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U.S. DOE

CHP Technical Assistance Partnerships

PROJECT PROFILE

BP's Helios Plaza

4.6-MW CHP System

PHOTO COURTESY: BP

BP's Helios Plaza, a LEED Platinum building in Houston, installed CHP to ensure it would always have reliable power to run its 24/7 trading operations.

Quick Facts

LOCATION: Houston, Texas
MARKET SECTOR: High-rise office building
FACILITY SIZE: 6 stories, 355,000 square feet
FACILITY AVERAGE LOAD: 2 megawatts (MW)
EQUIPMENT: Solar Mercury 50 gas turbine, 1,350-ton absorption chiller, 1,200-ton backup chiller, 4,000-ton-hours thermal storage tank, 1.6-kW backup generator
FUEL: Natural gas
USE OF THERMAL ENERGY: Chilling
CHP TOTAL EFFICIENCY: >75%
CHP IN OPERATION SINCE: 2009
NOTABLE: Houston's first LEED Platinum certified building

Site Description

BP's Helios Plaza is home to BP's North America Gas and Power, including the Integrated Supply and Trading and the Upstream Learning Center business units. The 6-story, 355,000-square foot high-rise office building was constructed with recycled, rapidly renewable, and locally-produced materials, and was Houston's first LEED Platinum-certified new construction building. An onsite CHP system enhances the site through added reliability, improved energy efficiency, and reduced emissions. BP is a global energy company with more than 80,000 employees in 80 countries. BP North America Gas and Power, headquartered at Helios Plaza, is a major electricity, natural gas liquids and natural gas marketer and trader.

Reasons for CHP

Onsite reliability and resiliency were the key reasons for an investment in a CHP system at BP's Helios Plaza, helping ensure the business's 24/7 trading operations are never interrupted. CHP contributes to the building's ability to continue operating during hurricanes, tornadoes, blackouts, or other adverse events. Improved energy efficiency and reduced emissions are additional benefits of the 4.6 megawatt (MW) onsite system.


PHOTO COURTESY: BP


PHOTO COURTESY: TAS

Reliable, always-on power and cooling are important for ensuring BP's trading operations are never interrupted—even during grid outages. A Mercury 50 turbine from Solar Turbines supplies all of the power for BP's Helios Plaza, and the recycled thermal energy from the turbine supplies the building's chilled water needs via an absorption chiller.

CHP Equipment Configuration

The CHP system, designed and integrated by Turbine Air Systems (TAS), uses a natural gas-fueled 4.6-MW Mercury 50 turbine from Solar Turbines. The heat from the turbine goes through a heat recovery steam generator (HRSG) and drives a 1,350-ton absorption chiller for all of the building's chilled water needs. Heat when needed is from electric resistance heaters. The plant also has a 1,200-ton electric backup chiller, and 4,000 ton-hrs of thermal energy storage (a 400,000 gallon tank of 40 degree chilled water). Two over-head power feeds from electric utility grid serve as backup to the turbine, and, for additional protection, the building has a 1.6-MW life safety emergency generator and a redundant uninterruptible power system (UPS, or battery backup).

CHP Operation

The system runs 24/7, and has two plant operators per shift, provided by Solar Turbines. The turbine normally operates in "load following" mode, providing all of the building's typical 2-MW demand with minimal exporting of power to the grid. The system is "islandable" so it can run while connected or disconnected from the utility grid. It cannot export power to the utility grid during grid outages, such as rolling blackouts or brownouts, in order to protect utility personnel. Operating procedures that BP has worked out at the Helios Plaza building include: only operating the turbine above 35% capacity to comply with Texas' air quality regulations, using thermal energy storage as a load when disconnected from the grid on cooler days, and water treatment for the condenser water since it supplied by either harvested rainwater or city water.

Lessons To Share

The CHP system at BP Helios, in operation since 2009, yields the following advice for other companies considering CHP:

- When evaluating the economics of a potential CHP project, the cost of operation should be weighed against benefits such as increased reliability and security.
- Thermal load balancing can be challenging for data centers—the system needs to match power and cooling demands.
- Modularity in system components, greater standardization, and less field construction will provide cost savings.

For More Information

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