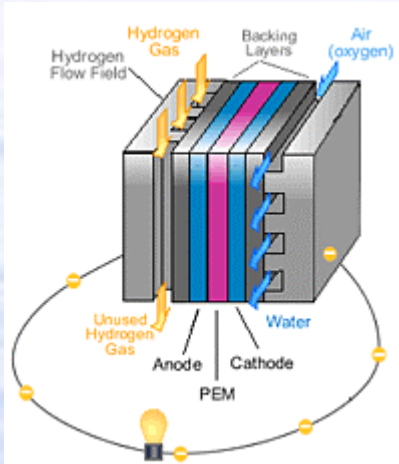
U.S. Department of Energy
Energy Efficiency and Renewable Energy

Fuel Cell R&D Pre-Solicitation Workshop

Valri Lightner, Fuel Cell Team Leader

Office of Hydrogen, Fuel Cells and Infrastructure Technologies



Agenda

- Discussion of Potential Topics, Summary of Comments Received - *Valri Lightner (40 min)*
- Application Content, Evaluation Criteria/Process - *Reg Tyler (20 min)*
- Instructions on IIPS - *Doug Baptist (20 min)*
- Collection of Written Questions/Break to Prepare Responses *(40 min)*
- Responses to Written Questions *(90 min)*

Solicitation Summary

Next Generation Fuel Cell R&D Projects

- **R & D is focused on advancing fuel cell technology toward 2010 performance targets.**
- **Funding Opportunity Announcement is anticipated ~ August 2005**
- **DOE funding of $70 M over 3 years is anticipated, with applicant cost share of 20-40% depending on stage of development**
- **Potential Topics of Research:**
  - **Improved Fuel Cell Membranes**
  - **Water Transport Within the Stack**
  - **Advanced Cathode Catalysts and Supports**
  - **Cell Hardware (Bipolar Plates, Seals)**
  - **Freeze-Capable Stacks**
  - **Balance of Plant (Compressors, Auxiliary Motor/Controllers)**
  - **Effects of Impurities on Fuel Cell Performance & Durability**
- **Grant Awards are anticipated ~ October 2006**

Summary of Written Comments

- Written Comments on the Draft Topic Descriptions were collected by email by the May 15th deadline.
- The following summarizes and compiles these comments by topic area.
- At the end, other comments or suggested new topics that do not fit within a particular topic are listed.
- We appreciate your input!

Topic 1: Improved Fuel Cell Membranes

Topic 1A: Low-Humidity Proton Conducting Materials
Topic 1B: Improving Durability of Membranes
Topic 1C: High-Performance Membranes

Comments Received:

- **Expand 1A to include inorganic membranes.**
- **Eliminate 1C or combine with 1A & 1B.**
- **Combine Topic 1A and 1C due to significant similarities.**
- **Develop high temperature membranes in parallel with complete fuel cell systems (Topic 1C).**
- **Add new subtopic on developing novel MEAs in conjunction with the improved membranes.**
- **Add development of standard in-situ and ex-situ measurement tools to characterize membrane properties, functionality.**
- **Add development of ionomers for electrocatalysts layers.**
- **Develop ionomers with superior resistance to chemical degradation that can operate at low RH.**
- **Develop membranes resistant to humidity cycling damage.**

Topic 2: Water Transport Within the Stack

Topic 2A: Exploratory Studies
Topic 2B: Engineering Studies

Comments Received:

- **Add new topic on Improved Gas Diffusion Layers to enhance performance rather than focus on water transport only.**

Topic 3: Cathode Catalysts & Supports

Topic 3A: Catalyst Durability
Topic 3B: High-Temperature Catalyst Materials
Topic 3C: Low-Cost Catalyst Materials

Comments Received:

- **Include Platinum-based catalyst resistant to particle-size growth.**
- **Put less emphasis on high-temperature, instead focus on improved activity and durability.**
- **Include development of new electrocatalyst supports in all three subtopics.**
- **Add new topic on Corrosion-Resistant Cathode Catalysts Layers and Corrosion-resistant supports.**
- **Add new topic on Cathode Catalysts Layers with Desired Water Management Properties.**
- **Add new topic on High Activity Pt-Alloy Catalysts.**

Topic 4: Cell Hardware

Topic 4A: Bipolar Plates
Topic 4A1: Carbon Bipolar Plates
Topic 4A2: Metal Bipolar Plates
Topic 4B: Seals

Comments Received:

- **Topic 4A2 should include in situ and accelerated testing.**
- **Topic 4A2 should be demonstrated in stack for full functionality under drive cycle conditions, freeze-start cycling, etc.**
- **Topic 4A should be expanded to include graphite sheet technology.**
- **Topic 4A should not be separated by material type.**

Topic 5: Freeze-Capable Stack

Topic 5A: Exploratory Studies
Topic 5B: Engineering Studies

Comments Received:

- **Put less emphasis on Topic 5.**
- **Combine with Topic 2 Water Transport Within the Stack.**
- **Address vehicular and stationary systems independently.**

Topic 6: Balance of Plant

Topic 6A: Compressor/Expander Technologies
Topic 6B: Standardized Scalable Motor Drives for PEMFC

Comments Received:

- **Put less emphasis on Topic 6B which is not research.**
- **Add new topic on Thermal and Water Management.**
- **Add new topic on Power Management.**
- **Add new topic on Passive Reactant Recirculation Systems.**
- **Add new topic on Flexible Hoses for Fuel Cell Systems to transport air, water, coolant and hydrogen.**
- **Recommend that Topic 6 development is best done in the context of a specific fuel cell system.**
- **Include Balance of Plant Material Development, specifically for use in fuel cell environment, which may be of broad industry interest.**

Topic 7: Effects of Impurities on Fuel Cell

Comments Received:

- **This topic should not be included.**
- **Topic 7, hydrogen purity, should be studied along with impact on membrane durability (Topics 1B and 1C).**

Other Suggestions/Possibilities

- Add new topic on New Fuel Cell Approaches/Architecture:
  - Alternative PEM Technology
  - Alkaline Fuel Cell Technology
  - Novel Stack Concepts
  - Other Low Temperature Fuel Cell Technology (non-PEM)
- Hold competition to Identify Best Mathematical Model Representing Cell and Stack Behavior.
- Shift emphasis from system-down approach to creating a system that best fits “ideal” MEA or stack.
- Topic for international projects that support International Partnership for the Hydrogen Economy (IPHE), where most of US funding is for the US partner
- Topic for intergovernmental projects that support the Interagency Hydrogen Research and Development Task Force

For More Information

DOE HFCIT Fuel Cell Management Team

Valri Lightner	*202 586-0937*	*Valri.Lightner@ee.doe.gov*
Kathi Epping	*202 586-7425*	*Kathi.Epping@ee.doe.gov*
John Garbak	*202 586-1723*	*John.Garbak@ee.doe.gov*
Nancy Garland	*202 586-5673*	*Nancy.Garland@ee.doe.gov*
Donna Ho	*202 586-8000*	*Donna.Ho@ee.doe.gov*
Amy Manheim	*202 586-1507*	*Amy.Manheim@ee.doe.gov*
Golden Field Office		
Reginald Tyler	*303 275-4929*	*Reginald.Tyler@go.doe.gov*
David Peterson	*303 275-4956*	*David.Peterson@go.doe.gov*
Technical Advisory Team		
Walt Podolski	*630 252-7558*	*Podolski@cmt.anl.gov*
Tom Benjamin	*630 252-1632*	*Benjamin@cmt.anl.gov*
John Kopasz	*630 252-7531*	*Kopasz@cmt.anl.gov*

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