COMBINED HEAT AND POWER ALLIANCE

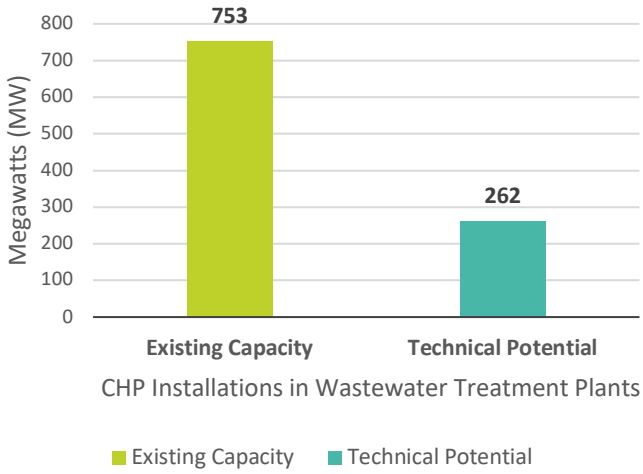
Combined Heat and Power (CHP) Potential in Wastewater Treatment Plants

Wastewater treatment plants account for 1.8% of total US electricity use. [1] Although this is a relatively small number, these plants provide a crucial service to the public; their continuous operation is necessary to remove and treat the wastewater from communitites, which keeps waterways clean and waste removal running smoothly, and the plants require reliable energy to meet these expectations. Combined heat and power (CHP) systems are both efficient and reliable, and provide wastewater treatment plants with the energy security they need. Power outages have severe detrimental impacts upon plant operation and the communities they serve. During a grid failure, a wastewater treatment plant must either shut down completely or depend on expensive and polluting back-up power from diesel generators.

CHP offers many direct benefits to wastewater treatment plants:

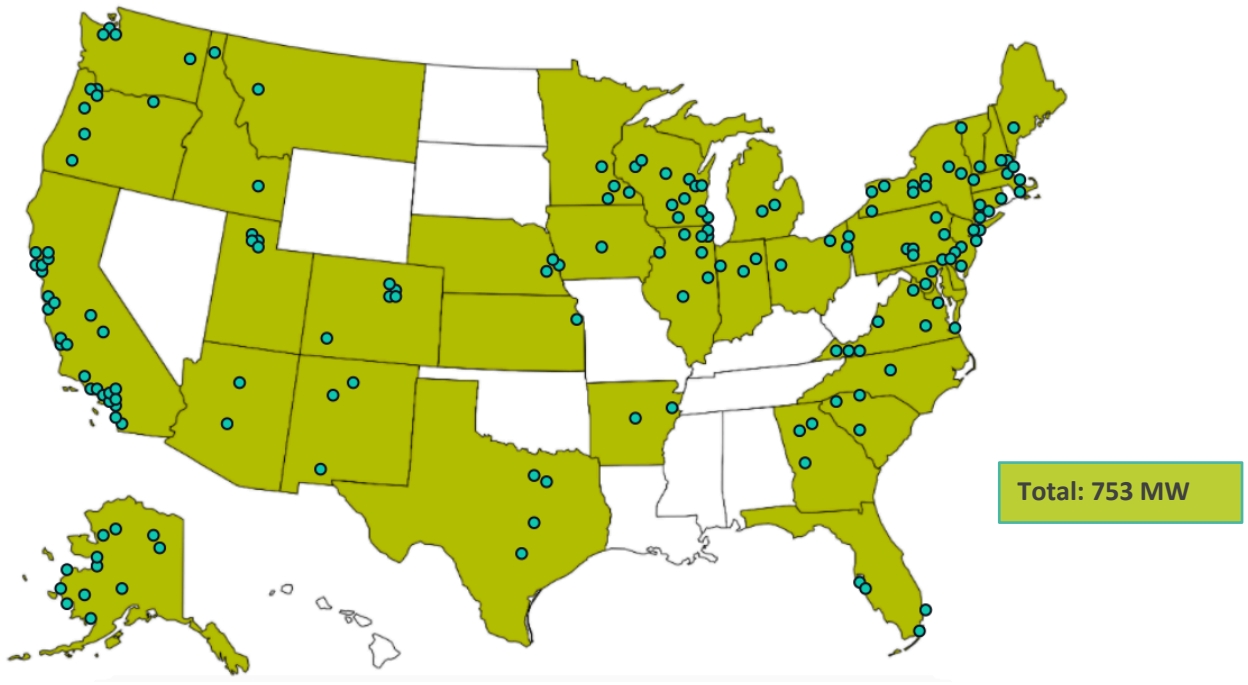
- Increased energy reliability
- Lower fuel costs
- Microgrid capability
- Storm resilience
- Emergency preparedness
- Increased energy efficiency
- Reduced greenhouse gas emissions
- Protection from volatile energy prices

