

Salem Community College

Soon after Hurricane Katrina devastated the Gulf Coast in 2005, the Salem County Red Cross in Carneys Point, New Jersey asked the nearby community college to continue its 15-year tradition of serving as the local Red Cross Disaster Relief Shelter.

However, the updated agreement stipulated Salem Community College must have a back-up power system that provides electricity, cooling, and heating to Davidow Hall – the 65,000-square-foot campus building that serves as the county's shelter during emergencies.

Officials at the 1,500-student college, eager to continue serving the community, agreed to upgrade the power system in Davidow Hall to comply with the agreement. They also knew a more efficient energy system to serve the building's day-to-day power, cooling, and heating needs could save the college significant amounts of money each year.

The massive building – one of the largest in this rural New Jersey county – houses a gymnasium that can hold 1,000 people during emergencies, a 400-seat performing-arts theater, classrooms, kitchens, office space, showers, and bathrooms. In a nutshell, Davidow Hall is an ideal facility for an emergency shelter. During non-emergency times, it's a bustling campus facility full of students, instructors, and regular community activities.

Raymond Constantine, Executive Director of Special Projects for Salem Community College, led the college's efforts to secure updated and clean power and HVAC systems. Through New Jersey's Public Utility SmartStart Incentive Program, the college received a US\$130,000 grant that helped fund the purchase of three Capstone natural-gas C65 ICHP MicroTurbines®, a 100-ton dual burner Thermax absorption chiller, and a Capstone Advanced Power Server (APS) controller.



At a glance

Location

Carneys Point, New Jersey, USA

Commissioned

2009

Fuel

Natural gas

Technologies

- 3 Capstone C65 ICHP MicroTurbines used in a combined cooling, heating, and power (CCHP) application.
- 100-ton dual burner Thermax absorption chiller.
- Capstone Advanced Power Server controller monitors the building's load changes and automatically shuts down the microturbine with the most run hours when it's not needed, for example, on weekends or in the late evening when students are gone.
- 9-year Factory Protection Plan with remote monitoring.

Results

- The 3 Capstone ICHP microturbines produce more than 80% of Davidow Hall's electricity and 100% of the building's heating and cooling each day.
- Dual-mode system is stand alone capable in the event of utility power loss.
- The microturbine system allows Salem Community College to be an approved Red Cross Disaster Relief Shelter.
- Officials anticipate a 30% overall energy savings.



"We wanted a system that could provide electricity, heating, and cooling each day, along with grid-disconnect back-up power in an emergency," Constantine said. "Capstone provided a CCHP solution that emits very clean emissions."

When planning for the new energy system began several years ago, the 11-acre main campus was heated and cooled by a long-standing geothermal system. College officials planned for the new clean-and-green energy system in Davidow Hall to supplement the campus's geothermal ground source system, installed in 1991. In addition, two inefficient systems, a DX cooling system that featured freon-based compressors and natural-gas boilers that produced building heat and hot water, also served massive Davidow Hall.

"The Capstone microturbines replaced these old, inefficient, and environmentally detrimental heating and cooling systems," Constantine said.

Salem College's Constantine was told the payback on the system will be 10 years, but because of its extreme efficiency and energy savings, he expects the payback will be much sooner. He anticipates a 30 percent overall energy savings because of the microturbines.

Commissioned in late 2009, the Capstone microturbines today produce more than 80 percent of Davidow Hall's electricity and 100 percent of the building's heating and cooling. The microturbines are dual-mode, which allows for them to island when utility power goes down.

"Dual-mode capabilities are important because we see a lot of brownouts and blackouts on the grid that serves Pennsylvania, New Jersey, and Maryland," Constantine said. "Our grid is vulnerable and by having our own onsite power plant, we're helping to relieve grid pressures."

"Because Capstone microturbines are a clean energy source and very efficient, they've helped the college reduce its energy costs," said Jim Bondi, Applications Engineer for Capstone distributor E-Finity Distributed Generation, which worked closely with Salem Community College on the project. "And since the microturbines also serve as a back-up power source, the school doesn't need to spend money on a stand-by generator that sits idle most of the time. Microturbines are cleaner than traditional reciprocating engines, have a lower total cost of ownership, and extremely low maintenance costs."

The system's efficiency is linked to the microturbines' CCHP application, and also to the Capstone APS. The APS is a stand-alone controller that monitors the building's load changes and automatically

shuts down the microturbine with the most run hours when it's not needed, for example, on weekends or in the late evening when students are gone.

"The outcome of this project has been reduced energy costs for electricity, heating, and cooling, which creates a source of funding back to the college's operating budget," Constantine said. "And we're ready in the event of an emergency."

He added, "Even when we're not using the facility for Red Cross Relief, it's a place for the community. The Field House and performing-arts theater have a lot of visitors. It's a wonderful facility with new life, and Capstones are the heart of it. The microturbines have allowed the college to better serve the surrounding community in Salem County."

Students also benefit from the Capstone microturbines. For the college's Sustainable Energy Technology program and Environmental Science classes, instructors use the Capstone system as a lab for students. Constantine said the school may begin an internship program where students actually help maintain and monitor the microturbines.

"I'm a strong believer that if this technology was used at other colleges, K-12 schools, municipalities, and county government facilities, there would be significant money saved," he said. "That means money going back to the community. I'm excited we're at the forefront of energy innovation and a model for others to follow." ■



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