

Community Energy Brief

Powering Through Storms



Combined Heat and Power Delivers Business Continuity, Risk Reduction, and Critical Infrastructure Resiliency Benefits

Recent extreme weather events have caused unprecedented infrastructure damage and disrupted daily life for communities in the Northeast. Most recently, Superstorm Sandy proved to be one of the most expensive natural disasters in U.S. history. At its worst, 2.1 million commercial and industrial businesses, healthcare facilities, multifamily buildings, and homes were without power in New York State, 2.6 million in New Jersey, and an additional 630,000 in Connecticut.¹ To aid recovery efforts, the federal government has appropriated \$60 billion for Sandy relief.²

In the wake of Superstorm Sandy, Tropical Storm Irene, and the Halloween Nor'easter of 2011, large numbers of customers suffered through extended power outages. Prolonged, widespread outages of this sort put great stress on critical facilities that serve vulnerable populations and provide essential social services – for example, hospitals, nursing homes, prisons, and similar facilities. Business owners and residents were not only inconvenienced, they suffered significant monetary losses due to production and sales downtime, lost inventory, and spoiled goods.

What is CHP?

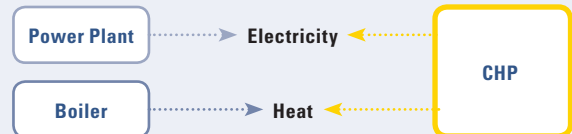
Combined heat and power (CHP) is a highly efficient alternative to traditional electric generation. CHP systems produce electricity and capture waste heat to use for hot water, space heating or cooling, or for industrial use. Unlike traditional electricity generation, CHP systems are sited at or near end users, which avoids the losses associated with transmitting electricity over long distances. Appropriately designed and operated CHP systems are a cost-effective, efficient, environmentally superior and reliable energy solution.

TRADITIONAL SYSTEM



45% EFFICIENCY

CHP SYSTEM



80% EFFICIENCY



NYU Lights the Way

New York University's 13.4MW combined heat and power plant remained operational throughout Hurricane Sandy and its aftermath, while virtually the entire rest of lower Manhattan was without power. NYU's CHP facility, which opened in 2012 at 251 Mercer Street, provides electricity, heat, and hot water to key buildings at the Washington Square campus.

Widespread grid failure also impacts the regional transportation sector. In the wake of Sandy, a combination of electrical short-circuits and storm damage led to a near total disruption in mass transit systems and a widespread shortage in gasoline supplies. Parts of northern New Jersey and southern New York experienced limited rail service and gasoline rationing for more than one week after the storm.

The storm damage has galvanized policymakers to consider policy responses and solutions that will lessen the impacts of future storms of this magnitude in the Northeast. Care must be taken to fashion policies that are both effective, sustainable, and cost efficient.

One such response calls for strategically targeting and developing greater numbers of technically proven, economically viable, and environmentally superior combined heat and power systems across our region. CHP systems generate power and provide thermal energy (hot water, heating, cooling) at the site where power and energy is consumed. Where such systems are appropriately designed and configured, they can and do continue to operate through natural catastrophes as powerful as the recent Superstorm Sandy.

This storm has exposed the fragility of our current backup power systems. Hospitals must operate to provide critical life and safety services and nursing homes must continue to serve vulnerable and frail populations, especially during times of emergency. However, conventional emergency generator backup systems have proven insufficient in some instances. The limitations of hospital emergency generators were previously observed and reported in the wake of the 2003 blackout. Approximately half of New York City hospitals' generators malfunctioned during the blackout³, and many other hospitals were unable to sterilize equipment due to insufficient steam pressure.⁴

Hospitals and nursing homes, in combination with police stations, fire stations, centers of refuge, prisons, and wastewater treatment facilities, form the network of "critical infrastructure" facilities that provide the essential services

that communities rely on during times of emergency. Reliable, appropriately designed CHP systems can offer improved power reliability at these critical locations. Data centers, financial services firms, telecommunications companies, and other industries also place a premium on extremely reliable power to ensure business continuity. The CHP system at a Sikorsky plant in Connecticut, for example, not only enabled the manufacturer to produce helicopters in the wake of Superstorm Sandy, but also kept the 9,000 Sikorsky employees who had lost power in their homes supplied with hot showers, meals, and medical treatment.⁵ Similarly, South Oaks Hospital's⁶ CHP system, designed to operate when the grid is down, provided uninterrupted service over a full 15 day period until the grid was stabilized. The CHP system kept the hospital and nursing home open, able to accept patients from other locations and to serve the community.

Endnotes

1. Hurricane Sandy – Nor'easter Emergency Situation Reports. Office of Electricity Delivery and Energy Reliability. Available: http://www.oe.netl.doe.gov/named_event.aspx?ID=68
2. <http://www.bloomberg.com/news/2013-01-15/house-supports-17-billion-in-hurricane-sandy-relief.html>
3. <http://www.epa.gov/chp/basic/benefits.html>
4. New York City Emergency Response Task Force. (October 28, 2003). Enhancing New York City's Emergency Preparedness: A Report to Mayor Michael R. Bloomberg. Available: http://www.nyc.gov/html/om/pdf/em_task_force_final_10_28_03.pdf.
5. <http://www.energyefficiencymatters.org/opportunities-and-successes-in-industrial-energy-efficiency-and-chp/>
6. detailed review of South Oaks Hospital's CHP system and its performance during Superstorm Sandy can be found at energy.pace.edu/publications/South_Oaks

For More Information

For more information on ways that CHP can make our communities more resilient, please contact:

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