NYSERDA
New York State Energy Research and Development Authority

Pepsi Bottling Company

Engines Produce Low Pressure Steam

DG/CHP Program **Project Profile**

Combined heat and power for Food Production Facility

Quick Facts

Location:
College Point, NY (Con Ed)

Installation Date:
Spring 2005

Operating Experience:
3 years (as of March 2008)

CHP Equipment:
Four 365 kW IC Engines

Generating Capacity:
1,460 kW

Heat Recovery Application:
Low Pressure Steam (15 psig)

Design CHP Efficiency:
>82% HHV

Type of Fuel:
Natural Gas

Annual Utility Savings:
$300,000 per year (estimated)

Simple Payback:
7.3 years (estimated)

Overview

The Pepsi-Cola Bottling Company of New York operates a production facility in College Point. The facility operates five to six days per week for up to 22 hours per day. The electric demand can approach 2 MW in summer when production peaks. Steam consumption follows a similar trend.

Four 365 kW engine-generator sets were installed at the facility and supply as much as 90% of the site's electricity. Heat from the engine coolant jackets and exhaust is recovered as low pressure steam that directly displaces load from an existing boiler plant.

The Application

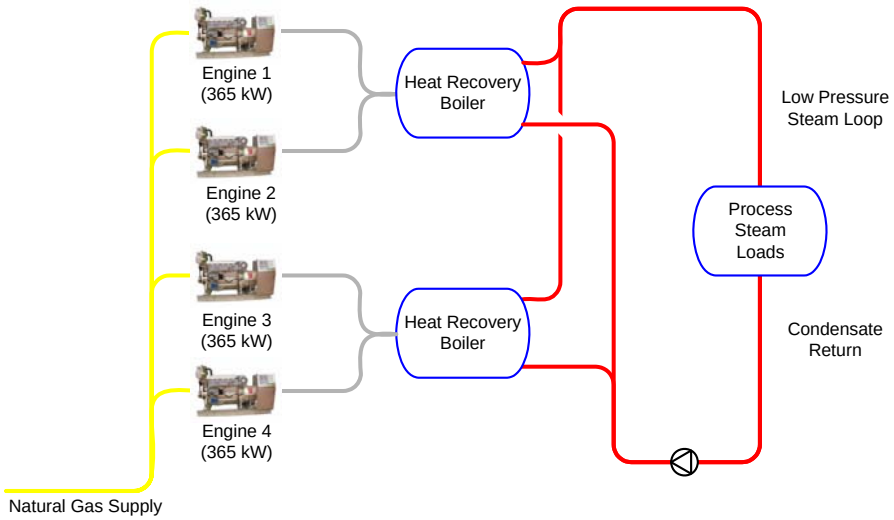
Beverage plants consume considerable energy processing raw materials and handling finished products. Electricity is consumed by various pumps, compressors, lights, conveyors and other devices. Hot water and steam is consumed cleaning and sterilizing production equipment and product containers. Bottles and cans are typically heated after being filled to prevent condensation from forming on the container surface; this is a necessity prior to labeling.

This simultaneous demand for heat and electricity make carbonated drink plants ideal candidates for CHP technology. Reciprocating engine-generators are a good match to these facilities for several reasons. Electrical loads are generally not excessive (< ~2 MW) and can be carried by a moderately sized generator(s). Thermal demands usually dominate site requirements though at a ratio favoring an engine's performance characteristics and the output of heat as hot water or low pressure steam.

Containerized Engine and Auxiliaries

CHP System and Equipment

The CHP system at the Pepsi plant was configured on four natural gas fired engine-generator sets. Installation costs were minimized by pre-assembling the generators and electrical components in containers that were shipped to site where the remaining equipment was added. Automatic controls sequence the operation of each generator and modulate the electrical output to follow the site load. No power is exported to the grid. Waste heat from the engine exhaust is used to produce low pressure steam in a pair of heat recovery steam generators (HRSG). A limited amount of heat is also recovered from the engine coolant as hot water. Any excess heat is rejected to atmosphere through external radiators mounted on top of each container.



Economics and Environmental Benefits

Hourly data have been collected from the site by ConEdison Solutions and are available on NYSERDA's DG/CHP web site starting from October 2007. Preliminary results from the site indicate the consumption of electricity from the grid has been reduced by approximately 400,000 kWh per month. The peak output from the generators has averaged 1,360 kW. Annual savings are expected to exceed $300,000 and should yield payback on the system within eight years. The CHP system's greater efficiency compared to the use of the plant's conventional utilities should help to substantially reduce emissions of carbon dioxide as well as other pollutants and greenhouse gases.

Installed Generator Modules

Detail of a Typical Radiator and Silencer

Summary of Benefits

- Pre-assembled modules reduced cost of installation and minimized site work
- Exhaust heat recovered as low pressure steam
- Cost savings should exceed $25,000 per month

"Producing steam from the engines seemed radical, but hasn't had an impact on the system's reliably."
- Anonymous

Web Links and Further Information:

ConEdison Solutions – Developer/Engineer

www.conedsolutions.com

Equipment Supplier

www.kraftpower.com

Other DG/CHP Resources

chp.nyserda.org

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