# Wastewater Treatment Plants with CHP: Resilient, Renewable, and Ready for Net Zero Energy

Wastewater Treatment Plants (WWTP's) have long been recognized as an attractive market for Combined Heat and Power (CHP). In our recent series of newsletters, the New York / New Jersey Combined Heat and Power Technical Assistance Center (NY/NJ CHP TAP) has addressed the theme of "resiliency" and CHP in the context of high-tech greenhouses[1], and in hospitals[2]. This newsletter builds upon prior work of the national network of DOE's CHP Technical Assistance Partnerships (CHP TAPs), discussing how CHP in WWTPs can contribute to site resiliency, to increased renewable energy production and to ultimately meeting net zero carbon goals.

## A Sampling of US Department of Energy Resources

Characterization of CHP Opportunities at U.S. Wastewater Treatment Plants. April 2019 DOE/EE – 1969. Source: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/Characterization_CHP_Opportunities_US_Wastewater_Plants_April2019.pdf

Combined Heat and Power (CHP) Fact Sheet Series: Wastewater Treatment Plants. Source:

https://betterbuildingssolutioncenter.energy.gov/resources/combined-heat-and-power-chp-fact-sheet-series-wastewater-treatment-plants

Energy Data Management Manual for the Wastewater Treatment Sector. [ DOE/EE-1700] By Paul Lemar. Oak Ridge National Laboratory Contract No. DE-AC05-00OR22725. December 18, 2017. Source: https://www.energy.gov/eere/slsc/downloads/energy-data-management-manual-wastewater-treatment-sector

Technical Assistance Partnership (CHP TAP). Source: https://chptap.ornl.gov/profile/422/CHP_in_Net-Zero_Energy_Facilities.pdf

[1] CHP Adds Food to the Resiliency Menu
[2] NYU Langone Hospital

The Midwest CHP Technical Assistance Partnership (CHP TAP) describes several illustrative cases of Net-Zero CHP: Examples from the Wastewater and Healthcare Sectors. The author observe that, "CHP systems are common in both the wastewater and healthcare sectors due in part to their need for reliable and resilient energy and their energy-intensive processes".[3]

With the passage of New York's Climate Law and Community Protection Act (CLCPA, or "Climate Act) forward looking investment planning focuses on recovering renewable methane and prioritizing renewable based generation options. Hybrid biogas / solar PV systems at wastewater treatment plants are emerging as the next level of environmentally superior, resilient, and economically advantageous energy investments. In our region, New Jersey, the Willingboro Municipal Utilities Authority (WMUA) recently was among the winners of the Project of the Year Award in the elite Environment + Energy Leader Awards program. In selecting this project, the judges stated, "the comprehensive nature of this upgrade (including biogas, CHP, microgrid and advanced meter infrastructure) provides a holistic solution improving the operation of the municipal water/wastewater system".[4] This innovative renewable CHP project and microgrid is projected to reduce energy costs and emissions, provide energy resilience to keep the plant operational during grid outages, and diversify the energy supply, while garnering over $7-4.9 (c)n <</MC4- 79-3.38 whgarn  invarnoer $i3.7.9 (96 (rid)2.3bEP.67.9 -6.6 (7.9 (96n74)2.6a1r58 r t4 (

A 2019 US DOE report stated that assessment of technical potential for ADG CHP should be limited to WWTPs with existing anaerobic digesters[9]. The report expands on these criteria stating that WWTPs processing at least 2 million gallons of wastewater per day (2 MGD) produce sufficient biogas to offer investment opportunities in renewable CHP systems. Using these criteria, the report found that New York ranked fifth among the 50 states in terms of sites with Technical Potential for CHP and identified 57 sites.[10]

As a follow-up to a stakeholder engagement conducted by the NY/NJ CHP TAP, in May 2022 we were provided a list of WWTPs with Anaerobic Digesters in NY[11] from the New York State Department of Environmental Conservation (NYSDEC). This database contains information on 136 existing WWTPs with anaerobic digesters in New York State, ranging from < 1 MGD to > 100 MGD.

We conducted an analysis of the NYSDEC data utilizing the methodology described in the 2019 US DOE report on Technical Potential. The results indicated that there are 49 WWTPs in NY meeting two threshold criteria for CHP technical potential: existing Anaerobic Digestors and capacity > 2 MGD. Of these 49 WWTPs , 16 of them treat between 2 and 5

Wastewater Treatment Plants offer a unique opportunity to integrate a CHP system as part of a comprehensive strategy to advance critically important societal, environmental, energy efficiency, infrastructure resiliency and greenhouse gas reduction goals. DOE's CHP TAPs promote and assist in transforming the market for CHP, waste heat to power, and district energy technologies/concepts throughout the United States. As leading experts in CHP (as well as microgrids, heat to power, and district energy) the CHP TAPs work with sites to screen for CHP opportunities as well as provide advanced services to maximize the economic impact and reduce the risk of CHP from initial screening to installation. For information and assistance, contact the CHP TAP in your area, found at this site, https://betterbuildingssolutioncenter.energy.gov/chp/chp-taps