Background

Events such as Hurricane Katrina in 2005 have focused attention on the availability and reliability of telecommunications services worldwide. Both wireless and wireline communications are expanding globally, so the provision of reliable, economical power is vital. Terrestrial Trunked Radio (TETRA) networks in use by emergency services, military personnel and government agencies require total system reliability during emergencies, when loss of communication would exacerbate an already critical situation. The rapid expansion of cellular networks in countries without more traditional land-based telephone systems is also demanding the provision of reliable power supplies and this market is one of the fastest growing worldwide. The choice of backup power technology for telecommunications therefore has a direct impact on the everyday life of people around the world.

Traditional solutions have included generators and batteries, but issues of maintenance, noise, pollution, size, insufficient runtime, remote monitoring difficulties and operation under extreme conditions all pose problems for these technologies. This has led to interest in fuel cell technology for this application, and fuel cell backup power units are now being installed in a number of countries.

**KEY BENEFITS**

- Operation is continuous as long as fuel is available
- Unlike batteries, temperature does not directly affect fuel cell performance
- Fuel cell systems have very few moving parts and require less maintenance than generators
- Systems can be monitored and operated remotely
- Minimal noise and pollution are produced at the site
- Fuel cells can be combined with onsite renewable electricity generation to provide near-autonomous power systems without emissions

**Fuel Cell Types Used In This Application Today**

**PEMFC**

Proton exchange membrane fuel cells (PEMFC) are ideal for this application because they can be cold-started and can be run in intermittent operation (frequent stop-starts). PEMFC use platinum catalysts, but costs have come down significantly over the last few years. They are fuelled with hydrogen, which can either be delivered in packaged form or generated on-site by electrolysis of water. Alternatively, the backup power system can incorporate a fuel reformer to convert other fuels to hydrogen for the fuel cell; for example, a mixture of methanol and water can be used, which is cheap, convenient and easy to handle.
Grid Failures in Indonesia

Power outages are common on the Indonesian islands, particularly on Sumatra which suffers from poor grid quality: grid failures often total 40 hours a month. PT Hutchison CP Telecommunications provides wireless mobile services to around sixteen million customers in Indonesia. The company must ensure that its network of 12,000 cell phone towers across the islands operates without interruption for a consistent customer service. Due to the unreliable grid, backup power is crucial. Standard backup power supplies are either batteries, which have a limited lifetime in tropical environments, or standby diesel generators, which can be unreliable, costly to maintain, noisy, and suffer from fuel theft.

PT Hutchison turned to fuel cell technology to address these issues. In March 2010, it chose a system from IdaTech, a US designer and manufacturer of fuel cell systems for telecommunications applications. By the end of 2010 over 100 of IdaTech’s ElectraGenTM H2-I 2.5 kW hydrogen-fuelled backup fuel cell systems had been installed on Sumatra, and PT Hutchison has now deployed more than 400 fuel cell systems in total across Sumatra, Java, Bali and Lombok to improve network availability. Installations on this scale underline the advantages fuel cells offer.

Natural Disasters in the USA

In August 2011, Hurricane Irene hit the north-eastern United States. Gales and record flooding caused widespread damage in the region, with many power lines brought down, and grid outages were experienced for extended periods.

Fuel cell developer ReliOn, based in Washington State, markets a range of systems for emergency and backup power requirements. It has supplied fuel cells to more than 50 installations across the north-eastern region and 45 of these were required to provide backup power during the outages for lengthy periods of six hours or more. ReliOn worked closely with its hydrogen refuelling partner Air Products to ensure an unbroken service.

Then in October 2011, a severe snowstorm in New England caused further power outages affecting three million homes and businesses. Some of those power failures lasted for up to two weeks and ReliOn fuel cells again provided vital power to cellular network providers. These incidents show the value of fuel cells as grid-independent power supplies.