

**Minutes of the High Temperature Membrane Working Group Meeting  
Monday, November 16, 2009**

The semi-annual meeting of the HTMWG was held at the Palm Springs Convention Center in conjunction with the Fuel Cell Seminar in Palm Springs, CA. Participants were welcomed by John Kopasz, representing the Department of Energy.

Following the welcome, Dr. Michael Hicks, from IdaTech, gave a very interesting presentation regarding Membrane Requirements for Back-up Power Applications. He started with a table showing the technical targets for membranes for automotive use and said that it is more difficult to put together such a table for stationary use. Typically, targets are stated in terms of the membrane electrode assembly or the system rather than the membrane.

Back-up power is usually broken into two broad classifications: reliable grid or unreliable grid. The reliable grid, such as found in North America, Japan and Western Europe, functions 99.89% of the time, with less than 10 hours/year of outages. On the other hand, the grid in Southeast Asia, Central and South America, Eastern Europe, Africa and the Middle East is highly unreliable. Here, outages occur 1 – 6 hours/day.

For the reliable grid, a system requires a lifetime of less than 5,000 hours but for an unreliable grid, from 10,000 to 40,000 hours is necessary. Dr. Hicks went on to compare fuel cells for both applications to the competing technologies. For the reliable grid, this is batteries, while for the unreliable grid, it is generators. He additionally compared the load profiles for fuel cells in each case, as well as the need for relative humidity and optimum operating temperatures.

After his presentation on back-up power, Dr. Hicks gave an overview of the U.S. Fuel Cell Council, of which he is the current president. This informative presentation provided an overview of the USFCC, the membership and structure, their priorities and recent successes and their outreach activities. This presentation concluded with a listing of available publications and contact information.

The next presentation was by Ilgaz Cumalioglu from Plug Power. This presentation provided an overview of the GenSys Blue, a fuel cell heating appliance. Mr. Cumalioglu first presented background to show the motivation for the development of such a unit. GenCore provides back up power; GenDrive provides motive power and the GenSys provides continuous power.

There are three continuous power markets: wireless telecommunications, remote residential and residential combined heat and power. The low-temperature GenSys product is applicable to the first two markets, while the high temperature system is more suited to the latter. This unit targets a 20% - 40% reduction in home energy

costs, while reducing home carbon emissions by 25% - 35%. The payback time is estimated to be 5 – 8 years. Additional system information was provided.

The final presentation of the meeting was made by Dr. Kevin Colbow of Ballard Power Systems. Dr. Colbow began his presentation with an overview of Ballard, including company statistics and market focus. He went on to discuss durability requirements for the different applications, comparing stationary and automotive requirements. He explained that the required lifetimes must be achieved over a range of operational conditions, while simultaneously satisfying other key system attributes.

Dr. Colbow continued his presentation with an overview of the membrane testing methodologies used at Ballard. Three types of tests were discussed: accelerated stress tests for screening purposes, accelerated durability tests with predictive capability and lifetime tests. This very interesting presentation concluded with a summary comparing key features for air cooled and liquid cooled systems.

The presentations were followed by a brief period of discussion and adjourned around 3:30 pm.