SOUTHWEST

U.S. DOE

CHP Technical Assistance Partnerships

PROJECT PROFILE

University of Utah

6.5-MW CHP System

Site Description

The University of Utah, an urban campus located in Salt Lake City, hosts 32,000 students and 25,000 employees. The flagship school in the state's higher education network, the university is known for its strong engineering and medical programs as well as its easy access to both outdoor and city activities. A CHP system installed in 2008 provides more than ten percent of the lower campus' electricity needs and all of its heating needs throughout the year.

Reasons for CHP

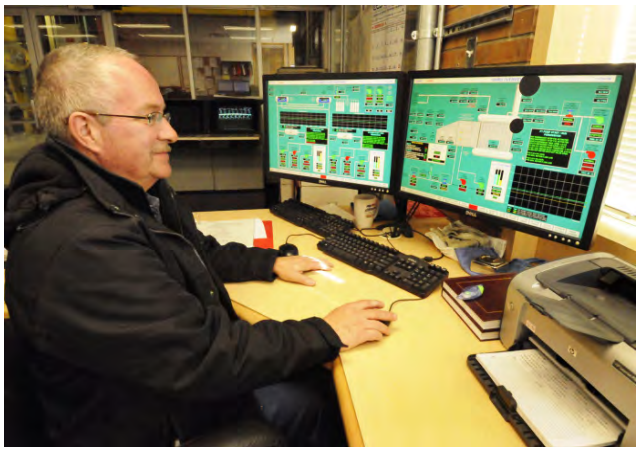
Improved sustainability and reduced greenhouse gas emissions drove the decision for the new CHP system—in fact, the university's president cut the ribbon for the CHP system at the same time he announced a pledge move the school toward climate neutrality. "This made a big dent in reducing our carbon emissions," says Steve Laraway, Project Manager for Campus Construction and Design.

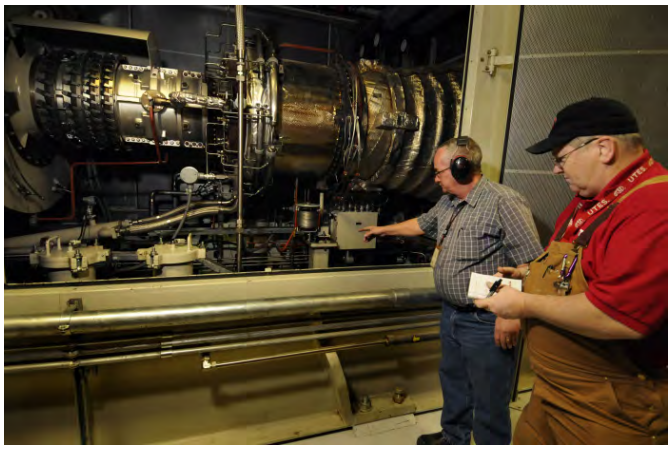
Quick Facts

LOCATION: Salt Lake City, Utah
MARKET SECTOR: Universities and colleges
CAMPUS SIZE: 28,000 students, 1,535 acres
EQUIPMENT: Solar Taurus SoLoNox gas turbine, Rentech waste heat recovery unit
CHP CAPACITY: 7.5 MW, de-rated to 6.5 MW due to altitude
FUEL: Natural gas
TOTAL EFFICIENCY: 90%
CHP PROVIDES: 10% of lower campus electric load, 100% of lower campus heating load
USE OF THERMAL ENERGY: High-temperature water for building heat & domestic hot water
CHP IN OPERATION SINCE: September 2008
COST OF CHP & HEATING SYSTEM RETROFIT: $18m
PAYBACK PERIOD: 12 years
ENVIRONMENTAL BENEFITS: 63,000 tons of CO2 reduced annually; NOx at only 9 ppm

Cost savings were another driver: the campus needed to replace two aging boilers (of 1960s vintage) that supplied hot water to heat campus buildings, and the university calculated that upgrading to CHP instead of just replacing the old boilers would provide good economic returns in the long run. The $18 million project has a 12-year payback. Furthermore, the system serves as a teaching tool for mechanical engineering students, sustainability-focused student groups, and other visiting organizations.

The University of Utah campus in Salt Lake City installed CHP for cost savings and greenhouse gas reductions





Terry Walters (left, and left) and Buddy Barker (right) give a tour of the control system and the turbine, sized to meet the lower campus' entire heating load. Beside the heating benefits, "Our cost per kilowatt hour is lower than what we would pay to our electric utility," says Steve Laraway, Project Manager for Campus Construction and Design.

CHP System Equipment & Operation

The University of Utah has a natural gas-fueled Solar Taurus 70 T7800S (Solar's SoLoNox™) gas turbine with a nameplate capacity of 7.5 MW, but de-rated to 6.5 MW based on altitude. The local utility, Rocky Mountain Power, provides the remaining power not met by the CHP system, and the CHP system never exports any power back to the grid.

The system was sized to produce enough thermal energy for all of the lower campus' needs, plus some room for growth. "In retrospect, sizing it for the thermal load was an economically wise decision," says Laraway. The recycled waste heat from the gas turbine is sent to a Rentech waste heat recovery boiler, where it produces 25-28 million Btu per hour (MMBTUH) of hot water. A supplemental burner adds another 75 MMBTUH when necessary for a combined total of 100 MMBTUH, and the 400-degree hot water is sent through pipes to warm the lower campus buildings. The university keeps a couple of old boilers in standby mode so it can still heat the campus during very cold spells or maintenance activities.

The system runs at a relatively constant rate throughout the year, and availability has averaged 95%—lower in the early months due to start-up issues but higher in recent months. The university depends on high reliability and uninterrupted run-time during daylight hours in order to get cost savings from its negotiated rate schedule with the utility. (Unplanned outages during daylight hours bump the university to a higher rate for the rest of the month.)

Nitrogen oxide (NOx) emissions from the CHP system are the lowest in the state for this type of system—just 9 parts per million (ppm)—accomplished without strategic catalytic reduction thanks to Solar Turbines' SoLoNox technology.

Lessons to Share

- Do a strong financial analysis up front, and keep in mind that electricity prices and natural gas prices can be variable.
- Consider sizing the system to provide all of your heating needs rather than electric needs.
- If the CHP system will be installed in an existing building, be sure to properly and thoroughly survey the building ahead of time. The university encountered asbestos in the boiler room, and its removal added time and cost to the project.
- Be aware that it may take at least a few months to get a new CHP system operating reliably and without any drop-outs.
- "Generally, the cogeneration system is working well for the university. My only suggestion to organizations investigating CHP is to evaluate future natural gas and electricity cost trends carefully; these trends can have a big impact on future savings and payback from the system," said Steve Laraway, the facilities manager at University of Utah.

For More Information

U.S. DOE SOUTHWEST CHP TAP
Christine Brinker, Director
720-939-8333, cbrinker@swenergy.org

UNIVERSITY OF UTAH
Steve Laraway
801-585-3123
stephen.laraway@fm.utah.edu

MORE CHP PROJECT PROFILES:
www.southwestCHPTAP.org/profiles

DATE PRODUCED OR UPDATED: 2015