



Combined Heat and Power (CHP) at Gundersen Health System

Site Description

The Gundersen Health System Onalaska campus, a two building, 350,000 square-foot clinic and support services building, saves an estimated \$440,000 annually by using a CHP system powered by landfill gas to produce three types of energy: electricity it sells to the utility, hot water for on-site heating, and chilled water for on-site cooling.



CHP System

- **Installation Year:** 2012
- **Cost:** \$3.5 million
- **Savings:** \$400,000 annually
- **Fuel:** Landfill gas
- **Capacity:** 1,137 kW electricity plus 4 million Btu per hour of 200 degrees F hot water
- **System Components:** 1,137 kW GE Jenbacher reciprocating engine generator; Intercooler, lube oil and jacket water decoupling heat exchanger; Exhaust heat recovery unit
- **Owner/Operator:** Gundersen Health System
- **Recognition:** La Crosse County's solid waste department earned Green Tier status from Wisconsin Department of Natural Resources for selling their landfill gas for beneficial use.

Absorption Chiller and Air Handling System

- **Installation Year:** 2017
- **Purpose:** beneficial use of additional waste heat not previously captured
- **Savings:** \$40,000 annually (est.)
- **Capacity:** 140-ton
- **Payback Period:** 5 years (expected)
- **Fuel/Energy Source:** Waste heat from CHP system



Project Highlights

- The CHP system offsets 100% of Gundersen's energy use at the Onalaska campus and 13% of the energy use across all of the health system's sites.
- Gundersen purchases landfill gas from La Crosse County and pipes it 1.5 miles from the landfill to fuel the CHP system.
- Local utility Xcel Energy buys the electricity and the associated renewable energy credits (RECs) because landfill gas is an eligible energy resource in the Wisconsin renewable portfolio standard. (Note: CHP systems in Colorado that use eligible energy resources such as landfill gas, biogas, biomass and waste heat can generate RECs as well.)
- Heat recovered from the engine is transferred to the campus' existing space heating and domestic hot water systems, replacing the existing natural gas boilers and hot water heaters.
- An absorption chiller which runs on excess waste heat not captured was subsequently added to provide air conditioning to the support services center and regulate temperatures in the data center.
- Project illustrates beneficial use of a previously unused resource (landfill gas) and is great example of a public-private partnership.



Project Details

In response to dramatically increasing energy costs in 2008, Gundersen Health System set goals to reduce energy consumption by 20% by 2009 and achieve total energy independence by 2014. To help meet those goals, Gundersen installed CHP to provide electricity, space heating and hot water to its Onalaska campus—a two building, 350,000 square foot clinic and support services building. This project offset 100% of the health system's energy use at the Onalaska campus and 13% of the energy use across all of its sites.

A turnkey engineering firm designed and built the CHP system which is comprised of a reciprocating engine generator set plus heat exchanger and exhaust heat recovery unit. The generated electricity is sold to the local utility (Xcel Energy) and the heat recovered from the engine is transferred to the buildings' existing space heating and domestic hot water systems, replacing the existing natural gas boilers and hot water heaters. The system runs on landfill gas that Gundersen purchases from La Crosse County and pipes 1.5 miles from the county landfill to the CHP system.

The landfill gas, which had previously been flared, is a listed resource in the Wisconsin Renewable Portfolio Standard (RPS). As required by the advanced renewable tariff, this project generates RECs and transfers them to Xcel along with the electricity it sells to the utility. The tariff and rate (\$0.08/kWh) were established when the project started in early 2012 and sunsets in January 2022, at which time Gundersen will revisit whether it utilizes the power onsite or continues to sell it to Xcel.

After a few years of operations, Gundersen noticed excess heat from the generator was going unused for nearly ten months each year. They installed a 140-ton absorption chiller that uses the additional waste heat to cool water they then use to provide air conditioning for the support services building. Formerly electricity had cooled the water for the air conditioning system. In addition to the absorption chiller, Gundersen added a special air handling unit to better regulate temperatures inside their data center. When outside temperatures dip below 60 degrees, the air handling unit draws cool air from outside into the data center but when it is 60 degrees or warmer outside, the air handling unit uses water that has been cooled by the absorption chiller to control temperatures inside.

The CHP system saves Gundersen about \$400,000 per year in electricity, heating and hot water costs. Both Gundersen and La Crosse County invested in the project. Gundersen's \$2 million investment is expected to pay back in about five years and the county's investment of \$1.5 million is expected to pay back in less than eight years. The absorption chiller and air handling unit are expected to save Gundersen an additional \$40,000 annually in electricity costs, with a five year payback.



Combined Heat and Power for Hospitals & Health Care

Combined Heat and Power (CHP) systems provide both thermal energy and electric power to hospitals and other healthcare facilities 24/7/365 while improving energy efficiency, lowering operating costs, and reducing emissions associated with power generation and heat production. Importantly, CHP systems can operate independently of the grid during natural disasters, storms and other events, powering life-critical processes, and in some cases the facility's entire load, when electric service from the utility is interrupted. The thermal energy generated in the CHP system can be used for heating and/or cooling, hot water, dehumidification, medical equipment sterilization, food preparation, and cleaning. CHP systems in Colorado that are fueled by energy resources listed in the Renewable Energy Standard, such as landfill gas, biomass, biogas and waste heat, are eligible to generate renewable energy credits (RECs) along with the power. More than 200 U.S. hospitals and numerous healthcare facilities operate CHP systems to offset power and fuel purchases, save money, and improve energy reliability and resiliency. Although the project drivers are often similar—cost savings, energy reliability and energy independence—hospital and healthcare CHP systems are tailored for each application.



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