DOE Hydrogen Program Manufacturing R & D Pre-Solicitation Meeting

Friday, May 18, 2007

Crystal Gateway Marriott

Meeting Agenda

1:00 pm	**Welcome and Opening Remarks** **JoAnn Milliken,** Chief Engineer**,** US DOE Hydrogen Program
1:05 pm	**FOA Application Process and Anticipated Timeline** **Jill Gruber,** Project Officer, US DOE Hydrogen Program, Golden Field Office
1:30 pm	**Manufacturing FOA Proposed Scope and Topics** **Pete Devlin,** Manager, Manufacturing R&D and Market Transformation, US DOE Hydrogen Program
1:50 pm	**Break for Comment and Question Submission and DOE Review**
2:30 pm	**Reconvene to Discuss Comments and Provide Responses to Questions**
3:30 pm	**Closing Remarks/Adjourn**

Polymer Electrolyte Membrane (PEM) Fuel Cells
Membrane Electrode Assemblies (MEAs) and Stacks

Current Status

- Approximate cost range from $3,000 to $5,500/kW
- Low volume production levels and high attrition rates

Solicitation Goals

- Advances progress toward the Program's goal of $30/kW
- Achieve higher quality standards

Topic 1: Alternative Electrode Deposition Processes

Problem: Catalyst Coated Membranes (CCMs) and Gas Diffusion Electrodes (GDEs) are not scaled up to meet the needs of high volume production requirements

Topic Goal: Meet high volume cost targets for MEA manufacturing while achieving a six sigma standard

To Be Addressed:

- Analysis of current electrode deposition processes and an evaluation of alternative processes
- Recommended alternative process
- Design study to determine feasibility and manufacturability
- Manufacturing cost analysis

Specific Exclusion: Automated equipment to perform proposed process

Applicant cost share requirement: 30% minimum

DOE funding up to $6 million (not including 30% cost share), up to three awards with projects lasting three to four years in length

Topic 2: Novel MEA Manufacturing

Problem: MEA manufacturing costs must be lowered through new approaches to cell stack construction

Topic Goal: Facilitate the development of alternative, lower cost approaches to fuel cell construction

To Be Addressed:

- Analysis of current MEA manufacturing processes with a comparison to a proposed design concept
- Design study to determine feasibility and manufacturability of the proposed concept
- Bench scale experimental test data that demonstrates the proposed MEA performance results
- Manufacturing cost analysis

Applicant cost share requirement: 20% minimum

DOE funding up to $8 million (not including 20% cost share); up to two awards with projects lasting three to four years in length

Topic 3: Rapid MEA Conditioning

Problem: The conditioning period occurring after cell stack assembly is a significant time and cost driver for an assembled fuel cell system

Topic Goal: Eliminate or significantly reduce cell stack conditioning time, thereby driving down cost as well as fuel cell assembly time.

To Be Addressed:

- A design concept that eliminates conditioning or provides for conditioning the MEA before stack assembly with a significantly reduced conditioning duration
- Experimental test data that demonstrates the proposed design concept achieved the results developed above

Applicant cost share requirement: 30% minimum

DOE funding up to $7 million (not including 30% cost share); up to two awards with projects lasting three to four years in length

Topic 4: Process Modeling for Fuel Cell Stacks

Problem: The current Design-For-Manufacture (DFM) or Design-For-Assembly (DFA) models apply to conventional technologies such as internal combustion engines but do not necessarily carry over and apply to fuel cell stacks

Topic Goal: A working model able to demonstrate cost and quality differences when variations to a benchmark set of product and product designs are provided as input

To Be Addressed:

- Benchmarking of current processes
- Assessment of the most cost-effective way to manufacture / assemble the entire stack
- Development of fuel cell system manufacturing models

Applicant cost share requirement: 20% minimum

DOE funding up to $5 million (not including 20% cost share); up to three awards with projects lasting two to three years in length

Topic 5: Process and Device for Cost Effective Testing of Cell Stacks

Problem: Cell stacks are currently tested manually and only one at a time in testing equipment that is very expensive

Topic Goal: The development of high-rate, low-cost quality control methods that will facilitate rapid testing and assembly of the cell stack while eliminating the need to test each cell component during cell stack assembly

To Be Addressed:

- Low cost, non-destructive quality control measuring devices
- Rapid leak testing equipment

Applicant cost share requirement: 30% minimum

DOE funding up to $12 million (not including 30% cost share); up to three awards with projects lasting three to four years in length

On-Board Hydrogen Storage System Manufacturing

Current Status

- 10,000 psi gaseous hydrogen storage cost range is $240 to $420/kWhr

Solicitation Goals

- Reduce cost of making high-pressure carbon composite storage systems
- Advance progress toward the Program's target cost of $2/kWh by 2015

Topic 6: Manufacturing Technologies for Reducing the Cost of High Pressure Composite Conformable Tanks

Problem: Composite storage tanks are currently expensive to produce, lack conformability, and are unable to be produced at a high-volume rate

Topic Goal: Dramatically reduce the cost and time required to produce high pressure composite conformable hydrogen storage systems

To Be Addressed:

- New lower cost precursor materials
- Analysis of current carbon fiber winding and placement processes
- A cost model to evaluate the proposed processes
- New manufacturing technologies that reduce time and cost of tank fabrication
- Lab testing and demonstration of a product scale (5kg) storage system

Specific Exclusion: Automated equipment to perform proposed process

Applicant cost share requirement: 30% minimum

DOE funding up to $10 million (not including 30% cost share), up to two awards with projects lasting three to five years in length

Topic Summary

Topic	Industry Cost Share %	DOE Funding (up to)	Number of Awards (up to)
1. Alternative Electrode Deposition Processes	30	$6 million	3
2. Novel MEA Manufacturing	20	$8 million	2
3. Rapid MEA Conditioning	30	$7 million	2
4. Process Modeling for Fuel Stacks	20	$5 million	3
5. Process and Device for Cost Effective Testing of Fuel Stacks	30	$12 million	3
6. Reducing the Cost of High Pressure Composite Conformable Tanks	30	$10 million	2

SUMMARY

- Reduce costs of manufacturing
- Develop manufacturing processes while HFC technologies are being researched
- Build Supplier Base