

# Downers Grove Sanitary District

## 655 kW Biogas CHP System

### Site Description and Project Overview

The Downers Grove Sanitary District (DGSD) in Illinois offers service to over 60,000 people and a number of industries, institutions, and commercial facilities for the Village of Downers Grove and portions of the Villages of Westmont, Woodridge, Lisle, Lombard, Oak Brook, and Darien. The facility operates a sewer system with over 245 miles of sewer main and treats an average of 11 million gallons of wastewater per day (MGD) at their wastewater treatment plant (WWTP). Wastewater is treated to a tertiary level of purification and then discharged to the east branch of the DuPage River.

The facility has five anaerobic digesters, three primary and two secondary, to stabilize sludge removed from the wastewater. The digesters were producing approximately 80,000 cubic feet of biogas per day, which is below the gas capture capacity of the system. Restaurant grease trap waste also began to be used within the digester system to increase gas production. In an effort to fully utilize this resource, DGSD installed in 2014 a 280 kW engine-driven generator with heat recovery, along with a gas conditioning system. DGSD added a 375 kW engine and generator in 2017 with incentives from utility ratepayer Energy Efficiency Portfolio funds. The DGSD estimated that the incentives would reduce the payback period from 12.4 to 10 years for the second phase of the project. See links below for information on continued incentives for CHP feasibility studies, inter-connection studies, and CHP installation and production.

### Quick Facts

**LOCATION:** Downers Grove, Illinois  
**MARKET SECTOR:** Waste Water Treatment Plant (WWTP)  
**FACILITY SIZE:** 11 MGD  
**PRIME MOVER:** Internal Combustion Engine  
**FUEL:** Anaerobic Digester Biogas  
**USE OF THERMAL ENERGY:** Heat for anaerobic digester  
**OPERATION:** 24/7  
**ELECTRIC OUTPUT:** 655 kW (280 & 375 kW)  
**THERMAL OUTPUT:** 3,183 kBtu/hr  
**TOTAL PROJECT COST:** \$4 million (\$2.5, \$1.5 million)  
**BEGAN OPERATION:** 2014, 2017



### Green Benefits – Moving Toward Net Zero



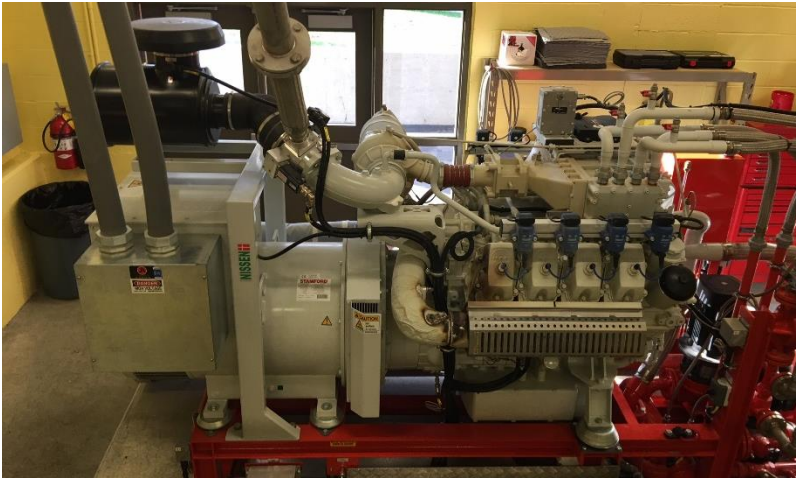
Reciprocating Engine

The Downers Grove Sanitary District pursued CHP because of numerous economic and environmental benefits, including:

- Ability to use the digester gas productively rather than simply flare it
- Existing sludge heating system that was easy to retrofit to accommodate the new CHP system
- Significant energy savings over a 20-year planning period for electricity
- Supplementing the digester heating with the waste heat from the engine to decrease reliance on four gas-fired boiler units with a total capacity of 3,750 kBtu/h
- Ability to receive high strength waste from waste haulers

DGSD has also steadily increased the energy efficiency of its operations to reduce treatment costs and environmental impact, with the ultimate goal of reaching site net zero energy consumption. Grants and incentives from the Department of Commerce and Economic Opportunity and the Clean Energy Community Foundation have helped DGSD to install a turbo blower, a sludge biogas cleaning system, biothermal heat pumps, efficient lighting, etc., reducing its energy consumption by over 50%. Together with its now expanded CHP system, DGSD is well on its way to its net zero goal.

## Equipment and Configuration



**New Nissen Generator and Engine**

engine and decrease the amount of maintenance. The siloxane filter system uses an activated charcoal media to remove the siloxanes while the iron sponge reactor tank removes any hydrogen sulfide from the gas produced by the digestion process. After conditioning, the biogas is ready for injection into the engine CHP system.

The CHP system in place uses internal combustion engines attached to generators to produce heat and electricity. The 280 kW unit captures heat at 1,556 kBtu/hr, while the 375 kW unit captures 1,627 kBtu/hr. The heat is captured via a hot water system which reduces the reliance on the digester system's boilers. The sludge/water heat exchangers were outfitted to preferentially use hot water from the engine before utilizing the old hot water boilers. The engine generators operate 24 hours a day, 7 days a week unless minor downtime is needed for maintenance. The gas conditioning skid is used as treatment to increase the life of the



## Lessons and Additional Work

Variability in biogas production and methane concentration prevented maximum engine output from being achieved throughout the day. A cause of this was the batch transfer of sludge between the primary and secondary digesters. Valve actuators have been installed to automate the transfer in order to reduce this issue.

A grease receiving station was installed to accept deliveries throughout the week. Several upgrades have been necessary to control problems inherent with grease receiving and handling. The goal is to make these nuisance type wastes profitable through disposal fees and higher gas production.

## For More Information

Several organizations are promoting the benefits and concepts of CHP in Illinois. For no cost technical assistance to investigate the technologies and economics of CHP at your facility, contact the US DOE Midwest CHP Technical Assistance Partnership (CHP TAP). For information on energy efficiency utility incentive rebates in the northern Illinois region totaling up to \$37.5K per feasibility study and up to \$2.5MM per installed CHP project, contact ComEd and Nicor Gas.

### **ComEd Energy Efficiency Program**

Phone: (855) 433-2700

[Comed.com/BizIncentives](http://Comed.com/BizIncentives)

### **US DOE Midwest CHP Technical Assistance Partnership**

(312) 996-4490

[www.MidwestCHPTAP.org](http://www.MidwestCHPTAP.org)

### **energySMART, a Nicor Gas Program**

(877) 886-4239

[www.nicorgasrebates.com/your-business](http://www.nicorgasrebates.com/your-business)