



Owensboro Grain

9 MW Natural Gas CHP System

Project Overview

Owensboro Grain Company, located on the Ohio River in western Kentucky, produces a vast array of products from soybeans. The company's soy products include protein meal and hull pellets for animal feeds, crude and degummed oil, lecithin, various blends of refined vegetable oil for human consumption, biodiesel and glycerin.



Aerial Photograph of Owensboro Grain

Owensboro Grain started in 1906 as a small grain merchant. Over the generations, the company grew steadily as soybean processors and grain merchandisers that valued technological advances as a way to produce dependable quality products. In January 2014 Owensboro Grain commissioned a CHP plant that would produce 100% of the company's electricity needs, in order to enhance their power independence.

Reasons for Installing Combined Heat & Power

Owensboro Grain decided to invest in a CHP system primarily to reduce their current and future energy costs. Since electricity prices in Kentucky were rising while natural gas price increase projections remained relatively low, the company started to investigate CHP as a way to safeguard against power cost increases. By recovering the heat from the engines and increasing efficiency, Owensboro Grain generates electricity at a lower rate than it can if purchased from the local utility. Another reason the company decided to install a CHP system was to reduce their carbon footprint. Electricity generation in Kentucky is coal based and since Owensboro Grain's main process boiler is also coal fueled, the natural gas fueled CHP system has reduced the site's emissions significantly.

Equipment, Configuration and System Operation

Natural gas fuels two 3.2 MW GE Jenbacher reciprocating engines that provide approximately 100% of the facility's electric needs. The plant has an average electric load of about 5.4 MW and reaches a peak load of 6.4 MW. The system was designed

Quick Facts

LOCATION: Owensboro, KY
MARKET SECTOR: Food Processing/Biofuels
FUEL: Natural Gas
GENERATING CAPACITY: 9 MW
IN OPERATION SINCE: 2014
EQUIPMENT: (3) GE Jenbacher reciprocating engines
USE OF ELECTRIC ENERGY: On-site
USE OF THERMAL ENERGY: Hot water
INSTALLED COSTS: <\$15 million
ANNUAL SAVINGS: \$1 million
ENVIRONMENTAL BENEFITS: Source to Site GHG emissions reduction & boiler emissions reduction
EMISSIONS CONTROLS: Oxidation catalyst
EFFICIENCY: up to 80% depending on amount of recovered thermal used



with N+1 redundancy: a third 3.2 MW reciprocating engine is on standby in case one of the other two engines are not available for operation or the plant experiences a higher peak load. The waste heat from the two engines' intercooler, water jacket, and oil is used to pre-heat the boiler makeup water, whereas the higher temperature waste heat from the engines' exhaust pre-heats the boiler feedwater. An oxidation catalyst is installed at the engine exhaust as a post-combustion technology to reduce CO emissions. The facility is also required to complete annual stack testing to assure compliance with emission limits.

Two of the GE Jenbacher Reciprocating Engines

constructed and installed in time to be interconnected during the annual outage resulting in no additional plant down time. The system operates 24/7 and is monitored both inside the CHP building and remotely at the boiler operator station. The company did not need to hire additional personnel to operate the CHP system - the existing boiler operators were trained to monitor, operate and maintain the system on a daily basis.

Owensboro Grain has an annual outage during which prescheduled maintenance is performed. The CHP system was

Project Economics and Partners

The CHP project cost Owensboro Grain less than \$15 million and saves the company approximately \$1 million annually in energy costs. Natural gas is bought at the wholesale market and distributed to the plant by Atmos Energy, the local gas utility. The company does not buy power from Owensboro Municipal Utilities anymore, but has a contract for standby power.

The project development and engineering for the CHP system was completed by PowerSecure, a Raleigh, NC based company. Even though Owensboro Grain maintains the system on a day to day basis, it also has a maintenance contract with Nixon Energy Solutions, the local GE Jenbacher distributor, to provide engine maintenance at specifically- defined operating intervals.

Testimonial

"The CHP system offers economic, environmental, and reliability benefits to Owensboro Grain, helps the company safeguard against rising energy costs, reduce GHG emissions, and enables Owensboro Grain to remain competitive in a tough economic environment"

*John M. Wright,
Executive Vice President,
Owensboro Grain*

Lessons Learned

Two were the main takeaways from the development and construction of the CHP project that resonate with the company:

- Be sure to partner with a development and engineering company that has completed successful CHP projects before, as they will avoid common mistakes, and know and understand the complexities of such systems.
- Exercise due diligence before choosing the equipment, more specifically the reciprocating engines. There is a vast variety of options but not all are suitable for your specific needs.

For More Information

U.S. DOE SE CHP TECHNICAL ASSISTANCE PARTNERSHIP

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More Project Profiles: <http://www.southeastchptap.org> or <http://www.energy.gov/chp>

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