COMBINED HEAT AND POWER ALLIANCE

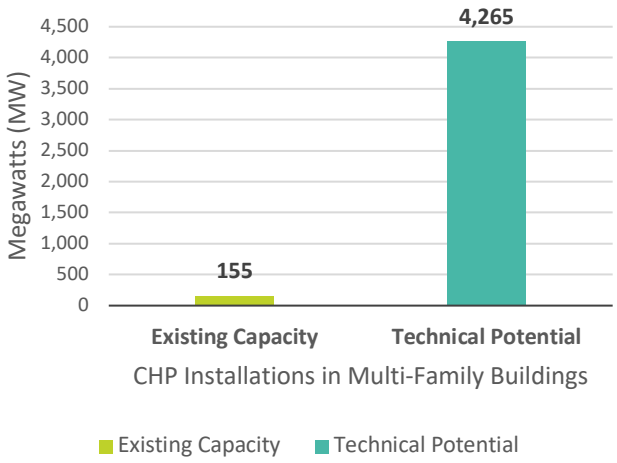
Combined Heat and Power (CHP) Potential in Multi-Family Buildings

A growing number of Americans live in multi-family apartment buildings. These complexes, especially the high-rise buildings common in major cities, depend on reliable and affordable energy to provide a comfortable living environment for their residents. Combined heat and power (CHP) generation systems are reliable and cost-effective and can ensure multi-family complexes have the energy security they need to ensure their residents remain comfortable and safe. In an industry where loss of power can negatively impact all aspects of their residents' lives, resilience and affordability are necessary.

Direct CHP Benefits for Multi-Family Complexes:

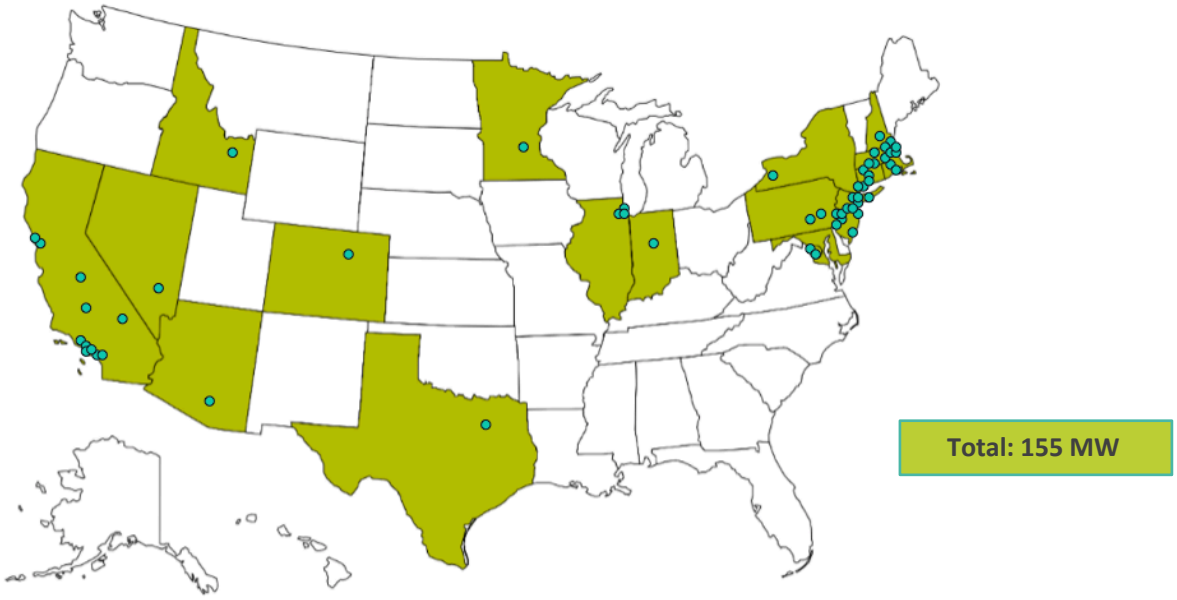
- Reduced energy costs
- Increased energy efficiency
- Storm resilience
- Increased energy reliability
- Increased resident safety
- Emergency preparedness
- Reduced greenhouse gas emissions
- Insulation from volatile electricity prices

Figure 1: CHP Capacity at US Multi-Family Buildings Compared to Technical Potential [2,3]



