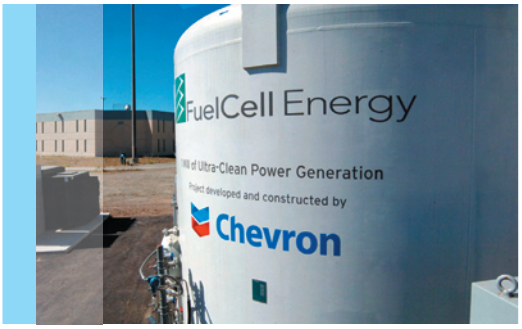
Case Study

Santa Rita Jail Fuel Cell Power Plant

County of Alameda
California



Background

Alameda County's Santa Rita Jail is the third largest county detention facility in California and the fifth largest in the nation. It holds approximately 4,000 inmates and consumes more energy than any other county government building. Alameda County wanted to reduce its peak electricity demand and improve the security and reliability of power supply at the Jail. This was the third major project undertaken by the County aimed at improving efficiency and employing sustainable energy sources at the Santa Rita Jail. Previously, the County had completed comprehensive energy retrofits and improvements and had installed the nation's largest rooftop solar power system (1.2 megawatt) at the Jail.

Solution

Fuel cells are among the cleanest, most reliable sources of power generation, providing continuous high-quality power 24 hours a day, with ultra-low emissions and quiet operation. In addition, the exhaust heat byproduct can be used for combined heat and power (CHP) applications using hot water, steam or chilled water to heat or cool buildings. The Santa Rita Jail fuel cell is the first megawatt-class fuel cell cogeneration plant in California and one of the largest in the United States.

PROJECT FEATURES

- First megawatt-class fuel cell in California
- Ultra-clean, ultra-low emissions, quiet operation
- Involves no combustion
- Heat recovery cogeneration increases efficiency by capturing exhaust heat for water and space heating inside the Jail
- Reduces power purchases by 80% during peak-demand summer months

FuelCell Energy manufactured the DFC1500 fuel cell and integrated all of its components within the power plant. Chevron Energy Solutions developed and constructed the project, ensuring that all utility interconnection points were integrated with the fuel cell and the rest of the Jail's infrastructure. Chevron ES also designed the heat exchanger equipment, which captures exhaust heat for water and space heating at the Jail.

The project involved careful planning and management of utility interconnection applications and construction targets in order to meet financial incentive requirements. All

non–fuel cell infrastructure had to be complete before the arrival of the fuel cell equipment at the project site. This work included the concrete equipment pad, underground piping for gas and water lines, and high voltage electrical service.

Chevron Energy Solutions managed all activities associated with obtaining funding through PG&E's Self-Generation Incentive Program. On-site training for operations and maintenance personnel was also provided as part of the contract.

The fuel cell's performance is continuously monitored through UtilityVision®, Chevron Energy Solutions' web-based energy tracking and reporting system, which offers County and Jail staff immediate access to all fuel cell output information including electricity production, waste heat recovery, and fuel consumption.

QUICK FACTS

Project Partners	County of Alameda, California Chevron Energy Solutions – project developer/ prime contractor FuelCell Energy, Inc. – fuel cell manufacturer
Project Value	$6.1 million ($1.4 million from PG&E's Self-Generation Incentive Program; $1 million from the U.S. Department of Defense Climate Change Fuel Cell Program; $2.8 million funded by energy savings; $900K funded by previous energy incentives)
Project Scope	• One-megawatt DFC1500, molten carbonate fuel cell power plant (single module with four 400-cell internal stacks) used as base load power in parallel with utility grid and on-site solar power system • Associated heat recovery cogeneration equipment used to pre-heat hot water system • UtilityVision® Control System for measurement and verification of performance
Project Results	• Annually generates 8,000,000 kWh of electricity and 1.4 MMBtu of waste heat (50% and 18%, respectively, of Jail's needs) • Overall system efficiency of 58% • 98.5% reduction in NO_X emissions compared to standard power plants • California Air Resources Board certification as an ultra-clean distributed generator • Expected life: 25 years

Benefits

This project benefits Alameda County and the surrounding region by reducing grid power purchases from conventional, combustion-engine power plants. Cogeneration equipment increases the plant's efficiency by capturing exhaust heat for water and space heating inside the Jail.

Combined with the previously installed rooftop solar power array and energy efficiency upgrades, this installation will reduce power purchases by as much as 80% during peak-demand summer months. This translates to avoided greenhouse gas emissions of 3,200 tons annually, equivalent to planting approximately 900 acres of trees.

The project will save county taxpayers more than $260,000 per year.

Chevron Energy Solutions partners with institutions and businesses to improve facilities, increase efficiency, reduce energy consumption and costs, and ensure reliable, high quality power for critical operations. Our customers include schools, colleges, universities, and other institutions; federal, state, county and municipal government facilities; and commercial and industrial businesses.

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