Application Note

Extended Run Backup Power for Telecom Applications

Introduction

With the rapid expansion of wireless communication systems worldwide, and the increasing socioeconomic benefits of mobile phone technology, the need for dependable and economical backup power is critical. Electric grid loss throughout the year, whether from severe weather, natural disasters, or limited grid capacity, is an ongoing challenge for network operators.

Traditional telecom backup power solutions include VRLA batteries for short duration backup and diesel and propane generators for longer duration backup. Batteries are relatively inexpensive for 1 to 2 hours of backup power. However, batteries are not ideal for longer duration backup power applications because they can be expensive to maintain, unreliable after aging, temperature sensitive, and hazardous to the environment after disposal. Diesel and propane generators are capable of longer duration backup power. However, generators can be unreliable, maintenance intensive, and emit high levels of pollution and greenhouse gases into the atmosphere.

Fortunately, clean fuel cell technology has been developed to solve the limitations of traditional backup power solutions. Fuel cells are reliable and quiet, with fewer moving parts than a generator, and a wider operating temperature range, -40°C to +50°C, than a battery. In addition, a fuel cell system has a lower lifetime cost than a generator. The lower costs for the fuel cell are the result of only one maintenance visit per year and significantly higher system efficiency. Finally, the fuel cell is the clean technology solution with minimal environmental impact.

IdaTech fuel cell systems provide backup power to critical communication network infrastructures in wireless, fixed and broadband telecom applications ranging from 250 W to 15 kW, and they offer many outstanding features:

- **RELIABLE** – Few moving parts and no discharge in standby mode
- **QUIET** – Low noise signature
- **ROBUST** – Operating range from -40°C to +50°C
- **FLEXIBLE** – Outdoor or indoor (container/shelter) installations
- **POWERFUL** – Up to 15 kW
- **LOW MAINTENANCE** – Minimal annual maintenance
- **COST EFFECTIVE** – Attractive total cost of ownership
- **CLEAN ENERGY** – Low emissions with minimal environmental impact

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How the Fuel Cell Works

The system continuously senses the direct current (dc) bus voltage and seamlessly takes over critical loads if the dc bus falls below a customer determined set point. The system is fueled by hydrogen, which is delivered to the fuel cell stack in one of two ways – either from a commercial-grade hydrogen supply or Hydroplus, methanol and water liquid fuel, using an integrated reformer system.

Electricity is generated by the fuel cell stack as direct current. The dc energy is passed to a dc/dc converter, which converts the unregulated dc electricity from the fuel cell stack into high-quality regulated dc electricity to serve the required loads. IdaTech fuel cell systems can provide multiple days of backup power, since run time is limited only by the amount of hydrogen or methanol/water fuel stored on site.

Benefits of Fuel Cells vs. Current Backup Power Solutions

Fuel cells offer improved system reliability, more predictable performance in a broad range of climates, and a reliable service life when compared to the industry standard valve-regulated lead acid (VRLA) battery strings. Life cycle costs are also reduced because of greatly decreased maintenance and replacements needs. Fuel cells offer environmental advantages to end users because disposal costs and liability risks related to lead acid batteries are an increasing concern.

Battery performance can be affected by a wide variety of factors including charge level, temperature, cycles, age, and other variables. The energy provided will vary based on these factors and is not easily predicted. PEM fuel cell performance is relatively unaffected by these factors and will provide critical power as long as there is fuel available. Increased predictability is cited as an important advantage in switching to fuel cells for critical backup power applications.

Fuel cells generate energy only when fuel is applied, like a combustion generator, but have no moving parts in the generating region. Therefore, unlike a generator, they are not prone to rapid wear or frequent maintenance and lubrication requirements.

Extended Run Solutions

IdaTech has developed the capability to generate hydrogen onsite using Hydroplus, methanol/water liquid fuel and our patented reformer technology. This allows the fuel cell to support backup power requirements of days versus hours by using a liquid fuel.

Bottled hydrogen is appropriate and cost effective for many backup power applications, but when critical backup power systems need to operate for more than 8 hours, or hydrogen storage is not practical or in remote locations where hydrogen delivery is not feasible, a compact liquid fuel system is a more practical solution.

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Methanol Fuel

The fuel used to operate the extended run fuel reformer is a fuel mixture of methanol and water. Methanol is a readily available, commercially produced fuel that is currently used in common applications such as windshield washer fluid, plastic bottles, engine additives, and latex paints, among others. Methanol is easily transported, water miscible, easily biodegradable and sulphur-free. It has a low freezing point (-71°C) and does not degrade when stored for a long time.

Conclusions

Fuel Cell systems are used today to back up critical communication network infrastructures in wireless, fixed and broadband telecom applications.

For more information please visit **www.idatech.com**.

IdaTech Backup Power Product Line

iGen™

Power range:	250 W
Voltage:	24 Vdc or 12 Vdc
Dimensions:	0.3 x 0.4 x 0.5 m (WxDxH)
Temperature:	-20°C to +50°C
Fuel type:	Methanol/water liquid fuel

ElectraGen™

Power range:	5 kW or 3 kW
Voltage:	48 Vdc or 24 Vdc
Dimensions:	0.6 x 1.0 x 1.3 m (WxDxH)
Temperature:	-40°C to +50°C
Fuel type:	Hydrogen gas

ElectraGen™ XTi

Power range:	5 kW or 3 kW
Voltage:	48 Vdc or 24 Vdc
Dimensions:	1.5 x 0.9 x 2.1 m (WxDxH)
Temperature:	-40°C to +50°C
Fuel type:	Methanol/water liquid fuel

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