# The Power of Going Green in Indonesia

By Kathy Fosberg

With the rapid growth of the mobile telecommunications market in Indonesia, mobile operators are expanding their mobile network and upgrading existing sites to meet the increased demand in services. To date, there are about 80,000 cell sites in Indonesia, and many are without backup power systems.

With a population of 230 million people, Indonesia is the world's fourth most populous country. Indonesia is located in Southeast Asia and comprises 17,508 islands. The country's growth has put a strain on its electric grid, and the need for reliable and economical backup power systems at cell sites is evident to mobile operators.

Traditional backup power technologies have well known drawbacks. In hot climates like Indonesia, batteries have short life times and have to be replaced frequently, resulting in a high monetary cost to the operator and a high environmental cost due to the toxic disposal of batteries.

Another traditional backup power solution, diesel generators, have high maintenance costs. Additionally, it can often be difficult to find qualified technicians in rural areas of the world's largest archipelago. Community issues such as theft of power generators, banning of diesel generators due to high noise level, and lack of availability of spare parts also contribute to the challenges network operators face in Indonesia.

The growing trend for network operators in Indonesia is to reduce operating expenses. To accomplish this, operators are installing outdoor, low-power base stations at new sites. This removes the need from an equipment perspective to have shelters and air conditioning. This presents a challenge for traditional backup power solutions like VRLA batteries because in tropical environments the lifetime of batteries is only one to two years. Site sharing is also common to avoid multiple towers in close proximity.

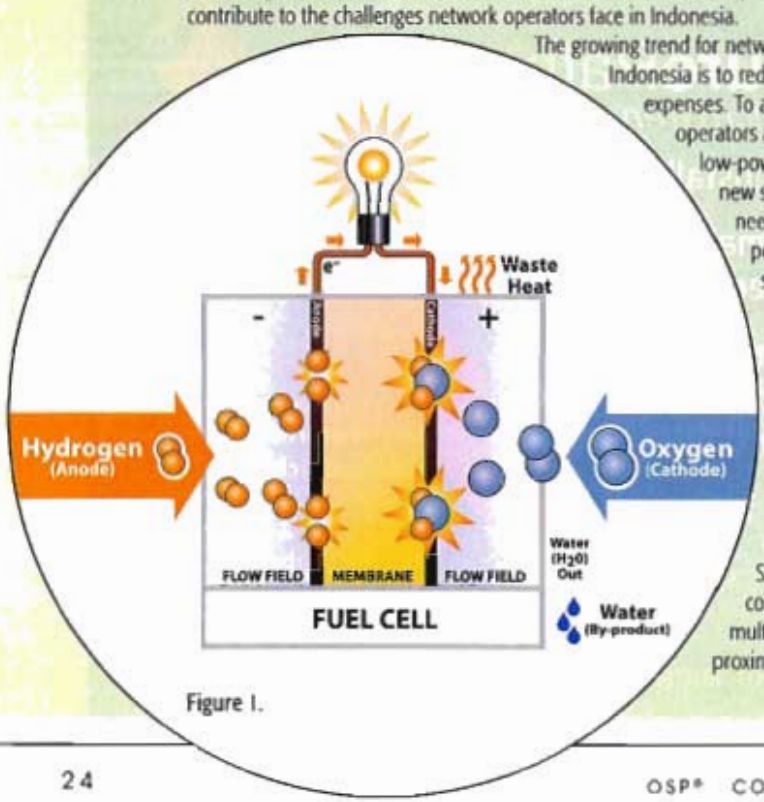


Figure 1.

The government and local authorities encourage network operators to share infrastructure. Both these trends open the opportunity to introduce new technologies for backup power. Newer technologies are more efficient, more reliable, lower maintenance and reduce operating costs.

## An Alternative Solution

Cascadiant, an energy solutions provider based in Singapore, was created to meet the growing energy demands from the Southeast Asia telecommunications market. Currently, the company is deploying over 400 backup power fuel cell systems at telecom sites in Indonesia. Notably, this is one of the largest deployments of fuel cells in the world.

The ElectraGen™ backup power fuel cell system is the product Cascadiant chose to install on networks throughout Indonesia. It is manufactured by IdaTech, a fuel cell manufacturer based in Bend, Oregon. These fuel cell systems utilize advanced proton exchange membrane (PEM) technology. (See Figure 1.) A PEM fuel cell is a device that generates electricity by a chemical reaction. Hydrogen and Oxygen (Air) are the two fuels of that reaction.

How does a backup power fuel cell work at a telecom site? The fuel cell 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-water liquid fuel, using an integrated fuel 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

Indonesia base station site with backup power fuel system.

regulated dc electricity to serve the required loads. Run time is limited only by the amount of hydrogen or HydroPlus stored on site.

Reformer based fuel cell systems support backup power requirements for days instead of hours. For example, a system that includes a 225-liter fuel tank allows the fuel cell to generate 5kW of power for 50 hours, compared to a direct hydrogen system that would require 30 T-cylinders of hydrogen to produce the same amount of energy. Methanol-water is an attractive fuel for Indonesia; it is much easier to store and transport to sites than hydrogen, and reduces the possibility of theft compared to diesel. Diesel fuel theft is a growing problem in emerging markets worldwide, and HydroPlus (methanol-water) is a cost-saving alternative.

Fuel cell systems are an ideal backup power solution for telecom applications worldwide. Available in 2.5 kW and 5 kW configurations, they are reliable and quiet, with fewer moving parts than a generator, and a wider operating temperature range, -40C to +46C, than a battery. In addition, a fuel cell has a lower operating cost than a generator. The lower operating costs for a fuel cell are a result of only one maintenance visit per year, to clean or replace two air filters, and significantly higher system efficiency.

Mobile operators increasingly value the green aspect of fuel cell systems. Fuel cells produce low emissions, are very quiet, and have a low environmental impact on the community. Indonesia is one of many countries adopting green initiatives and encouraging alternative energy solutions to reduce greenhouse gas emissions. Indonesia has pledged to reduce carbon emissions to 26 percent from 40 percent in 2020.

The adoption of green backup power is a growing trend for mobile networks. Providing reliable backup power will help telecom carriers in developing countries whose electricity grid is strained due to large economic growth.

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