



NORTHEAST  
**CHP**  
APPLICATION  
CENTER

combined heat & power in universities

# Central Connecticut State University

## 2.5 MW CHP Application

### Project Profile



CCSU Energy Center

### Project Overview

Several years ago the 294-acre campus of Central Connecticut State University was experiencing problems with its aging infrastructure. The University's steam heating system, installed in 1950s-60s, was outdated and inefficient, as well as undersized for a campus that has seen significant growth and is continuing to expand. Buried steam pipes often ruptured, requiring costly repairs and disrupting pedestrian traffic. Few buildings on campus had air conditioning, and most that did had trouble with noise from the equipment.

In 1990, the University began to plan upgrades to the infrastructure and appearance of the campus. In 2002, construction of a new energy center and utility distribution system began. The completed plant began operation in 2004.

The new 36,000 square foot energy center provides all heating, cooling, hot water and some electricity for the campus. The design allows space for additional equipment to accommodate future growth.

The energy center uses electric generators in a combined heat and power system to provide increased power reliability for the campus, improve the system economics and support the reliability of the electricity supply to other customers in the region. Through the ISO New England Demand Response Program, CCSU supplements power plants in meeting peak demands. ISO pays CCSU to keep the generators on standby and pays a premium for electricity generated at peak times. The generators can also be used in the case of power outages to power essential functions on campus. Exhaust from electricity generation is recovered to supplement the boilers in steam generation.

### Quick Facts

**Location:** New Britain, Connecticut

**Installation Date:** 2004

**Equipment:**

- Three dual-fuel boilers
- Two 1,250 kW natural-gas engines
- One 1,500-ton electric centrifugal chiller
- One 1,500-ton steam absorption chiller
- Two heat recovery steam generators

**Type of Fuel:** Natural gas

**Heat Recovery Applications:**

- Building heating & cooling
- Domestic hot water

**Design:** van Zelm, Heywood & Shadford and BVH Integrated Services

**Control System Design:** TVC Systems

**Project Manager:** DMJM+Harris

**Architect:** Amenta-Emma

**Structural Engineering:** Macchi Engineers

**Construction:** Middlesex Corporation and All-State Boiler & Construction Inc.

## Energy Overview

The energy plant at Central Connecticut State University has three dual-fuel Nebraska boilers, which generate steam at 135 psig, the pressure needed by the absorption chiller. Steam is reduced to 65 psig for distribution through campus for heating. A 2,000-foot utility tunnel carries steam and chilled water distribution lines through campus.

Two 1,250 kW Cummins engines are fueled with natural gas. Two heat recovery steam generators use the 950°F exhaust from the engines to generate steam at 135 psig. The total electrical demand on campus is approximately 4 MW. The generators are operated only when the cost of generating electricity on-site is lower than the cost of purchased electricity from the utility, when there is a power outage, or when additional generation is needed to meet high demand in New England.



Heat recovery steam generator

The plant has two Trane chillers, one electric chiller and one steam-driven absorption chiller, each with 1,500-ton capacity, which together ensure reliable cooling and allow the flexibility to optimize cooling costs as energy costs fluctuate.

A supervisory control and data acquisition (SCADA) system allows remote access to system information, provides detailed system information that can be used to monitor and assess plant performance, and reduces staffing costs through semi-automation.

In future expansions, the plant is expected to add a third generator, a fourth boiler, three more absorption chillers and another electric chiller.

Boiler maintenance is performed by CCSU staff. Trane performs maintenance on the chillers and CCSU has a maintenance contract with Cummins Metropower.

## Benefits

- Increased efficiency
- Concentrated maintenance
- Peak electrical load stabilization
- Removal of old asbestos-encased steam lines
- Air conditioning now available in more buildings on campus
- New plant location, equipment, and construction technique reduce noise on campus

## Challenges

- Challenges in initially getting the system online and fine tuning of controls

### For Further Information Contact:

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