INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

June 27, 2008

The Honorable Nicole R. Nason
Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE, West Building
Washington, DC 20590

Notice of Proposed Rulemaking; 49 CFR Parts 523, 531, 533, 534, 536, and 537; Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011-2015; Docket No. NHTSA-2008-0089

Dear Administrator Nason:

The National Highway Traffic Safety Administration (NHTSA) has requested comments on a proposal to increase corporate average fuel economy (CAFE) requirements for passenger cars and light trucks. The proposed standards, required for 2011-15 models, would apply the same vehicle attribute-based structure to cars that already applies to light trucks.

The Energy Independence and Security Act of 2007 mandates the use of a vehicle attribute-based structure for setting fuel economy standards for light trucks and cars, but this system currently is being applied only to light trucks. Applying it to cars will continue to encourage automakers to use new fuel efficiency technologies to achieve fuel savings rather than simply making vehicles smaller and lighter. The current standards for light trucks, and the proposed standards for both cars and light trucks, use a vehicle's "footprint" to determine its required miles per gallon. NHTSA also is proposing to maintain the use of a continuous function, as opposed to a step function, to assign fuel economy targets to vehicles.

The Insurance Institute for Highway Safety (IIHS) strongly supports the extension of an attribute-based system to cars and the agency's proposal to index fuel economy to a continuous function. The latter is important to eliminate some of the safety issues related to the alternative step function. We also agree that use of vehicle footprint as the index attribute will mitigate much of the potential for automakers to downweight or downsize vehicles to improve fuel economy and, hence, will help maintain the safety benefits associated with those attributes. However, as explained in previous comments (IIHS, 2005), we still believe that a vehicle mass-based system offers a more direct approach to balancing fuel savings with safety.

Continuous versus step function

NHTSA has proposed using a continuous function to assign fuel economy targets, and IIHS strongly supports this approach. The alternative step function, under which vehicles are categorized according to their footprints, raises several safety concerns. A main concern is the incentive for automakers to redesign vehicles with minimally larger footprints to achieve lower fuel economy targets or to downsize vehicles to achieve weight reductions within footprint categories.

A step function can include relatively large spans of footprints, across which vehicle weights and fuel economy can vary significantly. By minimally boosting the footprint of a vehicle near an upper boundary, an automaker can gain a large benefit in meeting fuel economy targets. By the same token, an automaker can significantly decrease a vehicle's size and weight as long as the changes do not place the

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vehicle below the lower boundary of its current step. To reduce or eliminate these incentives, NHTSA proposes to use a continuous function, which also would help market preferences serve as a restraint against unnecessary vehicle footprint changes. The changes some vehicles would require to cross boundary lines in a step function system may be small enough to escape the notice of consumers, but car buyers would be more likely to notice design changes incorporated to achieve a substantial CAFE benefit in a continuous function system.

Footprint versus mass as the system's attribute

A vehicle's footprint is the product of its wheelbase and average track width. Using this metric to determine CAFE standards is less intuitive than using vehicle mass, which is more strongly related to fuel consumption. The effects of mass on vehicle crashworthiness have been observed and documented in numerous published studies (e.g., Kahane, 1997; O'Neill et al., 1974; Partyka, 1996), but the relationship between vehicle footprint and safety is less well established. In a frontal crash, the most common type of fatal crash, the ability of a vehicle's structure to protect its occupants is influenced by its own properties, those of the vehicle or object that is struck, and the speed and configuration of the impact. Relevant vehicle characteristics include mass, length and stiffness of the crush zone, and strength of the safety cage. Although a vehicle's footprint is correlated to some of these properties, it does not directly measure any of them.

NHTSA has said in the past that the goal of the footprint-based system is to "encourage broader use of fuel saving technologies, resulting in more fuel-efficient vehicles and greater overall fuel economy" (70 *Fed. Reg.* 51455 (Aug. 30, 2005)). Our concern is that there are at least two ways automakers could achieve CAFE improvements without incorporating new technologies. The first is to redesign vehicles with larger footprints, thus relaxing their fuel economy targets. If the accompanying mass increase were small, a vehicle might meet its new, lower target even though actual fuel consumption would not decrease. Consumption could even increase because of slight additional mass or aerodynamic drag. The safety implications of this are unclear. If automakers were to use this method of compliance, the result could be a safety improvement, as larger vehicles theoretically could enhance occupant protection. But it also could allow more powerful engines, leading to faster travel speeds and riskier driving and thus more crashes and injuries.

A second way vehicles could meet stricter CAFE requirements without incorporating new fuel efficiency technologies is by reducing mass while maintaining size so as to maintain the same footprint-based category. A lighter vehicle would consume less fuel but be subject to the same target as the previous, heavier design. However, reducing vehicle mass typically reduces crashworthiness. The magnitude of the effect on safety depends on how an automaker achieves the reduction in mass and which vehicles are made lighter. Automakers could use lighter materials, maintaining the same size and structural performance, thus limiting the safety consequences. Still there would be a crashworthiness effect because of the separate effects of decreased size and weight (Kahane, 2003; National Academy of Sciences, 2002). The fleet-wide effect on safety of decreasing vehicle mass would be most apparent if the weight reductions were among the smallest and lightest vehicles. If the reductions were among the heaviest vehicles, the increased crash injury risk for their occupants could be offset by decreases in the risks these vehicles pose to others on the road. If the reductions were among vehicles weighing more than 5,000 pounds, then the result could be a net societal safety benefit (Kahane, 2003).

Despite these concerns, IIHS agrees that indexing fuel economy to a footprint-based system will control the most egregious threats to safety, which occur when vehicles are both downweighted and downsized. We also note that in this era of very high fuel costs, consumers are likely to opt for lighter vehicles in any case, further blurring the distinction between mass- and size-indexed systems.

Conclusion

From a safety standpoint, IIHS is encouraged that NHTSA has proposed to extend the concept of a footprint-indexed fuel economy standard to all passenger vehicles. Although we think a mass-indexed standard would make even more sense, we agree that the footprint index will mitigate the safety costs that might otherwise occur as federal fuel economy requirements are ratcheted upward. To maximize effectiveness, it is especially important that required fuel economy be a continuous function of footprint rather than a step function.

Sincerely,

Adrian K. Lund, Ph.D.
President

cc: Docket Clerk, Docket No. NHTSA-2008-0089

References

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