

WHEN 9/11 HAPPENED, NO ONE WAS READY. NO ONE HAD BACKUP CONTINUOUS POWER.

Power from fuel cells costs around 12 cents a kilowatt-hour, depending on location, competitive with electric costs of 14 cents a kilowatt-hour, Eschbach said. Samuelsen from the National Fuel Cell Research Center explained that competitive pricing stems from "waste heat that is recovered and used and when natural gas pricing is not exorbitant."

But not everyone thinks that the cost of fuel cells is affordable. "The technology isn't ready for prime time because of cost," noted Dan Rastler, technical leader of the distributed energy resources program at the nonprofit Electric Power Research Institute (EPRI) in Palo Alto, Calif. As natural gas prices spike, he would like to see government regulators provide more incentive for energy efficiency to help reduce the cost of fuel cells. Even Cynthia Mahoney White, the manager of public relations and marketing at Plug Power, a public company and fuel cell manufacturer, which launched in 1997 and is based in Latham, N.Y., admits that cost savings from fuel cells aren't there yet. "It's about supply and demand," she said.

Plug Power has a different business plan than competitor FuelCell Energy. Because its fuel cells are 5 kilowatts, it concentrates on selling back-up power to utilities and telecommunication companies. "Utilities spend millions on backup power," White stated. Plug Power's 5-kilowatt GenPower fuel cell for backup power costs from \$15,000 to \$50,000, depending on the storage unit for hydrogen and installation and service costs, she noted. Its fuel cells also support communication systems and can provide power for a black start when there is no power, she added.

Terrorism has enhanced market interest in fuel cells, White suggested. The World Center terrorist attack was a wake-up call for the United States and for utilities, which recognize the need for reliable backup power. "When 9/11 happened, no one was ready. No one had backup continuous power. People are much more aware of how vulnerable we are," White declared.

Detroit Edison, which owns 14 percent of Plug Power, has tested and introduced its fuel cells for back-up power. It piloted fuel cells in 2001 as backup power in a substation, explained Haukur "Hawk" Asgierrsson, a supervising engineer in distributed resource planning for Detroit Edison. After the test proved successful, Detroit Edison in 2005 installed a fuel cell as backup power in one of its substations.

Even Detroit Edison is moving cautiously into using fuel cells. Of its 600 substations, it uses fuel cells at only one of them. "It's still in development," Asgierrsson noted. At this point, he added, fuel cells cost the same as normal battery-driven back-up generators, though he envisions that using fuel cells at larger stations will be cheaper in the future.

Why are fuel cells more advantageous than batteries for back-up power? ReliOn's Saathoff replied that "batteries have a problem with temperature ranges. Fuel cells don't. Batteries require replacement every three to five years, and you need a Hazmat certificate to dispose of them. Fuel cells have no environmental issues, and their only byproduct is water, which evaporates or sinks into the ground."

Asgierrsson also envisioned that fuel cells could play a larger role at remote locations. Remote loads pay the same rates and yet are more costly to maintain and monitor. Indeed, Plug Power is researching fuel cells that will provide "prime power in a continuous run, targeting remote locations," White said.

As part of its 10-year \$355 million "Clean Energy Initiative," the nonprofit Long Island Power Authority (LIPA), which provides electricity for Nassau and Suffolk counties, is testing the use of fuel cells "to provide continuous power," said Dan Zaweski, its director of energy efficiency and distributed generation programs, based in Uniondale, N.Y. Ratepayers paid for this initiative, not government subsidies.

In 2005, LIPA piloted a fuel cell with a reformer built at a dozen residential apartment buildings, owned by two Long Island hospitals, Good Samaritan Hospital and North Shore University Hospital. The fuel cells, which can be hooked up to natural gas lines, supplement the power grid power and operate through a direct transfer switch. "It's part of our search for clean, alternative generation technology. Fuel cells produce substantially less sulfur oxide and nitrogen oxide," Zaweski noted.

LIPA will base fuel cells' effectiveness on whether they can provide sustained energy and avoid unplanned shutdowns. Although many customers approved of the pilot, Zaweski said some neighbors were concerned that stored hydrogen, which is flammable, could be a hazard. LIPA assured them there was no risk.

EPRI's Rastler is advising utilities to keep track of R&D on "higher temperature fuel cell systems, which have a wide range of uses, from residential to industrial. GE, Rolls Royce and FuelCell Energy are developing utility scale technologies, if they can meet cost targets."

Rastler reminds utility executives that "It took 30 years to use gas turbines for prime power. It'll take some time to bring fuel cell technology into the mainstream."

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Pacific Gas and Electric recently announced it has spliced its 10,000th solar power customer to the power grid, making it the leading utility in tapping solar power.

The utility has paid \$115 million in special financial incentives to those installing 230 solar projects totaling more than 30 megawatts worth of generation. It also offers incentives for wind, fuel cell or cogeneration units of 30 kilowatts or more.