Global Relay, a Canadian firm that specializes in providing electronic archiving, supervision and e-discovery solutions for the global financial sector, is using 1 MW Caterpillar generator sets powered by C32 diesel engines for its backup power needs.

POWER TO COMPLY

Canadian data storage firm installs Cat backup power to safeguard financial messaging information

BY JACK BURKE

For Vancouver, British Columbia, Canada, firm Global Relay, uptime is nonnegotiable. The company specializes in providing electronic message archiving, supervision and e-discovery solutions for the global financial sector and other highly regulated industries.

"What we do is provide messaging system compliance solutions for the financial sector where there's government regulation regarding how they track and store messages so they can't be tampered with, basically to maintain an audit trail of data to protect against things like fraud," said Paul Giannoulis, data center manager, Global Relay. "It goes all the way back to the days of Enron and MCI Worldcom, where there was a lot of collusion and then destruction of evidence after the fact."

Global Relay works with 23 of the top 25 global banks and has clients across the globe, so it's handling a lot of data around the clock, Giannoulis said.

"The whole thing with compliance is that it's real-time, so we need to be able to receive and archive that data in real time," he said. "In regards to the marketplace, the stock market and the exchanges all work extremely fast and deals are made and lost in literally seconds, and the way the regulators have the regulations, if you don't have a working compliance solution, you're not allowed to trade or do business on the markets.

"So it's crucial for us to have 100% uptime so we can provide these services to our customers all the time. If we can't do that, then they can't do business, and you have potentially millions and millions of dollars at stake if they can't work because they're not compliant."

So when Global Relay began planning its new $24 million server facility just a stone's throw from the waterfront in North Vancouver, Giannoulis said finding dependable backup power was critical. The company chose 1 MW Cat generator sets powered by C32 diesel engines along with Cat 1000iZ series flywheel uninterruptible power supply (UPS) systems. The equipment was spec'd and supplied by Cat dealer Finning Canada in Vancouver, a division of Finning International. Two gen-sets are currently on-site, with two more scheduled

The $24 million Global Relay facility in Vancouver, British Columbia, Canada, is also using Caterpillar 1000iZ series flywheel uninterruptible power supply (UPS) systems. The company worked with Finning Canada on sourcing the equipment.

for installation. A fifth gen-set can be added if demand warrants, Giannoulis said.

"These are units that in 15 years will still be running in this facility," Giannoulis said. "We also talked to industry peers who have used different types of engines and equipment in their facility — if they had to do it again what would they buy? We based our decision partially on the feedback from our peers, not only on price but who was with them at commissioning, who was there during the operational life of the equipment and who continues to be with them with servicing. Cat was the best natural choice that we could make."

The server facility site offered a few design challenges, said Ben Mah, electric power sales representative for Finning Canada.

"It's right by the waterfront and real estate is at a premium so the space was limited, but we worked with Global Relay on a solution for the tight fit," Mah said. The infrastructure for all five gen-sets was put in place in 2011, he said, and the first two gen-sets were installed right away. According to Mah, the additional gen-sets were modified to fit the existing footprint because the gen-set design had been altered in the interim.

The machines incorporate 2060 gal. of fuel in a sub-base tank, which is intended to keep the engines running for more than 24 hours. The tanks have double walls to help protect against fuel spills as does the building's foundation, which can capture and contain spills, as well, Mah said.

"They left nothing to chance," he said. "They were building something that was designed to last."

The gen-set enclosures were customized for space and sound attenuation, Mah said. Because of their location

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With space at a premium, Global Relay and Finning Canada worked together to make sure the generator sets and UPS systems would fit in the available footprint. The site has two gen-sets installed with two more on the way. A fifth can be installed if demand warrants.

near the water, Global Relay wanted the gen-set enclosures to have the air exhaust discharged straight up to help reduce noise, he said. The enclosures achieve 80.2 dB(A) at 7 m.

Space limitations also played a role in the UPS choice, Mah said. While flywheel UPS systems are more efficient than battery systems — a flywheel achieves roughly 98% efficiency, while battery systems reach about 93% efficiency — they are also more compact, which helped with the tight space requirements, he said.

