Nuevo León Department Store

When an upscale department store in Mexico was shopping for a reliable power source to provide low-cost electricity with low-emissions, Capstone MicroTurbines® fit the bill. Over the years, the retailer has become one of Mexico's most recognized department stores by providing superb merchandise and progressive operations.

With the innovative installation of 20 natural-gas powered Capstone C65 microturbines in 2006, the esteemed store became the first retailer in Latin America to install microturbines.

Located in one of the warmest metropolitan areas in Mexico, installing a reliable source for extensive year-round cooling was critical to the project's success. The state of Nuevo León in northeastern Mexico, where the store is located, can experience extreme temperatures that reach 40°C (104°F) in summer months. Winter temperatures average 23°C (73°F).

"Year-round air conditioning that's virtually utility free means deep cuts in operating costs," explained Cuit Sandoval, Capstone's Mexico, Central America, and Caribbean Sales Manager. "This department store chose a combined cooling and heating (CCHP) system to ensure the business remains cool during sweltering temperatures and operates seamlessly if a utility power outage occurs."

"Approximately 40 percent of the power demand is generated by the Capstone microturbine array," explained Sandoval. "Any remaining power needs come from the local utility grid. The store uses low-cost power generated by the C65s when utility rates are highest from 7 a.m. until 10 p.m. During off-peak hours they use more expensive utility power. This arrangement helps ensure they have the power needed at the most economical costs available."

Since installation of the CCHP system, the facility has experienced annual energy savings that can exceed 40 percent. Capstone microturbines provide an environmentally-friendly solution that delivers consistent and reliable power.

At a glance

Location

Nuevo León, Mexico

Commissioned

March 2006

Fuel

Natural Gas

Technologies

- Twenty C65 Capstone microturbines in a combined cooling heat and power application.
- York hot water absorption chiller.
- Capstone integrated heat exchangers (ICHP).

Results

- The 20 Capstone microturbine system supports 40% of power demand, and has decreased reliance on the utility grid.
- The custom microturbine system allows the site to operate off the grid in a natural gas peak shaving mode, and provide 1.3MW of backup power for use during utility outages.
- The tri-generation installation meets Mexico's strict noise and emission requirements.
- Annual energy savings have reached over 40%.
- The absorption chiller captures thermal energy from the microturbines to provide approximately 400 refrigeration tons (RT) of refrigeration for air conditioning.

"The dual-mode system controller isolates the power generation system and allows the system to run flawlessly during outages."

— Cuit Sandoval, Sales Manager, Capstone Turbine Corporation

The 20 natural-gas fueled microturbine system drives a chilled water absorption chiller that produces 400 refrigeration tons (RT) that provides air-conditioning to the four-level department store. Units are fueled by utility natural gas at about 75 psi. The system includes a group of backup compressors used when the utility only is able to provide low-pressure natural gas.

"It was important that the microturbines generate power needed during power outages," Sandoval said. "The dual-mode system controller isolates the power generation system and allows the system to run flawlessly during outages."

The department store's system includes integrated heat exchangers installed on each microturbine that capture waste heat energy naturally produced when the microturbines run. The heat exchangers then supply the heat energy to the absorption chiller, which uses the thermal energy to produce a cool water feed to the building's air-conditioning system. The result: consistent building temperatures regardless of outside temperatures. Each heat exchanger's compact size and low noise emissions make them an ideal fit for the project.

The C65s are covered by a Capstone Factory Protection Plan that includes scheduled and non-scheduled maintenance to keep the units continuously available.

Mexico is ranked 11th in the world for high carbon emissions. Installing a low-emission and reliable power system was a key requirement of facility owners.

Additionally in 2012, the Mexican legislature passed one of the world's strictest climate-change laws. It mandates that companies reduce carbon dioxide emissions 30 percent by 2020, and 50 percent below 2000 levels by 2050. The law stipulates that 35 percent of the country's electricity come from renewable sources by 2024.

With the Capstone microturbines, the progressive retailer is poised to meet the country's requirements today and in the future. "Registered as a clean company, the complex's emissions and noise levels are audited twice a year," Sandoval said. "The microturbines have allowed them to fully comply with the regulations."

"Mexico's climate bill reflects a global trend for countries to be proactive as they address climate change and environmental concerns," Sandoval said. "As a well-regarded department store, it was important that the Capstone microturbines deliver ultra-low emissions and help the store continue its long-standing commitment to be responsible stewards of the environment." ■

Twenty Capstone C65 microturbines produce 40 percent of the electrical power needed to operate a department store in Monterrey, Mexico.

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