Alliance for Automotive Innovation

Comments to
U.S. Department of Transportation
National Highway Traffic Safety Administration

Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027-2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030-2035

Proposed Rule

Docket ID No.
NHTSA-2023-0022

October 16, 2023

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List of Acronyms and Abbreviations

A/C	Air conditioning
Auto Innovators	Alliance for Automotive Innovation
BEV	Battery electric vehicle
CAFC	Corporate Average Fuel Consumption for medium-duty chassis-certified pickups and vans
CAFE	Corporate Average Fuel Economy for light-duty vehicles and medium-duty passenger vehicles
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EVs	Electric vehicles, inclusive of battery electric, plug-in hybrid electric, and fuel cell electric vehicles
FCEV	Fuel cell electric vehicle
FCIV	Fuel consumption improvement value
GHG	Greenhouse gas
HDPUV	Heavy-duty pickup truck and van
ICE	Internal combustion engine
MDPCS	Minimum domestic passenger car standard
MPG	Miles per gallon
MY	Model year
NHTSA	National Highway Traffic Safety Administration

PEF	Petroleum equivalency factor; 10 C.F.R. § 474.3(b)
PEV	Plug-in electric vehicle (including battery electric and plug-in hybrid electric vehicles)
Proposed Rule	Referring to 88 Fed. Reg. 56128 (Aug. 17, 2023)
ZEV	Zero-emission vehicle (including battery electric and fuel cell electric vehicles)

1 Introduction

The Alliance for Automotive Innovation ("Auto Innovators"),[1] representing 42 automobile companies, automotive suppliers, and automotive technology companies that produce about 97% of the new vehicles sold in the United States, offers these comments on the U.S. Department of Transportation National Highway Traffic Safety Administration's ("NHTSA") proposed rule, Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027-2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030-2035 (the "Proposed Rule").[2] We and our members appreciate NHTSA's work in developing the Proposed Rule, and we look forward to further engagement and discussions regarding the Proposed Rule. While we support the overarching goals of the Proposed Rule, Auto Innovators is concerned about several aspects of the Proposed Rule, as we explain in the following comments.

Auto Innovators and its members support the related goals of reducing vehicle greenhouse gas ("GHG") emissions, conserving energy, and a transition to electric vehicles ("EVs", including battery electric, plug-in hybrid electric, and fuel cell electric vehicles). Auto Innovators has previously stated: "With the right complementary policies in place, the auto industry is poised to accept the challenge of driving EV purchases to between 40 and 50 percent of new vehicle sales by the end of the decade."[3] While the Bipartisan Infrastructure Act and Inflation Reduction Act are a good start to the necessary complementary policies to increase EV production and sales in the U.S., significant work remains to address the supply chain, infrastructure, and market challenges during this transition. Efficient, coordinated, and realistic government policies will be necessary for an accelerated transition.

2 Corporate Average Fuel Economy ("CAFE") Program

The best policy to sustain an EV transition would be a return to a single national standard to reduce carbon in transportation. The United States has one vehicle fleet and should have one national standard. Conflicting and overlapping rules are complex

[1] From the manufacturers producing most vehicles sold in the U.S. to autonomous vehicle innovators to equipment suppliers, battery producers and semiconductor makers – Alliance for Automotive Innovation represents the full auto industry, a sector supporting 10 million American jobs and 5 percent of the U.S. economy. Active in Washington, D.C. and all 50 states, the association is committed to a cleaner, safer and smarter personal transportation future. www.autosinnovate.org.

[2] U.S. Department of Transportation, National Highway Traffic Safety Administration, Notice of Proposed Rulemaking: Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027-2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030-2035, 88 *Fed. Reg.* 56128 (Aug. 17, 2023), hereinafter "NPRM."

[3] Alliance for Automotive Innovation, "Auto Innovators: Aligning Policies for a Cleaner Future" (Aug. 5, 2021). Available at https://bit.ly/45GXdC5 (accessed Sep. 3, 2023).

and increase costs without corresponding benefits. Manufacturers need aligned standards between the three federal agencies and the state agency regulating vehicle tailpipes. We are concerned that NHTSA's consideration of battery electric vehicles ("BEVs") in developing its proposed standards, despite statutory prohibitions, combined with the Department of Energy's ("DOE") proposal to devalue the fuel economy of electric vehicles by 72%,[4] will result in serious misalignment, distracting manufacturers' attention and resources from the EV transition.

