



The U.S. Department of Energy Hydrogen Program

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Hydrogen can be part of a balanced energy portfolio.

- Energy is one of the greatest challenges we face as a nation. We rely too heavily on imported oil, particularly for transportation, and we must have cost-competitive, clean, low-carbon options for our power generation and transportation sectors.
- Hydrogen is one part of a balanced, strategic portfolio of energy alternatives that includes solar, wind, hydropower, and geothermal energy, as well as biofuels, plug-in hybrid vehicles and advanced technologies to increase fuel economies of today's vehicles.
- Hydrogen can be produced from abundant and diverse domestic resources including fossil, nuclear, and renewable energy. This diversity of supply means we do not need to rely on any single source for our energy needs. Hydrogen can be used in a fuel cell or an internal combustion engine to power a vehicle with zero or near-zero emissions from the tailpipe.



The President's Hydrogen Fuel and Advanced Energy Initiatives have accelerated R&D.

- The President committed \$1.2 billion over five years to support the Hydrogen Fuel Initiative. With funds appropriated by Congress, DOE and its partners in government, industry, and academia, including our national laboratories, have been working to achieve technology readiness in the 2015 timeframe.



Significant progress has been made toward hydrogen fuel cell technology readiness.

- DOE-funded research has:
 - Reduced the cost of producing hydrogen *by 40 percent*. If the infrastructure existed, hydrogen may be cost-competitive with gasoline. This is a projected hydrogen cost when produced from natural gas at the station. DOE continues to work on hydrogen production from renewable and other energy sources.
 - Reduced the projected cost of automotive fuel cell systems at high volumes from \$275/kW in 2002 to about \$95/kW – *a 65 percent reduction*.
 - *Doubled* the durability of automotive fuel cells- from 1,000 hours in 2003 to 2,000 hours, well on track towards meeting our target of 5,000 hours to meet consumer expectations and compete effectively with today's vehicles.
 - Identified new materials with a 50 percent improvement in hydrogen storage capacity, compared to 2004.

- Moved out of the lab and onto the road – the National Hydrogen Learning Demonstration brings together auto and energy company teams to validate hydrogen fuel cell vehicle and fueling technologies in real world conditions. It currently includes 92 fuel cell vehicles and 16 hydrogen fueling stations. DOE has collected data from more than *one million miles* traveled; findings are shared with the community and referred back into the R&D program.
- Demonstrated the safety of hydrogen technologies and educated stakeholders. For instance, hydrogen tanks undergo rigorous testing including gunfire, bonfire and drop tests to ensure safety. DOE developed training materials, reaching thousands of people.
- All of this progress is the result of a collective effort among federal, state, and local governments with industry, national laboratory, university, and small business partners. DOE also collaborates globally with 16 countries and the European Commission through the International Partnership for the Hydrogen Economy to ensure a strong competitive position for our Nation as a global player.

We’ve come a long way but the job is far from done.

- It will take some time, before consumers can walk into a dealership and buy a hydrogen-powered vehicle. R&D is focused on key technical targets for:
 - Reducing the cost of hydrogen – which includes production *and* delivery – from multiple pathways, including renewable energy sources.
 - Reducing the cost of fuel cells and improving their durability.
 - Improving on-board hydrogen storage technology to enable a 300-mile driving range *without* compromising passenger and trunk space, performance, or cost.

Walking (or driving) the talk.

In May 2008, DOE expanded its fleet of alternative vehicles with the addition of a Chevrolet Equinox fuel cell vehicle. The vehicle, which is part of GM’s Project Driveway, is available to DOE employees for official business in the Washington, DC area. Drivers refuel at the Shell hydrogen station on Benning Road. Data collected from this effort will be integrated with data from the National Hydrogen Learning Demonstration to validate real-world performance.



Commercially Available Fuel Cells

Fuel cells are commercially available and can be cost-competitive for early market applications like forklifts, stationary backup power, and even prime power for critical loads such as data centers. Through interagency agreements with DOE, the Department of Defense/Defense Logistics Agency will deploy nearly 100 fuel cell forklifts at three of its largest distribution centers and the Federal Aviation Administration will deploy another 20-30 fuel cell backup power systems for its remote communications towers.

