



New York State Energy Research and Development Authority

NY Presbyterian Hospital

Turbine Provides HVAC and Electricity

DG/CHP Program

Project Profile

Combined heat and power for
Hospital



Quick Facts

Location:
Manhattan, NY (Con Ed)

Installation Date:
November 2009

Operating Experience:
18 months (as of 2011)

CHP Equipment:
Single Solar Turbines turbine generator set

Generating Capacity:
7,500 kW

Heat Recovery Application:
High pressure steam used for HVAC

Design CHP Efficiency:
> 80% LHV

Type of Fuel:
Natural Gas

Annual Utility Savings:
\$4.0 million (estimated)

Simple Payback:
5 years

Overview

The New York Presbyterian Hospital is one of New York's largest and most inclusive hospitals with over 13,000 employees and 2,400 patient beds. NYPH's downtown campus, known as the New York Weill Cornell Medical Center, is a teaching hospital affiliated with Cornell University.

A single 7.5 MW gas turbine generator set was installed at the facility to provide electricity to various load centers across the campus. Heat recovered from the turbine exhaust is used to produce high-pressure steam. The system can provide 60% or more of the site's electrical power at a CHP efficiency approaching 85% LHV.

The Application

NYPH's electric demand can exceed 11,000 kW. Thermal loads are dominated by space conditioning requirements. Steam is used for space heating and to provide air conditioning using steam driven centrifugal chillers. Consequently, there is continuous demand for steam that can at times exceed 200,000 lbs/hr.

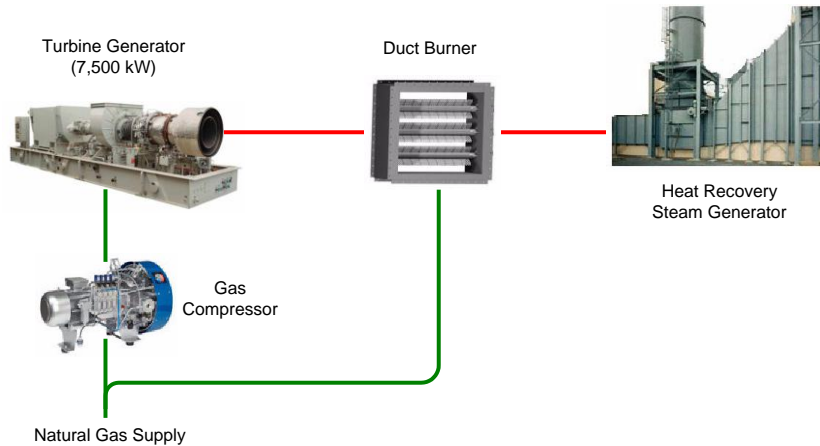
The magnitude of the loads favored use of a combustion turbine as the prime mover. Turbines are generally compact despite the large generating capacity that can be provided. Most stationary turbines also have a multi-fuel capability, a feature critical in hospitals. The turbine installed at NYPH can operate on natural gas or #2 fuel oil; the same fuels used in the existing boilers. The turbine operates in parallel with both the electric utility and steam plant. A synchronous generator was used so the turbine could continue operating in the event of a blackout.



Solar Turbines Taurus 7-T10301S natural gas fueled turbine generator set.

CHP System and Equipment

NYPH's CHP system is configured on a single 7.5 MW turbine generator set. The turbine is fired primarily on natural gas that is supplied to the site at 60 psig. A booster compressor is used to increase the gas pressure to a level suitable to fuel the turbine. Electricity is produced at 4,160 volts and distributed to load centers across the campus. Automatic controls modulate the electrical output to follow the site load. No power is exported to the grid. Waste heat from the turbine exhaust is used to produce steam at 185 psig in a heat recovery steam generator (HRSG). The installation includes an auxiliary duct burner that can be used to increase the steam output from the HRSG during periods of peak consumption. This limits the need to operate the existing boilers.



Economics and Environmental Benefits

Hourly data have been collected from the site since October 2009, and are available on NYSERDA's DG/CHP web site. The available data indicate the CHP system has operated at a peak output of 7.3 MW and produced an average of 3.6 million kWh per month since entering service. NYPH anticipates the unit cost of electricity will be reduced by 37%. Net savings should exceed \$4 million per year. Simple payback is expected within 5 years based on an equivalent installed cost of \$2,700 per kW of rated capacity. The CHP system incorporates a lean burn technology that limits the formation of nitrogen oxides. Total emissions are expected to be reduced by 20,000 tons annually in comparison to conventional practice.



Typical package gas turbine installation



Typical heat recovery steam generator

Summary of Benefits

- Enhanced energy reliability through on-site generation
- Reduced load on regional electric grid
- Energy efficient and environmentally friendly source of power
- Annual energy savings of \$4 million or more

“Every dollar saved on energy costs is a dollar that is devoted to improving medical care for our patients.”

~ Dr. Herbert Pardes,
President and CEO,
NY Presbyterian Hospital

Web Links and Further Information:

Developer

www.dylanassociates.com

Manufacturer

www.mysolar.cat.com

Other DG/CHP Resources

chp.nyserda.org

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