Even with EVs, NHTSA's proposal exceeds maximum feasibility. NHTSA projects that manufacturers will pay over $14 billion in non-compliance penalties,[5] affecting one in every two light trucks in 2027-2032, and one in every three passenger cars in 2027-2029.[6] The number of non-compliant vehicles and manufacturers projected exceeds reason and will increase costs to the American consumer with absolutely no environmental or fuel savings benefits. The projected $3,000 average price increase over today's vehicles[7] is likely to decrease sales and increase the average age of vehicles on our roads. Although NHTSA may balance its statutory considerations that were established by Congress, it cannot minimize consideration of technological feasibility and economic practicability to the extent that they are rendered meaningless.

For its final standards, NHTSA should remove the inappropriately included EVs and weigh technological feasibility and economic practicability more heavily. Its standards should be offset from final U.S. Environmental Protection Agency ("EPA") GHG standards considering the agencies' differences in the treatment of EVs and compliance flexibilities. Maximum feasible CAFE standards should coexist with an achievable EPA GHG program, resulting in CAFE compliance for manufacturers that comply with the GHG program. Standards that meet these principles will aid a smoother transition to electric vehicles and avoid negative impacts that will drive up unnecessary costs to consumers, workers, and manufacturers.

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[4] U.S. Department of Energy, Notice of Proposed Rulemaking; Request for Comment: Petroleum-Equivalent Fuel Economy Calculation, 88 *Fed. Reg.* 21525 (Apr. 11, 2023), hereinafter "PEF NPRM". The current petroleum equivalency factor for electric vehicles is 82,049 Wh/gal. 10 C.F.R. § 474.3(b)(1). The proposed value of the petroleum equivalency factor is 23,160 Wh/gal. PEF NPRM at 21539.

[5] NHTSA central rulemaking analysis, Compliance Report, sum of "Fines" for model years 2027-2032 for the combined baseline ("Scenario" 0) and proposal ("Scenario" 3).

[6] Auto Innovators analysis of data in NHTSA central rulemaking analysis, Compliance Report.

[7] NHTSA central rulemaking analysis, Compliance Report, sum of "Avg Reg-Cost" for model year 2032 for the combined baseline ("Scenario" 0) and proposal ("Scenario" 3).

2.1 Alignment of CAFE standards to EPA GHG standards is crucial to an accelerated transition to electric vehicles.

With limited resources (both human and capital), our members need efficient, aligned regulations more than ever. Yet, for the purposes of closely related GHG and fuel economy improvements, automakers remain regulated by four separate agencies in the U.S., including NHTSA for Corporate Average Fuel Economy ("CAFE"), DOE for the 'fuel economy' of plug-in electric vehicles ("PEVs"),[8] EPA for GHG emissions,[9] and the California Air Resources Board for both GHG emissions[10] and an additional zero-emission vehicle mandate.[11] As a result, automakers are subject to five separate regulations on efficiency and reducing climate-related emissions.

Automakers can ill afford to make the investments necessary to reach the Biden Administration's goal of 50% EV sales by 2030[12] while also making major investments in internal combustion engine ("ICE") vehicles. Unlike the past, where profits from existing ICE vehicles funded investments in the next generation of ICE vehicles, it is generally understood that (for legacy automakers) profits from ICE vehicles will be used to fund the transition to electric vehicles.[13] Nor can automakers afford to pay billions of dollars in civil penalties for non-compliance with CAFE regulations while still complying with EPA GHG regulations.[14]

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[8] *See* 49 U.S.C. § 32904(a)(2)(B) and 10 C.F.R. Part 474.

[9] *See* 40 C.F.R. § 86.1818-12.

[10] *See* 13 C.C.R. § 1961.3.

[11] *See* 13 C.C.R. §§ 1962.2 and 1962.4.

[12] *See* Executive Order 14037, Strengthening American Leadership in Clean Cars and Trucks, 86 *Fed. Reg.* 43583 (Aug. 10, 2021). *See also* U.S. Department of Energy, U.S. Department of Transportation, U.S. Environmental Protection Agency, and U.S. Department of Housing and Urban Development, *The U.S. National Blueprint for Transportation Decarbonization* (Jan. 2023). Available at https://www.energy.gov/eere/us-national-blueprint-transportation-decarbonization-joint-strategy-transform-transportation (accessed Sep. 3, 2023).

