

THE POWER OF PERCEPTION

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TELEPHONY

INTELLIGENCE FOR THE BROADBAND ECONOMY

Hydrogen fuel cell proponents say the technology is a clean, safe and reliable source of energy for backup power. But will the fuel's dangerous and costly image slow its growth?

BY STEPHANIE DELL

For much of the 20th century, hydrogen had a major image problem. The Hindenburg disaster of 1937 or the terrifyingly destructive power of hydrogen bombs built and tested during the Cold War didn't help public perception. Fast-forward to the 21st century, however, and the element is starting to catch on as a viable alternative fuel source for a variety of transportation, commercial and industrial applications. And hydrogen-powered fuel cells have recently enjoyed modest growth as a safe, maintenance-free source of backup power for telecom sites.

Since the early days of telecommunications, service providers have relied on valve-regulated lead acid (VRLA) batteries to provide backup power in the case of power grid failures caused by natural disasters or the like.

Fuel cell manufacturers like ReliOn and Plug Power are ready to revolutionize the backup fuel cell market. Both companies believe wireless carriers will be among the earliest adopters, installing the technology in remote sites, although larger wireline applications may be on the way.

Although there are different types of hydrogen fuel cells, proton exchange membrane cells are generally the most widely used in telecom applications. The hydrogen fuel cell generates electricity through an electrochemical reaction using hydrogen and oxygen. Hydrogen is sent into one side of a proton exchange membrane. The hydrogen proton travels through the membrane, while the electron enters an electrical circuit, creating a DC electrical current. On the other side of the membrane, the proton and

electron are recombined and mixed with oxygen from air, forming pure water (see figure). ReliOn's and Plug Power's systems differ in that ReliOn's has a hot-swappable modular design that can be built from 500 W to 5 kW and housed in cabinets or rack arrangements. Plug Power's system offers more density in a concentrated 5 kW base configuration.

Fuel cell proponents say the technology has some obvious advantages: It's a greener technology, allowing less harmful chemicals to leach into the environment. Water and heated moist air are virtually the only byproducts. In addition, the systems are much cleaner and quieter than diesel-powered generators, causing no more noise in an environment than typical telecom cabinets.

Roger Saillant, Plug Power CEO, said initial target markets for his company will be areas prone to power outages because of frequent natural disasters. In the case of the recent Hurricane Katrina, he said, fuel cells would have been a reliable source of power in the affected states.

"The telephone service that was lost was really a good system of opportunity for us because in many instances, the batteries failed much more quickly than people had expected them to, way in advance of flooding, and we believe one of the advantages of fuel cells is that they provide reliable extended run service versus batteries," Saillant said. "I think what's really going to happen is that something unexpected is going to occur, and there will be fuel cells in almost the same locations as lead acid batteries, and

the one-to-one comparison will show in a very poignant way the advantage."

In terms of cost, manufacturers say fuel cells are more expensive upfront but require much less maintenance costs over time than traditional VRLA battery backup systems. Because VRLA batteries are considered to be a hazardous material at the end of their lifecycle, service providers must consider the cost of disposal when it's time to replace them. In addition, VRLA batteries must be maintained and serviced fairly frequently, and fuel cell proponents say once they're installed, fuel cells are virtually maintenance-



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—JOE BLANCHARD
RELION

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free—except for the periodic replacement of hydrogen tanks—and can be remotely self-monitoring, checking for system readiness at preset intervals.

To offset the additional initial expense, companies implementing fuel cells could get a financial boost, thanks to the Bush

administration's 2006 energy bill, which offers tax credits of \$1000 per kilowatt to companies purchasing fuel cells.

Verizon is currently working with ReliOn to test fuel cells in outside plant remote locations, under harsh conditions in states such as California, Idaho and Washington. A Verizon spokesperson said the company is working with Plug Power and other manufacturers to explore the use of fuel cells in much larger applications as well. Verizon will be publishing an internal report before the end of the year, evaluating fuel cell efficiency and cost.

