GlobalAutomakers

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John Bozzella, Global Automakers' President and CEO, offers these responses to Additional Questions for the Record submitted after the House Energy and Commerce Subcommittee on Commerce, Manufacturing and Trade and the Subcommittee on Energy and Power joint September 22, 2016 hearing entitled "Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles."

The Honorable Michael C. Burgess M.D.

1. **In your opinion, are advances in conventional internal combustion engine technology (i.e., non-hybrid) sufficient by themselves to achieve the current standards for model year 2025? If not, could you please provide your estimates for how much of each of the following technologies (as defined in the TAR) will be required to achieve the current standards for model year 2025: (a) mild hybrid, (b) full hybrid, (c) plug-in hybrid electric vehicle, and (d) electric vehicle.**

   Our preliminary analysis of the Technical Assessment Report (TAR) suggests that the agencies' modeling has over-predicted the fuel efficiency benefits of several international combustion engine technologies and, thus, has under-predicted the amount of advanced technology needed to meet the standards for model year 2025. The agencies gathered data from many sources, but it is not clear how they prioritized use of that information. Also, EPA anticipates significant industry reliance on higher compression ratio, naturally aspirated engines to help meet future standards, but the benefits of this technology suggested in the TAR have not yet been substantively validated. Any overly-optimistic predictions about a technology's fuel efficiency will yield an under-prediction of the types and amounts of technology needed to achieve compliance obligations.

   Currently, less than three percent of vehicles meet the 2025 model year standards, even though manufacturers have already applied many of the technologies that the agencies predicted would allow them to come into compliance for the 2025 model year. There are no gasoline vehicles that meet the 2025 standards, and the only 2015 model year vehicles that meet the 2025 standards are advanced technology vehicles such as hybrids, plug-in hybrids, fuel cell electric vehicles or battery electric vehicles.

   While conventional internal combustion engine technology continues to improve, the industry has expressed concerns with the agencies that conventional technology alone will not be sufficient to meet the 2025 model year standards. Global Automakers believes that more hybrids and electric-drive vehicles will be needed to meet the standards than the agencies have predicted. We are undertaking a more in-depth analysis of the TAR's modeling and results to better approximate the percent of each

different technology that will be needed to meet the current 2025 standards. Once our analysis is complete, we will share it with the agencies and with the House Energy and Commerce Committee.

2. **According to Table ES- 3 of the TAR, EPA's compliance pathway for meeting the MY2025 GHG standards envisions that 44% of vehicles would use higher compression ratio, naturally aspirated gasoline engines. If a manufacturer does not have that type of engine in any of its vehicles today, what steps would it have to take in order to integrate that type of engine in its product line, and how long would it take for it to reach a 44% penetration rate?**

In planning a new fleet of vehicles, there are several factors that impact the ability and timeframe to roll out technologies, including product planning, technology research and development, safety testing, supply chain logistics, manufacturing tooling, and so forth. It is important to note that the 44% penetration rate of the higher compression ratio, naturally aspirated gasoline engines is a fleet-wide average and will apply differently to each vehicle manufacturer. EPA's technology pathway predicts that some manufacturers' use of higher compression ratio, naturally aspirated gasoline engines will be as high as 70% of their fleets. If this technology is not already in use by such manufacturer, then that is a significant portion of the fleet to change over.

One of the key aspects related to the ability to change technology is associated with product cycles. The 2015 NAS report, *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*, looked at motor vehicle product planning as the coordination of three different development cycles: (1) models, which undergo major upgrades every six to eight years, on average, (2) powertrains and transmissions, which are upgraded every 10 to 15 years, and (3) new vehicle platforms, which can remain in use seven to 10 years.[1] Based on these product development constraints, it is unlikely that a given manufacturer will be able to increase their fleet from 0% to 44% higher compression ratio, naturally aspirated gasoline engines in less than ten years.

This is just one technology pathway to meeting the standards, which EPA has determined is the least-cost pathway. Automakers, of course, may choose different pathways for various reasons, including those not necessarily related to costs (*e.g.*, brand identity, competitive strategy, etc.). Based on EPA's assessment, doing so would increase compliance costs even more.

To summarize, EPA's low-compliance-cost fleet projection is predicated on an assumption that the industry will rapidly adopt and incorporate multiple unproven technologies in a short period of time. For a capital-intensive industry like the

[1] National Academies of Science. "Chapter 7: Cost and Manufacturing Considerations for Meeting Fuel Economy Standards." *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles.* (2015), p. 256. https://www.nap.edu/read/21744/chapter/9

automobile industry, this is fundamentally unrealistic. While some of these technologies may succeed in the market, some may not. Others may see a slower pace of customer receptivity and gain market traction over time through gradual, iterative refinements of the technology. EPA's projected TAR costs reflect a "perfect" scenario of lowest cost technology development, rapid technology introduction and broad public receptivity. Should EPA's scenario not bear out in reality, automakers will face higher compliance costs than predicted by the agency.

