Introduction

These comments are submitted by the Alliance of Automobile Manufacturers (Alliance), an association representing 12 manufacturers of cars and light trucks.[1] The Alliance supports the One National Program (ONP) and its goals of reducing greenhouse gas (GHG) emissions and improving the corporate average fuel economy (CAFE) of light-duty vehicles via harmonized federal and state regulations.

In 2011, 13 light-duty vehicle manufacturers, including several Alliance members, submitted letters[2] to the U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA) (collectively, Agencies) in support of the model year (MY) 2017-2025 ONP. A key reason those manufacturers were able to support standards[3] that would not be in effect until over a decade later was due to the Agencies' agreement to conduct a midterm evaluation (MTE) of those standards. The MTE is meant to reassess the practicability and feasibility of the MY2022-2025 standards by examining all relevant factors, including the availability, benefits, and costs of technology; factors related to customer acceptance; economic factors; and other related issues.[4] A proposed determination of the appropriateness of the GHG standards and notice of prosed rulemaking (NPRM) for the CAFE standards for MY2022-2025 is expected in 2017[5] and a final determination on the GHG standards must be made by April 2018, with a CAFE final rule to follow.[6] The Draft TAR is the first milestone in the MTE process. It forms the basis on which the proposed determination and NPRM will rely. As such, it is critically important that it be fact-based, accurate, and robust in its analysis.

The Draft TAR contains more than 1,200 pages and incorporates the findings of dozens of separate studies, most of which were not previously available. Recognizing the complexity of this analysis, on August 1, 2016, the Alliance submitted a request for an extension of the 60-day comment period.[7] The Agencies denied this request. Nonetheless, the 60-day comment period is not a sufficient amount of time to review and provide meaningful input on all of the complex

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[1] Alliance members are BMW Group, FCA US LLC, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche Cars North America, Toyota, Volkswagen Group of America, and Volvo Car USA. For more information, please visit: www.autoalliance.org.

[2] "Transportation and Climate: Presidential Announcements and Stakeholder Commitment Letters." EPA. Accessed September 7, 2016. https://www3.epa.gov/otaq/climate/letters.htm#2011al.

[3] The Alliance recognizes that the MY2022-2025 CAFE standards are considered "augural" and subject to a de novo rulemaking. For simplicity, these standards are herein referred to, at times, without noting their augural status.

[4] 40 CFR 86.1818-12(h) and 77 Fed. Reg. 62784 (Oct. 15, 2012).

[5] See https://www3.epa.gov/otaq/climate/mte.htm and http://www.nhtsa.gov/Laws+&+Regulations/CAFE+-+Fuel+Economy/ld-cafe-midterm-evaluation-2022-25. Accessed September 23, 2016)

[6] *Id.*

[7] Letter from Chris Nevers, Vice President, Environmental Affairs, The Alliance of Automobile Manufacturers to Chris Lieske, Environmental Protectio Agency, Rebecca Yoon, National Highway Traffic and Safety Administration, and Michael McCarthy, California Air Resources Board (August 1, 2016). Docket ID EPA-HQ-OAR-2015-0827-0928 and NHTSA-2016-0068-0022.

technical analyses in the Draft TAR. The Alliance anticipates submitting supplemental comments after the close of the 60-day comment period, and expects that the Agencies will respond formally to those comments prior to issuing a proposed decision and NPRM to ensure that they include the most up-to-date information.[8]

The Alliance has significant concerns with much of the data and analyses in the Draft TAR. Our key concerns fall into two areas. The first is a fundamental disagreement with the level of technologies modeled by the Agencies as likely required for manufacturers to comply with the future standards. Simply stated, there are numerous flaws in the modeling, and additional (and more costly) technology will be needed than suggested by the Draft TAR. The second concern is that the Agencies have not adequately met their obligation to assess customer acceptance of those technologies that will be necessary for future compliance. These concerns are interrelated: if flawed modeling projects the cost of compliance incorrectly low, then customer acceptance, willingness, and/or ability to pay for such efficiency improvements will be lower than projected. In particular, customer willingness to pay for efficiency is further hampered by the dramatic decrease in fuel prices since the 2012 final rulemaking (2012 FRM).[9] This directly threatens both the ability of manufacturers to comply with the standards and the overall success of the program.

In addition, experience with the ONP has demonstrated two other concerns, implicit in the Draft TAR, which must be addressed. First, "one" national program has not resulted in harmonizing the three underlying programs of EPA, NHTSA and the California Air Resources Board (CARB). Second, flexibilities and other necessary regulatory elements are crucial to compliance and the success of the program.

The following comments and ten modules address these concerns, and a number of other issues.

