



# Texas A&M University

## 45-MW CHP System



### Site Description

The Utilities & Energy Services Department at Texas A&M University provides comprehensive utilities and energy management services for the entire University, serving over 800 buildings, over 24 million gross square feet of facilities, and over 60,000 faculty, staff, and students engaged in research, teaching, and service activities. The utility systems at the university have operated continuously longer than any other in the region, with on-site power generation since 1893, together with thermal energy production (cooling and heating) to meet Texas A&M University requirements. Approximately 90 percent of conditioned building space on campus is served by a centrally-supplied thermal district cooling and heating system, supplied from four major utility plants - a Central Utility Plant (CUP) and three satellite utility plants (SUP1, SUP2, and SUP3).

### Reasons for CHP

To efficiently and reliably meet planned electrical, heating and cooling load growth of the campus, Utilities and Energy Services completed a 45 Megawatt (MW) combined heat and power (CHP) system in 2011. This CHP plant is operated at the CUP, with total capacity to self-generate up to 50 MW of electrical power, with a campus peak load of 75 MW. On-site power generation serves an average of 60 percent of total campus electrical load with the balance of electrical requirements supplied from the 138 kV power transmission that feeds the campus. This ability to both self-generate and purchase electrical power from the grid provides redundancy with greater flexibility and reliability, while ensuring the most cost-effective procurement of electrical supply. Another benefit of CHP is the

### Quick Facts

**LOCATION:** College Station, TX

**MARKET SECTOR:** University

**FACILITY SIZE:** 45 MW

**FACILITY PEAK LOAD:** 75 megawatts (MW)

**EQUIPMENT:** 1 natural gas-fired combustion turbine, 1 heat recovery steam generator, 2 steam turbines

**FUEL:** Natural gas with fuel oil backup

**USE OF THERMAL ENERGY:** 24,000 ton-hour chilled water thermal energy storage

**ENVIRONMENTAL BENEFITS:** 20% reduction in CO<sub>2</sub>

**YEARLY ENERGY SAVINGS:** \$6 million

**CHP IN OPERATION SINCE:** 1893 and 2012

important capability it provides to meet essential University power requirements in the event of a regional power outage or other emergency that requires isolation from the external system.

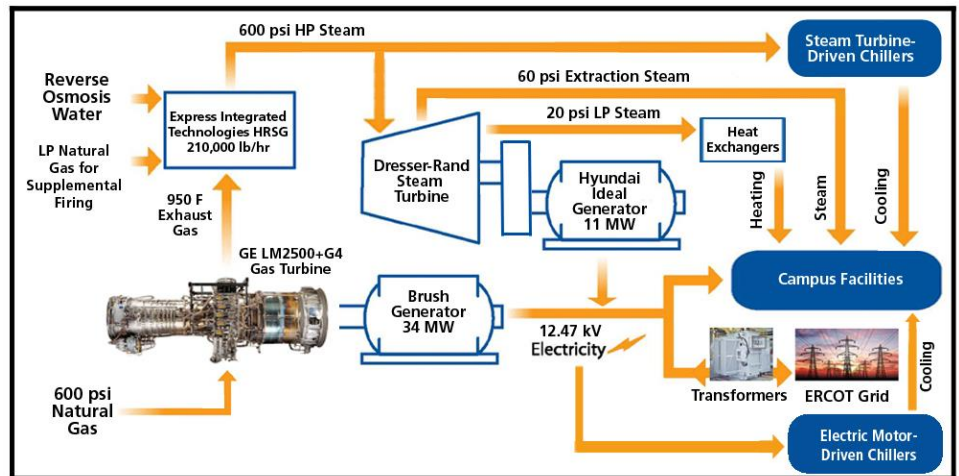
## CHP Equipment & Configuration

The CHP system consists of a GE LM2500+G4 natural gas-fired combustion turbine with a 210,000 lb per hour Express Integrated Technologies heat recovery steam generator, together with a Dresser-Rand back pressure steam turbine, with 600 psi input and 20 psi exhaust steam to serve campus heating loads. High pressure, superheated (600 psi, 750F) steam is produced by the heat recovery steam generator (HRSG) using gas turbine exhaust, together with supplemental firing capability.

## CHP Operation

The 600 psi steam is used to drive a back pressure turbine to generate additional electricity while providing low pressure (20 psi) exhaust steam for heating hot water and domestic hot water service to campus. The 600 psi steam generated in the HRSG is also used to drive steam turbine-driven chillers to help provide district cooling to 24 million gross square feet of conditioned facilities.

The CHP system provides up to 70 percent of the campus heating for heating hot water, campus steam distribution, and domestic hot water, and can provide 9,500 tons of cooling capacity using steam turbine-driven chillers. The new 45 Megawatt CHP power and steam generation capacity replaces the previous CHP system. Together with an existing 5 megawatt steam turbine generator, TAMU has 50 megawatts of power generation to serve the TAMU campus. The system operates at a heat rate of 5,100 Btu/kWh and approaches 80% efficiency.



## Benefits of CHP

CHP has been an important component that has made it possible for TAMU to reduce energy consumption by over 43 percent per gross square foot since 2002, resulting in over \$200 million in cost avoidance. Because of the CHP Project completed in 2012, purchased energy cost avoidance of over \$6 million annually has been achieved through more efficient power and thermal energy generation, together with a significant reduction in GHG emissions.

**“The CHP plant is an integral component of comprehensive mission-critical utilities and energy services provided at TAMU.”**

**- Les Williams, Director  
Utilities and Energy Services**

## For More Information

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