NEW ENGLAND CHP TECHNICAL ASSISTANCE PARTNERSHIPS

Pfizer - Andover

10 MW CHP System

Project Overview

Pfizer is a global health care company that develops and produces pharmaceuticals and consumer products. The company uses combined heat and power (CHP) in several of its facilities. In Andover, Massachusetts, Pfizer has a 70-acre site with seven buildings, which house both R&D and manufacturing facilities. A CHP system was installed in 1999 to provide increased power reliability and utility cost savings. In 2003, the system was expanded to a total capacity of 10 MW.

Quick Facts

LOCATION: Andover, MA
MARKET SECTOR: Biotechnology
FACILITY SIZE: 950,000 square feet in 7 buildings
FUEL: Natural gas
PRIME MOVER: Two 5 MW Solar gas turbines
POLLUTION CONTROL: SCONOx emission control system using a proprietary catalyst
OPERATION: 24/7
SYSTEM CAPACITY: 10 MW, 80,000 lb steam/hour
ANNUAL ELECTRICITY GENERATION: 51,000 MWh
USE OF THERMAL ENERGY: Manufacturing process, heating, steam turbine driven chillers
SYSTEM EFFICIENCY: 78%
ANNUAL ENERGY SAVINGS: $4 million
BEGAN OPERATION: 1999, expanded in 2003

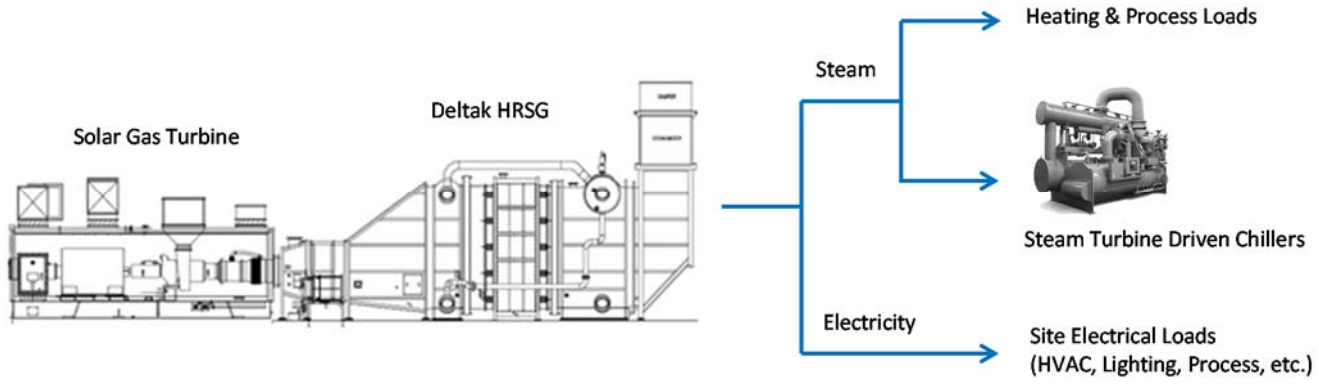
Reasons for Installing CHP

A reliable power supply is essential at this facility because of biotechnology operations that require electricity, steam and other support utilities (compressed air, oxygen, carbon dioxide, purified water) at all times. CHP is a key part of a site utility network that has been designed to provide redundancy, described below, so that an outage of any single utility or piece of equipment will not impact site productivity.

At times when outages are anticipated, Pfizer can temporarily separate their facility from the grid and operate solely on electricity from the CHP system. For example, the staff switched to island mode before a blizzard in January 2015. The storm brought high winds and nearly two feet of snow to the area, while Pfizer was able to continue operations without concern about potential disturbances to the grid.

The efficient CHP system also provides substantial energy cost savings and contributes to Pfizer's environmental commitments by reducing pollutant emissions.

System Schematic



Pfizer Andover CHP Facility

System Design and Operation

The Central Energy Plant at the Pfizer Andover facility consists of the following equipment:

- Two 5 MW Solar Taurus gas turbines
- Downstream heat recovery steam generator (HRSG)
- Two existing water-tube boilers
- Two steam turbine driven chillers
- Three electric chillers
- Four backup generators fueled with ultra-low sulfur distillate oil

The turbines are dual-fueled but run primarily on natural gas, and they operate in parallel with the local electric utility to generate electricity for use on site. Exhaust gas exits the turbines at approximately 950°F and is directed to the HRSG, which generates steam by transferring heat from the exhaust to circulating water. That steam is used for heating, process, and to generate chilled water in the two 1,200 ton steam turbine driven chillers. Supplemental and backup steam and chilled water are provided by the two existing boilers and three electric chillers.

The system was first installed in 1999 with one turbine, and the second turbine was added in 2003. Since that expansion, two major changes have been made to the system:

- Originally, the facility received natural gas from their utility company at approximately 80 psi. The gas turbines require higher gas pressure, so the facility used two 400 hp compressors to raise the gas pressure to 275 psi before it went into the turbines. The company worked with the utility to put in a new line in 2005, so the facility now receives gas directly at 275 psi. Pfizer saves electricity by not needing to run those compressors, and the new gas line provides gas at a more stable pressure, which is better for operation of the turbines.
- The system originally included absorption chillers. A few years ago when those chillers were approaching their end of life, Pfizer staff evaluated their options and decided to install steam turbine driven chillers for lower maintenance.

The SCONOx emission control system uses a proprietary catalyst that promotes the reaction of NOx to elemental nitrogen and oxygen. This technology was selected rather than the more common ammonia based NOx reduction technology to avoid having to handle relatively large quantities of aqueous-based ammonia solutions. The controls have reduced the CHP system's NOx emissions by 90% and CO emissions by 95%.

The system operates continuously year round, with semi-annual maintenance performed by Solar. Its total efficiency is approximately 78%, and it produces 94% of the site's total annual electricity and steam requirements. Pfizer estimates that the CHP system saves $4 million a year in energy costs.

"The CHP plant provides the site operations with a reliable, cost-effective source of both power and steam, while minimizing costs and providing a level of utility independence."

- James W. Kuc, Pfizer Andover Director of Engineering & Facility Infrastructure

For More Information

U.S. DOE NEW ENGLAND CHP TECHNICAL ASSISTANCE PARTNERSHIP

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