



Southside Wastewater Treatment Plant (WWTP)

4.2-MW CHP System



Quick Facts

LOCATION: Dallas, TX

MARKET SECTOR: Wastewater Treatment

Facility Size: 110 Million gallons per day (MGD) design, 195 MGD peak

Facility Peak Load: 4.75 MW

Facility Average Load: 3.8 MW

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

FUEL: Biogas

Operation: 46% of electric load supplied by biogas CHP

USE OF THERMAL ENERGY: Heat Digester Vessels

CHP IN OPERATION SINCE: 2008

ENVIRONMENTAL BENEFITS: CO₂ emissions cut by 43,440 tons/year, and generates 32,000 Renewable Energy Credits/year

Site Description

The Southside WWTP is located on over 2,800 acres, twenty miles southeast of downtown Dallas. The plant's treatment capacity is roughly 110 million gallons of wastewater/day and it processes and disposes over 150 tons of solids/day. Wastewater solids are fed into heated digester vessels where it is decomposed by anaerobic digestion. 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.

In November 2008, the City of Dallas entered into a 20-year lease agreement with Ameresco for the development and operation of the cogeneration facility. The outcome of this public-private partnership agreement was minimal upfront costs for the City to build the facility and that the City would not have the expense of hiring and/or training City employees to maintain and operate the cogeneration facility.

Reasons for CHP

Texas Senate Bills set goals for electricity generation from renewable energy resources and established rules for buying and selling renewable energy credits (SB7) and local and state governmental entities to reduce energy consumption by 5% per year for five years (SB5 & SB12). In addition to these policy initiatives, rising electricity costs and opportunity for the public-private partnership model with Ameresco were the main drivers for the project.



CHP Equipment & Configuration

The average daily biogas production from the digesters is 1.4 million cubic feet per day with an energy value of 500–650 Btu/cf. This biogas is fed into three Jenbacher – Model 420 generators which have a combined nominal capacity of 4,200 kW. The heat produced by the generators is captured for use in the

system hot water loop and to heat the digesters. As a result of the installation, the City reduced its dependence on the electric grid by 32,456 MWh per year, an overall reduction of 4% for the City of Dallas' total grid derived electricity consumption. The savings in electricity purchases translates to an estimated \$1.572 million/year.

CHP Development and Operation

The CHP system is part of a public–private partnership between the City of Dallas and Ameresco and required significant coordination and cooperation between the two organizations. The responsibilities of each organization includes:

The City of Dallas' responsibilities included:

- Lease a 2.5 acre tract of land (leased premises) at SWWTP to Ameresco for the proposed CHP Facility.
- Provide for the construction of all utility extensions (piping and electric duct bank to the 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

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 ongoing operations of digesters and boilers (no less than 41% efficiency ,LHV).

CHP Environmental Benefits

The project generates roughly 32,000 Renewable Energy Credits (REC's) per year. In addition to significant reductions in particulate matter, Mercury, SOx, volatile organic compounds and water use, the project results in reductions of 43,440 tons/year of CO₂.

Lessons to Share

The public–private partnership provided a significant opportunity for each party. The City of Dallas assumed reduced risk and costs due to Ameresco having the responsibility to design, construct, operate and maintain the facility. Ameresco benefited by having a guaranteed revenue stream for 20 years, incentives from the utility and available federal tax credits.

“This project has allowed Dallas to save money on its electrical costs and has increased reliability at the plant with another electrical feed. By utilizing a public-private partnership, the City was able to implement the project without additional capital to construct the facility or additional labor to operate and maintain the facility.

**- Richard Wagner
Senior Program Manager**

For More Information

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www.southwestCHPTAP.org

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