Ritz-Carlton San Francisco Hotel

Ranked high on Condé Nast Traveler's 2012 Gold List of 'The World's Best Places to Stay,' it's clear Ritz-Carlton San Francisco doesn't limit luxury to amenities alone.

Located in upscale Nob Hill, the five-star Ritz-Carlton San Francisco's track record as the epitome of elite hospitality is matched by its progressive environmental stewardship.

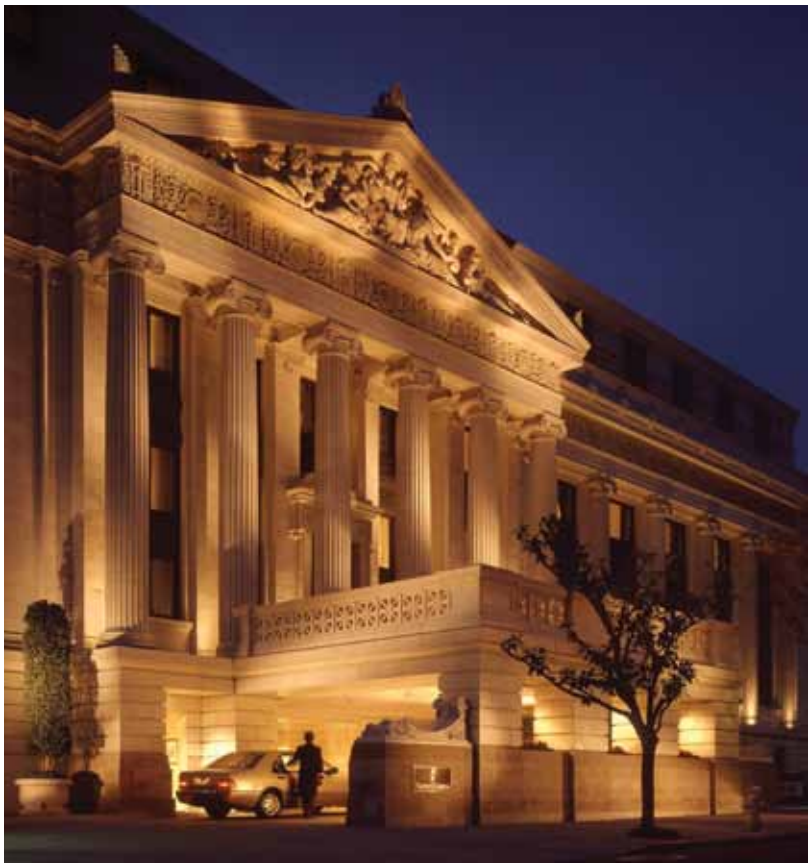
The trend-setting luxury hotel was the first in the world to install the sophisticated Capstone MicroTurbine®-based UTC Power Company PureComfort™ combined cooling, heating, and power (CCHP) system to conserve energy and protect the environment.

"We've always been at the forefront of sustainability, so it made sense to upgrade our traditional power to highly-efficient microturbines to lower energy consumption," said John Traynor, Director of Engineering, Ritz-Carlton San Francisco.

Redefining the luxury hotel experience

At the core of the CCHP system, four Capstone C60 Microturbines generate electricity and heat to provide base-load power and air-conditioning that support much of the hotel's captivating 440,000-square-foot grounds.

Using natural gas, the CCHP system provides the exquisite 336-room hotel with 240kW of electricity and 120 refrigeration tons (RT) of cooling year-round at 80 percent efficiency, which is near maximum overall efficiency for this type of system.



At a glance

Location

San Francisco, California, USA

Commissioned

October 2005

Fuel

Natural gas

Technologies

- UTC Power Company PureComfort™ power solution comprised of 4 Capstone C60 Microturbines, Carrier Corporation double-effect absorption chiller, 2 fuel gas boosters, and control hardware and software.

Results

- The CCHP system generates 240kW of electricity and 120 RTs of cooling year-round at 80% efficiency.
- Since installing the CCHP system, the hotel has reduced its power consumption by 20% – equivalent to electricity required to power 200 average American homes annually.
- The luxury urban hotel has saved an estimated US$120,000 each year in energy costs.
- The microturbine CCHP system emits 40% less CO_2 a year – approximately 800 tons – than conventional power systems.
- The CCHP configuration meets 70% of the hotel's cooling demand and is designed to satisfy base-load chiller demand for the whole year.
- The system achieves a coefficient of performance (COP) of approximately 1.3.

Capstone®

"The big payback is the tremendous amount of heat that comes from the four microturbines. Heat recovery is key to reducing a hotel's energy consumption and costs."

— John Traynor, Director of Engineering
Ritz-Carlton San Francisco

For Ritz-Carlton, guest comfort is paramount, which makes the quiet, low-vibration microturbines an ideal power source for the hotel's relaxing ambiance.

Reduced consumption, costs, and emissions

According to Traynor, purchasing the CCHP system resulted from an ongoing plan to lower the hotel's energy consumption and reduce energy expenses. "The hotel's parent organization strongly wanted to deploy the highly efficient CCHP system to offset energy loads," Traynor said. "Our philosophy is to reduce our carbon footprint and minimize our impact on our community and the environment. We're always looking to advance our sustainability profile and Capstone microturbines align with our corporate vision for environmental stewardship."

With a 1MW peak electricity demand and significant chilling requirements that approach 300 RTs, Ritz-Carlton San Francisco needed a cleaner, more efficient power system to align with its industry-leading corporate standards for conservation.

The hotel's original inefficient 300 RT electric chiller ran 24/7 year-round, even though the hotel's chilling needs often were well below the chiller's capacity. Today's newer microturbine-based CCHP configuration meets 70 percent of the hotel's cooling demand and is designed to satisfy base-load chiller demand for the whole year. This allows the facility to shut off the inefficient 300 RT chiller for eight months each year.

"The big payback is the tremendous amount of heat that comes from the four microturbines," Traynor said. "Heat recovery is key to reducing a hotel's energy consumption and costs."

Exhaust heat from the four microturbines is captured by a Carrier Corporation 120 RT double-effect absorption chiller, which can be manually configured to operate as either a chiller or heater. When in cooling mode, the chiller recycles the microturbines' exhaust heat to achieve a COP of approximately 1.3.

Since the rooftop CCHP system was commissioned in 2005, the lavish hotel has reduced its energy consumption 20 percent and saved an estimated US$120,000 each year in energy costs. With financial support from California's Self Generation Incentive Program and the U.S. Department of Energy, the hotel's return on investment took less than four years.

According to the Pacific Region CHP Application Center, the Capstone microturbine system at Ritz-Carlton San Francisco saves enough electricity annually to power 200 average American homes.

With such tremendous energy savings, greenhouse gas emission reduction is inevitable. The clean-and-green Capstone system emits 40 percent less CO_2 a year than conventional systems – a benefit equal to planting 150 acres of pine and fir forest. In fact, the CCHP system reduces 800 tons of CO_2 each year when compared with traditional onsite energy systems.

Additionally, with NOx emissions less than nine parts per million at 15 percent exhaust oxygen, the Capstone system emits 90 percent less NOx a year than conventional systems, which is equivalent to removing 250 cars from the road.

The CCHP system at the hotel requires nominal maintenance compared to its traditional system. "The microturbines run all the time with minimal maintenance," Traynor said. "The past six years have been a good performance indicator." ■

Four 60kW Capstone microturbines provide cooling, heating, and power to the prestigious Ritz-Carlton hotel in San Francisco.