



New York State Energy Research and Development Authority

Hilton New York

Fuel Cell Provides Electricity and DHW

DG/CHP Program

Project Profile

Combined heat and power for
Hotel/Hospitality



Overview

The Hilton New York is the largest hotel in the city. The 46 story building houses 1,980 guest rooms and over 150,000 square feet of space dedicated to banquet facilities, meeting rooms and exhibition halls. The electric demand at the hotel averages more than 3 MW. Equally significant heating loads are incurred.

A single 200 kW phosphoric acid fuel cell was installed at the site to provide electricity and hot water. The fuel cell provides about 6% of the hotel's total electricity and 8% of the required heat while operating at an efficiency approaching 50% HHV.

Quick Facts

Location:
New York, NY (Con Ed)

Installation Date:
Summer 2007

Operating Experience:
13 months (as of October 2008)

CHP Equipment:
Phosphoric acid fuel cell

Generating Capacity:
200 kW

Heat Recovery Application:
Domestic Hot Water (400 MBtu/h peak)

Design CHP Efficiency:
52% HHV

Type of Fuel:
Natural Gas

Annual Utility Savings:
\$80,000 per year (est.)

Simple Payback:
NA

The Application

Energy can account for 6% or more of the operating costs incurred by hotels. Although use of electricity tends to dominate, hotels generally have continuous, sizeable heating loads as well. These conditions favor CHP technologies though the lack of free space and concerns about disturbing guests limits the appeal of large engine driven systems. Fuel cells have many characteristics that make them attractive in these situations: they do not vibrate, make much noise or have a visible exhaust. Corporate initiatives targeting environmentally benign technologies also encouraged Hilton's interest in fuel cell systems.

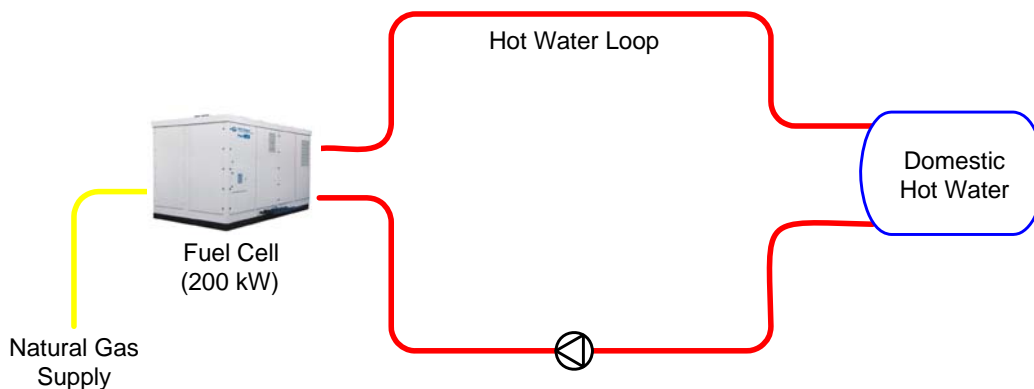
The hotel eventually installed a 200 kW fuel cell on a 4th floor mezzanine. The electricity produced by the fuel cell offsets utility purchases. Heat recovered as a byproduct of the fuel cell's operation provides a portion of the hotel's domestic hot water (DHW) requirement.



Installed Fuel Cell and Gas Booster

CHP System and Equipment

The hotel's CHP system is configured on a 200 kW phosphoric acid fuel cell. Natural gas is supplied from a gas pressure booster that slightly increases the inlet pressure. Hydrogen is stripped from the gas and combined with atmospheric oxygen to produce electricity at a conversion efficiency of 35%. The system's electrical output is maintained near its rated value because of the hotel's high demand. The fuel cell can operate in parallel with the utility or operate isolated from the grid in case of an emergency. Heat recovered from the process is recovered as hot water through separate high (250°F max) and low (~140°F) temperature loops. Heat from the high temperature loop is currently being rejected to the atmosphere through a dry cooling coil. The lower temperature water is being used to produce DHW adding more than 15% to the overall system efficiency at design conditions.



Economics and Environmental Benefits

Monitored data from the site are available in an hourly format on NYSERDA's DG/CHP website starting from September 2007. Hilton anticipates reducing its carbon footprint by 780 tons per year compared to the use of conventional utilities due to the fuel cell's low emission characteristics. A reduction in nitrogen oxide emissions approaching 3 tons should also be realized. In its present configuration the fuel cell's combined electrical and thermal output should produce annual savings in excess of \$80,000 though Hilton also perceives the system as being a highly reliable source of backup power that adds significant value to the installation beyond the energy savings alone.



Installed Fuel Cell and Dry Cooler on Left



Fuel Cell Standard Package

Summary of Benefits

- Fuel cell operates continuously at rated electric capacity
- Low emissions characteristics encouraged technology selection by end user
- System available as a source of emergency power

“The fuel cell at the Hilton New York is one of the more significant ways we can have an impact on energy consumption in one of the largest cities in the world.”

- George Neeson, VP of Engineering & Housekeeping, Hilton Hotels Corp.

Web Links and Further Information:

UTC Power – Developer/Operator/Manufacturer

www.utcpower.com

Other DG/CHP Resources

chp.nyserda.org

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