

POWER PROFILE

Customer: Ecogen

Location:

Rochaverá Corporate Towers
São Paulo, Brazil

Customer Business Issue:

Provide turnkey distributed generation

Solution:

G3520C gas generator sets (4)

Cat® Dealer:

Sotreq



Ecogen's headquarters at the Rochaverá Corporate Towers complex in São Paulo.

POWER NEED

As one of the fastest growing cities in the world, São Paulo, Brazil has the largest economy of all Latin American cities, measured by per capita GDP. To continue its fast-paced growth, the city must continue to have reliable sources of energy to feed the expanding commercial and industrial complexes being built.

Approximately 80 percent of Brazil's electricity comes from hydroelectric dams, a sustainable, yet sometimes unreliable, energy source. In fact, after experiencing below normal rain levels for a few years, the country went through a severe power shortage in the early 2000s that threatened to slow economic growth. Many power users across the country, including large commercial facilities, needed to reduce their grid electricity consumption by 20 percent to avoid rolling blackouts.

Diversifying the energy mix is key to increasing the grid's reliability. The country is turning to wind farms and its vast natural gas resources for new sources of energy as the authorities rush to keep up with a fast-growing natural gas and electrical demand.

To avoid the hazards that come with a potentially unreliable grid while saving operational expenses associated with increasing electrical rates, many industrial and commercial facility operators install on-site power generation solutions, typically powered by natural gas. Many of these installations use combined heat and power (CHP), also known as cogeneration. These plants harness the waste heat produced by the electrical generator sets and use it to power absorption chillers that air condition the buildings or provide heat for industrial processes.

SOLUTION

Founded in 2002, Ecogen is the leading developer of distributed energy efficiency projects in Brazil, providing clients with turnkey cogeneration solutions.

With a combined electrical generation capacity of about 140 MW, São Paulo-based Ecogen provides on-site power generation to

its customers, which include shopping malls, office buildings, hotels, and industries. The company has 21 cogeneration plants sited throughout Brazil, with the majority of the installations in São Paulo and Rio de Janeiro.

"We outsource this whole package because we understand customers need to focus on their core business—and it's not producing electricity, chilled water, or any other type of utility," says Gustavo Marchezin, commercial director for Ecogen. "With this approach, they can save money in capital expenditures and put their money in their core business and have more reliability on their energy source. We have more expertise and provide better aftermarket support."

The scale of Ecogen's business is large. It has 130 generator sets in its portfolio, including 33 Cat® gas generator sets and 38 Cat diesel generators that produce 84 MW of combined power. In most cases, the power plants are operated remotely from a centralized SCADA system at Ecogen's headquarters at the Rochaverá Corporate Towers complex in São Paulo.

The Rochaverá Corporate Towers complex occupies a privileged location on São Paulo's new urban development axis, the Berrini-Chucri Zaidan hub on the south side of the city. The concrete and glass buildings are arranged on the terrain's diagonals to create a central square and three other adjoining squares running alongside the public thoroughfares, demarcating semi-public spaces without fences and open to the city.

Rochaverá Corporate Towers was the first building in South America to gain the LEED Gold certification given by the U.S. Green Building Council.

The 125,000 square-meter office complex includes a cogeneration plant that is owned, operated, and maintained by Ecogen that provides all electricity and air conditioning to the facility, as well as backup power from diesel generators. Four Cat G3520C generator sets installed in two phases since 2008 generate electrical energy—up to 8 MW—capable of meeting a constant 100 percent load.

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Depending on the price of natural gas, the gensets will run at less than full capacity in tandem with the grid to provide the office condominium with a reliable and consistent price of energy, Marchezin says.

“Here at Rochaverá, we are generating the base load of electricity that is complemented by grid power,” Marchezin says. “The period from 5 p.m. to 8 p.m. is the peak time when power costs the most, so it’s during that time that we are operating the cogen system. And when the price of natural gas is competitive during off-peak periods, or if the thermal demand requires, we will operate the cogeneration system, as well.

“At the end of the day, the cogeneration plant helps us diversify and optimize power costs,” Marchezin says. “And it saves tenants from the risk of blackouts while providing a price comparable to the grid.”

RESULTS

Another advantage is the ability to operate the CHP system in island mode during times of peak demand when grid power can become unreliable. By the end of May, the Rochaverá power plant had operated in island mode for 67 hours this year.

“During hot periods when everyone is running air conditioners, the distribution line tends to be a little unstable,” Marchezin says.

“Distributed generation power plants can help with this. When we think this is going to happen, we run on island mode, and the building doesn’t feel anything.

“And during that entire time, we were out of power for just six minutes,” Marchezin adds. “So for 67 hours, we saved the condominium from having blackouts.”

A key component of Ecogen’s cogeneration strategy is utilizing waste heat from the jacket water and exhaust gas to create hot water that is the input for the absorption chillers, which provide chilled water for air conditioning. This results in higher efficiency and avoidance of additional cost from the grid.

At Rochaverá Corporate Towers, jacket water and exhaust heat recovered from the gensets produce 2,200 tons of chilled water through absorption chillers, resulting in the avoidance of 1.5 MW from the grid. This is complemented by another 2,300 tons generated by electrical chillers. The use of waste heat to create chilled water for air conditioning is replicated at most of Ecogen’s cogeneration installations.

“The need we have in the offices is just for air conditioning,” Marchezin says. “We recover heat from the engine block, and instead of using a radiator to cool, we put a heat exchanger that takes the jacket water heat. After this stage, the water also passes through another heat exchanger that passes heat through exhaust gas. The water temperature is around 90-92 degrees Celsius, and this water is sent to the chillers.”

Since 2010, Ecogen has reached an average of 95 percent availability at its cogeneration facilities during peak hours.

“When we started, we focused a lot on Caterpillar and (Cat dealer) Sotreq—our strategy was to have a mini portfolio of the same engines and the same supplier so we could learn about it,” Marchezin says. “Most of our generator fleet is comprised of Cat power, and Sotreq has two technicians dedicated to Ecogen.

“We are very well supported by them, and the level of parts in inventory is very good,” Marchezin continues. “We can handle some maintenance by ourselves, but we rely heavily on them. I follow everything that happens at our power plants, and at the end of the day, they are the best prepared dealers compared to dealers who represent other equipment manufacturers.”

For more information, please visit cat.com/powergeneration



Four Cat G3520C generator sets generate electrical energy—up to 8 MW—capable of meeting a constant 100 percent load for the Rochaverá Corporate Towers complex.