

## **Hydrogen and Fuel Cell Programs in the U.S.: Perspectives from the U.S. Department of Energy**

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The U.S. Department of Energy (DoE) has been conducting and sponsoring hydrogen and fuel cell research and development activities, via public-private partnerships, for several decades. These investments have begun to yield significant results as the costs of fuel cells have been dramatically reduced and the performance of hydrogen production, storage, transport, and end-use technologies has improved.

In January 2002 U.S. Secretary of Energy Abraham announced the FreedomCAR partnership. FreedomCAR is a partnership between DoE and the U.S. Council for Automotive Research (CAR), a cooperative endeavor among Daimler-Chrysler, Ford and General Motors to conduct pre-competitive, high-risk, high-payoff research into advanced automotive technologies. One goal of the FreedomCAR program is to stimulate the development of hydrogen fueled vehicles.

In January 2003, U.S. President Bush launched the U.S. Hydrogen Fuel Initiative and proposed \$1.2 billion in research funding with a national goal that first car driven by a child born today could be powered by hydrogen and pollution free. By catalyzing the simultaneous development of both hydrogen fueled vehicles through FreedomCAR and the necessary hydrogen production and refueling infrastructure through the President's Hydrogen Initiative, government leadership will help advance commercialization of hydrogen fuel cell vehicles and infrastructure by 15 years, from approximately 2030 to 2015. In July 2004 President Bush and Secretary Abraham announced more than \$500 million in public and private sector investments for hydrogen research and development and large-scale hydrogen demonstration projects.

The commitment to hydrogen technology research, development and demonstration is producing significant results: 1) the high-volume cost of automotive fuel cells has been reduced from \$275 per kilowatt to \$225 per kilowatt using innovative processes to reduce the use of precious metals. This nearly 20 percent improvement in a short time period puts us on the path to a cost competitive target of less than \$50 per kilowatt; 2) the cost of natural gas-based hydrogen production has been reduced from \$5.00 per gallon gasoline equivalent to \$3.60, using innovative reforming and purification technologies. To be cost

effective for the consumer, our goal is to reach \$1.50 per gallon gasoline equivalent; and 3) the world's first energy station that co-produces electricity and hydrogen from natural gas was built in Las Vegas, Nevada. This achievement demonstrates the important synergy between the transportation and electric generation sectors for the hydrogen economy.

In early 2003 the U.S. proposed the establishment of the International Partnership for the Hydrogen Economy (IPHE) and this organization was established in November 2003. The goal of IPHE is to organize and coordinate multinational research, development and deployment programs that advance the transition to a global hydrogen economy. IPHE members include Australia, Brazil, Canada, China, European Commission, France, Germany, Iceland, India, Italy, Japan, Norway, Russia, South Korea, United Kingdom, and the United States.