



PROJECT PROFILE

Gundersen Health System Onalaska, Wisconsin Campus

1,137 kW Landfill Gas-to-Energy CHP Project

Project Overview

Gundersen Health System (Gundersen), in partnership with the La Crosse County Landfill, is successfully operating a landfill gas-to-energy combined heat and power (CHP) system that produces electricity while simultaneously providing space heating, hot water, and space cooling (through a waste heat driven absorption chiller) to its Onalaska Medical Clinic campus.



Engine/generator set with heat recovery and gas clean up

In March 2012, Gundersen began operation of an engine driven CHP system fueled by landfill gas. The landfill gas, which is piped 1.5 miles from the La Crosse County landfill, is used to fuel a 1,137 kW reciprocating engine/generator set with heat recovery. The generated electricity (~8,500,000 kWh/yr.) is sold to the local utility (Xcel Energy) under a long term negotiated tariff. The heat recovered from the engine (~4 MMBtu/hr) was used originally to provide space heating and domestic hot

water for the campus. While operating the system successfully for several years, Gundersen understood that the CHP system generated more waste heat, on an annual basis, than the campus could use to satisfy its space and water heating needs.

In September, 2016, Gundersen decided to extend the original project by utilizing more of the available waste heat to provide cooling to the campus' Support Services Building, which houses Gundersen's Data Center. The 140 ton absorption chiller and air handling system replaced several electric vapor compression units, thus reducing the facilities electric consumption while increasing the annual utilization of the waste heat from the engine/generator set and increasing the overall efficiency of the CHP system.

Gundersen Health System Energy Plan

Gundersen is a physician-led, not-for-profit healthcare system headquartered in La Crosse, Wisconsin. Its integrated system serves 21 counties in western Wisconsin, northeastern Iowa, and southeastern Minnesota. In 2008, with rising energy costs, Gundersen established its Envision® program that made a commitment to improve the health of the communities it serves and control rising energy costs. Gundersen would accomplish this by reducing energy consumption throughout its campuses through improving energy efficiency and by replacing fossil fueled generated

Quick Facts

Location: Onalaska, Wisconsin

Market Sector: Healthcare

Facility Size: 350,000 square feet (clinic plus support services building).

Prime Mover: 1,137 kW GE Jenbacher reciprocating engine/generator set

Fuel Type: Landfill Gas

Heat Recovery Equipment:

- Intercooler, Lube Oil, and Jacket Water Decoupling Heat Exchanger
- Exhaust Heat Recovery Unit

Use of Thermal Energy: Space Heating, Domestic Hot Water, and Space Cooling

Thermal Generating Capacity: 4 MMBtu/hr glycol/water loop at 200°F

Cooling Equipment: 140 Ton single effect waste-heat driven York Absorption Chiller.

Dates of Operation:

March, 2012 – Original Project – Engine/generator set with heat recovery (space heating and domestic hot water)

September 2016 – Project Extension – Absorption Chiller with special air handling unit for temperature control in Data Center.

Total Project Cost (including project extension): \$4.1 M

Annual Total Estimated Savings: \$400,000 (original project) and \$40,000 (project extension)

energy, where possible, with clean renewable forms of energy.

In October 2014, through a series of project partnerships, Gundersen reported that it had reached its goal of becoming completely energy independent, the first healthcare system in the U.S. to do so.

Partnership with La Crosse County Landfill

“The project (cost) is paying back quite nicely because it’s off-setting a big portion of our electricity bill as well as our natural gas bill and we’re providing a revenue stream for the county.”

Jeff Rich, Executive Director, GL Envision, Gundersen Health System

A landfill gas collection system was already in place at the La Crosse County landfill, located 1.5 miles from the clinic and was collecting an average of 300 cubic feet of landfill gas per minute that was subsequently flared. Recognizing an available resource, Gundersen teamed up with La Crosse County to explore a public-private partnership to develop a landfill gas-to-energy project. While the simpler and least

expensive option was to install an engine/generator at the landfill and only sell electricity to the grid, the partnership recognized the greater opportunity if the waste heat from the engine/generator could be recovered and utilized in the clinic. To this end, the county chose to pipe the landfill gas 1.5 miles from the landfill to the medical campus, where it could be used to fuel the engine and the waste heat could be recovered.

The county provided \$1.5 million of the total \$3.5 million project cost, while Gundersen funded the remainder. The project proved mutually beneficial by assisting Gundersen to achieve its energy goals and helping the county’s solid waste department earn Green Tier status from the Wisconsin Department of Natural Resources while simultaneously creating a new revenue stream. The projected annual savings for Gundersen, after all revenues and expenses are accounted for, is \$400,000/yr.

“This is a good use of a previously unused natural resource and it is an excellent example of what a public-private partnership can achieve in our community.”

Hank Koch, Solid Waste Director, La Crosse County

Absorption Cooling Extension

With the implementation of a 140 ton single effect waste heat driven absorption chiller in 2016, Gundersen Lutheran was able to increase the useful forms of energy produced from the landfill gas CHP system to now include chilled water in addition to the previously generated electricity and hot water.

The absorption chiller, powered by the waste heat from the landfill gas fueled engine/generator set, was successfully connected to the Support Services Building chilled water loop, providing air conditioning for the building. In addition, the chiller installation included a special air handling unit used to tightly regulate the temperature inside Gundersen’s data center, located within the Support Services Building. When the outside temperature is equal to or greater than 60°F, the air handler uses chilled water from the absorption chiller to control temperatures in the data center. When the outside temperature drops below 60°F, the air handler draws outside cool air into the data center to regulate temperatures.

“After initial skepticism, Gundersen is now committed to the data center’s higher operating temperature and the resulting energy/cost savings. The new system provides the temperature control capability necessary to ensure server integrity.”

Alan Eber, Facility Operations Director Gundersen Health System

The new air handler provides sufficiently accurate temperature control to allow Gundersen to confidently raise the operating temperature within the data center. The higher ambient temperature (72°F) has resulted in significant additional energy savings with no negative effects on the data center servers. The extension of the project to include the absorption chiller and air handler is expected to save Gundersen an additional \$40,000/yr in electricity costs (in addition to the \$400,000 estimated savings from the initial phase).

For More Information

U.S. DOE Midwest CHP Technical Assistance Partnership

Phone: (312) 996-4490 www.MWCHPTAP.org

The Midwest CHP TAP is a U.S. DOE sponsored program managed by the Energy Resources Center located at the University of Illinois at Chicago **Version 9/19**

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