Agency Modeling Underestimates Actual Technologies Required

To predict GHG and CAFE compliance (and associated costs) five to eight model years in the future, the Agencies use various modeling techniques to identify potentially available technologies and to assess their effectiveness, cost, and impacts across the entire light-duty vehicle fleet. The Alliance has identified numerous issues with these techniques that must be addressed before going forward with the proposed determination and NPRM. In essence, the Agencies' fleet level modeling results do not match independent analyses of the technologies which will be required to meet future GHG and CAFE targets. These analyses predict more electrification will be required (including full hybrids) than either Agency predicts. There are

[8] Letter from Julia Rege, Director, Environment and Energy, The Association of Global Automakers, Inc., and Chris Nevers, Vice President, Environmental Affairs, The Alliance of Automobile Manufacturers to Janet McCabe, Acting Assistant Administrator for the Office of Air and Radiation, US Environmental Protection Agency and Paul Hemmersbaugh, Chief Counsel, National Highway Traffic Safety Administration (Sept. 9, 2016). Docket ID EPA-HQ-OAR-2015-0827-3292.

[9] "2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards," 77 Fed. Reg. 62623 at 62624 (Oct. 15, 2012).

several reasons for the differences in modeling outputs, including the Agencies' overestimation of technology effectiveness.

Specific comments on the Agencies' full vehicle simulation modeling can be found in Module 1, and comments on specific vehicle technologies in Module 2. These modules address the overarching concern that the Agencies appear to have minimized real-world constraints and have selected only the most optimistic data available for the purposes of evaluating technology costs, effectiveness, and leadtime.

Agency Modeling Outputs Do Not Match Third-Party Analyses

Third-party modeling outputs, both at the vehicle and fleet level, do not match either Agency's projections. The resulting conclusion from these third-party studies is that more technology will be needed than projected in the 2012 FRM. The Agencies' modeling methods overestimate the effectiveness of technologies at the vehicle level and over-project the vehicle level benefits to the fleet.

The Alliance consulted Novation Analytics (who also provided the Vehicle Load Reduction analyses attached as Appendix A to the Draft TAR) for their assessment of the Agencies' 2012 FRM technology pathway modeling. Novation Analytics provided a study[10] (Fleet Level Tech Study, attached as Attachment 1) which includes today's fleet with the latest, most advanced fuel efficient technologies noted by the Agencies as effective through 2025. This study examined the feasibility of achieving the energy conversion efficiencies implied by the MY2021 and MY2025 GHG and CAFE targets using the Agencies' projected technology mix.[11] The results of the study, shared with the Agencies and CARB, show that the MY2021 and MY2025 targets cannot be met with the suite of technologies at the deployment rates projected by the Agencies in the 2012 FRM. It concludes that more technology will be needed than predicted by the Agencies. Essentially, only vehicles as efficient as modern strong hybrids will meet those future targets and "conventional" powertrains will likely not displace the need for more electrification.

Oak Ridge National Laboratory (ORNL) reached similar conclusions in a recent publication.[12] ORNL concluded that "[t]he path to meeting 2025 standards will likely involve significantly larger numbers of hybrid electric powertrain vehicles and/or plug-in vehicles being sold, compared to the current U.S. sales of such vehicles." and "[i]t will be quite difficult for the most efficient gasoline vehicles to reach 29%-31% combined-cycle efficiency, but this is the level the gasoline fleet would need to average to comply with the 2025 regulations…"

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[10] "Technology Effectiveness – Phase 1: Fleet-Level Assessment." Novation Analytics. 2015.

[11] The Fleet Level Technology Study assumed all agency-projected mass, aerodynamic, and tire load reductions. It also accounted for learning and agency assumptions of credits.

[12] Thomas, J., "Vehicle Efficiency and Tractive Work: Rate of Change for the Past Decade and Accelerated Progress Required for U.S. Fuel Economy and CO_2 Regulations," *SAE Int. J. Fuels Lubr.* 9(1):2016, doi:10.4271/2016-01-0909.

Novation Analytics was subsequently consulted to investigate potential vehicle level sources of the issues identified in the Fleet Level Tech Study. The resulting study on vehicle level technologies (Vehicle Level Tech Study, attached as Attachment 2) identified Agency modeling process issues as the key source of error in technology benefit estimates.[13] This study identified a number of issues with the Agencies' modeling processes including:[14]

