



Thermal Energy Corp.

48 MW CHP Application

Project Profile

combined heat & power at a medical center campus

Quick Facts

Site location: Houston, TX

Industry Type:
Medical Center Campus

CHP equipment:
One combustion turbine (GE LM 6000) with a heat recovery steam generator and an 8.8 million gallon chilled water storage tank

Fuel: Natural Gas

Generating Capacity: 48 MW

Steam Production (fired):
330,000 lbs/hr

Benefits
Reduce fossil fuel consumption by 61%
CO₂ reduction of 305,000 tons/yr

Site Overview

As the largest medical center in the world, the Texas Medical Center is home to many of the nation's best hospitals, physicians, researchers, educational institutions and health care providers. Thermal Energy Corp. (TECO) provides reliable, cost-effective and energy-efficient heating and cooling to roughly 75% of the Texas Medical Center. Eighteen different customers who own 45 buildings, with an area of roughly 18 million square feet are served by TECO through a district energy and combined heat and power system. The chilled water and steam are distributed via underground pipes to customers, who use heat exchangers to meet their respective air conditioning, space heating, dehumidification, sterilization and domestic hot water needs.

Project Description

The CHP plant at TECO consists of a LM6000 gas turbine, manufactured by GE, with a Heat Recovery Steam Generator (HRSG) and Selective Catalytic Reduction (SCR) technology. The installation was the first phase of a master-plan implementation, which also included the design-build of an 8.8 million gallon chilled water storage tank, substation and power distribution system upgrades, four 8,000 ton variable speed electric chillers and expansion of the existing thermal distribution system. The TECO Board approved \$377 million for the implementation of the master plan in July 2007. The CHP project, which came online in 2010, is projected to save cumulatively over \$200 million during the next 15 years. The installation of the chilled water storage tank and high efficiency chillers increased chilled water capacity to 120,000 tons. The project was supported by \$10 million in US DOE funding obtained from the American Recovery and Reinvestment Act of 2009. The project supported more than 1,000 direct and indirect jobs in manufacturing, engineering, and construction, with approximately 400 of those being jobs directly associated with construction of the CHP plant. In addition to economic benefits, the plant is expected to reduce regional air pollutants by 302 tons of NO_x, 305,000 tons of CO₂ and 83,000 metric tons of carbon per year. The carbon reduction is the equivalent to removing the emissions of 52,000 cars or adding 83,000 acres of forest annually.

CHP Drivers

Key drivers for the installation of CHP at the hospital were energy efficiency, reliability, favorable project economics, energy security and associated environmental benefits. With the upgrades to its central utility plant, TECO has the capacity to provide all the power and thermal energy needed by the healthcare and research institutions located on the Texas Medical Center campus. The facility is interconnected to the Houston-area grid but has the ability to operate in island mode in the event of any natural disaster.



Lessons Learned

- The first phase of the master plan was implemented successfully within three years, with close co-ordination between TECO, the owner's rep and the design-build firm.
- With the advent of nodal markets in December 2010, TECO adopted a real time operating strategy responding to market prices, rather than operate the CHP plant traditionally as a base loaded generator.
- This installation of the Thermal Energy Storage tank has provided huge operational flexibility and reliability to TECO.
- Aside from producing 100% of the site's electric requirements, the CHP plant is capable of providing additional electricity to the grid. Since the site as is located in a congested transmission area, added societal benefits have also been realized.
- The installation of the CHP plant, along with other additional operational enhancements resulted in a 12% rate reduction for TECO's customers during fiscal year 2011.

For more information –

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The installation of the CHP system doubled the operating efficiency at TECO from 42% to 80% reducing fossil fuel consumption by around 61%. In addition to environmental benefits, the project is expected to save over \$200 million during the next 15 years.

