

'Clean' Vehicle Research Initiative on Track, But Many Challenges Ahead

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A public-private effort to develop more fuel-efficient automobiles and eventually introduce hydrogen as a transportation fuel is well-planned and identifies all major hurdles the program will face, says a new report from the National Academies' National Research Council. Many technical barriers must be overcome and new inventions will be needed, but the program, which was launched three years ago, has already made an excellent start, said the committee that wrote the report.

"The goals of this program are extremely challenging and success is uncertain, but it could have an enormous beneficial impact on energy security and the U.S. economy," said Craig Marks, committee chair and retired vice president for technology and productivity, AlliedSignal Inc., Bloomfield Hills, Mich. "Although it is still too early to speculate whether the program will achieve its long-term vision, it is making significant headway."

The FreedomCAR (Cooperative Automotive Research) and Fuel Partnership, a research collaboration among the U.S. Department of Energy, the Big Three automakers, and five major energy companies, seeks to develop emissions-free and petroleum-free vehicles. The program includes the President's Hydrogen Fuel Initiative -- initiated in 2003 to develop technologies for hydrogen production and distribution -- and is a successor to the Partnership for a New Generation of Vehicles, a collaboration between federal agencies and automakers during the Clinton administration.

The long-term goal of the partnership is to develop technology that will help automakers decide by 2015 whether it is possible to manufacture and sell hydrogen-powered vehicles on a large scale. To achieve this goal, the program's partners are examining cost-efficient and safe ways to produce hydrogen from traditional and renewable energy sources, distribute it via filling stations, store it in vehicles, and convert it to electricity with fuel cells. The program also sponsors research to reduce the size, weight, and cost of all of the vehicle components needed. While pursuing these goals, the program is exploring technology that, in the short term, will provide more efficient and less polluting combustion engines, as well as electric batteries that could be used in hybrid vehicles with either fossil fuel- or hydrogen-powered engines.

The program's most difficult long-term challenge is hydrogen storage in vehicles, the report says. Hydrogen, whether gas or liquid, takes up more space than gasoline, requiring large, heavy tanks and frequent refueling. Commercially viable fuel cells with the desired performance, durability, and cost are another major challenge. Also, appropriate hydrogen filling stations will need to be designed and widely deployed. DOE should pay special attention to challenges and technological innovations that will arise during the shift from petroleum to hydrogen as a transportation fuel, in order to set goals and foster technologies that would speed the transition to a mature hydrogen economy, the report says.

Like gasoline, hydrogen is flammable, so safe systems for transporting, storing, and handling it are needed. DOE should broaden its team of safety experts to identify overall safety issues, help develop codes and standards, and increase public awareness of hydrogen safety issues to facilitate the introduction of hydrogen vehicles into the marketplace, the report says. Also, DOE and the U.S. Environmental Protection Agency should investigate the possible long-term environmental effects of large-scale hydrogen production and its use in transportation vehicles. The FreedomCAR and Fuel Partnership's management should perform an

overall program evaluation and analysis to help the program's partners establish priorities and make informed decisions about possible trade-offs, the report adds.

Currently, short-term activities, such as research on advanced combustion engines and electric batteries, receive 30 percent of the program's funding; long-term research on hydrogen energy technologies receives 70 percent. This funding split is suitable, the committee said, although for the past two years Congress has appropriated significant portions of the overall funding for specific recipients and activities not focused on program goals. If this practice continues without an overall funding increase to compensate for it, timing milestones for the program will certainly slip, the committee said.

Source: The National Research Council

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