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Energy

Fuel cells become more viable

By Jeff Miller

Fuel-cell companies face a Catch-22. Most customers won't buy their products until prices drop. But prices won't drop significantly until there are enough customers to justify mass production.

Nevertheless, analysts believe that fuel cells are for real.

"It looks like the fuel-cell market is starting to move out of its adolescence and go into targeted markets," said Richard Baxter, director of energy investor services at Pearl Street Inc. in Arlington.

Fuel cells convert the chemical energy of hydrogen and oxygen to generate electricity, water and heat. They have no moving parts and little to no emissions. Though they ultimately use hydrogen to produce energy, some designs strip hydrogen from a variety of fuels, such as natural gas or methanol.

Manufacturers are bullish on fuel cells because, with federal, state and city governments continuing to tighten emissions standards, fuel cells present a clean energy source.

In addition, fuel cells are much more efficient at producing energy than are the internal combustion engine and other sources.

But cost and reliability pose hefty hurdles to commercialization.

"Everyone tells us the same thing," said Brian McDonald, director of commercial power systems for UTC Fuel Cells in South Windsor, Conn. "If the PC25 (one of UTC's products) were $1,500 per kilowatt, we could have sold 100 to California."

UTC's PC25 system produces 200 kilowatts per hour and costs about $900,000 per unit, or $4,500 per kilowatt.

Two hundred kilowatts per hour is enough energy to power approximately 100 homes. An average hospital requires about two megawatts per hour, or 2,000 kilowatts. A high-rise building needs a power supply in the 10-megawatt range.

While rumors are flying within the industry that one of the big auto makers is set to make a "big" fuel-cell announcement, many remain skeptical.

A car's internal combustion engine produces energy in the $50-per-kilowatt range, a price point that fuel-cell manufacturers can't even hope to approach in the near term.

"That's an extraordinary cost target," McDonald said. The industry makes millions of internal combustion engines per year, "and they've had a century to improve on the technology."

UTC, on the other hand, makes about 30 to 40 fuel cells each year.

"We don't see automotive fuel cells until about 2010," McDonald said.

A young company in Marlborough claims that it can manufacture proton-exchange membrane (PEM) fuel cells at 20 percent of the current cost. But Protonex is still early in its life cycle, working on prototypes and looking for funding.

As for reliability issues, fuel cells are a relatively new technology. It's not that fuel cells are especially fragile or unreliable, analysts say. But the industry has a lot of development work ahead of it before fuel cells can meet the same expectations that consumers have of today's internal combustion engine, for example.

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McDonald said consumers tend to have high expectations for their power sources, whether they support a car or a household.

"People have the expectation that a fuel cell in their homes will be like any other appliance: It provides power instantly and is essentially maintenance-free," McDonald said. "You expect a car to start up and then go in three seconds, for instance."

Another problem: There's virtually no infrastructure to support cars using fuel-cell power, unless they extract hydrogen from gasoline. If the fuel cell needs repair work, good luck finding a technician.

But most analysts say that ultimately fuel cells are one of the more promising alternatives to the internal combustion engine in automobiles. Conventional batteries are simply too heavy for efficient use in fully electric cars.

Most analysts and executives see fuel cells first breaking into two markets: a source of stationary backup power and a replacement for small batteries.

"When you look at the cost per kilowatt of a battery, fuel cells can be much more competitive pricewise," said Aaron Tyler, an analyst with Reed Wasden Research in Seattle.

H Power in New Jersey, for example, is developing small hydrogen-powered fuel cells for military applications.

"Ball Aerospace is interested in using them to operate radios and recharge batteries on the battlefield," said H. Frank Gibbard, chief executive of H Power. "They're buying decent quantities."

Stationary power generation and backup power are other areas in which analysts believe fuel cells can break into the market.

"Chicago, for instance has decided to become a green city and push cleaner fuels," Baxter said. "They're also requiring every building over 80 feet to have a backup power generator."

The result, he said, is a natural niche market for fuel cells.

FuelCell Energy in Danbury, Conn., has seen the most success in this area, analysts say, with more than 12 megawatts of backlogged orders. Most recently, the U.S. Coast Guard bought a 250-kilowatt power plant built by FuelCell Energy for about $1.25 million.

Fuel cells developed for industry don't face the same infrastructure hurdles as those aimed at the consumer market. Many plants have an extensive natural gas delivery infrastructure in place, which fuel cells can mine as a hydrogen source.

FuelCell Energy, for example, sold a unit that runs off escaping methane from a nearby coal mine.

"Really, this is about educating the marketplace," said Jerry Leitman, chief executive of FuelCell Energy. "There is not a one- or two-megawatt power plant you can build today that you can get permitted because of environmental regulations."

Fuel cells, he believes, will create that marketplace.

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