PROJECT PROFILE

SOUTHCENTRAL

CHP TECHNICAL ASSISTANCE PARTNERSHIPS

Texas Medical Center and TECO

48-MW CHP System

PHOTO: BURNS & MCDONNELL

The Texas Medical Center saves $6 million per year in energy costs by using CHP, and ensures high reliability and energy security for the site's 45 medical buildings.

Site Description

As the largest medical center in the world, the Texas Medical Center (TMC) is home to many of the nation's best hospitals, physicians, researchers, educational institutions and health care providers.

Thermal Energy Corp. (TECO) is a district energy cooperative governed by the TMC institutions. TECO operates the central utility plant with CHP that provides steam and chilled water to eighteen different customers who own 45 buildings, with an area of 19.3 million square feet (roughly 85% of the Texas Medical Center). The chilled water and steam are distributed via underground pipes to these customers, who use heat exchangers to meet their respective air conditioning, space heating, dehumidification, sterilization, and domestic hot water needs.

Quick Facts

LOCATION: Houston, Texas
MARKET SECTOR: Healthcare
FACILITY SIZE: 19.3 million square feet
TECO PEAK LOAD: 60 megawatts (MW)
EQUIPMENT: 48 MW turbine (GE LM 6000) with HRSG and steam-driven chillers
FUEL: Natural gas
USE OF THERMAL ENERGY: Steam-driven chillers, space heating, hot water, dehumidification, and sterilization
ENVIRONMENTAL BENEFITS: Reduces CO_2 emissions by 305,000 tons/yr
YEARLY ENERGY SAVINGS: $6-12 million
CHP IN OPERATION SINCE: 2010

Reasons for CHP

The CHP project, which came online in 2010, saves the medical center up to $12 million per year in energy costs. Key drivers for the installation of CHP at the medical center were reliability and energy security, favorable project economics with the timing of the other needed utility plant upgrades, and environmental benefits.

Equipment & Configuration

The CHP plant consists of a General Electric LM6000 (48 MW) gas turbine with Selective Catalytic Reduction (SCR), Heat Recovery Steam Generator (HRSG), and steam-driven chillers.

TECO has the capacity to provide all of its power needs for making chilled water, as well as all the thermal energy for the healthcare and research institutions located on the campus. It uses boilers to provide steam when the CHP system does not run.

PHOTO: BURNS & MCDONNELL

The CHP project helped transform the Texas Medical Center's energy center into a model for energy efficiency, system reliability, operating flexibility, environmental sensitivity—and the largest district cooling system in the U.S.

The CHP system operates about 1500 hours per year, and only runs when it can produce electricity at a total price that is less than the price of electricity available from the grid on that day. When grid prices are high, including system peak periods, the CHP plant can operate its steam-driven chillers and export excess electricity to the grid, beyond what is needed to meet TECO's electric chiller demand. The CHP plant is interconnected with the Houston-area grid, but also can operate in island mode in the event of a grid electrical failure.

The CHP installation was part of a utility plant upgrade master-plan, which also included substation and power distribution system upgrades, four 8,000 ton variable speed electric chillers, an 8.8 million gallon chilled water storage tank, and expansion of the existing thermal distribution system. TECO's board approved $377 million for the implementation of the master plan in July 2007.

Lessons To Share

- For operational flexibility, the plant design called for two turbines—one now and one in the future—rather than a single large turbine.
- The cost-effectiveness of CHP systems is very dependent on the electric market model in the area where the CHP system is operated.

The customers we serve, hospitals and medical research facilities, have critical loads. Reliability is extremely important to them, and CHP is an important factor in ensuring excellent reliability.

— Steve Swinson, President, Thermal Energy Corporation

For More Information

U.S. DOE SOUTHCENTRAL CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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