

POWER PROFILE

REDUCE ENERGY COSTS, IMPROVE RELIABILITY

POWER NEED

São Paulo, Brazil — one of the fastest growing cities in the world — 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 fastgrowing 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 referred to 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.

Despite being an appealing option, many companies are hesitant to make the investment in CHP projects. They may not have the capital to make the investment needed up front nor the engineering and maintenance experience to run these plants independently with their own staff. Rather than make the capital expenditures themselves, some companies opt to partner with

an energy provider that will install and manage the CHP plant on their behalf.

Ecogen is one such company. This fullservice energy solutions company focuses on developing, operating and maintaining energy systems including CHP plants and chilled water plants for its diverse customer base. In 10 years of operation, Ecogen has become Brazil's leading investor in energy solutions by building, owning and operating more than 38 energy plants, including 14 CHP installations.

The developers of the Rochavera office complex in São Paulo turned to Ecogen, which developed a unique CHP solution using Cat® generator sets, supported by the local Cat dealer, Sotreq Power Systems.

SOLUTION

Rochavera opened in São Paulo in 2008. Designed as a major commercial office and retail complex, its unique architecture makes it well known as a major landmark in the city. Constructed to stringent green building standards, this LEED Gold-certified complex features a rainwater recycling system, direct access to a train stop and 8,000 square meters of landscaping.

Because of the area's subtropical climate, there tends to be nearly as much energy demand for facility cooling as there is for electrical power to serve tenants. Such a year-round demand for cooling and electricity lends itself well to CHP. The facility designers worked with Ecogen to reserve space that could be used for the energy plant while laying out facility infrastructure accordingly.

The four buildings in the complex, comprising 120,000 square meters of office space, were implemented in two phases with two buildings per phase. During each phase, Ecogen installed two Cat G3520C gas generator sets rated at 2,055 kW of electrical power each and one 1,500 kW Cat 3512B diesel generator set for standby or peaking power.



CUSTOMER:

[Ecogen Brasil](#)

LOCATION:

São Paulo, Brasil

SCOPE OF ENGINE USE:

- Four Cat® G3520C gas engine generator sets
- Two Cat® 3512B diesel generator sets

CAT DEALER:

[Sotreq Power Systems](#)



Sotreq delivered the six generator sets to the facility and facilitated installation and commissioning.

According to Nelson Oliveira, Ecogen executive director, they chose those specific generator set models because they would be the most efficient for this project, considering the capital expenditure to operating expenditure ratio. More than 80 percent of the gaseous fuel energy can be converted to useful electricity and cooling by the G3520C. They've also used the same models on other installations, making maintenance easier. "By repeating generator set models over multiple projects, it becomes easier to maintain, provide services and keep parts inventory for them," said Oliveira.

Eduardo Acquaviva, Sotreq's gas power sales manager, agrees, "Ecogen and Sotreq have partnered on previous similar installations, and it becomes very easy to build on well-established maintenance, parts and service plans that we were all comfortable with."

To capture waste heat at Rochavera, each gas generator set includes jacket water and exhaust gas heat exchangers that capture the engine's thermal energy and transfer it to a common water circuit that is fed to four 540 ton (TR) rated hot water absorption chillers. The absorption chillers convert that heat energy into chilled water that feeds the facility's air conditioning system. The absorption chillers work in parallel with two 340 ton electric chillers, three 450 ton electric chillers and a 320 ton natural gas-fired chiller to maintain the facility's cooling needs. All electrical power generated from the Cat generator sets is then fed through utility paralleling switchgear that can operate in parallel with or in isolation from the local electric utility grid to meet all of the facility's electrical demands. The generator sets are controlled according to the buildings' electrical demand.

The system can provide 11.2 MW of electrical energy and the equivalent of 4.5 MWeq of cooling capacity for a total of 15.7 MW of energy to the Rochavera complex.

During the contracted period, the project will be maintained by Ecogen's highly qualified engineering and maintenance team; any major planned repairs will be performed by Sotreq's certified technicians. At the end of the 20-year energy services contract between the facility owner and Ecogen, the customer has the option to renew the contract or take over the plant operation.

RESULTS

With the facility operating at full capacity, Ecogen's plant is saving Rochavera's owner 6 million kilowatt hours of energy consumption each year while reducing demand on the local electrical grid. Without having to make significant capital investments and operational expenses on their own, Rochavera's owners pay utility rates that are competitive with local rates and the power is more reliable.

The system has been running trouble-free, thanks in part to the good working relationship between Ecogen and Sotreq. Oliveira notes, "We've been working with Sotreq since 2003. Sotreq has well-trained technicians who provide our operations with agility on troubleshooting, equipment delivery and considerable parts inventory." In fact, Sotreq has a global contract with Ecogen that provides them with two dedicated technicians that assist Ecogen staff with a scheduled maintenance plan for all their Cat generator sets.

Oliveira looks forward to a continuing partnership with Sotreq for future projects: "Caterpillar and Sotreq are good and reliable partners and still our first option when we talk about generator sets."