[13] *See, for example,* Nair, Ganapavaram and Leinert, "Ford boosts EV spending to $50 billion, sets up new Model e unit", Reuters (Mar. 2, 2022), quoting Ford CEO Jim Farley saying "We need the ICE business to generate cash and the EV business to focus on innovation." Available at https://www.reuters.com/business/autos-transportation/ford-run-ev-ice-businesses-separately-2022-03-02/ (accessed Sep. 3, 2023).

[14] While NHTSA CAFE civil penalties are expensive, and their impact continues to increase under inflation adjustment rules and with the diminishing oil savings of each "mile per gallon", EPA's penalty structure remains higher and more prohibitive. Thus, as a result, compliance with EPA's rules becomes a pre-condition and the baseline in standard-setting design.

Given current statutory requirements and constraints, a CAFE program that is aligned to the EPA GHG program is the most efficient regulatory pathway to address the burdens, overlap, and compliance challenges between the two government regulations. When determining maximum feasible CAFE standards, NHTSA is statutorily prohibited from considering the fuel economy of dedicated alternative fuel vehicles, including BEVs and fuel cell electric vehicles ("FCEVs"), and must treat dual fueled vehicles, such as plug-in hybrid electric vehicles, as operating only on conventional fuel.[15] In contrast, EPA may consider electric vehicles in setting GHG emissions standards. Therefore, the level of GHG emissions reductions possible in a future where manufacturers are transitioning to EVs is likely to increasingly exceed the level of maximum feasible fuel economy improvements under NHTSA's statutory authority. Indeed, this is the case, albeit with adjustments needed, in the present rulemakings from EPA and NHTSA as described further below.

Auto Innovators believes that the EPA proposed standards, particularly through 2030, are neither reasonable nor achievable.[16] Yet NHTSA's proposed standards exceed those proposed by EPA in 2027. For example, EPA's projected fleet of passenger cars in model year "MY" 2027 (including 43% BEVs) would be subject to a proposed CAFE standard of 60.7 miles per gallon ("MPG"),[17] but this fleet is projected to achieve only 59.4 MPG.[18] Similarly, EPA's projected fleet of light trucks (including 32% BEVs) would have a proposed CAFE standard of 44.4 MPG, but achieve only 42.7 MPG. This outcome is a result of DOE's proposed reduction in the CAFE petroleum equivalency factor ("PEF") and NHTSA's (improper in our view) inclusion of BEVs in developing its proposal. Overall, the proposed standards exceed maximum feasibility and NHTSA's statutory considerations, particularly technological feasibility and economic practicability.

Ultimately, we believe the EPA standard must be changed to mitigate risks associated with achieving the projected level of EV sales necessary to comply. Thus, the CAFE standards should also be modified commensurately. NHTSA and EPA should closely

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[15] 49 U.S.C. § 32902(h)(1) and (2).

[16] *See* Alliance for Automotive Innovation, Comments to U.S. Environmental Protection Agency Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (Jul. 5, 2023), attached as "Attachment 1 - Auto Innovators Comments to EPA" at pp. i, 1 to 23, and 54 to 60. *See also* Benchmark Minerals Intelligence, U.S. Electric Vehicle Feasibility Study (Q1 2023), included as Attachment 2 – US Electric Vehicle Feasibility Study (Benchmark Minerals Intelligence). Auto Innovators is the licensee to the copyrighted content of this report and has BMI's written permission to make the content publicly available.

[17] Auto Innovators analysis. Proposed CAFE targets applied to the individual vehicles in EPA's central analysis Vehicles Report output file; sales-weighted average.

[18] Auto Innovators analysis. Individual vehicle GHG emissions / electrical energy consumption in EPA's central analysis Vehicles output file (included EPA-assumed A/C efficiency and off-cycle credits) converted to fuel economy based on carbon content of gasoline / diesel and current / proposed petroleum equivalency factor; sales-weighted average.

coordinate their final rules to ensure that EPA-projected fleets that comply with EPA GHG standards also comply with CAFE standards.

2.2 The 'petroleum equivalency factor' is the major difference between the GHG and CAFE programs; NHTSA should consider the PEF in developing aligned standards.

