FUEL CELL TODAY

Opening doors to fuel cell commercialisation

DoE announces US$350 Million in Hydrogen and Fuel Cell Research Projects

Stefan Geiger, Fuel Cell Today – 28 April 2004

During this week, various announcements regarding further details on US President Bush's plans on how to support the fuel cell and hydrogen industry were made. The now proposed US$350 million represents nearly one-third of the President's US$1.2 billion commitment in research funding to bring hydrogen and fuel cell technology from the laboratory to the showroom.

The funded projects involve 30 lead organisations and include over 100 partners from academia, industry and national laboratories. The money will be spend on four key research areas:

1. Hydrogen Storage

The DoE plans three so-called "Centers of Excellence" which will carry out exploratory research in hydrogen storage. Each centre includes a DoE national laboratory lead and several university and industry partners. The centres will address the major technical barrier to on-board hydrogen storage - storing enough hydrogen to enable greater than 300 mile driving range without impacting cargo or passenger space. In addition, individual universities, research institutes, and small businesses will explore new materials for hydrogen storage. The DoE share for this National Hydrogen Storage Project is US$150 million over 5 years with an additional private cost share of approximately US$20 million.

Chemical Hydrogen Centre will be lead by the Los Alamos National Laboratory and the Pacific Northwest National Laboratory. Other organisations include: University of Pennsylvania, University of California Los Angeles (UCLA), University of California-Davis, Penn State University, University of Washington, University of Alabama, Rohm and Haas, Millennium Cell, Intematix and US Borax.

Metal Hydride Centre will be lead by the Sandia National Laboratories and other organisations will include Stanford University, General Electric, University of Hawaii, California Institute of Technology, Jet Propulsion Laboratory, HRL Laboratories, University of Illinois, University of Pittsburgh/Carnegie Mellon University, National Institute of Standards and Technology (NIST), University of Nevada-Reno, Oak Ridge National Laboratory, University of Utah, Intematix Corporation and Brookhaven National Laboratory,.

Carbon Centre is lead by the National Renewable Energy Laboratory (NREL) and will include the California Institute of Technology, Duke University, Penn State University, Rice University, University of Michigan, University of North Carolina, University of Pennsylvania, Oak Ridge National Laboratory, Lawrence Livermore National Laboratory, NIST and Air Products.

Additionally, there will be some **individual projects**:

Prime	Partners	Research Area
TIAX LLC	Gas Technology Institute Yale University University of Oklahoma	Lifecycle and cost analysis
University of Missouri	Pacific Northwest National Laboratory	New materials
University of Connecticut	Pacific Northwest National Laboratory	New materials
Michigan Technological University		Chemical hydrides
Gas Technology Institute	Superior Graphite Co. NEXGEN Fueling	Carbon Off-board storage
Alfred University	Savannah River Technology Center Mo-Sci Corporation CERALINK	New processes
Carnegie Institute of Washington		New materials
Research Triangle Institute	State Scientific Research Institute (Moscow, Russia) ATK/Thiokol Propulsion	Chemical hydrides
State University of New York	PoroGen, LLC	Carbon
TOFTEC, Inc.	University of Florida	New processes
University of Michigan	Northwestern University Los Alamos National Laboratory	New materials
University of Pennsylvania	Drexel University NIST	Carbon
University of California-Berkeley	Lawrence Berkeley National Laboratory	New materials
University of California-Santa Barbara	Los Alamos National Laboratory	New materials

2. Vehicle and Infrastructure "Learning" Demonstrations

The "Learning demonstrations" key area will provide important data to focus research efforts. The use of hydrogen as a transportation fuel and the development of fuel-cell vehicles will require extensive research and an implementation strategy. Automakers and energy companies will work together with their teams under this project to demonstrate integrated and complete system solutions operating in real world environments. These demonstrations will assess the research program's progress toward meeting the goal of making a commercialisation decision by 2015. The expected DoE share is US$190 million over 5 years with an additional private cost share of approximately US$190 million.

Energy and Automotive Company Partners	Additional team members
Air Products and Chemicals Partners: Toyota Motor Nissan NA American Honda Motors ConocoPhillips BMW	UTC Fuel Cells Proton Energy Systems University of California, Davis Southern California Edison California Energy Commission California Air Resources Board South Coast Air Quality Management District Sacramento Metropolitan Air Quality Mngmt District

This team announced, that they plan to assign, collectively, up to 65 fuel cell vehicles to this project, and BMW plans to assign up to 15 hydrogen-fuelled internal combustion engine vehicles. The vehicles are to be driven by a broad range of drivers and interested parties including technical experts, policy makers, vehicle customers and fleet operators. The team's automakers are seeking no money or reimbursement for providing their vehicles to the program. Vehicle production and maintenance is included in the cost-sharing portion of the award total. The project team requested DOE funding of approximately $35 million of the overall award for hydrogen infrastructure activities and a public outreach program.

