

FUEL CELLS FOR SCHOOLS

A School's Fuel Cell Saves Money and Provides Emergency Shelter

Hamden High School, in Connecticut, installed a fuel cell in 2011 to provide power to the facility during power outages. As a designated public emergency shelter, this school's technology selection was inspired by a similar story at another school in the state.

When South Windsor High School installed a fuel cell power plant in 2002, it was to save money and do something good for the environment. As a designated regional emergency shelter, the school was also required to have a back-up power system in place that can support the facility's critical loads when the electrical grid is down.

This fuel cell at South Windsor High School is no longer operational, but during its tenure it proved to be a valuable addition. In late October 2011, an unusually early storm dropped record amounts of snow, with more than 12 inches falling in the capital city of Hartford and as much as 24 inches in other parts of the state. The storm was accompanied by hurricane-strength wind. Heavy wet snow fell on trees that still had their leaves, causing record numbers of downed trees and power lines.

More than 830,000 people across the state suffered through power outages that lasted as many as 11 days in some areas. South Windsor High School facilities manager Patrick Hankard estimated that 85 percent of the town's residents were without power for a week or more during and after the storm, as reported in a CleanTechnica article.¹

The school's fuel cell ran on natural gas, which is delivered through underground pipes and therefore typically much less susceptible to storm damage than electrical lines. Because of this, the school was able to supply itself with electricity and heat during the power outage. The school provided space for 200 people to sleep each night and served 600 hot meals over the course of the 3-day storm. A nurse's station was kept operational, hot showers were available, and power outlets were available to charge cell phones. "It was almost like a hotel," said Town Manager Matt Galligan in a Hartford Courant article.²

Using a fuel cell to provide electricity and heat has saved South Windsor High School \$80,000 per year.



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OVERVIEW

FACILITY TYPE

Public High School and Emergency Storm Shelter

TECHNOLOGY

Hydrogen Fuel Cell

FUEL

Natural Gas

CAPACITY

400kW

YEAR INSTALLED

2011

LOCATION

Hamden, Connecticut

PROJECT PARTNERS

US Dept. of Energy, Connecticut Green Bank, and UTC Power/Doosan

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Technology Overview

Hamden High School's 400kW fuel cell, supplied by local company UTC Power, is a combined heat and power system. It meets 90% of the school's electrical demand and heats the school in the winter and the swimming pool year-round. The system has not yet had to weather a major storm like the one experienced at South Windsor High School, but is set up to do so when the time comes.

Environmental Benefits

The environmental benefits of the fuel cell are important to school administrators. Because the fuel cell is fueled by natural gas, which it uses to produce electricity and heat without combustion, the installation of this technology has reduced the carbon emissions of the school by 809 tons per year, thereby lowering the school's carbon footprint and reducing its impact on global climate change. Power generated by fuel cells also saves water, with 3.8 million gallons of water saved for every 1 MW of electricity generated. The emission

of nitrous oxides, a contributor to the formation of acid rain and smog, has also been reduced by 3 tons each year.³

Other Benefits

South Windsor High School chose a fuel cell for its backup power source because it made financial sense while also benefiting the environment. Additionally, the fuel cell became a component of the curriculum, with real-time data collection that students monitored from their computers.⁴

Using the fuel cell to provide electricity for the school, heat the building, and pre-warm the water for the boiler also saved the school \$80,000 per year. Because fuel cells are classified as renewable energy in Connecticut, the South Windsor High School has generated an additional \$55,000 per year from renewable credits trading. As an added benefit, installing this technology at these schools supports an important part of the state's economy; more than 3,000 workers in Connecticut have jobs related to fuel cell production.

- 1 "Fuel Cell System Saves the Day in Connecticut in Wake of Winter Storm Alfred," *CleanTechnica*. Dec. 1, 2011. <http://cleantechnica.com/2011/12/01/fuel-cell-system-saves-the-day-in-connecticut-in-wake-of-winter-storm-alfred>
- 2 Gary D. LeBeau and John Harrity, "Take State's Fuel Cell Expertise to Next Level," *Hartford Courant*. Dec. 4, 2011. http://articles.courant.com/2011-12-04/news/hc-op-lebeau-fuel-cells-have-arrived-1204-20111204_1_utc-power-east-hartford-fuel-cell-energy
- 3 "Hamden High School to Generate Clean Power On-Site," *Bloomberg*, May 2, 2011. <http://www.bloomberg.com/apps/news?pid=conewsstory&tkr=UTX:US&sid=aPqFp1EaCicQ>
- 4 "South Windsor High School is Educating the Leaders of Tomorrow," *PureCell Solution Case Study*. http://www.fuelcellmarkets.com/content/images/articles/PP0105_SWHS.pdf

Resilient power is distributed clean energy systems capable of islanding from the grid to supply power for critical services during power outages. With the Resilient Power Project, Clean Energy Group and Meridian Institute are advancing renewable energy technologies to strengthen communities against power outages and other harmful impacts of power loss and severe weather. www.cleanenergygroup.org or www.resilient-power.org.

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