing resiliency to maintain operation through Superstorm Sandy with no discharges.

Project Overview

The Joint Meetings of Essex and Union Counties is a municipal wastewater treatment facility in Elizabeth, NJ that has been in service for over 100 years. It treats over 85 million gallons of wastewater and sewage a day, servicing an area of 65 square miles, with a population of over 500,000. It treats water from commercial, industrial, and residential facilities.

Joint Meetings received utility power and relied on fuel oil for heat until the installation of the CHP system in 2009. Prior to the CHP installation, Joint Meetings was experiencing issues with its grid supply of electricity, especially with outages occurring in the wintertime and during heavy storms. Losing power in a wastewater treatment facility, especially during heavy rainstorms, can lead to overflows and permit violations regarding sewage emissions due to the inability to run its pumps.

A serious test of Joint Utility's CHP system came three years after its installation, in the form of Superstorm Sandy in 2012. In an impressive showcase, the facility ran islanded from the grid for five days with no overflows or permit violations. It was one of the only sites in coastal New York and New Jersey to do so during Superstorm Sandy.

CHP Equipment & Operation

Four Caterpillar G3516B reciprocating CHP engines provide the Joint Meetings with 92% of the power for the wastewater treatment facility, and 80% for the entire site. The heat recovered from the engines is used to heat the wastewater treatment facility and the anaerobic digesters. For optimal operation, the digesters are kept at 95 degrees Fahrenheit.

Foley Power Systems, the local Caterpillar dealer, worked with Joint Meetings to design the CHP and anaerobic digester system. Crucial to the operation of the project is a digester gas pretreatment system that removes hydrogen sulfide gas, moisture, and siloxane products. This allows use of digester gas in the CHP engines without causing a drop in performance or damage to the pistons and valves from abrasive contaminants.

The CHP system is designed for resiliency, with black-start capability and the ability to power 92% of the load from the wastewater treatment system. In normal operation, only three of the Caterpillar engines are in use, with one reserved for backup use during scheduled maintenance of one of the other engines.



Caterpillar G3516B Reciprocating Natural Gas Engine

COURTESY OF Foley Cat, Inc.

Operation During Superstorm Sandy

Superstorm Sandy made landfall on October 29th, 2012, bringing unprecedented amounts of rain and storm surge flooding to Northern New Jersey and New York. Located on the New Jersey coast just south of Newark, Joint Meetings saw 10 foot storm surge in its bordering Elizabeth River and Arthur Kill, and it lost utility power close to midnight of the 29th.

Thanks to its CHP system, Joint Meetings remained operational through the storm, and kept operating for the next five days until utility power was restored. It

was able to rely on natural gas primarily, and save its digester gas for the worst of the storm in case of an interruption of the gas supply. As a consequence of the Superstorm, 11 Billion gallons of raw and untreated sewage were released from other facilities, with most flowing into waterways of New York and Northern New Jersey. Joint Meetings had no releases of untreated water, operating flawlessly through the storm and its aftermath.

“Without the cogeneration facility provided to us by Foley Power Systems, we would not have been able to [operate through Superstorm Sandy]. When everyone else was dark, we were light. We had power and operating pumps.”
- Francis Bonaccorso, Assistant Superintendent Joint Meetings of Essex and Union Counties`

For More Information

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More CHP Project Profiles:

www.nynjCHPTAP.org

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