Additionally, the project team plans to make substantial commitments to establish and demonstrate hydrogen infrastructure in California. Over the five-year program, up to 24 fuelling station locations using multiple approaches to producing hydrogen and providing fuelling infrastructure could be developed.

Energy and Automotive Company Partners	Additional team members
DaimlerChrysler Partner: BP America	DTE Energy SAIC SRI International Ballard (Canada) NextEnergy California Fuel Cell Partnership National Hydrogen Association

During the DoE press conference, DaimlerChrysler said it wants to add 37 fuel cell cars to US fleets as soon as this summer.

Energy and Automotive Company Partners	Additional team members
Ford Motor Partner: BP America	Ballard (Canada) NextEnergy Environmental Protection Agency H2Systems Sacramento Municipal Utility District California Energy Commission California Air Resources Board Progress Energy

Ford announced, that it plans to deploy a fleet of vehicles (up to 30) to the cities of Detroit and Orlando. Ford will also base five Focus FCVs in Vancouver, British Columbia, to give its Canadian "evaluation partners" an opportunity to test the vehicles in real-world applications. At least one of the Central Florida vehicles is expected to be used to patrol Wekiwa Springs State Park. Together with Progress Energy, BP plans to develop and build a hydrogen-refuelling station that's expected to be a prototype for future stations.

Energy and Automotive Company Partners	Additional team members
General Motors Partner: Shell Oil Products	Air Products and Chemicals Praxair GE Global Research NextEnergy Viewpoint Systems Strat@comm Inc Department of the Army Port of Los Angeles Maryland Energy Office NY State Energy Research and Development Authority

Energy and Automotive Company Partners	Additional team members
Texaco Energy Partner: Hyundai Motor	UTC Fuel Cells University of California, Davis AC Transit Southern California Edison South Coast Air Quality Management District California Energy Commission California Air Resources Board New York State Electric and Gas Rochester Gas and Electric

Hyundai and subsidiary Kia, which have received certification from the US DoE, have announced that they will test-drive up to 32 of their fuel cell auto model (Tucson FCHEV) in major US cities over the next five years until the first half of 2009.

Furthermore, ChevronTexaco intends to provide the design and construction of up to six hydrogen fuelling stations to be operated primarily in California

3. Fuel Cell Research

This key area will address critical fuel cell cost and durability issues for consumer electronics and other applications. The DoE share is US$13 million dollars over 3 years with an additional private cost share of approximately US$10 million. These selections are in addition to the US$75 million in fuel cell awards announced by Secretary Abraham last year.

Prime Contractor	Sub-contractors
Fuel Cells for Consumer Electronics Devices Poly Fuel MTI MicroFuel Cells	Intel Corporation Flextronics Methanol Foundation Dupont Fuel Cells
Fuel Cells for Auxiliary Power Generation Cummins Power Generation Delphi Automotive Systems	International Truck & Engine Corporation SOFC Holding Volvo Trucks North America PACCAR Electricore, Inc
Off-Road Fuel Cell Applications Ida Tech	Donaldson Company The Toro Company University California, Davis 3M Company

4. Hydrogen Education

Hydrogen technology education projects include middle school and high school curricula and teacher professional development. These projects pair hydrogen technology experts with professional educators and experienced curriculum developers to create hands-on activities and lessons to engage students in the developing hydrogen economy. Teacher professional development is an essential component, as teachers nationwide will not only learn how to use the materials but also receive the training they need to build their expertise and enhance their ability to educate students. The hydrogen education projects also include the development of materials suitable for a general audience. These materials will help introduce the public to the hydrogen vision, as well as provide a better understanding of how fuel cells work; how hydrogen is produced, delivered, and stored; and the facts about hydrogen safety.

Prime	Partners	Project
University of California, Berkeley (Center for Curriculum Innovation of the Lawrence Hall of Science)	Schatz Energy Research Center at Humbolt State University; Chabot Space and Science Center; Alameda-Contra Costa Transit; Lab-Aids, Inc.; National Hydrogen Association	Curricula and teacher professional development
National Energy Education Development (NEED) Project	Sentech, Inc; Los Alamos National Laboratory; National Association of State Energy Officials; National Hydrogen Association; U.S. Fuel Cell Council	Curricula and teacher professional development
Andersen Creative Group	Argonne National Laboratory, NuZoo Media, Inc.	Educational materials
Energy International, Inc.	H2Nation, Breakthrough Technologies, Inc.	Educational materials