NYSERDA
New York State Energy Research and Development Authority

10 West 66th Street

Micro-Turbine Provides Hot Water

DG/CHP Program

Project Profile

Combined heat and power for Apartment Building

Quick Facts

Location:
New York, NY (Con Edison)

Installation Date:
July 2004

Operating Experience:
20 months (as of March 2006)

CHP Equipment:
One IR PowerWorks Microturbine

Generating Capacity:
70 kW

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

Design CHP Efficiency:
67% HHV

Type of Fuel:
Natural Gas

Annual Utility Savings:
$34,000 per year (estimated)

Simple Payback:
11 years (estimated)

Overview

10 West 66th Street is a 256 unit, multi-family residential building located in Manhattan near Central Park. The building has extensive electrical loads; the peak demand can exceed 650 kW. Consequently, the cost incurred purchasing energy has risen substantially in recent years.

A 70 kW micro-turbine generator set was installed at the site to produce electricity and domestic hot water (DHW). The generator operates in parallel with the utility and offsets part of the building's base electrical load. The micro-turbine runs continuously and operates at a CHP efficiency of approximately 67% HHV.

The Application

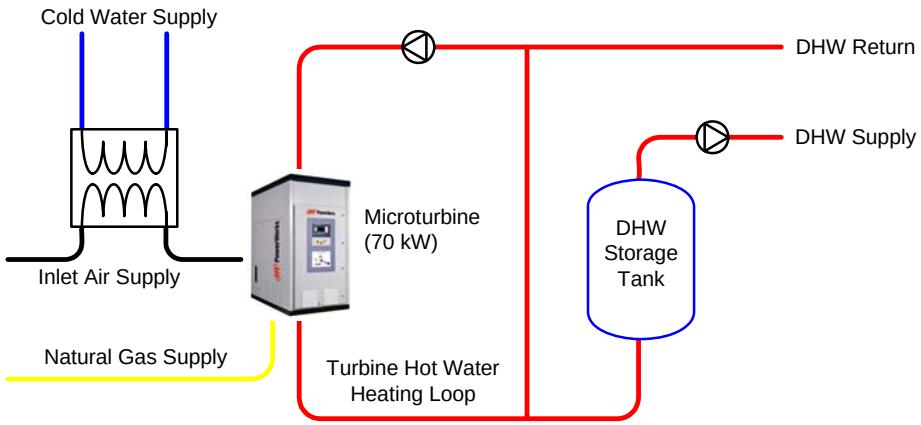
In the past, many large residential buildings were encouraged to use electricity to provide most of the building services. This practice was economical at the time but has proven costly as the price of electricity has escalated. 10 West 66th Street was built in this pattern. However, the management has been active in implementing energy conservation measures and viewed CHP as an innovative means of continuing that practice.

The micro-turbine was attractive because of its modular configuration and relatively small size. Waste heat from the exhaust is used to augment the supply of DHW which is one of the few centralized utilities in the building. The micro-turbine was also attractive because of its operating characteristics. The low level of noise and vibration produced is more compatible with the building use than other CHP technologies

70 kW Micro-Turbine Package

CHP System and Equipment

The CHP system is configured on a single micro-turbine generator. Electricity is produced in parallel with the utility grid. The demand at the site generally exceeds the micro-turbine capacity though the output can be modulated when necessary to follow the actual load. No electricity is exported to the grid. Cold water is used to cool the combustion air entering the turbine to enhance its performance when ambient temperatures are high. The exhaust gas temperature can range from 400 to 500°F. The unit has an integral exhaust gas-to-water heat exchanger designed to recover up to 400,000 Btu/h as 180°F hot water. This energy is captured by circulating some of the return DHW flow and fresh make-up through the unit. This partially heats the water and reduces the load on the conventional heating system.



Economics and Environmental Benefits

Monitored data are being collected from the site by Connected Energy and are available in an hourly format on NYSERDA's DG/CHP website starting from November 2005. The unit has produced more than 300,000 kWh annually. The peak electrical demand at the site has been reduced by an average of 60 kW per month over the past two years. A payback period approaching eleven years is expected based on estimated annual energy savings of $34,000. The system consumes approximately 21% less fuel than would be expected using a conventional DHW heater and purchasing electricity. Carbon dioxide emissions should be reduced by 100 tons per year based on this savings.

Installed System

Heat Exchanger Ports in Panel

Summary of Benefits

- Modular system simplifies installation
- Unit operates continuously at near rated conditions
- Significant fuel and emissions reductions achieved

"It's exciting to know we've applied a state-of-the-art approach to help control the cost of operating a building that we call home. " - Anonymous

Web Links and Further Information:

DSM Engineering Associates, P.C. – Developer/Engineer

Equipment Manufacturer

energy.ingersollrand.com

Other DG/CHP Resources

chp.nyserda.org

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