



# Winnebago County Sheriff's Office

## 2.5 MW CHP System

### Project Overview

In April 2007, Winnebago County Solid Waste Management Board began the operation of a 1.1 megawatt combined heat and power (CHP) landfill gas to energy (LFGE) system located at the Winnebago County Sheriff's Office in Oshkosh, Wisconsin. At the core of the CHP system is a single GE Jenbacher engine generator with Cain exhaust heat recovery equipment. The recovered heat from the engine generator supplements both heating and domestic hot water systems at the sheriff's office. Excess electrical power generated by the CHP system is sold directly to the Wisconsin Public Service Corporation. The CHP system cost approximately \$1.2 million, achieving a simple payback of less than three years.

In 2009, Winnebago County added a 1.4 MW CHP system to the original system along with a new 250 ton absorption chiller. The new equipment cost about \$1.8 million, providing a similar payback. The CHP system runs 24/7 and is shut down only for normal maintenance.

### Background



Winnebago County Sheriff's Office  
Oshkosh, WI

### Quick Facts

**LOCATION:** Oshkosh, Wisconsin

**FACILITY SIZE:** 209,020 square feet

**MARKET SECTOR:** Government (sheriff's station)

**CHP GENERATING CAPACITY:** 2.5 Megawatts

**PRIME MOVER EQUIPMENT:**

1.1 MW GE Jenbacher JMC320 engine genset

1.4 MW GE Jenbacher engine genset

**HEAT RECOVERY EQUIPMENT:**

Cain Exhaust Heat Recovery Unit

**HEAT RECOVERY RATE:**

7.6 MMBtu per hour at 194°F

**HEAT RECOVERY UTILIZATION:**

Building Heat and Domestic Hot Water

**CHP TOTAL EFFICIENCY:** 84.6 %

**FUEL:** Landfill Gas

**TOTAL PROJECT COST:** \$3.0 Million

**YEARLY ENERGY SAVINGS:** \$900K to \$1.0M

**PAYBACK:** less than 3 years

**BEGAN OPERATION:** 2007, 2009

Winnebago County has a history of taking advantage of landfill-gas-to-energy opportunities. Since 1999 the county has invested \$12 million in gas collection and electrical generation equipment at its two landfills. The construction of a new sheriff's office next to its Sunnyview Landfill provided a perfect opportunity for additional LGTE.

In 2006, working with a local engineering firm EarthTech and engine distributor Inland Power Group, county officials decided to pursue a project that would pump landfill gas from Sunnyview to the newly built sheriff's office on the east side of the landfill and burn the gas in a CHP plant.

Construction and installation of a 1.06 MW CHP plant commenced in November 2006 and the system was commissioned in April 2007. The second 1.4 MW system was constructed and commissioned by 2009.

The CHP installation provides some control over volatile energy costs. According to the Landfill Manager, the sheriff's office saves anywhere from \$900,000 to \$1,000,000 annually in avoided costs of natural gas. The county also performs its own operation and maintenance of the CHP plant and gas cleanup system.



**GE Jenbacher Container with Heat Recovery Equipment**

In many applications, a comprehensive and costly gas-cleaning system is installed to remove contaminants from landfill gas. Instead, Winnebago County officials decided to increase maintenance intervals at their gas cleanup plants rather than install a new gas-cleaning system, which proved to be both an effective and cost-effective solution for their operations.

### Emissions Reduction

According to the US EPA's Landfill Methane Outreach Program, the 2.5 MW CHP plant reduces annual emissions, both directly through allowing less methane and CO<sub>2</sub> to leak to the atmosphere and indirectly through avoiding the use of fossil fuels. Direct and indirect emission reductions include:

- o 4,800 tons of methane (CH<sub>4</sub>)
- o 13,700 tons of carbon dioxide (CO<sub>2</sub>)
- o 1 million metric tons of carbon dioxide equivalent (MMTCO<sub>2</sub>)



**GE Jenbacher J320 Engine Generator**

### Landfill Gas Cleanup

One of the prerequisites for a successful LFGE project is to ensure the landfill gas is properly cleaned. The contaminants in the gas – which include siloxanes, chemical compounds of silicone, oxygen, and carbon and hydrogen – must be dealt with. Fortunately, gas cleanup at the Winnebago County landfill is a relatively simple process.

*"This is an extremely efficient use of our landfill gas. The county is glad to hear that we are creating revenue and saving money in heating costs."*

*"Our landfill gas supply was rising; we needed to decide how to use it efficiently. Waste-heat recovery seemed like a good idea. We figured out the rough cost of doing this and we liked what we saw."*

*- Jim Morris, Landfill Manager for Winnebago County Gas Recovery*

### For More Information

#### U.S. DOE MIDWEST CHP TECHNICAL ASSISTANCE PARTNERSHIP

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

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