

NRC Reports Affordability and Emission Controls as Key Issues in PNGV Initiative

After evaluating hundreds of technologies, the Partnership for a New Generation of Vehicles (PNGV) reached its first major milestone last year by selecting the technologies that show the most promise for meeting the program's goals and deadlines of creating an affordable, mid-size vehicle that could get up to 80 miles per gallon (mpg) while meeting prevailing emission standards. The hybrid-electric vehicle—an electric car that also has a small diesel engine—is a front-runner because it has the potential to achieve up to 80 mpg.

However, although the hybrid-electric vehicle is technologically advanced and could meet many of the program's goals, these types of cars might be too expensive to compete in the U.S. market, said a committee of the National Research Council in a report issued in April 1998, the latest in a series of annual reviews of the program. In addition, major technological advances will be needed to control engine emissions.

Hybrid-electric vehicles would require complex and costly battery, power-conversion, and electronic-control systems. Because they would make the vehicle more expensive, money saved on fuel could fall far short of offsetting the higher purchase prices, the report said. Owners also might spend more on maintenance because the systems are more complex.

The committee said that PNGV should continue to analyze costs and, if warranted, the program should be expanded to include the development of lightweight, conventional vehicles. Built with advanced diesel engines and many other technologies developed in the program, these vehicles could reach up to 60 mpg and would cost about the same to manufacture and maintain as current automobiles. Improved engine-emission control systems also would be needed to meet program goals.

Although the diesel engine is the most advanced of the primary power-source technologies considered, the committee said, significant technological developments still are needed to reduce emissions. More funds should be devoted to developing advanced engine emission-control systems to meet strict emissions standards, and suppliers of these systems should be more involved in the program. In addition, PNGV should continue to evaluate

other types of internal-combustion engines, such as the gasoline direct-injection engine, to determine whether they could meet the emission requirements while being fuel-efficient and affordable.

The report said that the partnership also should continue to examine the types of fuels that will be needed and whether they can be readily supplied and distributed. To meet emissions standards, any type of engine developed through the program could require fuels that are lower in sulfur content. If the chosen fuels significantly differ from those already in use, the projected costs for fuel production and distribution should be determined early in the development process. The oil industry should cooperate more closely with the program in analyzing and developing new fuels, the committee said. Fuels that are not widely available could greatly delay the introduction of the PNGV vehicles on the market.

The committee recommends that PNGV evaluate whether technologies under development can be transferred to sport utility vehicles, minivans, and light trucks, which make up almost 50% of sales in the current U.S. automotive market. Whenever possible, the program should begin strategies for transferring technological advances to these types of vehicles, which need to be included to make an impact on U.S. fuel consumption.

The committee said that funding for research on fuel cells—which have the best potential for being highly energy efficient with near-zero emissions—should continue at present levels or be increased. Fuel cells already are being developed in Japan and Europe and could become critical for maintaining U.S. competitiveness. Research is needed on reducing the substantially higher projected costs of fuel cells. In addition, the committee recommends that the federal government take the lead in identifying and developing other longer range, higher risk, potentially useful technologies that may not be ready for use in the initial PNGV concept cars and production prototypes that are scheduled for 2004.

For previous coverage of the PNGV initiative, see *MRS Bulletin*, July 1997, page 12, and July 1996, pages 12 and 13.

Copies of *Review of the Research Program of the Partnership for a New Generation of Vehicles: Fourth Report* are available from the National Academy Press, Box 285, 2101 Constitution Ave., N.W., Washington, DC 20055; 800-624-6242; 202-334-3313; <http://www.nap.edu>.

Smith Named to Head NIST Materials Science and Engineering Laboratory

Leslie E. Smith, a nearly 30-year veteran of the National Institute of Standards and Technology (NIST), has been appointed as the director of the agency's Materials Science and Engineering Laboratory (MSEL) by NIST Director Ray Kammer. Dale Hall, acting MSEL director since March 1997, will resume his duties as the laboratory's deputy director.

Smith joined the National Bureau of Standards (NIST's predecessor until 1988) in 1969 as a physical chemist and has served NIST in a number of key roles since then. These include chief of the Polymers Division; director of the NIST Program Office; acting associate director of NIST; and, most recently, a second tour as chief of the Polymers Division.

Smith's research interests have focused primarily on the physical interactions of polymers with other materials and the behavior of polymers in thin films. In particular, he has investigated the use of polymers in synthetic medical implants and in magnetic recording media. From 1985 to 1992, Smith served as the U.S. editor for the international journal, *Polymer Communications*.

Graduate Enrollments in Science and Engineering Continue Downward Move

Following 15 years of consistent gains, graduate enrollments in science and engineering for 1996 declined for a third straight year, according to a newly published National Science Foundation (NSF) Data Brief. The NSF figures show that enrollment of women in graduate science and engineering (S&E) programs, which rose consistently since 1980, went up again by about one percent over the 12-month period ending in the fall of 1996. Meanwhile, graduate S&E enrollments for men, which started downward in 1992, continued its slide, down 3.3% from 1995 to 1996. Overall, there have been more than 20,000 fewer S&E graduate enrollments from 1993 to 1996. Enrollments have declined consistently in the physical sciences (3%) and in engineering (4%).

The data brief is produced by NSF's Division of Science Resources Studies. For more information see <http://www.nsf.gov/sbe/srs/stats.htm>. □

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