

**COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
U.S. HOUSE OF REPRESENTATIVES**

*Examining Federal Vehicle Technology Research and
Development Programs*

**Tuesday, March 24, 2009
10:00 a.m. -12:00 p.m.
2318 Rayburn House Office Building**

PURPOSE

On Tuesday, March 24 the Subcommittee on Energy and Environment will hold a hearing to receive testimony on the Department of Energy's (DOE) Vehicle Technologies research and development programs. Witnesses will discuss the role of federal research programs in light and heavy duty vehicle technology development, as well as future directions for FreedomCar and 21st Century Truck Partnerships at DOE, specifically, and proposals for programmatic changes to meet ever-changing market and public needs.

WITNESSES

- **Mr. Steven Chalk** - Principal Deputy Assistant Secretary - Energy Efficiency and Renewable Energy - U.S. Department of Energy
- **Dr. Kathryn Clay** - Director of Research - Alliance of Automobile Manufacturers
- **Mr. Anthony Greszler** - Vice President of Government and Industry Relations - Volvo Powertrain North America; Member - 21st Century Truck Partnership Executive Committee
- **Dr. John H. Johnson** - Presidential Professor of Mechanical Engineering - Michigan Technological University; Chair - National Academies Committee to Review the 21st Century Truck Partnership
- **Mr. Thomas C. Baloga** - Vice President of Engineering U.S. - BMW of North America

BACKGROUND

For over two decades the Department of Energy has funded a wide range of research activities on passenger vehicles and heavy-duty trucks through its Vehicle Technologies program. The program's mission is to "Develop 'leap frog' technologies

that will provide Americans with greater freedom of mobility and energy security, while lowering costs and reducing impacts on the environment.” Most recently DOE has addressed these research needs through two public-private research programs: The 21st Century Truck Partnership (21CTP), which conducts R&D through collaborations with the heavy-duty trucking industry; and the FreedomCar and the Hydrogen Fuel Initiative programs which examine the pre-competitive, high-risk research needed to develop technologies that will apply to a range of affordable cars and light trucks.

Over the last decade federal research priorities have shifted between passenger and heavy duty vehicles, as well as diesel-hybrids, hydrogen-fueled, and battery-powered drive systems. While the programs have had some notable successes in transferring technologies to the marketplace, critics contend that previous administrations have adopted an inconsistent winner-take-all approach to vehicle research where one technology or platform receives the large bulk of funding, only to have funding cut before the programs can reasonably be expected to develop commercially viable technologies. They will argue that what is needed is long-term sustained funding on a broad range of areas from near-commercial technologies to exploratory research on systems with the potential to revolutionize transportation in the U.S. Striking the appropriate research balance and strengthening the federal commitment in this area is especially critical at a time when both the automotive and trucking industries have very limited resources for research and development.

Light Duty Vehicles and the FreedomCar Partnership

FreedomCar has been focused primarily on R&D for hydrogen-powered passenger vehicles. Launched in 2003, the initiative aims to help industry make mass-market fuel cell and hydrogen combustion vehicles available at an affordable cost within 10 to 15 years. The program replaced the Clinton Administration initiative, the Partnership for a New Generation of Vehicles (PNGV), which was funded for 10 years with the goal of developing ultra-efficient diesel hybrid passenger vehicles with fuel mileage up to 80 miles per gallon. PNGV resulted in prototype vehicles that met the criteria, but was ultimately cancelled in 2001 at the request of the industry partners represented as U.S. Council for Automotive Research (USCAR – Daimler Chrysler, Ford, and General Motors).

The FreedomCar program was then established as a collaborative effort between DOE, energy companies and the USCAR partners, and the focus was shifted to longer-term research on hydrogen vehicles. While simultaneously pursuing their own proprietary research, the partners work together to develop hydrogen technology roadmaps, determine technical requirements and goals, and suggest R&D priorities for the federal program. Efforts are divided among six technical teams: fuel cells, advanced combustion and emissions control, systems engineering and analysis, electrochemical energy storage, material, and electrical and electronics. Generally, the partners aim to have reliable systems for future fuel cell power trains with costs comparable to conventional internal combustion engines and automatic transmission systems. If successful, advances in hydrogen technologies could ultimately mean significant

reductions in greenhouse gas emissions, reduced fuel costs for consumers, and greatly decreased imports of foreign oil.