“The key to it is that this is highly reliable; first cost might be a secondary issue—even though it's cheaper to do it another way, it's extremely reliable,” said Jim Hopkins, senior staff consultant of strategic sourcing for Verizon. “People will pay the freight at least at those locations where having the ability to power a remote facility

until telcos get used to the idea of using something new and different.

“The problem is the phone industry at large has not been used to, and is not real comfortable with—at least the field people are not real comfortable with—pure hydrogen tanks sitting in a site, even though these tanks are commercially safe, and they can be transported, installed and handled reasonably safely,” Celantano said. “The telco guys who grew up with lead acid batteries have to change their thinking.”

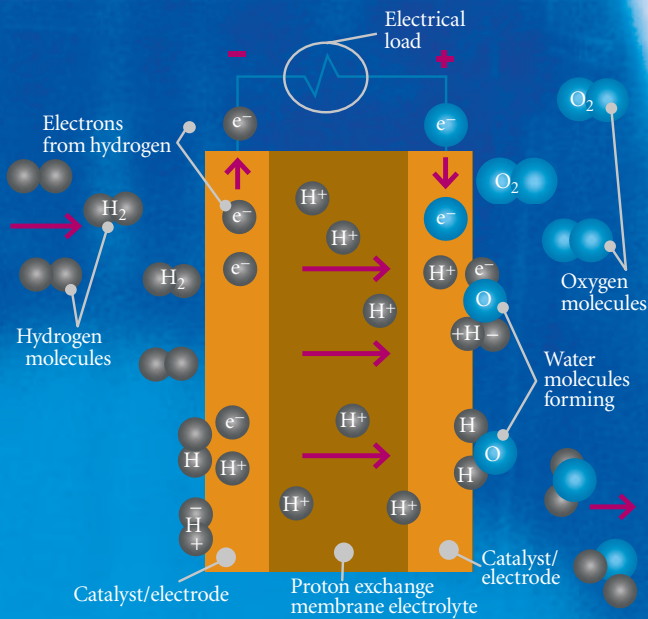
Perceptions can have a real impact on how fast telcos will adopt fuel cells. Jeremy Metz, energy team leader for Verizon, said concern, mostly based on perception rather than fact, will be a major factor.

“There's a lot of ignorance about the dangers of hydrogen. At many construction sites, folks are using all kinds of different bottled gases, many of us have propane tanks at our homes, and most of the experts we've talked to think those are far more dangerous than tanks of hydrogen,” he said. “And yet, because different fire safety codes or building codes are unfamiliar with hydrogen, they treat it as stringently as they might propane or even more stringently. One of the bigger issues is the local siting issue. If there gets to be more knowledge and acceptance of this technology in fire safety codes and so on, then we'll say that this is worth a full-scale or broader deployment, and we'll do it.

“If we have to have a town hearing for every site that we want to put in, obviously that's going to slow us up, and we're only be putting in the most extreme sites or the most remote sites.”

Hydrogen fuel cells' use in telecom is still in the early growth stage. Although the technology is gaining in the perception department, cost, size and reliability will play a large role if the technology is to reach widespread deployment. ■

PEM FUEL CELL: HOW IT WORKS



Source: ReliOn

administration's 2006 energy bill, which offers tax credits of \$1000 per kilowatt to companies purchasing fuel cells.

“Traditionally, tax credits like this have not been available to the public utilities,” said Joe Blanchard, ReliOn vice president of product line management. “In this case, even the regulated telcos are eligible to receive the tax credit for deploying hydrogen fuel cells. Generally, the tax credit is \$1000 per kilowatt, starting in 2006. That's actu-

ally a pretty significant statement that the federal government is taking toward alternative energies, particularly fuel cells.”

But let's not forget the aforementioned public perception. Analyst John Celantano, Skyline Marketing Group president, said it's probable that fuel cells will remain in a niche category

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ReliOn
15913 E. Euclid Ave.
Spokane, Washington 99216
509-228-6500
www.relion-inc.com



TEL-167-CU