3. **In the TAR, the EPA states that in its modeling, "the California Zero Emission Vehicles (ZEV) program is considered in the reference case fleet; therefore, 3.5% of the fleet is projected to be full EV or PHEV in the 2022-2025 timeframe due to the ZEV program and the adoption of that program by nine additional states." TAR at ES-10. Since a significant portion of the required GHG reductions will be met through manufacturing electric-drive vehicles for the ZEV mandate, shouldn't EPA have considered those costs in its assessment of the costs of the regulation? If EPA had considered the costs of producing electric-drive vehicles, what impact would that have had on the cost estimates in the TAR?**

You are correct. In its regulatory account of costs and benefits, EPA included the benefits of ZEVs but did not account for the costs of the ZEV mandate; NHTSA has not considered the impact of the mandate at all. The ZEV mandate requires a growing percentage of vehicles to be ZEVs by 2025, estimated in 2012 to be approximately four million ZEVs sold in California and the nine other states that have adopted California's ZEV mandate. Since these ten states require ZEVs, these vehicles will be factored in as part of a manufacturers' national fleet for GHG compliance purposes. Thus, both the volume of ZEVs and associated technology costs should be assessed as part of the GHG compliance pathway.

If EPA were to consider the cost impact of the ZEV mandate, the TAR's estimated cost of compliance would increase because electric-drive technologies cost substantially more than other technologies on a per-ton of CO_2 reduced basis. EPA projects that the increase in the average per-vehicle costs of meeting the MY 2022-2025 standards are $894 - $1,017. Our preliminary analysis shows that the average vehicle price would increase by $356 on top of the EPA estimate (or an additional 35-40%) when accounting for electric-drive vehicles that are required by the ZEV mandate. This has a significant impact on Americans' monthly budgets, as the overall cost of the average vehicle is already more than half of the 2015 median income of $56,500.[2]

These higher costs could lower consumer demand, especially given the concerns that customers have about the convenience and the perceived durability and reliability of vehicles

[2] http://www.nytimes.com/2016/09/14/business/economy/us-census-household-income-poverty-wealth-2015.html?_r=0.

that use electric-drive technologies. By way of comparison, conventional hybrid vehicles have been in the market for over 15 years. While conventional hybrids do not share some of the customer acceptance challenges facing most electric-drive vehicles (such as the need for available electric charging), hybrid vehicle sales are still sensitive to consumer preferences and market changes, as evidenced by the drop in hybrid sales nationally from three percent in 2013 to less than two percent in 2016.[3]

4. Mr. German mentioned a study prepared by Novation Analytics at the behest of your trade associations and implied that it was backwards looking and didn't account for future technologies. Is this true, and if not, why not?

The Novation Analytics study referenced by Mr. German is an analysis of the 2012 final rule in which Novation Analytics, through a detailed assessment of the EPA's and NHTSA's modeling processes, provides valuable plausibility checks and other information that could be utilized by the agencies to improve their modeling efforts during the midterm evaluation process. (At the time Novation Analytics conducted its analysis, the agencies TAR modeling assumptions and inputs were not yet available). Among the study's findings is an identification of overly optimistic agency efficiency projections for certain technologies.

While the Novation Analytics work does not directly include forecasts of new technologies not currently in the market, it does consider improvements to the powertrain overall, including application of new hardware and incorporation of learning, *i.e.* that manufacturers will shift to "best-in-class" fuel efficiency over time.

Moreover, the Novation Analytics study does not exclude the benefits delivered by mass reductions and other load reductions. In fact, the work assumes that the agencies' estimates for future fuel efficiency improvements associated with mass reduction, aerodynamics and tires are met. These values are accepted and removed from the analysis to allow for a powertrain-focused assessment.

Novation Analytics' work does not suggest that the standards cannot be met. Rather its findings support that, in contrast to agency assertions, additional technology, with additional associated costs, will be needed to meet upcoming compliance obligations. These findings were presented to EPA, NHTSA and CARB in the months leading up to the TAR release.

Based on a preliminary analysis of the TAR's modeling, we believe a number of the same modeling concerns found in the 2012 final rule still exist, which underscores our concern that additional technologies and cost will therefore be needed to achieve the model year

[3] IHS Global New Vehicle Registration Data, 2013 and January-June 2016.

2025 standards.

5. **If the assumptions in the TAR prove wrong, what, if anything, can we do to mitigate the damage to consumers and industry?**

Congress plays an important role in the oversight of the agencies and regulations to ensure that regulatory actions are transparent, scientifically sound, data-driven and robust. Through oversight, Congress can review the agencies' methodologies and recommend that they consider the most up-to-date data in the midterm evaluation. Congress can also highlight the critical role of all Americans in meeting the GHG and CAFE regulations. Consumer acceptance of new technologies and vehicle affordability must be considered by the regulators.

Further, there is space for legislative action by Congress to further harmonize the EPA, NHTSA and California programs to better achieve one national program. For example, it may be possible for Congress to take legislative action to change the current statutory requirements that each of the federal agencies must follow. By aligning these statutory guides further, we can reduce drag in the system and better encourage innovations to reduce emissions and improve fuel economy.