



City of Dallas Wastewater Treatment Plant

4.2 MW CHP Application

Project Profile

Quick Facts

Site location:
Dallas, TX

Industry Type:
Wastewater Treatment Facility

CHP equipment:
Three GE Jenbacher 420 engines with
heat recovery hot water generator

Fuel: Biogas

Generating Capacity:
4.2 MW

Hot water Production:
1,500 gpm at 170-190°F

Site Overview

The Southside Wastewater Treatment Plant is located on over 2800 acres, approximately twenty miles southeast of downtown Dallas. The plant's treatment capacity is roughly 110 million gallons of wastewater per day. Additionally, it processes and disposes over 150 tons of solids per day. Wastewater solids from the city are fed into heated digester vessels where it is decomposed by anaerobic digestion (a bacterial process carried out in the absence of oxygen). The process generates biogas with a high proportion of methane. Prior to the installation of the combined heat and power plant, a majority of the generated biogas was flared on-site while a small portion was used in boilers to heat the digester vessels.

Project Description

The clean energy project served as a successful demonstration of public-private partnership. In November 2008, the City of Dallas entered into a 20-year lease agreement with Ameresco for the development of the cogeneration facility. In addition to minimal upfront costs for the City to build the facility, additional labor & skill sets would not be required to maintain and operate the cogeneration facility. The average daily bio gas production from the digesters was 1.3 million cubic feet per day with an energy value of 550-600 Btu/cf. The biogas is fed into three Jenbacher - Model 420 generators which have a combined nominal capacity of 4,200 kW. As a result of the installation, the City reduced its dependence on the electric grid by 30,000,000 kWh per year. The heat produced by the generators is captured for use in the system hot water loop and to heat the digesters. The savings in electricity purchases translates to an estimated \$900,000/year. The project generates roughly 30,000 Renewable Energy Credits (REC's) per year. Furthermore, in addition to significant reductions in particulate matter, Mercury, SO_x, volatile organic compounds and water use the project results in reductions of 40,156 tons/year of CO₂.

combined heat & power at a
wastewater treatment plant

CHP Drivers

Texas Senate Bills set goals for electricity generation from renewable energy resources and established rules for buying and selling renewable energy credits (SB7) and required political subdivisions to reduce energy consumption by 5% per year for five years (SB5 & SB12). In addition to these policy initiatives, rising electricity costs & the public-private partnership model with Ameresco were the main drivers for the project. Project responsibilities were clearly delineated and incorporated onto the contract.

The City of Dallas' responsibilities included:

- Lease a 2.5 acre tract of land (leased premises) at SWWTP to the Ameresco for the proposed Cogeneration Facility
- Provide for the construction of all utility extensions (piping and electric duct bank to the lease premises (\$6.5 Million)
- Guarantee to supply a minimum quantity of biogas to Ameresco (283,240 mmBtu/year)
- Purchase all electricity produced by the cogeneration facility beginning at 6 cents/kWh and escalating at 1.5%/year over the lease term

Ameresco's responsibilities included:

- Finance, design, permit, build, operate and maintain the cogeneration facility
- Provide a base rental payment to the City for the use of the leased premises (\$1,000/yr)
- Provide the City a guaranteed minimum amount of electricity to the City (no less than 34% efficiency, based on the lower heating value of the biogas)
- Provide the City a guaranteed minimum amount of hot water for heating on-going operations of digesters and boilers (no less than 41% efficiency, LHV)



Lessons Learned

- Successful public-private partnership
- City assumed reduced risk due to Ameresco's operation & maintenance of the CHP plant
- Ameresco benefited by a guaranteed revenue stream for 20 years, incentives from the utility and available federal tax credits
- Extra effort was devoted in the planning and contractual stage
- Permitting & electric utility involvement at early in the project development cycle the beginning of the process

As a fuel to generate electricity, DWU's Biogas has the potential to reduce the City of Dallas' total grid derived electricity consumption by almost 4%. The project received an incentive from Oncor, the local utility.



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