

Assessment of Technologies for Improving Fuel Economy of Light-Duty Vehicles – Phase 3

Statement of Task

The committee that will be formed to carry out this study will continue the work of the National Academies for the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) in the assessment of technologies for improving the fuel economy of light-duty vehicles. While the committee will need to consider the near term deployment of fuel economy technologies, it is tasked with looking out into the 2025 to 2035 time frame to provide updated estimates of the potential cost, fuel economy improvements, and barriers to deployment of technologies. The committee will need to broadly consider the types of technologies that might emerge over this time period and their impacts on fuel consumption. It will also consider shifts in the personal transportation and vehicle ownership models and how such shifts might impact vehicle technologies. The committee will build on the assessments completed in earlier National Academies reports, including the first two phases of this series of studies Assessment of Fuel Economy Technologies for Improving Light-Duty Vehicle Fuel Economy (2011) and Costs, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles (2015). It will reflect on developments since these reports were issued and investigate any new technologies and trends in consumer behaviors that may become important by 2035. In particular, the committee will:

1. Examine the costs (direct and indirect), fuel economy improvements, and potential implementation timing for high volume production of technologies for internal combustion engine powertrains.
2. Examine the costs (direct and indirect), fuel economy improvements, and potential implementation timing for high volume production of electric powertrain technologies. The committee shall include an examination of the cost, performance, durability, usable battery capacity and other issues related to critical components, including batteries, ultracapacitors, and power electronics and auxiliary vehicle systems such as heating and cooling. The committee will also address transition issues associated with meeting the infrastructure needs for such powertrains.
3. Examine the costs (direct and indirect), fuel economy improvements, and potential implementation timing for high volume production of non-powertrain technologies including mass reduction, aerodynamics, low rolling resistance tires, and vehicle accessories. For mass reduction, the committee shall consider opportunities for a range of baseline vehicle materials, including steel, high strength steel, mixed metal, aluminum, polymers, composites and others. The committee shall include an examination of methodologies for cost assessment of mass reduction, including equipment and retooling costs, manufacturing issues, supply chain requirements, and implications for durability, safety, and reparability.

4. Consider the current and possible future role of flexibilities in the CAFE program on the introduction of new technologies, including credit trading, treatment of alternative fuel vehicles, off-cycle provisions, and flexibilities for small volume manufacturers.
5. Assess how shifts in personal transportation and vehicle ownership models might evolve out to 2035, how these changes could impact fuel economy-related vehicle technologies and operation, and how these changes might impact vehicle scrappage and vehicle miles traveled. Scenarios might be used to bound this task.
6. Examine consumer behavior issues associated with new fuel efficiency technologies, including acceptance of any utility or performance impacts and cost of new technologies. This could include considerations of consumers' willingness to pay for improvements in fuel economy and other vehicle attributes.
7. Write a final report documenting the committee's conclusions and recommendations.

Expertise Needed

The appointed committee will consist of about 14-16 members with expertise in the following areas: spark ignition (gasoline) engine technologies; hybrid electric vehicle technologies; battery technologies; compression ignition (diesel) engine technologies; vehicle technologies; engineering cost analysis; economics; systems engineering; automotive design and manufacturing; light-duty vehicle transportation systems; vehicle marketing; consumer behavior in the vehicle sector; vehicle safety; vehicle lifecycle cost analysis; policy analysis; light duty fuel economy regulation. Individual committee members may have expertise in more than one area.