A significant difference between the EPA GHG and NHTSA CAFE programs is their treatment of electric vehicles. EPA correctly recognizes that EVs have zero tailpipe emissions. In contrast, NHTSA (through DOE's petroleum equivalency factor or "PEF") treats PEVs as consuming petroleum even though they generally do not. This difference must be accounted for to avoid the unintended but foreseeable consequences of overly aggressive CAFE standards. Absent efforts to account for the difference in how EVs are counted, regulatory alignment issues unnecessarily arise that could have been avoided when the standards were set.[19]

Further, DOE has proposed to lower the PEF by 72%, effective MY 2027. This action would lower the fuel economy of all BEVs in the fleet by 72%. This change has an immediate real-world impact on CAFE compliance and affects NHTSA's rulemaking given its inclusion of BEVs in its analysis (despite the statutory prohibition).[20] Auto Innovators commented extensively on DOE's proposal,[21] and will continue engagement with DOE in search of a more appropriate PEF that reflects an EV's petroleum consumption and seeks a more appropriate implementation timeframe.[22] NHTSA can also help address CAFE alignment to the GHG Regulation and CAFE compliance concerns by deferring (or phasing in) the use of a lower PEF if DOE ultimately adopts a new value. DOE has not issued a final rule and it is unknown whether or to what extent the PEF ultimately will be revised. Therefore, it is speculative, premature, and

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[19] In general, ICE vehicle technologies provide similar GHG and fuel economy benefits. In contrast, a BEV provides more compliance benefit in the GHG program than in the CAFE program, a situation further and drastically exacerbated by DOE's proposal to reduce the PEF by 72%. Without alignment, manufacturers may become subject to additional civil penalties that provide no environmental or energy conservation benefits. Such penalties instead draw resources away from investments in EVs or other technology.

[20] DOE's proposal to weaken the value of the PEF significantly is relevant to NHTSA's CAFE proposal to the extent it will radically narrow the pathways to compliance for manufacturers. There must, therefore, be greater coordination between the two agencies in establishing a regulatory framework that is feasible for regulated parties, where each agency's decisions (on the PEF and in standard-setting) are inextricably interdependent.

[21] *See* Attachment 3 – Auto Innovators Comments to DOE.

[22] DOE has considerable discretion under the statutory factors governing the establishment of the PEF, see 49 U.S.C. § 32904(a)(2)(B)(i)-(iv), which include "the need of the United States to conserve all forms of energy and the relative scarcity and value to the United States of all fuel used to generate electricity," *id.* § 32904(a)(2)(B)(iii). DOE has maintained that it has authority to strengthen the value of the PEF based on that factor. *See* PEF NPRM (*supra* note 4) at 21535.

inappropriate for NHTSA to include any revision to the PEF in this current rulemaking. Given the use of a speculative PEF in its proposal, NHTSA should reopen comments on the CAFE proposal following final DOE action on the PEF.[23]

2.3 NHTSA's proposed standards are improperly predicated on alternative fuel vehicles.

Despite clear prohibitions,[24] NHTSA improperly includes the fuel economy of BEVs, a type of dedicated alternative fuel vehicle, in its consideration of CAFE standards. It does so under the guise of including them in its baseline assessment (i.e., a view of what NHTSA projects would happen absent further regulation) through a variety of pathways. However, the law makes no such exception.

The inclusion of BEVs increases the modeled achieved fuel economy of the passenger car and light truck fleets by up to 17.1 miles per gallon ("MPG") and 7.9 MPG, respectively in the timeframe of the Proposed Rule.[25] Including BEVs in the baseline assumes market feasibility and adoption levels that NHTSA has not properly analyzed in reaching this conclusion. Without these dedicated alternative fuel vehicles, the proposed standards clearly exceed technological feasibility.

While we respect NHTSA's desire to reflect electric vehicles in its analysis, NHTSA cannot simply ignore or bypass clear direction from Congress.

Please see Appendix A for more details.

2.4 The proposed standards exceed technological feasibility and economic practicability.

Putting aside that NHTSA's inclusion of dedicated alternative fuel vehicles in its analysis is proscribed by statute, the proposed passenger car and light truck standards exceed technological feasibility and economic practicability. This point is demonstrated by NHTSA's projected compliance outcomes.[26] In the rulemaking time period, NHTSA projects that 13 out of 19 manufacturers (68%) will be subject to civil penalties in one or

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[23] *See* 49 U.S.C. § 32909(c). (Indicating that NHTSA could be directed to receive additional submissions if they "are material and there were reasonable grounds for not presenting the submissions in the [rulemaking] proceeding").

[24] 49 U.S.C. § 32902(h)(1).

[25] Auto Innovators assessment based on data found in NHTSA's central rulemaking analysis Vehicles Report model output file. (Comparison of sales-weighted average 2-cycle compliance fuel economy with and without battery electric vehicles.)