1. Some of the full vehicle simulation results used to calibrate technology effectiveness models are over-optimistic and fail basic, and very liberal, plausibility checks… the model assumptions do not properly account for implementation issues such as durability and reliability requirements, emissions and on-board diagnostics (OBD) compliance, and consumer needs such as drivability and noise-vibration-harshness (NVH) limits.
2. The [EPA Lumped Parameter Model] used to project the incremental effectiveness of technologies (applied to each manufacturer's vehicle models) are not based on the fundamental factors determining vehicle CO_2 and fuel consumption and thus fail to adequately capture the efficiency trends and relationships which influence the incremental benefit of added technology.
3. The [A]gencies' modeling processes do not recognize the inherent variability of efficiency within the light-duty fleet, treating all products within a category as equal… this approach results in over-projection of the most efficient vehicles.
4. No procedure or methodology is currently in place to check the outcomes of the technology effectiveness projection process against logical efficiency metrics and limits. Without such checks, the outcomes can exceed plausible limits.
5. **The combination of these sources of error – overoptimistic vehicle simulation results used to calibrate an oversimplified technology effectiveness projection process —compound and yield overoptimistic vehicle-level and ultimately fleet-level results.** (Emphasis added.)

In summary, the Vehicle Level Tech Study shows that the Agencies' modeling processes, particularly the EPA's Lumped Parameter Model (LPM), have systemic issues that need to be corrected to obtain accurate results.

To better ascertain fleet plausibility in MY2022-2025, the Agencies should move to full vehicle simulation with quality and plausibility checks. If EPA retains the LPM, it should be updated to reflect proper powertrain principles and its outputs should be validated against actual vehicles and full vehicle simulations which were not used to calibrate the LPM.

[13] "Technology Effectiveness – Phase II: Vehicle-Level Assessment." Novation Analytics. 2016.
[14] *Id.* at 8 et seq.

The 60-day comment period was not enough time to make a thorough analysis of all the modeling and to engage the Agencies in the sustained manner needed to resolve all the modeling issues before submitting our comments on the Draft TAR. The Alliance looks forward to working with the Agencies to address these and other modeling issues. We believe that the Agencies could hold public workshops to reassess and remedy the findings and recommendations identified in the Draft TAR and specifically in Chapter 5. The workshops could emphasize resolving issues in an iterative manner together with automakers and other experts, adding workshop days as needed, instead of the format using a presentation followed by questions and answers.

Technology Effectiveness and Cost

The core of the Agencies' technology assessments are the analyses located in Chapter 5 of the Draft TAR. The Alliance provides comments in Module 2 on some of the key technologies modeled by the Agencies such as advanced Atkinson cycle engines, gasoline downsized turbocharged direct injection (GTDI) engines, transmission technologies, mild hybrids, P2 versus power split hybrids, mass reduction, aerodynamic improvement, and tire rolling resistance reduction. Due to the limited time made available to comment on the Draft TAR, the Alliance focused its efforts on what were considered key technologies, but notes that the Agencies should not interpret a lack of comment on any specific area as assent.

The analysis includes the following key findings:

1. Advanced Atkinson Cycle Engines: EPA combines an Atkinson cycle engine (based on the Mazda SkyActiv engine) with cooled exhaust gas recirculation (CEGR) and cylinder deactivation, claiming large synergistic benefits, and applies the technology to 40% of the modeled MY2025 fleet. The Alliance identified multiple technical errors resulting in over-optimistic projections of benefit. In addition, we note that Mazda, other automakers, and EPA have not been able to verify the modeled benefits because this technology package could not be fully operated, even in a laboratory setting.
2. Downsized GTDI Engines: The Agencies' model inputs were based on high octane fuel and no consideration was given to customer acceptance when determining the degree of downsizing.
3. Transmission Technologies: The effectiveness modeled by the Agencies exceeds that demonstrated by manufacturers using the technologies described. Furthermore, EPA's grouping of transmission technologies ignores the unique effectiveness and cost implications of these vastly different technologies.
4. Mild Hybrids: The Agencies' cost and benefits estimates are inconsistent and should be revisited. In addition, projected costs failed to include those associated with vehicle integration.

5. Strong Hybrids: The Draft TAR assigns identical cost and effectiveness values to both Power-Split and P2 hybrids. The architectures of these two technologies are sufficiently different to warrant separate assessments.
6. Mass Reduction: Modeling of mass reduction in a continuous fashion instead of discrete bins yields incorrect benefit assumptions. Theoretical mass reductions do not properly account for materials already in use.
7. Aerodynamic Improvements: Aerodynamic improvements are too broadly applied, resulting in implausible levels of aerodynamic reduction for many vehicles.
8. Tire Rolling Resistance: Further consideration must be given to the degree of rolling resistance reduction applied to specific vehicles.

Individually and collectively, these issues will result in overestimation of the benefits of the technologies modeled, and subsequently result in underestimating the overall penetrations of technology to meet the MY2022-2025 standards (and resulting costs).

