Resilient CHP Facilities: The *Real* Reason Hurricanes Don't Jolt Facilities Like they Used To

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With the production of natural gas offshore decreasing and onshore shale boom ramping up, the impact major hurricanes, storms, and natural disasters have on the energy market has lessened. However, the threat on facilities in storm-strickened states is still very real.

Electric grid outages have increased significantly over the past 20 years, costing about $25 billion per year. Today, severe weather accounts for over 70% of all power outages. As we saw with Hurricane Katrina and, most recently, Superstorm Sandy, facilities must be prepared to batten down the hatches and weather these storms the best way they can. Disaster preparedness planners have become increasingly more aware of the need to protect critical infrastructure facilities and to better prepare for energy emergencies.

Combined heat and power, or CHP, can be an ideal solution for these facilities and can save lives by providing power in emergency situations such as storms, overloads, and security breaches. With CHP, buildings are able to become more resilient and mitigate the impacts of an emergency – keeping facilities running by creating their own hot water, chilled water, steam and electricity onsite, with or without the local utility, and providing backup power.

A Safe Haven

When a natural disaster strikes, would you rather be the one seeking shelter or the one providing it? More and more facilities are depending on microturbines to provide emergency relief during storm and ensure an uninterrupted supply of

power, heating, and cooling to the host facility.

When Superstorm Sandy made landfall in 2012, the east coast was heavily hit – causing extended power outages that lasted for days. At the height of the blackout, 2.6 million facilities, businesses, and homes were without power in New Jersey, 2.1 million in New York, and 630,000 in Connecticut.[1] This loss of power, resulting in suspended business activity, attributed to nearly $20 billion in losses,[2] with $11.7 billion in state GDP in New Jersey alone.[3] This tri-state area was among the most heavily-hit regions in terms of power outages, and these states were Federal Emergency Management Agency (FEMA)-declared disaster areas.

However, the bright spot in what seemed to be nothing but darkness were the CHP facilities that managed to operate during the storm. Among the sites that lost grid power, and where there was a CHP system in place that was designed to operate during a grid outage, all of the CHP systems performed as expected.[4]

Christian Health Care Center in Wyckoff, New Jersey, ran smoothly during Sandy with only a momentary loss of power. The healthcare facility that specializes in a wide range of services including independent senior living, psychiatric care, assisted living, and skilled nursing, has (4) four Capstone C65 (65kW) microturbines simultaneously providing 260kW of electricity, 100 tons of cooling, and/or 1.2 million Btus of hot water for domestic use. Christian Health Care Center met all of resident's power, heating, and hot water needs, running independently of the grid for **14 days**. Due to the reliability of the Capstone microturbines, no residents needed to be transferred to other facilities for care during the storm.

Salem Community College, a 1,300 student, non-residential community college consisting of five buildings and over eleven acres in Carneys Point, New Jersey, houses (3) three Capstone C65 microturbines, providing 195kW of electricity. The CHP system produces 100% of the sites hot water and chilled water and 80% of the site's electricity. The college's Davidow Hall serves as a Red Cross Disaster Relief Shelter where nearly 100 people called "home" during Sandy. The Capstone microturbines were the only source of power during the storm and operated continuously from 9:00 am on October 28th until 8:30 am on November 1.[5]

Microturbines in CHP applications are designed to operate with or without the electric grid. By being able to operate with the electric grid, a site is able to improved resiliency, mitigate the impacts of a disaster, provide energy cost savings, greats efficiencies, and reduce overall emissions, all while providing reliability during grid outages.[6]

How Does it Work?

In short, every CHP installation involves the production of electricity from abundant, clean burning natural gas with simultaneous recovery of otherwise-wasted thermal energy to produce useful energy right on a customer's site. This recovery of wasted thermal energy is what makes CHP technology more efficient than typical power plants and delivers significant environment benefits that can surpass solar and wind facilities. Specifically, CHP systems can reach fuel efficiencies of up to 80%, compared to about 45% for conventional separate heat and power.[7] Further, CHP systems that run consistently throughout the year are more reliable in an emergency than a backup generator that is called on during emergencies only.

Another benefit to CHP technology is that CHP systems such as microturbines run on the air you breathe, eliminating the need for frequent synthetic oil changes and distribution losses created from pulling electricity from a central power plant, resulting in reduced primary energy use and lower greenhouse gas emissions by as much as 40 percent or more.[8] Further, the EPA believes that with CHP technology, 50GW of capacity could be able to be deployed by 2020 and produce an annual savings of $77 billion, provide thousands of jobs, and giving the United States an economic and competitive edge over other countries.

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[1] Powering Through the Storms," Pace Energy and Climate Center.

[2] http://money.cnn.com/2012/10/29/news/economy/hurricane-sandy-business/index.html

[3] Rutgers Regional Report, *The Economic and Fiscal Impacts of Hurricane Sandy in New Jersey*, January 2013. http://policy.rutgers.edu/reports/rrr/RRR34jan13.pdf.

[4, 5, 6] Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities

[7] US Department of Energy, Combined Heat and Power Basics, http://www1.eere.energy.gov/manufacturing/distributedenergy/chp_basics.html

[8] CHP EPA Combined Heat and Power Partnership, "Combined Heat and Power: Frequently Asked Questions," http://www.epa.gov/chp/documents/faq.pdf.