[26] We refer to the rulemaking analysis, not the Environmental Impact Statement analysis. We recognize that the rulemaking analysis is constrained in certain respects and that the Environmental Impact Statement analysis may be more reflective of what could happen in practice. However, NHTSA's responsibility is to determine maximum feasible standards subject to the constraints set by Congress.

more model years.[27] On a sales basis, nearly one out of every three passenger cars sold (32%) in MY 2027-2029 will be subject to penalties for failure to meet applicable standards. For light trucks, 49% of vehicles sold in MY 2027-2032 are forecast to have penalties assessed on them. In fact, NHTSA projects that the light trucks on average will fail to meet the proposed standards in every year of the program.

NHTSA notes that it does not set standards based on the least capable manufacturer.[28] However, NHTSA grossly misconstrues this approach in the Proposed Rule. When the majority of manufacturers and a significant portion of the fleet (or worse yet the fleet on average) are projected to be unable to meet (a question of technological feasibility) or unwilling to meet (a question of economic practicability) the proposed standards, the proposal clearly exceeds maximum feasibility for both passenger cars and light trucks.[29] In other words, the proposal misses the mark on the overarching purpose of the Energy Policy and Conservation Act of 1975 and the Energy Independence and Security Act of 2007.[30] Instead, the proposal drives increasing civil penalty payments to the U.S. general fund without commensurate energy saving or environmental benefits.

Appendix B includes further analysis and commentary on these issues.

2.5 NHTSA presumes an economically impracticable increase in ICE fuel economy in combination with a rapid transition to electric vehicles.

Between 2012 and 2022, the average 2-cycle fuel consumption (gal/mile) of non-EVs improved at an average annual rate of 1.3% (passenger cars) and 2.0% (light trucks).[31] Higher observed rates of improvement in overall CAFE performance are attributable to increasing usage of off-cycle and air conditioning efficiency fuel consumption

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[27] NHTSA central rulemaking analysis Compliance Report.

[28] NPRM (*supra* note 2) at 56314.

[29] *See* S. Rep. No. 94–516, 94th Congress, 1st Sess. 154–155 (1975) (stating that NHTSA's determination [of maximum feasible average fuel economy level] should take industry-wide considerations into account. … the Secretary must weigh the benefits to the nation of a higher average fuel economy standard against the difficulties of individual manufacturers."); *see also* H. Rep. No. 94–340, 87 (1975) ("[A]ny regulatory program must be carefully drafted so as to require of the industry what is attainable without either imposing impossible burdens on it or unduly limiting consumer choice as to the capacity and performance of motor vehicles.").

[30] NHTSA discusses EPCA's/EISA's overarching purpose of energy conservation in the NPRM (*supra* note 2) (see, e.g., NPRM at 56138, 56259, and 56311), and notes that it is guided by this overarching purpose while balancing various statutory factors. However, as demonstrated in our comments, NHTSA's NPRM in several areas, including the vast number of vehicles subject to civil penalties, reveals its proposed actions undermine the underlying purpose of EPCA and EISA.

[31] S&P Global Mobility, Model Years 2012 to 2022 Baseline Study (Jan. 20, 2023). Referenced detail data available by request to Auto Innovators.

improvement values and through increasing EV market share (for passenger cars in particular).

In the 2022 to 2032 period,[32] NHTSA projects that non-EV 2-cycle fuel economy will increase by 2.2% per year for passenger cars and by 2.9% per year for light trucks,[33] a significantly higher rate than that historically observed. These gains are largely projected to come from increasing sales of strong hybrid electric vehicles (from 5% to 21% of passenger cars sales and from 8% to 45% of light truck sales). At the same time, NHTSA projects EV sales share to increase from 14% to 42% (passenger cars) and from 3% to 39% (light trucks).

Manufacturers have a limited pool of human and capital resources to invest in new vehicles and powertrains. Auto Innovators does not believe that it would be economically practicable to invest the resources necessary to achieve both the non-EV improvements envisioned and the increase in EV market share envisioned.

2.6 NHTSA incorrectly asserts that light trucks have more room to improve fuel economy than passenger cars.

NHTSA is proposing light truck standards that increase at a rate of 4% per year in contrast to passenger car standards that increase at a rate of 2% per year. NHTSA asserts that “light trucks have significantly more opportunity for fuel economy improvements due to lower baseline technology levels, and greater average [lifetime mileage].”[34] The assertion that light trucks have lower baseline technology levels is generally incorrect.

