Education
Data Center

Syracuse University

Escalating demand for greater computing capabilities and data storage meant Syracuse University needed to replace its outdated data center, which had been housed in an old brick building for decades.

The university – regularly ranked among the Top 100 in the United States – responded with the opening of the Green Data Center, one of the world's most energy efficient and green data centers. The 12,000-square-foot facility, which opened December 2009, is designed to use 50 percent less energy and produce fewer greenhouse gasses than traditional data centers.

Key to the center's energy savings are 12 patented Hybrid UPS MicroTurbines® from Capstone Turbine Corp. that power the entire facility. Capstone's Hybrid UPS is the first onsite power system to integrate clean-and-green C65 (65-kilowatt) microturbines directly with a dual-conversion UPS to provide power for mission-critical loads.

The low-emission microturbines are the heart of an innovative trigeneration – or combined cooling, heating and power (CCHP) system – that further boosts the data center's energy efficiency. Capstone distributor BHP Energy integrated the design of the CCHP system so the 12 natural-gas microturbines produce electricity and supply heat and cooling power to the data center and a nearby building.

Capstone Microturbines: Heart of Energy Savings

Traditional data centers rely on power from the utility and have banks of batteries that keep servers and equipment running during a short power loss. A stand-by emergency diesel generator is typically used for longer outages.

At Syracuse, the Capstone microturbines allow the data center to be isolated from the utility, yet draw on the utility as a backup power source.

At a glance

Location

Syracuse, New York, USA

Commissioned

December 2009

Fuel

- Natural gas
- Propane-air mixture as backup fuel if natural-gas system fails

Technologies

- 12 Capstone C65 Hybrid UPS microturbines used in a combined heat and power application.
- Two 150-ton Thermax® absorption chillers.
- Cain Industries heat exchanger.
- Validus® high-voltage AC-DC rectifier.
- One 40-ton EnerSys® battery bank to carry the data center's maximum load for 17 minutes in rare catastrophic situations.

Results

- The data center is one of world's greenest. It is designed to use 50% less energy and produce fewer greenhouse gasses than traditional data centers.
- Capstone's Hybrid UPS generates power while also using utility power to meet the center's electrical load demand. This allows the system to operate at the optimum point, which is a balance between electrical requirements and heating and cooling demand.
- The power system always operates in an N+1 redundancy configuration with the high level of reliability required by a productive data center.

Capstone®

A 40-ton EnerSys® battery bank with enough power to carry the maximum load for 17 minutes is available for rare catastrophic situations. It's highly unlikely, however, that the batteries ever will be used because microturbines are renowned for their high reliability and low maintenance.

Extreme Efficiency Through Integration of Multiple Technologies

The Green Data Center achieves its renowned energy savings and efficiency through the integration of several advanced technologies, many of which have never been used together in a data center setting.

The 12 Capstone microturbines and the trigeneration system are a hallmark of the innovative onsite technologies. IBM was a major partner in the project and provided US$5 million in design services, support and equipment, such as "cooling doors" that use chilled water to cool each server rack independent of its neighbors. This reduces cooling and energy costs.

Two 150-ton Thermax® absorption chillers onsite convert exhaust heat from the microturbines into energy that chills water used to cool the racks and the entire building. A Cain Industries heat exchanger can be used at the same time as the chiller to produce hot water to heat peripheral areas of the data center and the building next door.

The system also employs free cooling when the temperature outside is low. A heat exchanger is used to produce chilled water directly from a cooling tower on the roof.

IBM also provided computer equipment that operates from a direct current (DC) powered distribution system, thus eliminating traditional power loss associated when converting alternating current (AC) electricity from the utility to DC to power servers. Validus® DC Systems supplied the project with high-voltage DC equipment, including AC-DC rectifiers. ■

Thermax® absorption chillers.

Twelve Capstone C65 Hybrid UPS microturbines are installed in Syracuse University's Green Data Center. The center is designed to use 50 percent less energy than traditional data centers.

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