NYSERDA
New York State Energy Research and Development Authority

Sea Rise I & II

Engine Generators Provide Hot Water

DG/CHP Program **Project Profile**

Combined heat and power for Apartment Building

Quick Facts

Location:
Brooklyn, NY (Con Edison)

Installation Date:
April 2004

Operating Experience:
22 months (as of February 2006)

CHP Equipment:
Four 60 kW IC Engines (2 per building)

Generating Capacity:
240 kW

Heat Recovery Application:
Domestic Hot Water (1.2 MMBtu/h peak)

Design CHP Efficiency:
85% HHV

Type of Fuel:
Natural Gas

Annual Utility Savings:
$124,600 per year (estimated)

Simple Payback:
6.6 years (estimated)

Overview

The Sea Rise complex consists of two adjoining buildings (Sea Rise I & II) located in Brooklyn, NY. Each building has 334 apartments. The building's electric loads are similar; the demand ranges from 400 to 600 kW typically peaking in winter.

Two 60 kW engine-generator sets were installed in each building to produce electricity and heat domestic hot water (DHW). The generators produce about 20% of the electricity consumption and most of the DHW achieving a CHP efficiency of 85% HHV.

The Application

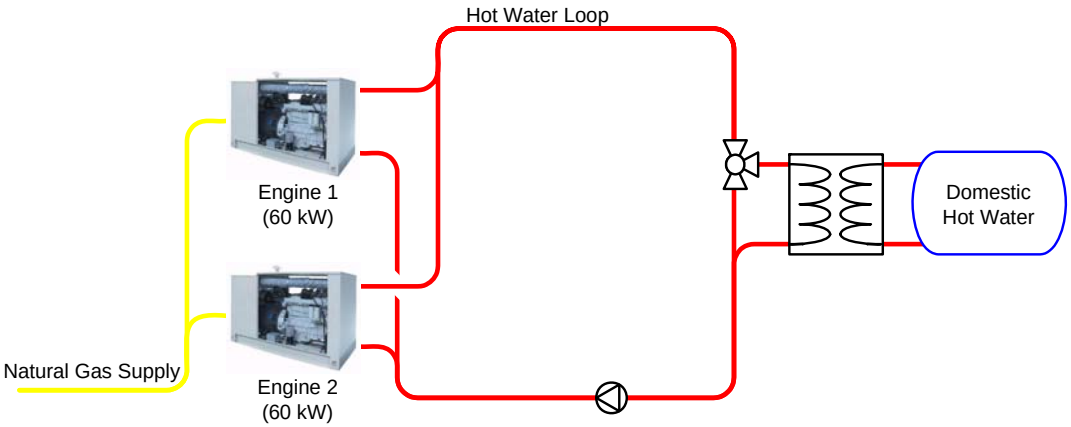
A prior attempt to use CHP technology at the Sea Rise apartments failed more than two decades ago. Problems associated with the state of the technology and economic viability over the ensuing years prevented attempts to revitalize the installation. Changes in the electric rate structure and increasing energy costs prompted renewed interest from the site's management.

The original CHP system was abandoned in favor of a new, modular design. Two packaged engine-generator sets were installed in each building. Engines were selected to match the site's thermal characteristics while the use of multiple units provides additional reliability. Virtually all of the engine heat is captured and used to produce DHW. More than 75% of the annual DHW requirement is met using the CHP system.

Outside Installation of a 60 kW CHP Module

CHP System and Equipment

The CHP system in each building is configured on two, 60 kW natural gas fired engine-generator sets. Electricity is produced in parallel with the utility grid. All of the generated electricity is consumed on site. The electrical output is modulated to match the available heat to the thermal load. Consequently, there are no requirements for auxiliary cooling allowing the installation to be significantly simplified. Heat recovery is accomplished by circulating engine coolant through a heat exchanger on the return side of the DHW distribution system. The flow of potable water and any required make-up is thus preheated and the fuel consumption of the existing heater is proportional reduced.



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 September 2006. The CHP systems in Sea Rise I and II produced 370,000 and 470,000 kWh, respectively, in 2007. The peak electrical demand in each was reduced by an average of 100 kW per month. Simple payback on each installation should be achieved in less than seven years. The CHP systems' greater efficiency as compared to the use of conventional utilities should reduce carbon dioxide emissions by almost 1,200 tons per year.

Typical Engine Heat Recovery Piping

Typical DHW Heat Exchanger Network

Summary of Benefits

- Modular configuration simplifies installation
- Multiple units provide redundancy
- Complete thermal utilization maximizes CHP efficiency

"The success of this project, the way it came together and performed after a previous false start, will really get a lot of other sites to think about doing the same."
- Anonymous

Web Links and Further Information:

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

Equipment Manufacturer

www.coastintelligen.com

Other DG/CHP Resources

chp.nyserda.org

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