NHTSA’s own model shows that ICE-based passenger cars and light trucks have similar levels of technology both in MY 2022 and in the NHTSA-projected MY 2026-2032.[35] Where passenger car and light truck powertrain technologies differ is in the degree of electrification of the fleets in this same timeframe. Setting aside dedicated alternative fuel vehicles, which NHTSA is not supposed to consider in its rulemaking analysis, light

[32] We recognize that the period presented here is broader than the standard-setting years NHTSA is considering. However, the years in advance of the standard-setting years form the basis upon which additional fuel economy improvements in the standard-setting years are premised. I.e., without those earlier improvements, the level of fuel economy achievable in the standard-setting years would likely be lower.

[33] Auto Innovators analysis of NHTSA central rulemaking Vehicle Report file.

[34] NPRM (*supra* note 2) at 56259.

[35] Auto Innovators analysis of NHTSA central rulemaking Technology Utilization Report, no action (baseline) scenario. Details available in Appendix C.

trucks exhibit higher penetration of 12-volt engine stop-start systems and strong hybrid systems both in MY 2022 and the NHTSA-projected MY 2026-2032.[36]

An analysis of the MY 2022 fleet prepared by S&P Global Mobility[37] tells a similar story. Setting aside alternative fuel vehicles, the sales-weighted powertrain efficiency[38] of the passenger car and light truck fleets is the same – 24%. Little variation is observed in sub-segments of the fleet (traditional cars, utility vehicles classified as passenger cars, utility vehicles classified as light trucks, minivans, and pickups). All range between 23% and 24% powertrain efficiency. Thus, for ICE powertrains, we find that light trucks utilize the same or more baseline powertrain technology than passenger cars, in direct contrast to NHTSA's assertion.

According to NHTSA's modeling,[39] transmission technologies also exhibit similar penetration between passenger cars and light trucks. In MY 2022, 55% of light trucks used an advanced transmission[40] as compared to passenger cars at 59% (a minimal 4 percentage point difference). In NHTSA's baseline projections for MY 2027-2032, utilization of advanced transmissions in passenger cars and light trucks remain separated by only 3-4 percentage points. We conclude that light trucks do not have significantly lower baseline transmission technology levels than passenger cars.

Differences in roadload technologies (aerodynamic, tire, and mass improvements) between passenger cars and light trucks are mixed. For tires, NHTSA generally finds similar technology levels in MY 2022 and predicts a rapid transition to the lowest rolling resistance tires by MY 2027 for both fleets, with light trucks generally achieving slightly higher use of low rolling resistance tires than passenger cars. In a similar vein, NHTSA projects rapid improvements in vehicle aerodynamics with light trucks achieving higher

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[36] Belt-integrated starter generator (mild hybrid) systems, another type of electrification, have similar technology penetration in the passenger car and light truck fleets.

[37] S&P Global Mobility, Model Years 2012 to 2022 Baseline Study (Jan. 20, 2023). Referenced detail data available by request to Auto Innovators.

[38] Powertrain efficiency is defined here as the tractive energy required for a vehicle to drive the combined city / highway test cycles (based on its weight and roadload characteristics) divided by the fuel energy supplied.

[39] Auto Innovators analysis of NHTSA central rulemaking Technology Utilization Report, no action (baseline) scenario. Details available in Appendix C.

[40] Here, Auto Innovators bins dual clutch transmissions, transmissions labeled "level 2" or higher in NHTSA's modeling, and transmissions used in hybrid and electric vehicles as "advanced."

average levels of aerodynamic improvement where feasible.[41] The only place where there is some difference in which passenger car baseline technology levels exceed those of light trucks is in mass reduction. However, the sales-weighted average mass reduction levels in passenger cars (average of level 2.5) and light trucks (average of level 2.2) are similar. For roadload technologies, we again find that there is not a significantly greater opportunity for improvement in light trucks relative to passenger cars.

For additional details, please see Appendix C.

2.7 A model year 2032 augural standard is unnecessary.

A MY 2032 augural standard is unnecessary and generally inconsistent with Congressional intent. Congress set a limit on the number of years that could be considered in rulemaking to ensure that NHTSA did not set standards so far into the future such that its projections and analysis of maximum feasible standards would become subject to too much uncertainty. Given that NHTSA would need to undertake additional rulemaking to finalize a MY 2032 standard, we recommend that NHTSA forego an augural standard at this time, leaving MY 2032 for a future rulemaking. If NHTSA's concern is providing future direction, that direction is unnecessary given that without such an augural standard, manufacturers will have the direction provided by MY 2032 EPA GHG standards.