Figure 1: CHP Capacity at US Wastewater Treatment Plants Compared to Technical Potential [2,3]



In the US, 223 commercial and municipal wastewater treatment plants have installed CHP systems totaling 753 megawatts (MW).[2] However, the US Department of Energy (DOE) estimates that approximately 262 MW of CHP potential remains in this sector.[3]

Fig. 2: CHP Deployment Sites among Wastewater Treatment Plants in the US[2]



Resilience Case Study: Why Wastewater Treatment Plants Need Dependable Power

In September 2018, the Southside Wastewater Treatment Plant, just south of Willmington, NC lost power. When both of the plants' backup generators failed, 5.25-million gallons of partially treated waste water poured into the Cape Fear River. The spill lasted over 14 hours—dumping nearly half the wastewater that the plant treats daily. The discharge was unrecoverable, endangering residents and polluting the river and the surrounding area.[4] The Southside experience is not unique. The US Environmental Protection Agency estimates that at least 23,000 to 75,000 sanitary sewer overflow events occur in the US each year.[5] Many of these events are caused by power outages. Not only do wastewater system failures harm the plant and surrounding residents, but they also impact the natural river environment and those living downstream. Wastewater treatment failures have dangerous and lasting effects. CHP systems protect water treatment facilities from unexpected power outages, preventing dangerous sewage spills.

A sewage stream builds during a 10-hour spill outside Asheville, NC

Wastewater Treatment Plant CHP Success Stories

Bergen County Utilities Wastewater Treatment Plant (Little Ferry, NJ): The Bergen County Utilities Wastewater Treatment Plan treats 80 million gallons of wastewater per day from 47 communities in New Jersey. The 4.2 MW CHP system was able to maintain service during Super Storm Sandy because of its ability to operate independently of the electrical grid, demonstrating the resiliency benefits of CHP. The system also saves the plant over three million dollars from lower electricity demand. [6]

Bergen County Utilities Plant

East Bay Municipal Utility District

East Bay Municipal Utility District (Oakland, CA): The East Bay Municipal Utility District's 11 MW CHP system provides energy for the plant, which treats about 75 million gallons of wastewater per day. The CHP system uses digester gas, created from wastewater solids using bacteria in an anaerobic digester at the facility and accepts high-strength wastes, mainly fats, oils, and grease, from outside facilities to increase the amount of available digester gas. The system saves the plant over one million dollars a year.[7]

[1]Congressional Research Service. "Energy-Water Nexus: The Water Sector's Energy Use". 2017. https://fas.org/sgp/crs/misc/R43200.pdf
[2]US DOE. "Combined Heat and Power (CHP) Installation Database." Installations as of Dec. 31, 2018. https://energy.gov/chp-installs
[3]US 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
[4]Murawski, John." 5.25 million gallons of waste water spills into Cape Fear River after power outage." *The News & Observer*. September 15, 2018. https://www.newsobserver.com/news/local/article218476205.html
[5]American Society of Civil Enginners (ASCE). "2017 Infrastructure Report Card: Wastewater." January 2017. https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Wastewater-Final.pdf
[6]ICF International. "Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities". 2013. https://www.energy.gov/sites/prod/files/2013/11/f4/chp_critical_facilities.pdf
[7]US DOE. "East Bay Municipal Utility District". 2015. http://www.chptap.org/Data/projects/ebmud-wwtp.pdf

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