



Johnson & Johnson

2.2 MW reciprocating CHP system

Project Profile

combined heat & power in a pharmaceutical research facility

Quick Facts

- Location:**
La Jolla (near San Diego), CA
- Capacity:**
2.2MW (two 1,100 kWe 16-cylinder reciprocating engines from Cummins)
- Fuel:** Natural gas
- CHP system:**
Hot water and absorption cooling
- Grid Interconnection:**
The system can be operated in grid-independent mode to provide high-reliability power
- System Online:**
March 2004
- Total Project Cost:**
Approximately \$4,000,000
- Energy Cost Savings:**
Approximately \$1,000,000/year
- Estimated Payback Time:**
4 to 5 years
- Funding Sources:**
Johnson & Johnson, San Diego Regional Energy Office (SDREO) refund of \$800,000 (from the CA Self-Generation Incentive Program)

Project Overview

Johnson & Johnson Pharmaceutical Research & Development (J&JPRD) operates eleven research laboratories worldwide and is a leading maker of personal care products, diabetes medications, and other pharmaceuticals. Three years ago J&JPRD planned to double the size of its La Jolla, California facility space from 120,000 sq. ft. (11,000 m²) to 300,000 sq. ft. (28,000 m²).

This project was conceived in 2003, when the California energy crisis made J&JPRD reluctant to sign long term electricity contracts. J&JPRD sought to find an integrated, holistic approach to its energy needs

For the research facility in La Jolla electrical loads are high during the business hours of 7am to 6pm (the maximum peak load is around 2.5 GW), when power peak rates in California also climb. These circumstances make the facility an ideal absorption chiller candidate. Almost all recovered heat can be utilized by the cooling system. However, because there also are cold days at this seaside location J&JPRD has to heat the facility during some periods and the need for recovered heat is well distributed over the whole year.

Originally, fuel cells and microturbines were also considered, but were rejected for reasons including better maintenance agreements for

reciprocating engines and a smaller system footprint. The installed 2,200 kW internal combustion system produces around 15,000,000 kWh/yr of electricity plus 10,548,040 kWh/yr (= 360,000 therms) of heat and 1,120,000 kWh/yr (= 1,600,000 ton-hr/yr) of chilled water, providing more than 90% of the facility's electric power and much of its heating and cooling needs. The current overall exhaust heat utilization is about 75%.

The installation was done in two phases. Unit one, which is powering the old J&JPRD building, came online 2003 and unit two was switched on in February 2004.

As part of the agreement for this project, J&JPRD is required to buy 5% of its electricity needs from the grid (San Diego Gas & Electric). Furthermore, to obtain the permit, J&JPRD had to demonstrate that the system does not back-feed electricity to the grid.

It is estimated that the CHP system at J&JPRD saves around 3,200,000 lb (1,450 tonnes) CO₂/yr. This is equivalent to the operation of about 285 automobiles.



Picture by Johnson&Johnson

Left hand side: 500 RT (refrigeration ton) absorption chiller.

Picture below: 16-cylinder 1,100 kW reciprocating engine from Cummins.



Picture by Johnson&Johnson

The system runs without any operator and is fully monitored by DSL connection. Sensors automatically page and dispatch a technician when needed.

Costs & Financial Incentives

The total costs of the CHP project are estimated at \$4,000,000. It is difficult to exactly determine the total project cost because a complete new building with HVAC system was erected and some of the CHP and HVAC components are not clearly dissoluble. Some of the HVAC aspects were rolled into the larger construction budget and new elements were married up to existing elements. However to mitigate the high costs J&JPRD received a \$800,000 rebate from the San Diego Regional Energy Office (SDREO) under the Self-Generation Incentive Program.

SDREO is an independent, public-benefit, non-profit corporation that provides objective information, research, analysis and long-term planning on energy issues for the San Diego region.

IC engines and large gas turbines (with waste heat utilization)	Incentives (\$/W)
with renewable fuel	1.00
with non-renewable fuel	0.60

Incentives from the Self-Generation program for qualifying equipment for the year 2006 are shown in the table on the left hand side.

Future Tasks

At the La Jolla site five heat exchangers are currently in place. There is enough waste heat for a sixth heat exchanger, which is planned to be added to maximize heat utilization. When this sixth heat exchanger comes online, two old remaining boilers can be decommissioned and this will result in an overall exhaust heat utilization of nearly 100%. Furthermore, J&JPRD is exploring the possibility of adding a 200 kW photovoltaic system for additional peak power shaving. Moreover, other Johnson & Johnson sites are possible CHP candidates. Plans are being discussed to install a CHP system at an East Coast location, as well as at a Puerto Rico site.

Further information can be found at

Johnson & Johnson (La Jolla):
www.jnjpharmarnd.com/locations/ca.html
 San Diego Regional Energy Office (SDREO):
<http://www.sdenergy.org/> and
 Self-Generation Incentive Program:
<http://www.sdenergy.org/ContentPage.asp?ContentID=35&SectionID=24>
 PRAC: www.chpcenterpr.org

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“There are so many benefits to cogeneration. Innovation is at the core of our R&D efforts, and so we’re pleased to be using this cutting-edge cogeneration technology to power, heat and cool our new laboratories.”

J&JPRD Senior Vice President of Drug Discovery, Michael Jackson

“Self-generation reduces electricity consumption from the grid, reduces the need for new infrastructure and helps the environment.

This project is great for the San Diego region.”
SDREO Executive Director, Irene M. Stillings