2.8 Minimum Domestic Passenger Car Standards

NHTSA proposes to finalize minimize domestic passenger car standards ("MDPCS"), as required by Congress, with an offset to account for uncertainty in the projected fuel economy of passenger cars upon which the MDPCS is based. Actual achieved fuel economy can vary from the fuel economy projected when a standard is finalized, potentially resulting in civil penalties that would not have occurred if the fuel economy of the passenger car fleet was accurately projected initially. An offset to account for such uncertainty remains warranted in the MY 2027-2032 CAFE program.

2.9 Air conditioning efficiency and off-cycle fuel consumption improvement programs remain important and applicable to both ICE and EVs.

Flexibilities such as the air conditioning ("A/C") efficiency and off-cycle fuel consumption improvement values ("FCIVs") have been an important part of the CAFE program since 2017. These flexibilities have encouraged the development of new technologies and have resulted in real-world fuel consumption reductions beyond those that would have

[41] NHTSA correctly recognizes that the opportunity for aerodynamic improvements on pickup trucks at the highest modeled level is not feasible given their design and utility requirements. Descriptions here are based on percentage of passenger cars and light trucks achieving aerodynamic improvement levels relative to the maximums allowed by NHTSA's model.

been achieved through focusing on only laboratory test cycles. The existing A/C efficiency and off-cycle credits are balanced to produce a verifiable real-world result, and both are subject to caps to further ensure that the FCIVs remain reasonable.

Auto Innovators believes that such flexibilities can and should still play an important role moving forward for both ICE and EVs. Consistent with our recommendations to EPA, we urge NHTSA to maintain A/C efficiency and off-cycle FCIVs for EVs and ICE vehicles through at least MY 2032 and to coordinate with EPA. We discuss these issues in greater detail in Appendix D.

2.10 NHTSA needs to address credit transfer caps

Automobile manufacturers may earn credits for exceeding applicable standards.[42] In the Energy Independence and Security Act of 2007, Congress required NHTSA to create a credit transfer program, allowing for the movement of credits between compliance categories.[43] Congress also set limits on such transfers based on MPG, the same units in which credits are generally denoted.

However, as fuel economy standards increase, the oil savings represented by the mile per gallon metric decrease. As a result, the credit transfer flexibility afforded under NHTSA's implementation of the credit transfer statute is significantly reduced over time. For example, credit transfer flexibility is reduced by 48% between MY 2018 and MY 2026. This erosion will continue under NHTSA's proposed standards.

Congress clearly intended that there be a usable credit transfer program. As stated in statute, "The Secretary of Transportation shall establish by regulation a fuel economy credit transferring program." (Emphasis added.)[44] Thus, NHTSA's current implementation of the statute, which results in a declining to near-meaningless transfer program, fails to meet Congressional intent.

However, there is a solution. Auto Innovators proposes that NHTSA interpret the statutory cap on credit transfers in terms of oil savings, a primary purpose of the CAFE program. While the statute does not require NHTSA to preserve oil savings when credits are transferred, NHTSA may make such an interpretation. In fact, NHTSA has already taken this approach in its credit trading (movement of credits between manufacturers) program. Doing so would be consistent with Congress's intent to provide a meaningful credit transfer program and would also support the Energy Policy and Conservation Act's energy saving purpose. Auto Innovators previously presented

[42] 49 U.S.C. § 32903(a).

[43] 49 U.S.C. § 32903(g).

[44] *Id.*

this concept to NHTSA and is disappointed this proposal lacks, at a minimum, the opportunity to comment on an approach directly related to recognition of oil savings.

The Inflation Reduction Act of 2022 includes a number of incentives to encourage domestic production of batteries and EVs. These provisions may further exacerbate concerns with NHTSA's interpretation of credit transfer caps as manufacturers move production of highly efficient EVs from import passenger car to domestic passenger car fleets. The remnant import passenger cars will likely have lower average fuel economy, not because those vehicles have become less efficient, but because the more efficient vehicles would be removed from that particular fleet. Without action to address the interpretation of credit transfer caps, import passenger car fleets may become increasingly subject to CAFE civil penalties.

Details of our proposal are provided in Appendix E.

2.11 Conclusion on Proposed CAFE Standards

For the above reasons, NHTSA should reconsider its proposed passenger car and light truck standards. The final CAFE standards should ultimately be aligned to reasonable and practicable GHG standards, properly recognize electrification, and result in a CAFE program under which manufacturers that are compliant with the GHG program do not become subject to CAFE penalties.

