



Santa Rita Water Reclamation Center

195 kW Cogeneration System

Quick Facts

LOCATION: Durango, CO

MARKET SECTOR: Wastewater Treatment

FACILITY SIZE: 5.5 acres

FACILITY PEAK LOAD: 2.2 megawatts (MW)

EQUIPMENT: 3 Capstone C65 ICHP
Microturbine Generators

FUEL: Microbe-Produced Methane Gas

ENVIRONMENTAL BENEFITS: Reduced levels of phosphorous and nitrogen in treated wastewater that could have led to algae blooms that can suffocate fish

TOTAL PROJECT COST: \$64.2 million for all site upgrades

CHP IN OPERATION SINCE: 2019

ADDITIONAL BENEFITS: Future regulatory requirements compliance and ability to accommodate future growth



IMAGE FROM CITY OF DURANGO

Site Description

The City of Durango's Santa Rita Water Reclamation Facility, formerly named Durango Wastewater Treatment Plant, was built more than sixty years ago and is located next to the Animas River in La Plata County near Durango, Colorado. The plant utilizes microorganisms to remove phosphorus, nitrogen, and other organic material from the service area's wastewater. The facility sits on 5.5 acres on a 14.2 acre parcel of land owned by the City of Durango Sewer Fund. Durango's population consists of around 17,000 residents, but increases to up to twice this amount daily due to tourists, college students, employees, and other visitors to Durango, which necessitates appropriate water treatment for all. *"The city of Durango takes great pride in ensuring that all of its operations are sustainable and the wastewater treatment plant is no different."* ([City of Durango WWTP project page](#))

Reasons for Plant Upgrade

The wastewater treatment plant had not been updated since the mid-1980s. The plant was rated to process three million gallons of waste per day (MGD) and six thousand pounds of carbonaceous biochemical oxygen demand (cBOD) per day. The aging facility was growing more and more difficult to maintain, was nearing capacity, and was not equipped to meet anticipated future regulatory requirements. As part of an outside assessment focusing on infrastructure and capacity, it was determined that under maximum loading conditions the liquid stream processes were well above ideal operating conditions. Further, the aeration basins, which add air and oxygen to the treatment process to ensure the healthy microbe

Wastewater treatment plants that use anaerobic digestion have consistent electric and thermal loads that can support on-site combined heat and power (CHP). The digestion process generates a renewable, methane-rich biogas that can be used to power CHP systems. These systems can provide enhanced on-site reliability and resilience, reduce greenhouse gas (GHG) emissions, and lower energy costs for the water treatment facility.

population that is necessary for the nitrification and denitrification process and removing ammonia, did not meet Colorado's State Department of Public Health and Environment design criteria for nitrification and denitrification.¹

CHP Equipment & Operation

The City embarked on a process to thoroughly review the plant and develop the improvements needed in order to address the operator's capacity

concerns. An assessment conducted in 2015 had resulted in approval for the updates. Construction began in mid-2017 and completed in late 2019. The Center's 2019 expansion included new anaerobic digesters, primary sludge station, dewatering facility, odor control tanks, UV disinfection buildings, and two new microturbine generators. In 2015 \$68 million in bonding authority was approved, allowing the City to make the much-needed improvements to the WWTP. The City issued \$62.2 million in State Revolving Fund loans to finance the improvements. Additional funding came from two loans from the Colorado Water and Power Development Authority's State Revolving Fund and a grant from the Department of Local Affairs.

The microturbines are fueled by the biogas from the newly installed anaerobic digesters. These digesters biologically degrade solids, and as microorganisms degrade solids they produce methane gas (biogas) that is utilized at the facility to produce power. This power generated by the microturbines offsets the power utilized by the other treatment processes. With the upgrade, the plant now has three microturbines on site. The two new turbines are Capstone Micro Turbine C65 ICHP grid connected units. Each can produce approximately 65 kW of energy and are equipped with stainless steel integral heat exchangers. The system is designed to flexibly ramp up and down units based on biogas production. One unit is the primary unit. When additional biogas is produced due to greater flow through, additional units can be started. For increased flexibility, the CHP system can use both methane gas and natural gas. Biogas is increasingly used as a fuel in combined heat and power (CHP) systems across the U.S.

The gas purification system, including H₂S and siloxane removal and compression, was provided by Unison Solutions.



IMAGE COURTESY OF
HORIZON POWER SYSTEMS

Lessons To Share

Prior to installation, the city's on-site energy production effort at the wastewater treatment plant generated approximately 400,000 kWh, which accounted for 12% of the facility's annual energy use. By adding another anaerobic digester and the two turbines, the city anticipated an increase in on-site renewable energy production as a result of the wastewater treatment plant processes.

There were some delays in completing the project. The postponements were due to additional enhancements, which included spraying aeration basins with a material to increase the structure's durability. The effluent pipe's path was also modified to improve the efficiency of the wastewater flow.

For More Information

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More CHP Project Profiles:
www.uwchptap.org

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¹ https://www.colorado.gov/pacific/sites/default/files/WQ-ENG-WQCD_20120915_WPC-DR-1_WW_Design_Criteria_Final.pdf