FuelCell 2004

$50-60 BILLION INVESTMENT IS NEEDED OVER THE NEXT 15 YEARS

I go to these conferences just to see if we are making any progress. This is what I saw and heard at the 2004 Fuel Cell Seminar, Nov. 1-5, San Antonio, Texas.

Roger Saillant, president and CEO of Plug Power, led off the conference as part of the plenary session with some refreshing straight talk that characterizes fairly well the situation.

- There are no "killer applications!"
- The value proposition drives price
- Price drives cost

(It is important that he did qualify his remarks as applicable to sizes between 750W and 200kW.)

The first Proton Exchange Membrane (PEM) session was on the failure modes for this type of fuel cell. It was a standing room-only venue with an overflow crowd.

Strong message follows. PEM fuel cells fail because the membranes thin out, causing increased localized electrical activity, which accelerates the failure mode. They thin out because they dry out, or are subject to localized stretching. The greatest technical challenge for the PEM fuel cell, by consensus, remains water management.

The U.S. Department of Energy has concluded a major study on fuel system alternatives and as a result, has suspended all efforts at onboard fuel reforming. Any hydrogen-fueled vehicle will require onboard hydrogen storage, which today means gaseous storage in high-pressure tanks. Sorry, I still don't see how this "opportunity" ever moves beyond a local fleet vehicle-level deployment.

In attempting to get commercial information for a new project, one of the fuel cell commercial leaders required a Non Disclosure Agreement to be signed in advance of providing any pricing information. Does this sound anything like a commercial operation?

I also sat in on the Solid Oxide Fuel Cell (SOFC) sessions. It was interesting to note that these sessions were almost devoid of Asian participants. The Asians were all in the PEM session. The reason is that the "killer app" is battery replacement in portable electronic devices. This is probably why Roger Saillant constrained his comments to 750W and above. The fuel is methanol, i.e., no reformer. It is a DC application, i.e., no power electronics. Did you notice that methanol was recently approved for use on airliners?

In the meantime, the SOFC developers are attempting to drive the operating temperatures from the current 1,000°C down to 600-800°C, to enable the use of less expensive metallic-alloy separator and interconnect components. While this probably does simplify the fuel cell, it does work against the gas turbine hybrid concept. At lower temperatures, the gas turbines in these hybrid systems will require supplemental firing or a substantial derate of the turbine's contribution.

Dan Rastler, technical leader of EPRI's Distributed Energy Resources Program, suggested that the optimum size for grid application is from 100kW to 10MW. Think 10MW, not 100kW. The 100kW is token acknowledgement of microturbine sizes. Rastler's comments would suggest a continued bias toward utility ownership at a substation level, and unfortunately, foregoing any opportunity for Combined Heat and Power.

Chromium poisoning of the catalyst remains a challenging technical issue for these hot fuel cells.

Jerry Leitman, president and CEO of FuelCell Energy, pointed out that the increased cost of gas has not been reflected in higher electric prices, due to the inertia in the regulatory rate-making process. This is a valid issue, but one that likely will not go away. It is hard to conceive of real time rate-making as a practical concept within the existing regulatory framework.

The hot fuel cell community is generally ignoring the fact that their concepts require extended start-up and shutdown times, which makes them a base load, not a dispatchable resource. Most of the participants talk about average pricing, not any form of time-of-day pricing. This assumption allows the capital cost of these fuel cells to be carried over the full 8,000 hours per year, rather than the 2,000-2,500 hours that are really available based upon competitive off-peak market rates. It is difficult to see how this will be resolved in favor of the fuel cells.

Volume price curves for all variations of fuel cells were repeatedly used to extrapolate costs and quantities to an automotive level, inevitably passing through the distributed generation story. This is a tired story and does not appear to be any more valid for fuel cells than it proved to be for microturbines.

The general consensus among presenters and, in particular, as advocated by Robert Rose, executive director of the U.S. Fuel Cell Council, is that the U.S. government needs to spend $50-60 billion over the next 15 years to make fuel cells a reality. TI

Author

Peter Baldwin is an industry consultant (www.base-e.net) and former executive of Ingersoll-Rand Company's Northern Research and Engineering Corp. (NREC) subsidiary. Reach him at pete_baldwin@base-e.net.