DE System Provides Power to Critical Verizon Switching Center

United Technology Corporation (UTC) Fuel Cells Provide 1.4MW of Clean, Reliable Power

Background

The tightly-packaged electronics of the telecommunications industry require huge amounts of electricity, reliable high-quality power for 24/7 processing, and large amounts of cooling. These needs provide an ideal opportunity for the application of Combined Heat and Power (CHP) Systems. Under a DOE/ORNL cost-shared competitive procurement, Verizon Communications, Inc. installed a fuel-cell-based CHP system into a 300,000 sq. ft., 880-employee Central Office on Long Island in New York during 2005.

This system allows reliable cell phone operation at all times – even during extended power outages as experienced during the 2001 terrorist attacks and the 2005 aftermath of Hurricane Katrina. Sustained communication capabilities during these types of emergencies can bring help to those in crisis and reassure the families of those who are safe.

Verizon Communications, Inc. CHP System

Technology

The Verizon system became operational in June 2005. Annually, the facility is expected to produce 11,100 MWh of electrical energy, 16,000 million BTU (MMBTU) of useful thermal energy, and will require 105,000 MMBTU (LHV) of natural gas fuel. The resulting overall fuel utilization efficiency at this level of production is over 50%.

The CHP system is a topping cycle with base-load electrical power provided to the building by seven UTC PureCell 200kW fuel cells and a dual-fuel (natural gas and diesel) engine. The fuel cells receive their hydrogen supply from natural gas which is already delivered for the dual-fuel engine. The fuel cell/engine combination generates up to 2.6 MW of electricity to essentially meet all of the facility's electrical needs. The generators are typically paralleled to the grid, but can run in isolation if necessary. Supplemental backup power is supplied by the Long Island Power Authority grid and two standby diesel engines.

Waste thermal energy from the fuel cells drives two 70-ton Thermax lithium bromide (LiBr) absorption chillers for cooling in the summer, and an unfired heat recovery steam generator (HRSG) for space heating in the winter. Cooling demands can range from 50 to 750 RT and the chillers offer flexible operation to meet part-load conditions in off-peak cooling seasons. Avoiding operation of the existing, older and less efficient electrical chillers results in energy cost savings. In addition, the HRSG that reclaims waste heat from the seven fuel cells in the winter replaces approximately a third of boiler fuel usage, significantly reducing NO_x emissions. These reduced emissions plus the reduced emissions of the co-fired engine allow the CHP system to operate longer without exceeding NO_x caps, resulting in more savings from peak-shaving.

Benefits

Verizon customers now have the ability to communicate even when the electrical grid is compromised for extended periods of time. The fuel cell, engine, chiller, and HRSG CHP system were designed to enhance the reliability of Verizon's telecommunications facility while providing an essentially free source of heating and cooling with reduced NO_x and greenhouse emissions.

Seven UTC PureCell 200 kW fuel cells and a dual-fuel (natural gas and diesel) engine generate up to 2.6 MW of electricity and serve as the primary power sources for the Verizon central office facility. Verizon customers can now depend on reliable service even during large-scale emergencies that compromise the electrical grid.

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