The Alliance makes the following recommendations to improve Chapter 5:

1. Full vehicle simulation modeling should be used to assess CO_2 and fuel economy (FE) performance. That is, the Lumped Parameter Model should be retired.
2. The advanced Atkinson technology package with CEGR and cylinder deactivation should not be utilized in the MTE analysis until the technology can be demonstrated to operate across all modeled operating points.
3. The Agencies should incorporate and make readily available modeling quality control parameters.
4. The GTDI packages should be revaluated for high load operation and other constraints while operating on 91 research octane number (RON) market and certification test fuels.
5. Vehicle performance metrics should be harmonized across both Agencies.
6. The EPA high efficiency transmission gear box (HEG2) package should not be utilized in modeling until it can be demonstrated as feasible.
7. The Agencies should study appropriate limits for reductions in tire rolling resistance related to customer acceptance.
8. Due to the various issues manufacturers face with implementing CEGR and cylinder deactivation, both Agencies should further explain and document the assumptions used in simulating related loss and electrical load functions.
9. The negative fuel economy and CO_2 impacts associated with Tier 3 emissions should be included in the analysis.
10. The negative fuel economy and CO_2 impacts associated with the California 1 milligram-per-mile particulate matter standard should be taken into account.
11. The Agencies should harmonize vehicle electrical loads.

Due to time constraints, the Alliance did not assess the fleet level costs of compliance described in the Draft TAR (or underlying assumptions such as learning and indirect costs), but did sponsor

studies by the Center for Automotive Research (CAR) to assess the cost and effectiveness of powertrain technologies and the costs and challenges to reducing mass.

The CAR Powertrain Study (attached as Attachment 3),[15] gathered actual cost data for powertrain technologies and pathways directly from manufacturers. The manufacturers' aggregated average direct manufacturing costs (DMC), when compared to NHTSA's cost estimates, show that most DMCs are, in general, higher than NHTSA's costs from the 2012 FRM. Given the trend shown in the study, even neglecting the predicted need for more technology than the Agencies estimated, the Alliance expects the Agencies' under-estimation of technology costs have continued in the Draft TAR. The CAR Powertrain Study indicates the cost of compliance to the MY2022-2025 targets will be higher than the Agencies projected for two reasons: more technology is needed than projected; and, in general, manufacturer costs for most technologies are higher than estimated by the Agencies.

The CAR Mass Reduction Study (attached as Attachment 4)[16] gathered vehicle content information and mass reduction pathways from nine manufacturers and vehicles representing almost half of U.S. sales. Comparing the CAR work to the Draft TAR, some general conclusions can be made, including the need for the Agencies to reassess the cost of mass reduction. Based on the updated EDAG Engineering GmbH cost study,[17] the Alliance believes that the Agencies' final mass reduction cost curves should be updated, and likely increased, based on evolution of the baseline fleet, barriers to mass reduction implementation, mass added to meet future market and regulatory requirements, and the manufacturers' challenges in fully applying secondary mass reductions."

Baseline Technology Assessment

Perhaps the most critical step in modeling the technologies (and costs) required to bring the future fleet into compliance with the MY2022-2025 standards is an accurate evaluation of the technologies already in use on current vehicles. This ensures that the projected future level of technology applied to meet the standards is feasible and practicable, and that the costs of such future technology are appropriately taken into account.

There are several issues in the Agencies' development of the baseline fleets that will result in significant errors and inconsistencies. For instance, the two Agencies use different baseline years (MY2014 for EPA and MY2015 for NHTSA). There are also errors in the baseline mass reduction, including the degree of technology already implemented, and a failure to apply the

[15] "An Assessment of Powertrain Technology Costs Associated with Meeting CAFE and GHG Standards." Center for Automotive Research. 2016. Attached as Attachment3_CAR_Powertrain_Study.
[16] "Assessing the Fleet-wide Material Technology and Costs to Lightweight Vehicles." Center for Automotive Research. 2016. Attached as Attachment4_CAR_Mass_Reduction_Study.
[17] Singh, H., Kan, C-D., Marzougui, D., & Quong, S. (2016, February). "Update to future midsize lightweight vehicle findings in response to manufacturer review and IIHS small-overlap testing" (Report No. DOT HS 812 237). Washington, DC: National Highway Traffic Safety Administration.

analysis to individual vehicles. In addition, there are major problems in the baseline aerodynamic drag assessment. A number of smaller problems also exist in the analysis, including assumptions about baseline tire rolling resistance. All of these issues and other baseline-related matters are extensively discussed in Module 3.

Customer Acceptance Concerns

There is no question that manufacturers are capable of developing and producing products that meet the MY2022-2025 standards. However, the success of the program depends on customer purchase of those products, not the mere ability to produce them. The Draft TAR projects far less technology, particularly less electrification, than will be necessary, and hence the Agencies posit less cost than will be necessary. This error has a direct influence on the analysis of customers' ability (and willingness) to purchase new vehicles.

