Market Segment: Mining

POWER PROFILE

Customer: B2Gold Corp.

Location:
Otjikoto Mine, central Namibia

Customer Business Issue:
Reduce operating costs through lower fossil fuel consumption while fulfilling corporate mission to improve sustainability.

Solution:
62,400 Cat® thin-film solar panels mounted on a single-axis tracker system

260 solar inverters

Seven 1 MW transformers

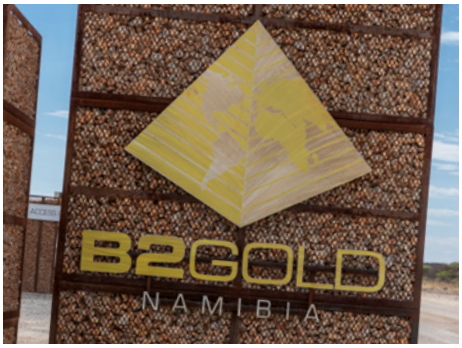
Cat Microgrid Master Controller (MMC) integrated with the pre-existing power plant's SCADA system through customized programming

Cat Connect Remote Asset Monitoring

Four Cat CM32 heavy fuel oil (HFO) generator sets

Three Cat 3516 diesel generator sets

Cat® Dealer:
Barloworld Equipment



Located in central Namibia, B2Gold's Otjikoto Mine produces between 160,000 and 170,000 ounces of gold per year.

POWER NEED
Headquartered in Vancouver, Canada, B2Gold Corp. is the world's new senior gold producer. Founded in 2007, B2Gold today has five operating gold mines and numerous exploration and development projects in various countries including Nicaragua, the Philippines, Namibia, Mali, Burkina Faso and Colombia. One of its operational mines is Otjikoto Mine, located about about 200 miles (320 km) north of the Namibian capital of Windhoek.

B2Gold began commercial production at the Otjikoto Mine in early 2015 supported by Cat® mining trucks, excavators, power solutions and other equipment. Barloworld, the local Cat dealer, has played an active role in the day-to-day operations of the mine by maintaining an onsite staff of about a dozen service technicians, inventory specialists and other personnel, as well as stocking a substantial inventory of maintenance and service parts locally.

Since the mine opened, primary power for operations has been supplied by four Cat CM32 generator sets that run on heavy fuel oil (HFO), with standby power delivered by three Cat 3516 diesel generator sets. While providing exceptional availability, the reliance on power produced from fossil fuels makes the profitability of the mine vulnerable to fuel price fluctuations and supply interruptions.

B2Gold has a strong commitment to responsible mining, and company leadership actively supports business decisions that incorporate careful consideration of people's health and safety, environmental protection and community well-being.

A chief example is B2Gold's 44,000-acre (18,000-hectare) Otjikoto Environmental Education Center and Nature Reserve, an integrated conservation and wildlife management landscape that optimizes biodiversity protection. The center has hosted thousands of local school children for programs such as learning about indigenous flora and wildlife and participating in Colorado State University's "Little Shop of Physics" initiative.

This commitment to giving back to the community and local environment encouraged B2Gold executives to plan the construction of a 7 MW solar facility at the mine.

"If you download a solar irradiance map for Africa, you'll see Namibia sticking out like a sore thumb," said John Roos, manager of management reporting and projects for B2Gold Namibia. "It's the best place to build a solar plant."

Planners were charged with designing an integrated hybrid system that would not only generate power while the sun shines, but also maintain a consistent flow of power for the mine's operations in cloudy conditions and at night.

"We run a 24-hour operation, so you can't have any drops in electrical power," explained Roos. "If the power drops off, production goes down. It's crucial to the operation."

SOLUTION
Designed, built and commissioned by Cat dealer Barloworld, B2Gold's solar facility at Otjikoto Mine includes 62,400 Cat thin film PVT modules mounted on single-axis trackers, 260 solar inverters, seven 1 MW transformers and the Cat Microgrid Master Controller (MMC).

Cat thin-film photovoltaic modules have a lower temperature coefficient than silicon modules, which delivers more power production as the module operating temperature rises in hot climate conditions.

The thin-film technology also performs well in humid conditions, producing up to 6 percent more energy annually.

The single-axis mounting system enables the solar facility to produce a consistently high amount of power throughout the day. It allows the system to reach full power generating capacity within a few hours after sunrise and then remain at peak power for most of the day.

POWER PROFILE

Customer: B2Gold Corp.

Barloworld and its consultants integrated the Cat MMC with the power plant's pre-existing SCADA system through customized software. Working together, the Cat MMC and SCADA system manage the flow of power from every source in the system to keep loads at the Otjikoto Mine continuously energized with high-quality power at the lowest cost. They automatically shut down generator sets when the solar PV output is generating enough power, and then restart generator sets in cloudy conditions and at night.

"The solar plant on a hot, sunny day could end up providing close to 50 percent penetration," said Mark Dawe, managing director and country manager for B2Gold Namibia. "The only way we could get that is through the autonomous synchronization supplied by the Cat MMC."

The solar facility leverages Cat Connect technology for real-time collection and communication of onsite performance data that can be monitored and analyzed remotely anywhere in the world.

"We monitor the power being generated by our solar plant on a continuous basis," Dawe noted. "We have it on cell phones, online and on our computers. Wherever we are in the world, we can see what the solar plant is generating."

RESULTS

Construction of the solar plant was completed on schedule and on budget in nine months, and the solar facility was commissioned in April 2018. Since then, it has performed beyond expectations, generating about 14.8 million kWh of energy.

"When we've reached peak capacity and the spinning reserve is sufficient, we're able to shut down one HFO machine," Roos observed. "That's where the real savings come in. You're saving fuel, and you're saving maintenance costs."

By converting the mine's power-producing capabilities to a solar hybrid, company officials estimate a reduction in HFO consumption of about 900,000 gallons (3.4 million liters) per year, which results in an annual savings of 14 to 16 percent in the cost of power generation. Mine executives have projected that the operational cost savings of the solar facility will result in a payback period of four-and-a-half to five years.

The solar facility has brought numerous benefits well beyond the cost savings. More than 100 local workers were employed to prepare the site and install the solar facility, providing them with valuable job skills. Additionally, B2Gold has reduced the transportation of HFO to the mine by about 100 trucks a year, helping to make local highways safer.

"B2Gold is completely focused on giving back," Dawe said. "While we take from the earth, we give back to the earth more than we've taken out."

Cat dealer Barloworld installed 62,400 Cat solar panels for an installed capacity of 7 MW.

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