Microturbine System Provides Electricity, Space Heating, and Cooling

HIGHER EDUCATION

Company Name
Syracuse University Green Data Center

Location
Syracuse, NY

Installation Date
2011

Operating Experience
Beginning 2011

CHP Equipment
Two Capstone Microturbine Arrays (6 C-65, each)

Generating Capacity
780 kW

Heat Recovery Application
Space cooling and heating

Type of Fuel
Natural Gas

Cost Savings
50% less energy

"When you get power from a utility, there are transmission losses. Generating our own DC power saves about 10 percent of our energy use."

- Mark Weldon, Executive Director Corporate Relations at Syracuse University

BACKGROUND

Syracuse University Green Data Center, Syracuse, NY

Syracuse University's Green Data Center was built with total energy efficiency in mind; 99% of construction waste was recycled and the building is anticipated to use about 50% less energy than a typical building of its size and use. This 11,900 square foot Data Center is powered by a 780KW MicroTurbine-based Combined Heat, Cooling and Power (CHCP) plant.

THE APPLICATION

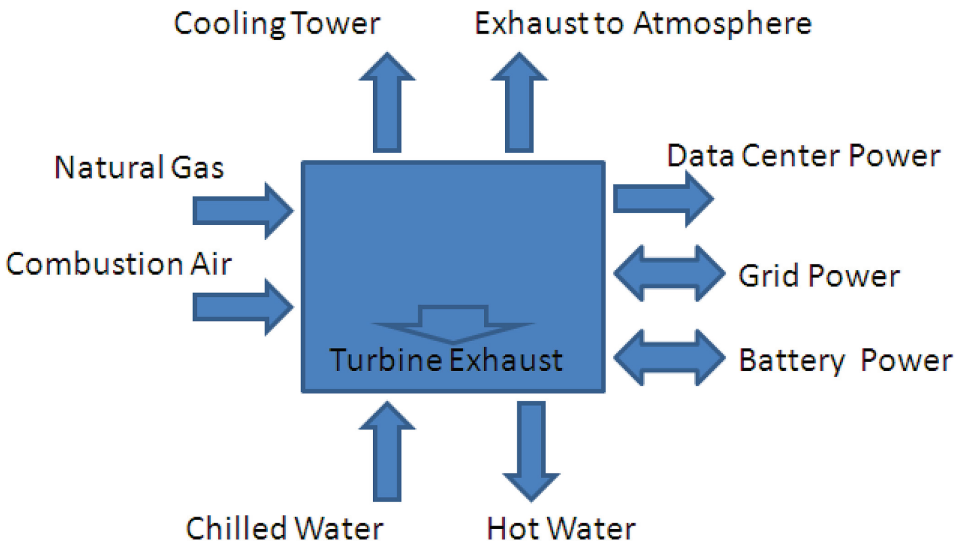
The design of the CHP system is comprised of two redundant arrays of six Capstone model C65 packaged MicroTurbines. The system is capable of producing AC and DC power simultaneously. The turbine exhaust can be used in comfort heating, and/or to provide cooling for computer equipment and air conditioning. This is being referred to as tri-generation of power by the turbines (electricity, heating and cooling).

The primary load for the system is the Data Center, but there are connections that allow for heating and cooling of the adjacent building, 621 Skytop Rd, as well. The system is designed to support its own power system, as well as connection to the power grid. Power may be either exported to or imported from the grid at this connection. Other available power generated by the system is exported to loads within the University's South Campus power system.

CHP SYSTEM AND EQUIPMENT

The turbines generate 65-KW each to power the data center. The turbine exhaust heat energy can be directed to two Cain Heat Exchangers to make hot water and/or to two Thermax absorption chillers to make chilled water for use in the data center and 621 Skytop Road. An underground 1,920 gallon storage tank of LPG gas can supply 24 hours of backup fuel to the turbines in the event of a natural gas supply disruption. A battery system also supplies back-up power to the data center in the event of multiple failures. This will allow sufficient time for safe shutdown of the computer systems.

Combined Heat and Power for a Higher Education Institution



Capstone – C65 microturbine

ECONOMICS AND ENVIRONMENTAL BENEFITS

The microturbine arrays at Syracuse University's Green Data Center are estimated to reduce energy use by approximately 50%, significantly reducing the environmental impact. The Data Center will be fully self-sufficient and off the power grid. The reduction of energy costs at the Green Data Center mean a reduction in overall IT costs as well as a reduced carbon footprint. Monitored data are being collected from the site and are available in an hourly format on NYSERDA's DG/CHP website starting from September 2011.

SUMMARY OF BENEFITS

- Reduces carbon footprint significantly.
- More than 50% less energy is used to run the system.
- Fully self-sufficient and free in the event of power grid failure.

ADDITIONAL RESOURCES

- **Developer/Engineer:** syr.edu/greendatacenter
- **Equipment Manufacturer:** www.microturbine.com
- **DG Integrated Data System:** chp.nyserda.org

Gas-powered Microturbines at Syracuse University's Green Data Center generate electrical power and heat for hot water and cooling.

nyserda.ny.gov/chp
1-866-NYSERDA

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

CHP-sugreendatacenter-cs-1-v1
4/15