Although customers value fuel economy, they consider a wide range of other factors when making new vehicle purchasing decisions. Among these are cost, affordability, comfort with new technology, seating capacity, handling, tow and load capability, safety, and comfort. Rather than asking whether the auto industry can build a vehicle that achieves MY2025 compliance, the Agencies should be asking whether the auto industry will be able to sell a fleet of vehicles that meet these future targets.

In the 2012 FRM, the Agencies indicated that an analysis of customer acceptance would be vital to the assessment of whether the MY2022-2025 standards are appropriate. Notwithstanding the central importance of this issue, under 30 pages of the 1,200-page Draft TAR are dedicated to an evaluation of customer acceptance. After providing a cursory literature review, the Agencies conclude that they cannot make any significant conclusions. They point to positive statements from professional auto reviewers without even attempting to link such statements to actual purchasing behaviors. The Alliance respectfully submits that this topic requires more extensive and robust study than a review of enthusiast or consumer magazines.

Indeed, other organizations have recognized the need for serious research on customer acceptance. For instance, the National Research Council's 2015 report on fuel economy technologies for light-duty vehicles[18] contains three separate recommendations for further research by the Agencies, including "research on the existence and extent of the energy paradox in fuel economy, the reasons for customers' undervaluation of fuel economy relative to its discounted present value, and differences in customers' perceptions across the population."[19]

It is no answer to this lack of serious research to assert that manufacturers have had a history of over-compliance with the standards for the early model years. While 22% of MY2015 vehicles

[18] "Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles." National Academy of Sciences, National Research Council to the National Academies. 2015.
[19] *Id*., pp. 333-334.

operating on diesel or gasoline meet the MY2018 standards or can do so with air conditioning improvements, fewer than 4% of current vehicles can meet the MY2022 targets, and no diesel or non-hybrid gasoline models meet the MY2025 target. While the Agencies contend that these out-year standards do not require significant hybridization or electrification, this conclusion exceeds current technology realities.

The Fleet Level Tech Study[20] further illustrates this disconnect. Novation Analytics found that automakers will need to apply additional and costlier technologies than were initially predicted to meet the projected MY2021 and MY2025 targets, and that the post-MY2021 standards cannot be achieved without significantly higher sales of advanced technology vehicles, including hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (BEVs) (also known collectively plug-in electric vehicles or PEVs). Novation Analytics concludes, "[m]oving the entire industry to the current best spark-ignition powertrains would provide compliance only to MY 2020. Advanced [spark ignition] SI technologies, unproven in production, and/or high rates of electrification will be required by MY 2025."[21]

Hybridization and electrification raise costs and, to date, customers have not demonstrated a willingness to purchase such vehicles in large numbers. One reason is the current low state of gasoline prices. The 2012 FRM was developed with an expectation of structurally high gas prices but is unfolding in a period of sustained low gas prices, profoundly impacting customer choice. In the Agencies' original analysis of the 2017-2025 joint rule, they predicted gas prices would be $3.87 in 2010 dollars by 2025, or about $5 a gallon. This assumption was made when fuel prices were at their highest level in the past 40 years, exceeding those of the late 1970s and early 1980s.[22] The fuel market has shifted quite dramatically since the 2012 FRM. Earlier this month, the American Automobile Association (AAA) national average fuel price was $2.22 and in August, gas prices in 14 states were below $2.00 per gallon.[23] While various uncertainties have the potential to disrupt the world oil market, in its *2015 Annual Energy Outlook*, the U.S. Energy Information Adminsitration (EIA) projects gas prices to remain relatively low through 2030.[24] Such low gas prices have resulted in a disconnect between customer preferences and the future CAFE/GHG standards. The 2012 FRM projected the 2025 vehicle fleet to be comprised of 67% passenger cars and 33% trucks. However, the Agencies' updated assessment in the Draft TAR now projects that the fleet mix in 2025 will likely be 52% cars and 48% trucks– acknowledging the direct impact low gas prices have on the composition of the vehicle. When gas prices fall, especially in the context of improving mileage across segments of the market, the desire to walk out of the showroom with a hybrid (or other alternative powertrain) diminishes.

