NORTHEAST CHP APPLICATION CENTER

combined heat & power in healthcare

South Oaks Hospital

1.3 MW CHP Application

Project Profile

Quick Facts

Location:
Amityville, NY

Installation Date:
June 1990

CHP Equipment:
Two Cooper dual-fuel reciprocating engines
Trane absorption chiller

Additional Equipment:
Two Cleaver Brooks boilers
Emergency generators

Type of Fuel:
Natural gas & #2 Oil

Heat Recovery Applications:
Space heating, space cooling, domestic hot water, cooking, laundry

System Efficiency:
82%

Project Cost:
$1.8 million

Simple Payback:
Less than 5 years

System Design and Installation:
Encotech Engineering, Schenectady, NY

Project Overview

South Oaks Hospital on Long Island installed a combined heat and power system in 1990 to reduce energy costs. The system had a simple payback of less than five years, and continues to generate almost all of their energy needs. The current operating cost is just 6 to 8 cents per kWh, compared to the cost of approximately 12 cents per kWh for electricity purchased from the utility.

This 350,000 square foot hospital contains a psychiatric hospital, a nursing home, and an assisted living facility. The system generates up to 100% of the hospital's electricity, with the utility providing backup power and on-site boilers providing supplemental steam. Steam output from the system is used for space heating, space cooling, domestic hot water, laundry, and the kitchen.

Reliability has been another advantage of CHP. This system is grid-connected but can operate off the grid during emergencies. During the major northeast blackout in August 2003, South Oaks never lost power, while the area around the hospital lost power for 14 hours. Employees were not even aware of the blackout at first because they saw no interruption in their service. The hospital chose to stay off the grid for five days following the blackout because of concerns about instability in the grid.

The South Oaks system is 1.3 MW, with two dual-fuel reciprocating engines run primarily on natural gas and total efficiency of 82%. The system is run continuously, with one engine typically turned off during winter nights. Total installation cost for the project was $1.8 million in 1990.

Energy Overview

South Oaks Hospital has two Cooper reciprocating engines, each 667 kW. They are dual-fuel engines which require diesel oil for ignition, then can run on either oil or natural gas. The hospital primarily uses cleaner burning natural gas, with oil as backup.

Steam is recovered at 100 psi off the exhaust and at 15 psi off the jacket water. The system makes use of at least 95% of the heat off the engines. A 750 ton Trane absorption chiller uses steam to provide all of the cooling in the hospital. Two Cleaver Brooks boilers rated at 20,000 lb/hr provide supplemental steam.

Most maintenance is performed in-house. Cooper provides service as needed.

South Oaks is able to sell electricity to the grid, but this is only done when it will be profitable. The Long Island Power Authority typically pays $0.06 per kWh for electricity generated at the hospital, so with current fuel prices there would be no benefit to the hospital. During the summer months, the hospital does contribute to the grid at times when the utility offers a higher rate to encourage customers to help meet high demand.

This CHP system has been very successful at South Oaks Hospital, but new air quality standards in New York require lower emissions than can be obtained with the current engines. The hospital is currently designing a new 1.2 MW system that will run entirely on natural gas. This will consist of five 250 kW engines with an additional hot water chiller. They plan to use this to replace the 1990 system in the summer of 2006.

Benefits

- Reduced operating costs.
- Increased power reliability.
- Competitive advantage for the hospital, especially after the 2003 blackout.

Challenges

- Maintenance of the CHP plant is the biggest challenge. It takes a lot of work, but is worth the effort for strong system performance.
- Rising natural gas costs are increasing the cost of operating the system.

"Our staff didn't know about the 2003 blackout at first because we didn't lose power at all."

Bob Chester, Director of Engineering

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