



DGS Central Plant

District Energy System

Site Description

The newly renovated Department of General Services (DGS) Central Plant is located at 625 Q Street in downtown Sacramento. The original heating and cooling plant was built in 1968 and included a deep well and a landscaped parking area. By the late 1970s, there had been an expansion of new California State office buildings, the introduction of personal computers to office areas, and additional modifications to building heating, cooling, and air systems, thus straining central plant capacity. In 1980, a gasifier building, storage building, and storage container were added. Cooling water has been provided from various wells including the Ranney Collection Well and Front Street Deep Well, located on Front Street near the Sacramento River. At maximum summer load, approximately 15 million gallons of heated water were previously discharged into the river per day. Because of the adverse effects to river ecology, a "cease and desist order" was issued by the Central Valley Regional Water Quality Control Board, necessitating the development of the new "closed loop" system.

Project Profile

The 1960s-era plant was replaced by a modern design with enhanced aesthetics for the site. The new Central Plant provides chilled water for cooling, steam for heating, and compressed air for controls to approximately four million square feet of office space in 23 downtown State buildings, including the State Capitol. The original central plant remained fully operational until the end of construction of the new plant. The approximately 78,000 square foot project includes:

- 7 centrifugal chillers with 16,300 tons of total cooling capacity
- 8 cooling towers with 55,000 GPM capacity
- Thermal energy storage (TES) system with 4.25 million gallon cap.
- 12 chilled water primary and condensate pumps
- 6 chilled water distribution pumps with 21,120 GPM capacity
- 4 boilers with 221,000 lbs/hr cap. at 250 psi and 1500° F. high-pressure steam (with fuel oil for backup of natural gas supply)
- Steam turbine generator with 2,900 kW capacity (for backup)
- 3 air compressors with 975 cu. feet per minute capacity
- 1 energy management control system
- 55 variable frequency drives (VFDs)

The water well used by the plant is 900 feet deep and produces 3,000 gallons per minute.

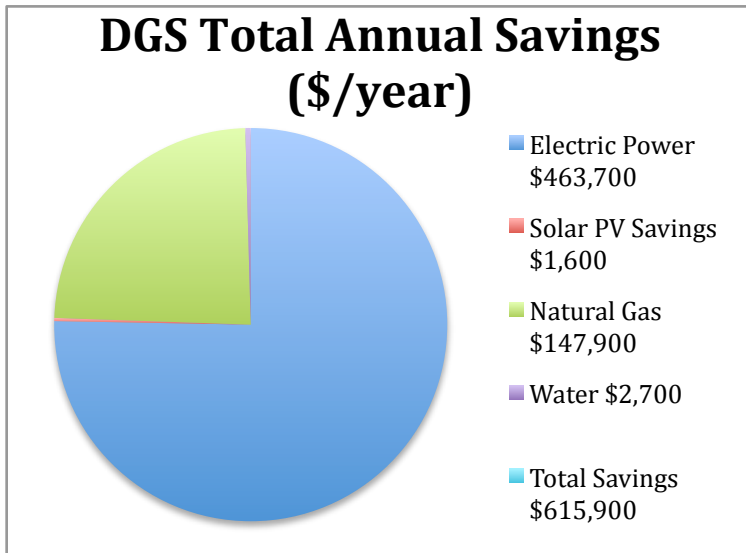
Quick Facts

LOCATION: Sacramento, California
MARKET SECTOR: Government sector
TOTAL PROJECT COST: \$181 million
PAYBACK PERIOD: No Data
ENERGY BILL SAVINGS: \$615,900
EQUIPMENT: 7 York chillers (16,300 total tons of cooling), 8-cell cooling tower, 4.2 million gallon thermal energy storage tank, 12 primary chilled water pumps, 6 chilled water distribution pumps, 4 boilers, 1 steam turbine, 3 air compressors, 1 energy mgt. control system, 55 variable frequency drives
FUEL: Natural gas
USE OF THERMAL ENERGY: Space heating and cooling
FACILITY SIZE: 78,000 square feet
FACILITY PEAK LOAD: 5.5 MW
FACILITY AVERAGE LOAD: 1.4 MW
IN OPERATION SINCE: 2011



DGS Central Plant

Additionally, the facility features an “N+1” redundancy concept for reliability as well as a small solar photovoltaic array for onsite power and parking lot shade (52 panels for 6.25 kW of capacity). The project had 3 phases: Phase I for the construction to install the new chillers and prepare for elimination of discharge to the river (14 months); Phase II for the demolition of the old plant and the installation of the boilers (16 months); and a final Phase III for the installation of the TES tank system. Below is the DGS total annual savings chart that indicates the annual electric power, solar, natural gas, and water savings. The development of the new plant benefitted from the “Savings by Design” program through participation of Pacific Gas and Electric Company (PG&E) and the Sacramento Municipal Utility District (SMUD).



DGS Central Plant Chillers

Sustainability Features

The goal of the Central Plant is to maintain maximum energy efficiency in all operational periods. In addition, it was built to Leadership in Energy and Environment Design (LEED) “Gold” certification. The energy efficiency and LEED credits are associated with the following features:

- VFDs to minimize energy use and overall life cycle costs — VFDs operate with demand-based controls that constantly match the power consumption with the most efficient plant operation;
- heating, ventilating, and air conditioning (HVAC) system — displacement ventilation versus conventional mixing systems to provide low noise (low velocity), less fan energy consumption, higher chiller efficiency, less required chiller capacity, more fresh air, and increased thermal comfort;
- occupancy sensors in the administrative area, which allow the HVAC system and lighting controls to go into standby mode when the space is unoccupied;
- solar hot water that contributes to on-site renewable energy credits;
- maintenance of high indoor air quality and lighting via carbon dioxide monitoring, low volatile organic compound (VOC) substances, indoor day lighting, and sun shades to prevent glare from the sun;
- use of recycled materials such as steel and fly ash; and
- on-site bicycle storage as well as numerous bus stops and a light rail station to reduce the impact of automobiles.

For More Information

DGS Central Plant:
<http://dgscentralplant.com/>

Additional Pacific CHP Project Profiles:
<http://www.pacificcleanenergy.org>

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U.S. DOE Pacific Region Clean Energy Application Center

Tim Lipman
 2150 Allston Way, Suite 280
 Berkeley, CA 94704
 510-642-4501
telipman@berkeley.edu