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[20] "Technology Effectiveness – Phase 1: Fleet-Level Assessment." Novation Analytics. 2015.
[21] "Trade Association Studies; Powertrain Technology Effectiveness, Phase II." Novation Analytics. Technical Briefing. May 17, 2016. Accessed September 21, 2016. Attached as Attachment 5.
[22] "Short-Term Energy Outlook." U.S. Energy Information Administration. Accessed September 21, 2016. http://www.eia.gov/forecasts/steo/realprices/.
[23] "AAA Gas Prices." American Automobile Association. Accessed September 21, 2016. http://gasprices.aaa.com/.
[24] "Annual Energy Outlook 2015." U.S. Energy Information Administration. Accessed September 21, 2016. https://www.eia.gov/forecasts/archive/aeo15/.

The customer acceptance challenges of meeting the MY2022-2025 standards are real and need more sophisticated analysis in the final TAR and upcoming NPRM. To perform an appropriate cost-benefit analysis, the Agencies must address the matters discussed above as well as the following issues (each of which is discussed in greater detail in Module 5):

- The enormous disparity between the payback periods anticipated by the Agencies and those that customers will tolerate raises important questions regarding long-term viability of the new car market.
- Automakers have limited tools with which to drive customer acceptance despite significant efforts to promote and incentivize highly efficient vehicles.
- Growth in the sales of highly efficient vehicles has been limited by low gasoline prices, the satisfaction customers already express with current fuel economy levels via modern internal combustion engines, and the fact that fuel economy savings are reduced as miles-per-gallon increase.
- Positive third-party reviews often do not translate to higher sales, particularly for electric powertrain vehicles.
- Increasing costs have an effect on affordability, and this issue needs further analysis, especially if the current, low-interest financing era ends.
- Cost increases resulting from a steep increase in fuel-efficiency requirements are likely to reduce the overall demand for new vehicles and constrain employment throughout the automotive sector.

Because of the importance of customer acceptance, the Alliance has done an extensive analysis of the matter, concluding that compliance with the MY2022-2025 standards will require a much higher and earlier deployment of more expensive technologies, with far higher levels of electrification than suggested in the Draft TAR. As a result, those levels and costs are far higher than customers are currently prepared to accept (See Module 5).

Harmonization Issues

NHTSA and EPA Harmonization

On June 20, 2016, the Alliance and The Association of Global Automakers, Inc. (Global Automakers)[25] submitted a petition[26] (see Attachment 10) asking EPA and NHTSA to make several regulatory changes to better harmonize their respective regulations for GHGs and fuel economy. The issues raised in this petition are relevant for the MTE because of their many

[25] Global Automakers' members are Aston Martin, Ferrari, Honda, Hyundai, Isuzu, Kia, Maserati, McLaren, Nissan, Subaru, Suzuki, and Toyota. Please visit www.globalautomakers.org for further information.

[26] Letter from C. Nevers to Mark Rosekind, PhD and Gina McCarthy re: Petition for Direct Final Rule with Regard to Various Aspects of the Corporate Average Fuel Economy Program and the Greenhouse Gas Program (June 20, 2016).

interactions with the assessments of the MTE. In addition, there are other differences between the EPA, NHTSA and CARB programs subsumed in the ONP. First, there is an inconsistency in the technical assessments performed by EPA and NHTSA. Second, and more significantly, the Draft TAR completely fails to harmonize with CARB's Zero Emission Vehicle (ZEV) Program ("ZEV Program" or "ZEV mandate")[27] by ignoring the costs of the ZEV mandate.

The Draft TAR Fails to Account for Costs and Technologies Needed to Comply with the ZEV Mandate

For the first time, EPA has included the estimated volumes of plug-in electrified and fuel cell vehicles that automakers are expected to produce under theZEV mandate. The ZEV mandate, as adopted by California and nine other states, will effectively force specific GHG reducing solutions (heavy electrification) into the market rather than allowing the "technology-agnostic" approach previously advocated by EPA and NHTSA. Because EPA waived the ZEV Program under the Clean Air Act, it is now wholly appropriate that EPA include the effect of the ZEV mandate when projecting technology pathways and costs for EPA's own national GHG program.

California's ZEV Mandate creates $6 billion in costs

When calculating the costs of the GHG program, EPA builds into its reference fleet the benefits of 280,300 fully electric, plug-in and hydrogen fuel-cell vehicles that manufacturers are expected to produce in response to the ZEV Program. However, EPA does not take into account the cost of the ZEV Program in California and the other ZEV states – regions of the country which also fall under the requirements of the federal GHG and FE standards. Economists working for CARB estimate that vehicles produced in response to the ZEV mandate will cost customers between $7,500 and $15,000 more in MY2025 as compared to today's average vehicle prices.[28] They also estimate that by MY2025, compliance with the ZEV Program in California alone will cost automobile manufacturers more than $6 billion annually.[29]