"One of the biggest considerations for us going with flywheel was footprint — the physical size," Giannoulis said. "Our electrical vault is about 6000 sq.ft., and at the end of the day, I have to fit eight 800 kW UPS units in a 6000 sq.ft. area. If I were to try to do that with a conventional battery UPS, I'd probably need an electrical room that was three to four times bigger."

Giannoulis said that, considering replacement costs, maintenance costs and other factors, the company saves roughly $75,000 over a three-year period per UPS with flywheel versus battery systems. In addition, the flywheel systems are more dependable, he said.

"I've been doing the data center side of the world for 17 years now and I just have a hate for batteries," Giannoulis said. "I've had many years of dealing with battery rooms and UPS and batteries leaking and cells exploding under load and various other scenarios, and the ongoing maintenance is expensive and time consuming."

Vancouver is in an earthquake-prone area, so Global Relay decided on diesel gen-sets because the supply of diesel fuel is more reliable in a worst-case scenario, Giannoulis said.

"Natural gas has a couple of challenges," he said. "Liquefied natural gas (LNG) would need significantly more storage space because we wouldn't be able to rely on running off the main supply lines in an earthquake or other significant event."

Diesel tankers are abundant in the region, but with LNG, there is a limited list of suppliers with the right equipment, Giannoulis said. There is also less risk of a fire or explosion with diesel in event of an earthquake or other natural disaster, he said.

Because of the earthquake risk, all of the computer equipment incorporates seismic isolation equipment, which basically decouples the servers from the physical building and allows them to "float" on top of the floor, Giannoulis said.

"If there was an earthquake, the servers and cabinets would remain relatively stationary and the building would be able to move or shake under the servers up to about 8 in. in any direction," he said.

The Global Relay facility also employs a cooling strategy designed to be energy-efficient. Instead of energy-intensive

air conditioning, the site taps into Vancouver's temperate ambient air by pulling it in through four air handling units per IT floor that first filter the air before it is circulated through the building using variable-speed electric fans, Giannoulis said. The system is designed to pull in as much as 80,000 cu.ft. of air per minute through each of the two, 6000 sq.ft. server room floors in the three-story building.

"We bring in cool, fresh air, filter it, pass it through the hot IT equipment and then vent that hot air out the other side of the building," Giannoulis said.

If the outside air is too cold, the system is engineered to recycle some of the waste heat to warm up the incoming air. If the outside temperature is too hot, an evaporative water-cooling system is used to cool it down, Giannoulis said. The system has reduced operating cost by about 50% compared to traditional air-conditioned facilities, he said.

"Our average hydro bill is $30,000 a month," Giannoulis said. "If I was running traditional cooling, I'd be spending $60,000."

In another nod to enhancing reliability, Global Relay constructed its own high-voltage substation on-site, Giannoulis said. The company takes a 25,000 Vac feed from the utility and brings that down to 400 Vac, three-phase power for use in the facility. This allows the company to take the line to neutral voltage — 230 Vac — which is usable by all of the company's IT gear, Giannoulis said.

"That way, we don't have to buy any customized IT equipment, and it allows us to maintain the highest distribution voltage possible throughout the building," he said. "So we minimize our wiring sizes, we eliminate all the additional step-down transformation and distribution units through the building that introduce sources of heat and points of failure."

Because of that, Global Relay needed gen-sets that supported 400 Vac instead of the more common 480 Vac. "It's not as simple as dialing down the rpm a little to get to 400 Vac, because you start messing with the frequency too much," Giannoulis said.

Mah said Finning custom-selected the alternator to match Global Relay's 400 Vac requirements.

Finning's service and ability to meet the specific needs of the Global Relay site really helped seal the deal, Giannoulis said. Global Relay also knew it could count on the reliability of the Cat equipment to ensure it could continue to serve its clients.

"If we're not up and able to provide services, not only does that affect our customers, it also affects all our potential customers, because they are going to be less likely to come to us because they're going to be concerned about our reliability and availability," Giannoulis said. **dp**

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