



CHP System Supplies Emergency Power at East Hartford High School

“Black Start” Capability Makes System Grid-Independent

Background

Following the terrorist attacks in 2001, the Northeast blackout in 2003, and natural disasters such as Hurricane Katrina in 2005, there is a new awareness of the need to provide safe shelter to communities in the event of an emergency. Accordingly, the Town of East Hartford, Connecticut has qualified the local high school as an emergency shelter in the event of an incident at the Millstone 3 Nuclear Power Plant located in nearby Waterford. In partnership with the U.S. Department of Energy and UTC Power, school administrators decided to install a PureComfort™ 240 integrated combined heat and power (CHP) system at the East Hartford High School (EHHS).



East Hartford High serves as an emergency shelter in its Connecticut community. The UTC Power PureComfort™ system provides power, cooling, and heating to the school.

Technology

In addition to regularly providing power, cooling, and heating to the school, the UTC Power's PureComfort™ 240M's “black start” capability allows it to operate without grid power. This capability is enabled by battery packs coupled with Capstone microturbines. As a result, back-up power can be generated in the event of a nuclear event or other type of disturbance, allowing EHHS to qualify as an emergency shelter. John Fox, UTC Power Manager, states, “The ability to operate without the grid is highly desired by certain potential customers – to sustain commercial operation, prevent spoilage of refrigerated or frozen goods, and to protect their community in the event of a power outage for whatever reason.”

The integrated CHP system at EHHS packages four 60-kW Capstone microturbines to generate 240 kW of electricity, and an exhaust-fired Carrier absorption chiller to produce 120 tons of chilled water. The system is pre-engineered and fully integrated, including the control software and hardware to ensure that it operates predictably, reliably, and safely. The system can reach up to 90 percent efficiency and operate in a wide variety of settings. This efficiency can be contrasted to a typical efficiency of 33% achieved by central electricity generation.

The system's two major components, the microturbine and the chiller/heater, both have relatively few moving parts, leading to high system reliability and low maintenance.



The chiller/heater control system allows stable, continuous part-load operation down to 25% of full load at cooling water temperatures as low as 64.4°F (18°C), without the need for a cooling tower bypass. By producing both hot and chilled water, the thermal energy for the microturbines is captured year-round, resulting in high system efficiency. Because otherwise wasted exhaust heat drive the chiller/heater, “free” space cooling and heating are produced, energy costs are reduced, and the pollution from making chilled or hot water is eliminated. Cost savings of approximately, \$130,000 year are expected compared to the previous on-site system; environmental benefits include annual reductions of approximately 47,000 lbs/yr NO_x, 3,100 lbs/yr SO_x, and 425,000 CO₂.

The system at EHHS is the first PureComfort™ product to be delivered as skidded modules. This permits the high quality of factory assembly and the reduced cost during site installation.

End User Perspective: “I think the PureComfort™ system is a perfect fit for us,” said Albert Costa, Director of Facilities for the East Hartford School District. “It’s very reliable, provides clean energy and operates very efficiently. After suffering a catastrophic loss to our power and cooling plants, I turned to a trusted leader in the industry, UTC Power. I also look forward to installing a PureComfort™ system at our middle school.”



See the following websites for more information about PureComfort™ systems:

DE Packaged System Evaluated by Supermarket

http://www.ornl.gov/sci/de_materials/documents/12DEIESatSupermarket_000.pdf

Innovative CHP System Provide Affordable, Clean Energy to Butler Hospital

http://www.ornl.gov/sci/de_materials/documents/13CHPatButler_000.pdf

Initial Use of DE Packaged System Evaluated in Hospitality Sector

http://www.ornl.gov/sci/de_materials/documents/16DEatRitzCarlton_001.pdf

New CHP Option Made Available to Commercial Markets

http://www.ornl.gov/sci/de_materials/documents/16.5PureComfortwithRecip.pdf

Future Work

The operation of the PureComfort™ system at East Hartford High School will be evaluated during times of grid failure to obtain additional data regarding its reliability and efficiency.

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