EPA's failure to consider the costs of the ZEV mandate would conflict with its own guidance and could result in arbitrary decision-making, for several reasons. First and fundamentally, the integrity of cost-benefit analysis requires making equivalent assumptions on both the cost and benefit sides of the analysis. Specifically, if the EPA assesses the *benefits* that the ZEV mandate will contribute to achieving the MY2022-2025 standards, the *costs* of that mandate should also be considered. Otherwise, the cost assessment will understate the true costs to manufacturers for

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[27] 13 CCR §§ 1962.1 and 1962.2

[28] "Staff Report: Initial Statement Of Reasons, Advanced Clean Cars, 2012 Proposed Amendments To The California Zero Emission Vehicle Program Regulations." California Environmental Protection Agency, Air Resources Board. 2011. 64. Accessed September 21, 2016. https://www.arb.ca.gov/regact/2012/zev2012/zevisor.pdf.

[29] "Staff Report: Initial Statement Of Reasons, Advanced Clean Cars, 2012 Proposed Amendments To The California Zero Emission Vehicle Program Regulations." California Environmental Protection Agency, Air Resources Board. 2011. Table 5.6. Accessed September 21, 2016. https://www.arb.ca.gov/regact/2012/zev2012/zevisor.pdf.

achieving the future standards. This is particularly important where the costs of the ZEV mandate are large enough to effectively dictate a particular pathway for achieving compliance at costs that can materially affect the feasibility of achieving the CAFE and GHG standards. Alternatively, were the Agencies to disregard the costs of the ZEV mandate, the costs of compliance with the MY2022-2025 standards should be spread over only the incremental benefits of emissions reductions *beyond* the ZEV mandate. Still this would be a less useful approach, since accounting for all of the costs and benefits better positions the Agencies to consider the feasibility of the standards.

Second, EPA has explained in its guidance the position that it is generally appropriate to include existing regulations in the cost baseline because, presumably, those costs have been accounted for elsewhere and should not be counted twice.[30] However, EPA has not considered the cost of the ZEV program at any point in time.[31] Indeed, CARB has not considered the full costs of compliance with the ZEV mandate, including the other states that have adopted the ZEV mandate. Omitting the costs of measures that would play a substantial role in achieving compliance with the MY2022-2025 standards would thus run counter to the objectives of transparency and sound decision-making that underlie the Agencies' cost-benefit analysis.

In summary, the Alliance believes that EPA should include the cost of the ZEV Program in the TAR, especially since the ZEV mandate provides no net GHG benefit and could force a more expensive compliance pathway than might otherwise be taken.

The Alliance also notes that NHTSA does not build ZEV compliance into its baseline scenario. A sensitivity analysis of EPA modeling that includes NHTSA's assumptions in this regard is critical for a realistic assessment of costs and benefits of the GHG program. For further discussion of these matters, see Module 8.

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[30] See National Center for Environmental Economics, Office of Policy, U.S. Environmental Protection Agency, "Guidelines for Preparing Economic Analyses" (December 17, 2010) at 5-9. Cited authority states "[i]f a proposed regulation is expected to increase compliance with a previous rule, the correct measure of the costs and benefits generally excludes impacts associated with the increased compliance. This is because the costs and benefits of the previous rule were presumably estimated in the economic analysis for that rule, and should not be counted again for the proposed rule."

[31] In evaluating whether to grant California the waiver necessary to implement the ZEV mandate, EPA did not fully evaluate the costs of the mandate at that time, either. Instead, EPA largely deferred to CARB estimates. See, e.g., U.S. Environmental Protection Agency, "Notice of Decision Granting a Waiver of Clean Air Act Preemption for California's Advanced Clean Car Program and a Within the Scope Confirmation for California's Zero Emission Vehicle Amendments for 2017 and Earlier Model Years," 78 Fed. Reg. 2111, 2115 (Jan. 9, 2013), noting that in the waiver context, EPA gives "very substantial deference to California's judgment" on the balancing of costs and benefits, and 78 Fed. Reg. 2118, noting that in decision whether to grant a waiver, EPA "provide[s] California with the broadest possible discretion in setting regulations that it finds protective of the public health and welfare while limiting EPA's review to a narrow role that provides substantial deference to the State."

NHTSA and EPA Performed Separate Technical Assessments

EPA and NHTSA have conducted separate technical assessments that the Agencies then combined into a single Draft TAR. In the Draft TAR's executive summary, the Agencies conclude that their "independent analyses complement one another and reach similar conclusions."[32] Considering their different statutory mandates, different approaches to defining baselines, and variations between the models used, some variation in outcomes is, of course, to be somewhat expected. However, the breadth of disagreement between the Agencies on several key modeling outcomes leads one to ask whether these outcomes really do "complement one another." For example, the percentage of higher compression ratio, naturally aspirated gasoline engines automakers are expected to deploy to meet the MY2025 standards differs by 43%. Similarly, the percent of turbocharged and downsized gasoline engines differs by 21%, and the percent of stop-start technology differs by 18%.[33] While some of these disparities are explainable, the delta between the Agencies' modeling outcomes implies that they are actually in significant *disagreement* as to how automobile manufacturers could comply with the standards, leading one to question their joint conclusions.

