NORTHEAST

U.S. DOE

CHP Technical Assistance Partnerships

PROJECT PROFILE

Syracuse University

780-kW CHP System

Site Description

Located in upstate New York, Syracuse University was chartered in 1870 as a private, coeducational institution of higher education.

Syracuse University is a leading national research university of more than 18,000 full- and part-time students from all 50 states and 90 countries, and more than 1,400 faculty members.

The University's $12.4 million, 12,000-square-foot Green Data Center facility consists of 6,000 square feet infrastructure space for mechanical and electrical equipment to run the building, and 6,000 square feet of primary raised-floor data center space for computers system. In 2009 Syracuse University installed twelve 65 kW Capstone micro-turbines and one 300 ton absorption chiller.

Quick Facts

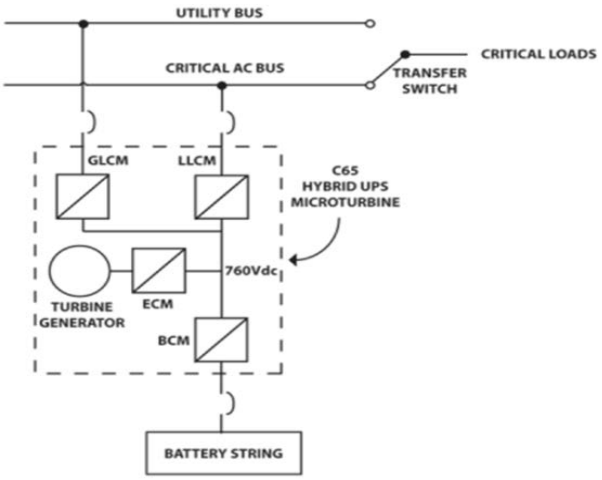
LOCATION: Syracuse University, New York
MARKET SECTOR: Education
FACILITY SIZE: 12,000 square feet
FACILITY PEAK LOAD: 780 KW
EQUIPMENT: 12-65kW Capstone MicroTurbines®, Thermax® absorption chiller
FUEL: Natural gas
USE OF THERMAL ENERGY: Building heat and cooling
CHP IN OPERATION SINCE: 2009
ENVIRONMENTAL BENEFITS: Reduced need for fossil fuel generated electricity, reduced greenhouse gas emissions

Reasons for CHP

Escalating demand for greater computing capabilities and data storage meant Syracuse University needed to replace its outdated data center, housed in a 100-year-old brick building that had become too outdated to continue using:

- IBM donated $5 million in design services and computer equipment for the new data center, and Syracuse received $2 million from NYSERDA.
- Capstone developed a new turbine product in six months, the Hybrid UPS (uninterruptible power supply) based on the C65.

Syracuse University, a private, coeducational institution of higher education, installed a CHP system for their data center. The system includes 12 Capstone Micro turbines (left) new heating and as absorption chiller (right).



The CHP system at Syracuse University also includes new Load Control Modules (left) and Backup Battery Bank (right).

CHP Equipment and Operation

The 585F exhaust stream from each microturbine is collected in a common duct, and that flows to two heat-recovery modules, one for hot water and another for absorption chillers that make chilled water. These modules use conventional tube-and-shell heat exchangers. Two chillers generate 300 tons of cooling, 100 for the data center and 200 for the building next door, a 100,000-square-foot research and office facility known as 621 Skytop. Data centers require air conditioning year round to cool their computers and data servers. The chillers can produce 45F chilled water, but currently are providing 67F water for cooling both the servers in the data center and the space in the building next door. Chilled water from the chillers is piped under the floor to racks of servers the size of refrigerators in the data center. A rear door on a server rack, made by Coolcentric, has a heat exchanger similar to a typical radiator coil with fins on it. The servers have fans that blow air horizontally outward through the doors. The cooled air then recirculates to cool the room and ultimately the servers. The facility uses 44 tons of sealed of batteries to augment the turbines. They are used to start the turbines and provide emergency backup power. Internal to the Hybrid UPS system is a DC connection that ties Grid LCM and Load LCM together, but also allows power to come from the microturbine generator and the external battery storage system. IBM provided computer equipment that operates from a direct current powered distribution system, eliminating losses from converting AC to DC. The 300-volt battery banks generate at least 17 minutes of full data center power, permitting an orderly shutdown of computers in the event of an outage.

Lessons to Share

- Modular system provides redundancy and reliability.
- Absorption chiller offsets additional summer peak electrical loads.
- The interconnection process is complicated and takes time.

For More Information

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