Blackouts due to weather, malfunctions, or emergencies can strain building infrastructure and managers as well as residents, who must adjust their normal activities to compensate for loss of electricity or relocate in the event of a prolonged grid failure. CHP systems allow buildings to operate as "microgrids" that can disconnect from the electrical grid and continue to provide electricity and heat during a grid-wide power outage. This allows continual operations of key building infrastructure, such as elevators and security systems, while ensuring residents can remain comfortable in their apartments during prolonged blackouts. Besides reliability benefits, CHP's high efficiency generation can lower energy and heating costs for buildings. In the US, more than 400 multi-family buildings have installed CHP systems, providing 155 MW of capacity.[1] However, the US Department of Energy estimates that 4,265 MW of CHP potential remains in US multi-family residences alone.[2]

Fig. 2: CHP Multi-Family Installations in the US[2]



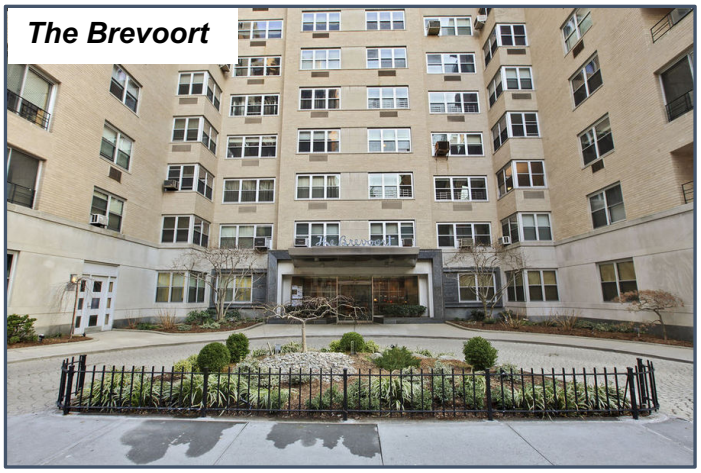
Case Study: Why we need dependable power – Irma

When Hurricane Irma struck the west coast of Florida in 2017, it left destruction in its wake, especially to the state's electricity infrastructure. Three days after the storm first made landfall, 62% of the state's households were still without power due to damage from the storm.[3] These power outages forced customers to adapt to life without modern comforts, such as air conditioning, which is necessary to keep cool in Florida's hot and humid environment.

Problems with outages are magnified in multi-family communities, especially multi-story complexes, where power outages can shut off elevators, which presents unique challenges for limited-mobility residents who cannot use the stairs. CHP can increase the energy resilience of multi-family complexes because of its ability to operate independently from the electrical grid, ensuring residents can continue to rely on elevators, air conditioning, and other key services.

Power trucks head out from Derby Lane in St. Petersburg on Sept. 12, 2017, into Pinellas County to restore power after Hurricane Irma.

CHP Success Stories



The Brevoort (New York, NY): The Brevoort is a residential high-rise in Manhattan that has 290 residential units. Building managers decided to install a 400 kW CHP system over concerns about the environmental impact of conventional heating oils. The reliability benefits of the CHP system were instrumental during Superstorm Sandy. The blocks surrounding the building lost power for multiple days, but the Brevoort's CHP system enabled the building to stay operational. It soon became a haven as residents took in family and friends from the surrounding area who had lost power during the storm. Besides environmental and social benefits, they CHP system has also saved $300,000 a year.[4]

University Square Apartments (Philadelphia, PA): University Square Apartments are a HUD-subsidized apartment complex for adults aged 62+. The 442-unit building chose to install a 150 kW CHP system to help lower energy costs, which are a large part of the building's operating budget. The system generates 16% of the building's electricity load and meets 34% of the building's space heating and hot water demands while saving 11% in energy operating costs. The building managers also appreciated CHP's emission reduction potential; the system selected has reduced the building's emissions by 550 tons per year.[5]

[1]U.S. DOE. "Combined Heat and Power Installation Database." Installations as of December 31, 2018. https://energy.gov/chp-installs

[2] U.S. DOE. "Combined Heat and Power (CHP) Technical Potential in the United States." March 2016. https://www.energy.gov/sites/prod/files/2016/04/f30/CHP Technical Potential Study 3-31-2016 Final.pdf

[3]Johnston, Caitlin and Griffin, Justine. "Irma causes one of the largest disaster power outages in the nation". 2017. https://www.tampabay.com/news/business/energy/nearly-a-million-tampa-bay-residents-still-without-power-after-irma/2337158

[4]US DOE. "Guide to Using Combined Heat and Power for Enhancing Reliability and Resiliency in Buildings". 2013. http://westernchptap.org/Data/publications/chp_for_reliability_guidance.pdf

[5]Aegis Energy. "University Square Apartments". https://aegischp.com/casestudy/university-square-apartments/

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