FACT SHEET

COMBINED HEAT AND POWER POTENTIAL IN DATA CENTERS

There are more than 8,000 data centers worldwide, supporting nearly all business and government entities. Data centers store, process, and disseminate information critical to daily operations. They are responsible for approximately 2 percent of all electricity use in the U.S. and also have large thermal loads for cooling processes needed to keep machinery from overheating.

Despite advances in resilient technologies, data centers remain vulnerable to grid outages. A 2020 survey of over 800 data centers found that 78% experienced at least one outage in the prior three years, with over half incurring costs greater than $100,000. Power supply issues caused over one-third of data center outages, underscoring the importance of generation that can disconnect from the utility grid and provide power on-site. Data centers need predictable electricity to maintain constant operation and protect critical information.

Direct CHP Benefits for Data Centers:

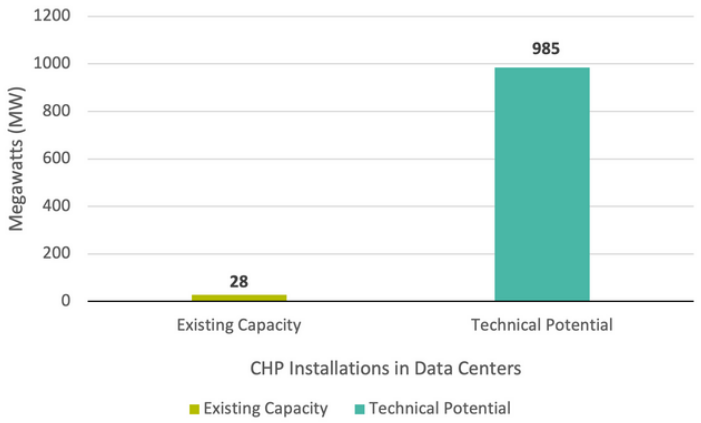
- Increased energy efficiency
- Reduced greenhouse gas emissions
- Reduced energy costs
- Microgrid capability
- Increased energy reliability
- Storm resilience & emergency preparedness
- Prevention of data loss & damaged equipment
- Minimized server downtime

Combined heat and power (CHP) generation systems can increase energy efficiency at data centers by continuously supplying them with both thermal energy and electricity. CHP units are also reliable in the face of unexpected outages, allowing data centers utilizing CHP to maintain nonstop operation.

An electric grid failure due to weather, malfunction, or an emergency puts considerable strain on data centers. Power outages can damage electrical equipment and cause significant data loss. A CHP system can operate as part of a microgrid that can separate itself from the utility grid, providing electricity to several buildings or facilities. CHP systems allow data centers to operate in “island mode,” disconnecting from the electric grid and continuing operation even during widespread blackouts.

This uninterrupted supply of thermal energy and power protects critical information and avoids costly damages. CHP units can also eliminate the need for expensive backup systems, which data centers must otherwise use in the case of grid failure. In addition, CHP units can be installed in microgrids that incorporate wind or solar power, providing a consistent source of power while enabling the use of these renewable resources. In the U.S., 18 data centers have installed CHP systems, providing 28 MW of capacity. However, the Department of Energy estimated in 2016 that the data center industry had a total CHP potential of 985 MW.

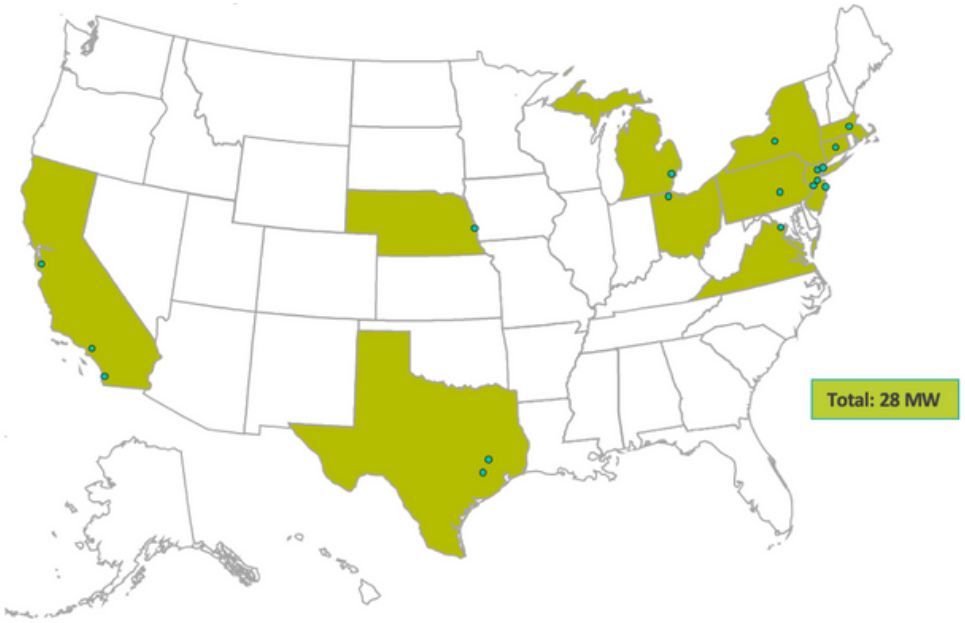
Figure 1: CHP at U.S. Data Centers Compared to Technical Potential



CASE STUDY: WHY DATA CENTERS NEED RELIABLE POWER

Data centers support critical business operations, ensuring entities across government, technology, retail, and other sectors remain functional. The First National Bank of Omaha's data center stores important bank functions and credit card processing for large corporations. After two power outages damaged this facility, causing millions of dollars in losses, the bank needed a reliable solution.

Figure 2: CHP Data Center Installations in the U.S



In 1999, First National installed two 400 kW CHP systems, with one operating as the primary power supplier and the other as a back-up generator. The primary system proved so reliable that when the time came for replacement, the bank decided they had no need for redundant capacity and downsized to one CHP unit. First National has not experienced an unexpected power interruption since they installed their first CHP system over 20 years ago.

CHP SUCCESS STORIES

Green Data Center

Syracuse University (Syracuse, NY): Syracuse University installed a 780 kW microturbine CHP system, providing power, heating, and cooling to its Green Data Center. The 12,000 square foot facility houses the campus' main computer data system, as well as critical electrical and mechanical equipment. The CHP unit supports thermal load balancing to match fluctuating energy demands. Syracuse also installed an absorption chiller, offsetting peak electrical load and cooling data system components year-round. On top of these benefits, the university installed a CHP system to improve energy efficiency and help meet their emissions reduction targets.

BP's Helios Plaza (Houston, TX): BP installed a 4.6 MW CHP unit to improve reliability and resiliency at Helios Plaza, ensuring the business's 24/7 trading operations are never interrupted. CHP allows the facility to continue operating during hurricanes, tornadoes, blackouts, and other outage events. The unit can also operate in "island mode" allowing it to run while disconnected from the utility grid. The system has a total efficiency of over 75%, which contributes to reductions in total fuel consumption, energy costs, and greenhouse gas emissions. Modularity in system components, greater standardization, and less field construction also provide cost savings.

BP's Helios Plaza