Regulatory Elements Necessary for Compliance

The Alliance's member companies remain committed to pursuing all technologies that have quantifiable GHG emissions and FE improvements both on-cycle and off-cycle. All stakeholders have acknowledged the contribution of these technologies to the environmental goals of the ONP with their inclusion in the regulation. The automakers' primary regulatory need is a renewed focus on removing all obstacles that are having the unintended result of slowing investment and implementation of these technologies. Agency action is needed to ensure that a simplified credit application process is quickly administered, including the establishment of processes for new technologies as they emerge. The Agencies should also reconsider the limits placed on recognizing the environmental impact of mobile air conditioning (MAC) improvements.

The Alliance proposes cooperating with the Agencies to develop technical studies needed to quantify the benefits of the next generations of innovative fuel savings technologies associated with safety and congestion mitigation from improved vehicle-to-vehicle and vehicle-to-grid communication, to car-sharing and car-hailing services. The Agencies should develop off-cycle credit frameworks to accelerate their implementation prior to MY2026. This includes addressing

[32] Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, (EPA-420-D-16-900, July 2016) at ES-2.

[33] Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, (EPA-420-D-16-900, July 2016), at ES-10, Table ES-3.

concerns with the AC17 test[34] used to quantify MAC system improvements. Actions to address the above will encourage, not slow, the introduction of technology.

Further details on the recommendations below are set forth in Module 7.

Electric Vehicle Upstream Emissions and Incentives

All of the Draft TAR scenarios assume zero grams CO_2 per mile for the upstream emissions associated with generating electricity used as a transportation fuel. Complicating a shift towards electrification is the requirement in the regulation that holds automakers responsible for CO_2 from electricity generation at utility power plants. Automakers are already concerned about customer acceptance of electrified products in the market. This requirement further disincentivizes electrified vehicles from the regulatory perspective, degrading the CO_2 performance of plug-in hybrids to be similar to hybrid electric vehicles. This disincentive also works directly against the CARB ZEV mandate. Since the upstream utility emissions are being regulated by EPA and the states, they should not be assigned to automakers (none of which have control over their generation). The Alliance also recommends that the EPA extend the advanced technology vehicle multiplier through MY2025 to continue the promotion of electric, plug-in hybrid, and fuel cell vehicles.

Other Issues Discussed

Employment Impacts

The MY2017-2025 regulations specifically required the MTE to assess the employment impacts of the proposed standards. The Draft TAR chapter on employment consisted of exactly 14 pages out of the 1,217-page Draft TAR. In the end, the Agencies concluded, "[b]ecause we do not have quantitative estimates of the output effect, and only a partial estimate of the substitution effect, we cannot reach a quantitative estimate of the overall employment effects of the standards on auto sector employment or even whether the total effect will be positive or negative."[35] The Alliance believes that more study, preferably including quantitative estimates as discussed in the Employment Impacts Module (Module 6), is needed to determine the employment impacts of the MY2022-2025 targets before a proposed determination or NPRM can be issued.

In addition to the major concerns summarized above, the attachments to this document cover a number of other issues, including economic impacts (Module 6), alternative fuel infrastructure (Module 9), and safety (Module 10).

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[34] 40 CFR § 1066.845

[35] Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, (EPA-420-D-16-900, July 2016), at 7-14.

Conclusion

The Alliance appreciates the analysis completed thus far by the Agencies for the Draft TAR, but has serious concerns with the analysis. Although on the surface the Draft TAR appears to be robust, multiple technical errors have combined to generate an implausible assessment of the technologies needed and the associated costs required for compliance through MY2025. In addition, the almost complete lack of assessment regarding consumer acceptance and other downstream impacts, with so little time remaining to correct these issues before the next steps of the midterm evaluation, is highly concerning and needs to be addressed. The Alliance expects to develop further input on the Draft TAR, and will submit that input as supplements to these comments. Given all the questions that now remain unanswered regarding the MTE but that must be addressed before April 2018, the Alliance and its member companies look forward to closer engagement with the Agencies prior to the next step of the process. In particular, we look forward to working with the Agencies' to address all of the factors that need to be considered per the 2012 FRM and the Energy Policy and Conservation Act[36] that have not been adequately addressed in the Draft TAR, to ensure a complete and accurate MTE.

[36] 49 U.S.C.A Section 329029(f)