

U.S. DOE

CLEAN ENERGY
APPLICATION CENTER

Sierra Nevada Brewery

1 MW Fuel Cell CHP System

Site Description

Sierra Nevada Brewing Co. (SNBC) in Chico, California is producing methane and electricity from byproducts of the company's beer brewing process. Founded in Chico in 1980, Sierra Nevada applies resource conservation and reusing/recycling raw materials as guiding operating principles.

Project Profile

The brewery has installed four 250-kW direct fuel cells that run off a combination of natural gas and methane produced from the brewery's wastewater anaerobic digester. The treatment of SNBC's effluent water takes place on-site and uses a two-step anaerobic and aerobic digester process that produces methane. The methane is then captured and piped to the fuel cells where it is mixed with natural gas from the pipeline. Their fuel cells are high-temperature molten carbonate units from FuelCell Energy Inc. They are providing a substantial portion of the facility's baseload power. The waste heat is being collected as steam and used for the brewing process as well as other heating needs onsite. The fuel cells initially ran off of natural gas alone, but in late 2006 the digester gas was integrated into the project, thus displacing 25-40% of natural gas use with the digester gas. The fuel cell system was installed by Alliance Power, a distribution partner of FuelCell Energy. Alliance Power performed all aspects of the initial project implementation, including siting, planning, permitting, designing, constructing, financing, and operating. SNBC purchased the fuel cells from Alliance Power in December 2006. FuelCell Energy continues to provide cell monitoring and servicing.

According to Cheri Chastain, Director of Sustainability at SNBC:

"Lately the CHP system is not running on biogas but on natural gas only. The reasons for this are first that the ebb and flow of the brewing production schedule is not allowing for a steady stream of biogas production. Once the scheduling moves toward a 24/7 production, than it will be possible to have a steady stream of biogas. Second, originally both compressors for the biogas provided 35 scfm capacities and each worked well. As the brewery has moved to 40 scfm of production the controls in the first 35 scfm compressor trip that unit off and causes drops in pressure."

The system engineers have concluded that this may be a programming problem, and the manufacturer and the owner are working toward a solution. However, meanwhile all biogas is being diverted to the boiler system, and is not going to waste.

Quick Facts

LOCATION: Chico, California

MARKET SECTOR: Beverage Development

TOTAL PROJECT COST: \$7 million over 5 years

PAYBACK PERIOD: Approximately 6 years (with incentives and using digester gas)

ANNUAL ENERGY BILL SAVINGS: \$400,000/year

EQUIPMENT: 1 MW (four 250-kW Fuel Cell Energy DFC300A molten carbonate fuel cells)

FUEL: Natural gas

USE OF THERMAL ENERGY: Steam for brewing process and other facility heating

FACILITY SIZE: No Data

FACILITY PEAK LOAD: No Data

FACILITY AVERAGE LOAD: No Data

CHP IN OPERATION SINCE: 2005

"Like any business Sierra Nevada was looking for stable, affordable, reliable power, and they wanted to limit the environmental impact of their operation. They found the answer in a hydrogen fuel cell that generates power on site."
Arnold Schwarzenegger Governor of California

**Air quality improvement is equal to an elimination of 500 gasoline cars.
The overall energy efficiency of the installation is about twice that of grid-supplied power.**

Financial Incentives

The total project cost for the first five years is approximately \$7 million, including installation costs and operation and maintenance for the hydrogen production system and the fuel cells. Some of the project costs were offset by \$2.4 million in funding from Pacific Gas and Electric Co. through the California Public Utility Commission (CPUC) Self Generation Incentive Program and \$1 million from the U.S. Department of Defense Climate Change Fuel Cell Program. With these subsidies, an estimated electricity cost savings of about \$400,000 per year, and other cost savings associated with the operation of the system, project managers expect a payback time of about six years.



California Self Generation Incentive Program

CPUC/PG&E’s Self-Generation Incentive Program (SGIP) provides financial incentives to help support the costs of on-site electric generating systems utilizing wind, fuel cell, micro turbine or internal combustion engine cogeneration systems. Program participants are eligible to receive incentives under this program for installing distributed generation technologies based on system type, size, fuel source and out-of-pocket costs. Only commercially available and factory new equipment is eligible to receive incentives under this program. Furthermore, The tiered incentive rate varies depending on the capacity of the system. For example the incentive rate for a 0-1 MW system is 100%, while it is 50% for a 1-2 MW system and 25% for a 2-3 MW system.

Example SGIP Incentive Levels for Advanced Technologies (as of September 30, 2010)

Technology	Incentive
Renewable fuel cells	\$4.50/Watt
Renewable micro-turbines	\$1.30/Watt
Non-renewable fuel cells	\$2.50/Watt
Non-renewable microturbines	\$0.80/Watt
Renewable gas turbines	\$1.00/Watt
Non-renewable gas turbines	\$0.60/Watt

A significant change in the proposed revisions to the SGIP program is that payments are now to be “performance-based” where the payment in the first year is proposed to be 25% of the full incentive, followed by five subsequent payments of 15% each year pending satisfactory system performance. This change is intended to assure that systems continue to operate efficiently after the first few years of the project.

For More Information

Sierra Nevada Brewery:
<http://www.sierranevada.com>

Alliance power, Inc:
www.alliancepower.com

Fuelcell Energy, Inc:
www.Fuelcellenergy.com

Self-Generation Incentive Program:
<http://www.cpuc.ca.gov/EFILE/RULINGS/124214.pdf>

Additional CHP Pacific Projects Profiles:
<http://www.pacificcleanenergy.org>

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