

FUEL CELL

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When You Can't Afford To be Without Power

When you can't afford to be without power. At ReliOn we use this phrase to describe the types of applications for which our fuel cells are designed. The locations where our customers place ReliOn fuel cells are generally those where they can least afford a primary power outage impacting their ability to do business. Whether this is a remote microwave E911 communication site, a high-traffic telecommunications hub, an air-to-ground radio transmitter/receiver or any of a multitude of other mission critical applications, our customers count on the ability of our fuel cells to provide uninterrupted services to their customers. ReliOn understands our role and responsibility to provide highly reliable fuel cell backup power solutions.

The business case for fuel cells is simple. Hydrogen fuel cells offer an effective, reliable and commercially competitive backup power solution. Increasingly, communication network operators are deploying fuel cell systems in critical communication applications in the wireless, wireline, utility and government sectors. Well-documented reliability and performance issues with batteries have created opportunities for fuel cell solutions. Batteries offer limited life often failing without warning, and they require regular expensive maintenance in order to provide reliable back-up power. Worldwide, billions of O&M dollars are spent to replace and maintain backup battery banks. In the past, battery replacement has been the price of reliability, resulting in life-cycle costs that can significantly exceed the cost of fuel cell alternatives. Fuel cells offer a cost-effective solution with multiple benefits.

The ReliOn I-1000 is a modular 1 kW PEM hydrogen fuel cell that provides backup power for ReliOn's customers. Based on ReliOn's patented hot-swappable Modular Cartridge Technology, the I-1000 offers a simple, air-cooled, self-hydrating solution with very few moving parts. The modular nature of the ReliOn I-1000 fuel cell allows our customers to scale solutions from 500 Watts to 5,000 Watts to meet their requirements. The I-1000 has been deployed in commercial

applications for over three years. In that time, more than 400 kW of backup systems have been delivered to sites in North America and other countries. ReliOn's fuel cell installations at the following two customer sites illustrate the different customer applications for reliable fuel cell backup power.

Gabreski Air National Guard Base

Long Island, New York

The ReliOn fuel cell installation at Gabreski ANGB was commissioned in September 2004. It is one of several sites ReliOn has installed as part of the Department of Defense Construction Engineering Research Laboratory (CERL) program, which provides funding for real-world fuel cell applications at US military installations.

Gabreski ANG is the home of the 106th Rescue Wing. The peacetime mission of the 106th Rescue Wing is two-fold. First, it is tasked with conducting Search and Rescue and Medevac Operations along the east coast of the US and down to the Bahamas. Secondly, it provides the Airborne Mission Commander for every shuttle launch, as well as pararescue staff for various missions. With these types of tasks, the ability to communicate during crisis is paramount.

The Gabreski installation is a 4 kW fuel cell system providing backup power to the telephone PBX switch and peripheral equipment located in their communications equipment room. The fuel cells are



connected to their existing DC plant and are configured to monitor both the AC power grid as well as the status of the DC plant on their UPS rack. Upon loss or failure of either power source, the fuel cells will start automatically to provide up to 48 kWh of continuous run power to the critical equipment at the site. Because this is a demonstration project, the fuel cells are also programmed to simulate a one-hour outage each day. ReliOn collects data from the fuel cells regarding system operations.

Through May of 2005, the fuel cell system provided one hundred sixty-five hours of runtime. These outages include both simulated and actual AC outages, during which the fuel cell operated as designed. The fuel cell system reliability following 173 simulated or actual outages has been verified to be 100 percent. The demonstration program will continue through December of 2005.

Bonneville Power Administration

Portland, Oregon



The Bonneville Power Administration (BPA), headquartered in Portland, Oregon, is a federal agency under the US Department of Energy. BPA serves the Pacific Northwest through operating an extensive electricity transmission system and marketing wholesale electrical power at cost from federal dams, one non-federal nuclear plant and other non-fed-

eral hydroelectric and wind energy generation facilities.

In July of 2004, the Bonneville Power Administration installed a ReliOn I-1000 1 kW fuel cell system at its Ross Substation. The substation is a small communications facility. BPA used the installation as part of their fuel cell trial program to determine the viability of fuel cells for emergency DC power backup at BPA facilities.

Following a one year trial, BPA elected to install a second ReliOn fuel cell system as part of an agreement with TriMet, Portland, Oregon's public transportation system. TriMet is a municipal corporation providing public transportation for much of the three counties in the Portland metro area, population 2 million. TriMet operates a comprehensive transit network including a 44-mile, 64-station MAX light rail system and 93 bus lines. The fuel cell system provides backup power to TriMet's UPS (uninterruptible power system) in the Powell ATP building, which houses ten people. Prior to installation of the fuel cell, the building had no backup power system. When primary power went down, so would the entire ATP building. This 1 kW installation was completed in August 2005 and provides backup power to the building's swipe card system, computer servers and telephone system.

Conclusion

As with most of ReliOn's customers, Gabreski ANGB and BPA illustrate the need for critical communication systems to be fully functional even through, and especially through, primary power outages. The I-1000 fuel cell system offers a simple, reliable method for producing backup power at a cost which is competitive with incumbent technologies.

Contact ReliOn at www.relion-inc.com.