

CHP Response in Natural Disaster Mitigation: DELIVERING RELIABILITY, SAVING LIVES

CHP AS A RESILIENCY MEASURE

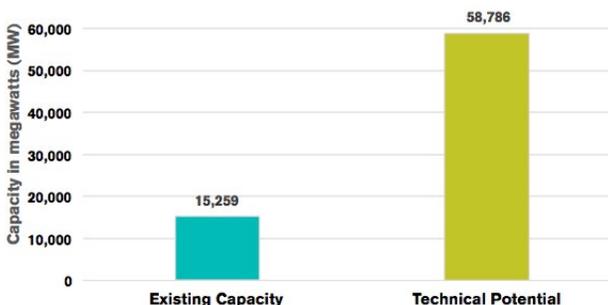
Combined heat and power (CHP) can help to improve building resiliency, mitigating the impacts of an emergency by keeping critical facilities running without any interruption.

CHP systems are a highly efficient form of distributed generation, typically designed to power a single large building, campus or group of facilities, including microgrids. CHP systems are comprised of on-site electrical generators (primarily fueled with natural gas) that achieve high efficiency by capturing heat, a byproduct of electricity production that would otherwise be wasted. The captured heat can be used to provide steam or hot water to the facility for space heating, cooling, or other processes. Capturing and using the waste heat allows CHP systems to reach fuel efficiencies of up to 80 percent, compared to about 50 percent for the separate generation of heat and power. When configured properly, a CHP system can continue to operate when the electricity grid is impaired, ensuring an uninterrupted supply of electricity to the host facility.

EXAMPLES OF CHP PERFORMANCE DURING RECENT NATURAL DISASTERS

Since 2005, the US has experienced numerous natural disasters including tornadoes, Superstorm Sandy, and hurricanes such as Katrina, Rita, Ike, Harvey, Irma and Maria. In fact, 2017 was the costliest year on record for weather-related natural disasters. These storms have wreaked havoc on local economies, infrastructure and communities, causing both widespread damage and economic losses. Most of these storms resulted in extended power outages that affected local areas for days, and in some cases weeks or months.

FIGURE 1: Existing Capacity Versus Technical Potential for CHP Deployment in Critical Infrastructure in the U.S.*



*Source: Data provided by ICF, adapted from DOE CHP Installation Database (U.S. installations as of Dec 31, 2016) and Combined Heat and Power Technical Potential in the United States, DOE, March 2016.

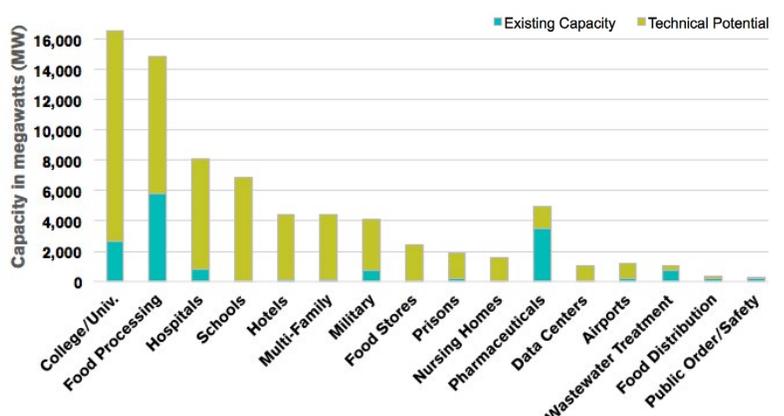
At least four hospitals with CHP were able to remain operational through recent Hurricanes Harvey, Irma and Maria:

- **University of Texas Medical Branch (UTMB) – Galveston, TX:** 15 MW gas turbines, operated without issue through Hurricane Harvey. UTMB had been heavily damaged during Hurricane Ike, and portions were rebuilt for resiliency, allowing the system to remain operational during the latest storm.
- **Texas Medical Center – Houston, TX:** (owned and operated by Thermal Energy Corporation) 48 MW gas turbines operated without issue through Hurricane Harvey.
- **University of Florida – Shands Medical Center – Gainesville, FL:** Operated without issue through Hurricane Irma. While there was not a local blackout, the hospital operated the CHP system in island mode during the storm in anticipation of potential power disruptions during the hurricane.
- **Hospital De La Concepcion – San German, Puerto Rico:** 1.2 MW reciprocating engines operated through Hurricane’s Irma and Maria.

For more case studies, visit: [“Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities”](#)

While CHP is already providing reliable power to critical infrastructure around the country, the potential is far greater (see Figures 1 and 2 below). In fact, only 26 percent of potential projects in critical facilities have been constructed.

FIGURE 2: Existing Capacity and Technical Potential for CHP Across Individual Critical Infrastructure Sectors in the U.S.*



STATE POLICIES TO ADVANCE CHP

Many states have taken action and adopted policies to encourage greater use of CHP and make their infrastructure more resilient:

- **New Jersey created the Energy Resilience Bank** to provide a grant/loan product that covers 100 percent of the cost of implementing resilient CHP systems.
- **The New York State Energy Research and Development Authority (NYSERDA) CHP Program** provides incentives for New York CHP installations.
- After Hurricane Ike in 2008, the **Texas state legislature passed HB 1831 and HB 4409**, requiring (1) the state to identify all critical infrastructure assets and that (2) all new state facilities or those undergoing major renovations, conduct an economic feasibility analysis of CHP for the site.
- **Connecticut** initiated a first-in-nation **Microgrid Pilot Program**, and conducted information and outreach webinars, explaining the central role of CHP in an economically successful microgrid.
- **California's Self-Generation Incentive Program (SGIP)** provides incentives to CHP projects up to 3 MW. A number of hospitals have recently installed CHP systems with funding from this program.
- In October 2015, the **Missouri** Department of Economic Development, Division of Energy, published the "**Missouri Comprehensive State Energy Plan**" which includes recommendations to incorporate CHP based on energy savings, meeting state energy goals, and providing energy security benefits.

HOW THE DOE TAPS CAN HELP

The DOE CHP Technical Assistance Partnerships (TAPs) can help states and cities improve their resiliency and ability to mitigate disasters through CHP by:

- **Providing educational information** to state and local governments about the benefits of CHP, and best practice policies that can help communities better withstand natural disasters through webinars, presentations, and committee or working group involvement.
- **Identifying critical facilities** that may be good candidates for CHP.
- **Providing information regarding resiliency** and CHP's important role in building city and neighborhood resilience to storms through microgrids.
- **Reviewing state energy, emergency preparedness or resiliency plans** to assess how CHP can add or improve these plans.
- **Providing technical assistance** to support development of CHP projects, following implementation of state education and information activities.
- **Educating potential CHP hosts** about resources that can help finance projects.

For more information, contact **Alexandra Rekkas**,
Senior Research Associate, Alliance for
Industrial Efficiency: alexandra@dgardiner.com

Shands Medical Center in Gainesville, FL is one of 220 U.S. hospitals that relies on CHP for clean, efficient and reliable power.

Photo credit: Shands Hospital

