



Utah State University

4.5-MW CHP System



Cost savings, reliability, and power quality were the key drivers for CHP at Utah State University. PHOTO COURTESY UTAH STATE UNIVERSITY

Quick Facts

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| LOCATION: | Logan, Utah |
| MARKET SECTOR: | Universities |
| TOTAL PROJECT COST: | \$14 Million |
| PAYBACK PERIOD: | 9.3 Years |
| ANNUAL NET ENERGY SAVINGS: | \$1.25 million |
| EQUIPMENT: | Solar Turbines Taurus 60 4.5 MW Turbine, Victory HRSG |
| FUEL: | Natural gas |
| USE OF THERMAL ENERGY: | Space heating and hot water |
| FACILITY SIZE: | 4.5 million sq. ft |
| STUDENT BODY: | 21,000 students |
| FACILITY PEAK LOAD: | 13 MW |
| FACILITY AVERAGE LOAD: | 9 MW |
| CHP IN OPERATION SINCE: | 2004 |

Site Description

Utah State University is located on a 500-acre site in Logan, Utah. The university maintains 4.5 million square feet of classroom, laboratory, administrative and dormitory space in more than 100 buildings for its 21,000 student-body. Since its founding in 1888, Utah State University has evolved from a small, agricultural college to one that is recognized nationally and internationally for its education program, agricultural and applied sciences, aerospace research undergrad research, and more. The CHP system at Utah State University was the first CHP project at a university in Utah.

Reasons for CHP

The project was initiated by the need of the university to expand the functionality of the central utility plant. The Utility Plant Expansion Project had the objective of providing chilled water to select campus buildings via an existing tunnel system, and generating onsite power and recovering the waste heat to use for campus heating needs. The financial goal was for the resulting savings in purchased electricity to be more than the cost of the plant expansion, over the life of the financing period. In order of priority, the objectives for adding onsite self-generation were to:

- Consistently reduce the cost of electricity to USU
- Increase overall reliability of electricity supply to critical loads
- Improve overall power quality

CHP Equipment & Configuration

USU's expansion included a 4.5 MW solar turbine for on-site electricity and steam generation, an 850-ton electric chiller, and 6,000 feet of supply and return chilled water piping. (The new chilled water system is not connected with the CHP system.)

The gas-fired Solar Taurus 60 turbine generator interfaces with two city-wide utility companies—the university is connected directly to Questar Gas' main line to feed natural gas to the generator, and the electricity is then fed into the lines owned and operated by Logan City.

Between 20,000 and 45,000 pounds per hour of 85 psi saturated steam is produced by the turbine, which is captured and forced into the existing heating pipes. This steam is the main source of heat for the campus to heat both water and buildings, though in the cold winter months the campus does require the use of supplemental boilers for heating.

The turbine is monitored from the control room, which is located within 50 feet of the turbine and staffed 24/7. The university also has a diesel generator onsite to provide some backup power in case of CHP maintenance or outages, with the remaining backup power supplied by the local electric utility. The university maintains regular boilers for backup heating.



The campus has a 13 megawatt (MW) peak demand, and the CHP system cuts 4.5 MW off of that peak.

CHP Operation

- USU's CHP plant was designed to operate 24 hours a day, seven days a week to cover base electrical and thermal loads.
- USU's self-generation and stand-alone abilities allow them to continue to produce a portion of their power demand even in cases of an interruption to the grid or supply from the local power provider.
- USU has the ability to export to the grid but generally does not do so, because it is more cost effective to reduce its own power costs than to sell to the grid.
- Reliability issues are strongly correlated with operator familiarity of the system. Reliability has improved as operator familiarity has improved.

"At current gas costs, USU is seeing about \$1.25 million in avoided cost savings annually with the CHP system."

— Charles Darnell
Associate VP for Facilities
Utah State University

For More Information

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MORE PROJECT PROFILES:
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