



Gundersen Health System: Onalaska Campus

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

Project Overview

In March 2012, Gundersen Health System (Gundersen) began operating a combined heat and power (CHP) system fueled by landfill gas at its Onalaska Campus, located in Onalaska, Wisconsin. The landfill gas, which is piped 1.5 miles from the La Crosse County landfill, is used to fuel a 1,137 kilowatt reciprocating engine generator set with heat recovery. The generated electricity is sold to the local utility Xcel Energy and the heat recovered from the engine is used to provide space heating and domestic hot water to the Campus buildings. Gundersen collects approximately \$500,000 in annual revenue from selling the generated electricity to Xcel Energy, while the county collects around \$200,000 per year from selling the landfill gas to Gundersen. Both values should increase over time as the landfill produces more gas. In addition, Gundersen saves \$100,000 annually in space heating and domestic hot water costs thanks to the thermal energy recovered from the CHP system.

Combating Rising Energy Costs

Gundersen Health System is a physician-led, not-for-profit healthcare system that serves the tri-state region of western Wisconsin, northeastern Iowa, and southeastern Minnesota. The health system is headquartered in La Crosse, Wisconsin and employs more than 6,000 staff. The Onalaska Clinic, located in Onalaska, Wisconsin, has more than 70 dedicated clinicians. A second building on the Campus houses support staff for the health system. In 2008, Gundersen saw its energy costs increasing at an alarming rate of more than \$350,000 per year. Determined to stop this trend, Gundersen developed an environmental program called Envision® which set a goal to reduce energy consumption by 20% by 2009 and achieve total energy independence by 2014, by generating the equivalent or more in clean and renewable energy that the health system consumed. To attain these goals, Gundersen

Quick Facts

LOCATION: Onalaska, Wisconsin

MARKET SECTOR: Healthcare

FACILITY SIZE: 350,000 square foot campus

PRIME MOVER TYPE: 1,137 kW GE Jenbacher
Reciprocating Engine Generator

HEAT RECOVERY EQUIPMENT:

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

FUEL TYPE: Landfill Gas

THERMAL GENERATING CAPACITY:

4 MMBtu/hr of 200° F Hot Water

USE OF THERMAL ENERGY: Space Heating and Domestic Hot Water

TOTAL PROJECT COST: \$3.5 Million

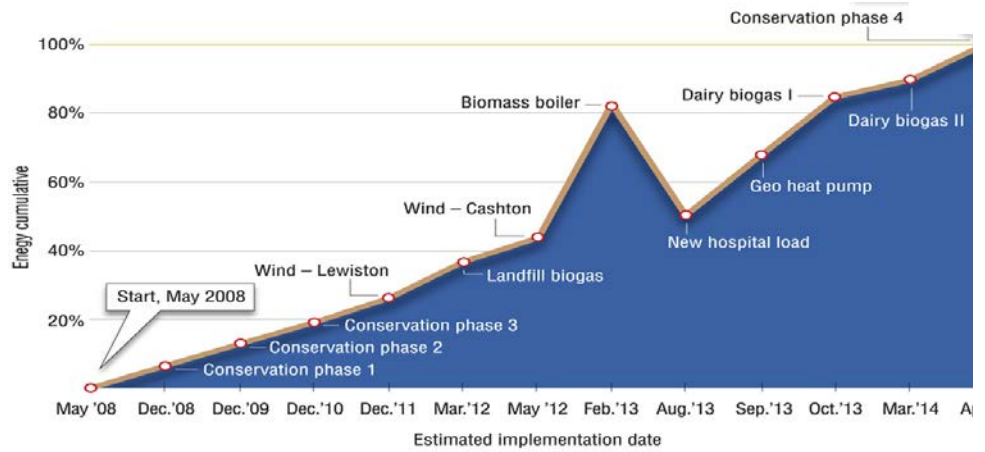
ANTICIPATED YEARLY ENERGY SAVINGS:
\$400,000

BEGAN OPERATION: March 2012



Gundersen Lutheran – Onalaska Clinic

implemented a phased approach that included efficiency and conservation measures in conjunction with clean and renewable energy projects (see graph). One such project was this landfill gas-to-energy CHP system fueled by landfill gas from the county landfill, which offset 11% of Gundersen's total energy use and rendered the Onalaska Campus 100% energy independent in terms of purchased energy. Gundersen achieved their overall energy independence goal in October 2014.



Gundersen Health's Energy Independence Plan (Source: BioCycle)

Partnership with La Crosse County Landfill

A landfill gas collection system was already in place at the La Crosse County landfill, 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 the potential for a landfill gas-to-energy partnership. Nearly 400 such projects are in operation in the United States today; however, less than 7% of these utilize technology to recover the waste heat off of the prime mover to offset a thermal load.¹ This is because landfills typically have no space or process heating needs on site. While the least expensive option would have been to install an engine generator at the landfill and only generate electricity,

"The project [cost] should pay 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

Gundersen and the county recognized a greater opportunity could be realized if the waste heat from the generator could be utilized. To this end, the county chose to pipe the landfill gas 1.5 miles from the landfill site to Gundersen's Onalaska Campus, where it could be used to fuel the gas-to-energy system. The county provided about \$1.5 million of the total \$3.5 million project cost, while Gundersen funded the remainder. This public-private partnership has proved

mutually beneficial by helping Gundersen achieve its energy goals and helping the county's solid waste department earn Green Tier status from the Wisconsin DNR while simultaneously creating a new revenue stream.

Source 1 - Cogeneration & On-Site Power Production

System Design and Operation

Through an RFP process, a turnkey engineering firm was selected to design and build the landfill gas-to-energy project, that would generate both electricity and heat. At the center of the project is a 1,137 kW reciprocating engine generator set, which was sized to completely offset the electric energy consumed by the Onalaska Campus. A decoupling heat exchanger recovers 2 million Btu per hour of heat from the intercooler, lube oil, and jacket water while an exhaust heat recovery unit captures 2 million Btu per hour of heat from the engine exhaust. In total, 4 million Btu per hour are transferred to a glycol-water heat recovery loop, which pipes the almost 200°F fluid to Gundersen's Onalaska Clinic and Support Services Building. Heat exchangers transfer the heat to the buildings' existing space heating and domestic hot water systems. The recovered heat is sufficient to allow the existing natural gas boilers and hot water heaters to sit idle on all but the coldest winter days. In 2014, the CHP system realized over 7,000 hours of operation.

For More Information

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"This is a great 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