powerprofile
RENTAL

CUSTOMER: **Investor-owned electric utility**
LOCATION: **San Diego, California**

Customer Requirement: Temporary power for a community with no power outages during a three-month construction project

Scope of Supply: **Equipment –**
Two Cat® 3516B diesel generators with pollution control devices, $150,000 in electronic switchgear, 5,000-gallon fuel tank ($180,000 in fuel)

Services –
Design and engineering, emission and noise permits

Cat Dealer: Hawthorne Power Systems, San Diego, California, USA

These two Cat 3516B diesel power modules supplied by Hawthorne Power Systems provided power to a small California community during daylight hours while electric utility crews installed new transmission lines for a 50 MW wind farm.

POWER NEED

When the local utility company asked Hawthorne Power Systems if it could power a small California community for a few hours a day, Rental Department Manager Paul Karpf said, "Sure, no problem."

The project sounded simple enough. Provide electricity for 2,000 people in rural San Diego County with two 3516B power modules from May to July 2005 while utility crews installed new transmission lines for a 50-megawatt wind farm. For Hawthorne, it turned out to be a $1.5 million project.

"We couldn't just turn off the generators and turn on the power lines because that would cause an outage," explains Karpf. With today's sensitive electronics and back-up generators, even a momentary outage can be disruptive. Besides, it was not acceptable to make 1,250 households and several dozen commercial customers go through a power outage twice a day for three months.

The simple method would have been to operate the power modules around the clock, but because pollution regulations limited the diesel units' hours of operation, the generators could power the community only during the day.

To address the technical and safety challenges of making seamless transitions between utility and temporary power, Karpf called on Neil Johnson and colleagues on the Hawthorne engineering staff. He also drew support from dealership field technicians, including senior field technician Mike LeClaire.

"We had switchgear going in, pollution control devices being installed, sound and emissions testing being done, load banks running, and modifications to an above ground fuel tank being configured—all under an extremely tight schedule. It was pretty hectic," Karpf says.

Tax incentives for the wind farm were set to expire, so the project had to stay on schedule. If not, the project was no longer economical and would probably be scrapped at a great loss to the companies involved.

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SOLUTION

The project turned out to be quite different from what rental dealers are used to. “Usually, we have this rock solid utility power, and we hook up our generators to supplement it,” Karpf says. In this case, the generators powered the community in isolation from the utility grid—a concept called islanding.

The challenge was to get the paralleled power modules to synchronize exactly with the utility in both frequency and voltage, and then to close the circuit with the utility to take the generator sets offline. That had to be done without damaging utility circuit breakers or controls with an over- or under-current situation, which could also cause a major outage.

As Karpf explains, it’s relatively easy to feed 3 MW into a 1,000 MW utility grid without an outage. In this case, however, Hawthorne had to bring the utility grid onto the tiny 3 MW island. “It’s kind of like replacing a car’s fuel cap by lifting and spinning the car!” he says.

The project turned into a major engineering project requiring $150,000 in electronic switchgear—the equivalent of a small utility substation.

There was one more hurdle to overcome during the end-of–day transition from the power modules back to the utility. A sudden transition could cause a momentary outage or electrical arcing that could damage the generator sets’ large and expensive breakers. “You can do that for an emergency, but you just can’t do that on a daily basis,” says Karpf. The team used the switchgear to bring the generators offline gradually.

To add to the complexity, environmental laws restricted all the equipment to the substation’s footprint, about 100 feet square. The temporary system was installed under the high-voltage transmission lines and around existing equipment while it was operating—a task accomplished by the utility crews.

Pollution restrictions necessitated the installation of selective catalytic reduction (SCR) units. The power modules Hawthorne owned were not set up to handle SCRs, so Karpf called upon Roger Wood at Cat® dealer Peterson Power in Northern California and purchased two 3516B power modules equipped to handle them. Hawthorne bought the SCRs from Caterpillar, and Joe Fiorito of Caterpillar assisted with the installation.

Fuel was stored in a 5,000 gallon, double-walled tank filled daily by Hawthorne, at a total cost of more than $180,000.

RESULT

Although unplanned outages were avoided, the first month was difficult as equipment and wiring were perfected. “We had to have our people out there every day,” says Karpf. “Without their expertise and dedication this project would not have been successful.”

As the equipment was being configured, the utility decided to change the project from a rental agreement and instead purchased the setup for more than $1 million. With the project now complete, the utility uses the equipment for other needs, and Hawthorne has a contract to both maintain and store it.

The project was completed on time. Just as important, the households and businesses in the area experienced no major power disruptions during the three months. For Karpf, it came down to one key accomplishment, “Our customer was happy.”

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