However, FreedomCar has raised public debate over several issues including the proper role of the government in R&D with ultimate market applications, as well as the appropriate level of funding for such long-term research when there are more immediate needs in the vehicle sector. The Congressional Research Service found that some critics of the program believe that there are too many technical and economic hurdles to the development of affordable, practical hydrogen and fuel cell technology for automobiles, and that federal research should focus on more realistic goals. Proponents of hydrogen research contend that it will require many years of sustained funding to realize its potential for revolutionizing the transportation sector, and withdrawing support now would amount to the squandering of several years and billions of dollars in government and private research.

Between 2003 and 2008 the FreedomCar and the hydrogen related research at DOE saw a steady increase in funding from \$184.6 million to \$338.5 million. However, for FY09, the Bush Administration's request for hydrogen related research within the Vehicle Technologies program dropped 30 percent below the FY08 appropriation, indicating that the program's focus would shift towards plug-in hybrid and alternative fuel vehicles technologies.

Medium-to-Heavy Duty Trucks, and the 21st Century Truck Partnership at DOE

Launched in 2000, the 21st Century Truck Partnership (21CTP) explores technology improvements in commercial and military trucks and buses. The aim of the program is to support R&D in five key areas: engine systems, heavy-duty hybrids, parasitic losses, idle reduction and safety. Other federal agencies in the 21st Century Truck Partnership include the Department of Defense, Department of Transportation, and the Environmental Protection Agency. The goal of 21CTP is to combine federal and industry resources to develop a balanced portfolio of heavy-duty truck research activities, coordinate their research activities where appropriate, and make effective use of the nation's research universities and national laboratories. In addition to funding specific research projects, 21CTP also serves as a forum for information exchange across all government and industrial sectors related to heavy truck research.

Funding for the Partnership steadily increased from \$45.6 million in FY99 to \$86.6 million in FY02. However, despite the potential economic and environmental benefits of improvements in trucks and the considerable technical hurdles that remain, the 21st Century Truck Partnership started to see a decrease in its funding in FY03 and hit a low of \$29 million in FY08. Stakeholders in 21CTP contend that the Bush Administration's decision to shift the focus of federal research to the passenger vehicle market came at the expense of truck related research.

Since 2000 there have been a number of suggestions on how to improve the 21CTP. In 2008, the National Academy of Sciences (NAS) at the request of DOE

released a report entitled, “Review of the 21st Century Truck Partnership.” In this report the Academies panel examined the overall adequacy and balance of the program, and made recommendations to improve the likelihood of 21CTP meeting its goals. There are a variety of recommendations related to the five main research areas and additional recommendations on the structure and management of the program. The Chair of this review panel will testify on the panel’s findings and recommendations at the hearing.

Electric hybridization is one area of focus for 21CTP. The power demands on trucks are as varied as the applications, and significant technical hurdles remain in hybridization. There is no one-size-fits-all solution for the entire sector. For example, through the course of an average drive cycle the charging and discharging of a hybrid system on a refuse truck, with its frequent starts and stops, dumpster lifting, and trash compaction, will be considerably different than that of a utility truck which may sit idling in one place for several hours in order to operate the bucket lifting boom and other equipment. Hybridization of long-haul tractor trailer rigs (Class 8) may prove even more challenging since they seldom brake during a drive cycle, providing few opportunities for battery systems to recharge through regenerative braking.

While the total number of heavy trucks is small compared to passenger vehicles, their fuel consumption and emissions justifies the high costs of development of hybrid models and other advanced truck technologies. According to figures by the Oshkosh Truck Corporation there are approximately 90,000 refuse collection trucks in the U.S. but their collective fuel consumption is roughly equivalent to 2.5 million passenger vehicles (based on 10,000 gallons/year per truck). Estimates done by the Eaton Corporation show that as little as 10,000 hybrid electric trucks could reduce diesel fuel usage by 7.2 million gallons/year (approx. 1 million barrels of oil), reduce NOx emissions by the amount equivalent to removing New York City’s passenger cars for 25 days, and reduce carbon dioxide emissions by 83,000 tons.

Given the additional funding for vehicle technologies under The American Recovery and Investment Act, and growing public awareness of the need for new vehicle technologies, it is important that DOE programs be continually assessed for their ability to meet the changing needs of the transportation sector. Witnesses at the hearing will address both the strengths and weaknesses of the public-private research programs, as well as provide suggestions for how the programs can be enhanced to ensure the most appropriate use of taxpayer funds in this sector.