3 Heavy-Duty Pickup and Van Program

NHTSA proposes corporate average fuel consumption ("CAFC") standards for heavy-duty pickup trucks and vans ("HDPUVs") for MYs 2030-2035, with proposed standards increasing stringency year-by-year during that timeframe at a rate of 10% per year. The agency proposes targets for each vehicle based on their work factor, which is a function of payload and towing capabilities, and sets fleet average standards for each manufacturer based on the aggregation of vehicle targets. The work factor attribute has been used to set attribute-based standards for HDPUVs in this manner since MY 2014. Agency modeling projects that manufacturers will electrify large portions of their fleets to achieve the proposed HDPUV standards.

Auto Innovators supports NHTSA's decision to update standards for HDPUVs as part of this rulemaking. We endorse and support many structural elements of the NHTSA HDPUV proposal, including:

- Maintaining, as is, the MY 2027 Advanced Technology Multiplier for electrified vehicles.
- Continuing to use work factor as the HDPUV attribute to set fuel consumption targets.
- Providing sufficient lead-time for new CAFC targets by starting new standards in MY 2030.
- Recognizing that zero-emission vehicles ("ZEVs") such as BEVs and FCEVs consume zero gallons of fuel per mile in compliance calculations.

- Providing transparent assumptions about compliance pathways, including a clear characterization of the baseline fleet, a transparent summary of projected fuel saving technologies, their cost and effectiveness in combination with other technologies, and how the agency projects manufacturers could adopt these technologies to meet the proposed standards.

Nonetheless, alignment with EPA and program implementation elements may justify further consideration.

For instance, as manufacturers electrify large light trucks (i.e., large sport utility vehicles and pickup trucks), many of these electrified vehicles will likely increase curb weight on account of batteries, increase gross vehicle weight rating to maintain capability, and transition from the light truck to medium-duty Class 2b/3 classification. Further, many customers will demand large capacity batteries to tow, receive charge quickly, and provide range in challenging conditions. Such batteries are likely to provide non-towing ranges exceeding 300 miles and will thus be larger than those the agency commonly modeled. EPA, as part of their parallel GHG rulemaking for light and medium-duty vehicles,[45] proposed updated regulatory definitions to allow manufacturers to certify capable, heavy ZEVs in the light truck fleet average. NHTSA, operating under different statutes, has not proposed adjustments to regulatory class definitions, yet still assumes many battery-electric large sport utility vehicles and pickup trucks will be included in the light truck fleet average.

Auto Innovators encourages NHTSA to establish a credit transfer mechanism from the HDPUV fleet to the light truck fleet to address the likelihood of light trucks with heavy batteries moving to the Class 2b/3 fleet, and to improve alignment with proposed EPA regulations. This concern can be addressed by allowing credit transfers from HDPUV to light truck fleets. NHTSA's governing statutes do not prohibit it from creating a credit transfer program between HDPUVs and light truck fleets. 49 U.S.C. § 32903 can serve as a guide for the credit transfer program. We suggest NHTSA establish a transfer program from HDPUV to light truck by converting credits based on oil savings.

In Appendix F, Auto Innovators outlines why this transfer mechanism is needed to align with NHTSA's projected compliance pathways, and outlines how transfers under this proposed credit program could be implemented to properly account for oil savings. We also provide additional comments on other aspects of NHTSA's HDPUV proposal, including our concern that the proposed increase of 10% each year for MY 2030-2035 as is exceeds the maximum feasible improvement factors.

Auto Innovators looks forward to working with NHTSA, together, to discuss a credit transfer mechanism from HDPUV fleet to the light truck fleet.

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[45] U.S. Environmental Protection Agency, Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 *Fed. Reg.* 29184 (May 5, 2023).

4 Additional Comments

Additional comments on other issues are provided in Appendix G. These include:

- Extension of some analyses out to calendar year 2100.
- Inclusion of brake and tire wear in PM 2.5, in addition to vehicle exhaust.
- Documentation of CAFE model output.

Alliance for Automotive Innovation

Appendices to Comments to
U.S. Department of Transportation
National Highway Traffic Safety Administration

Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027-2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030-2035

Proposed Rule

Docket ID No.
NHTSA-2023-0022

October 16, 2023

Table of Contents

List of Acronyms and Abbreviations

A/C	Air conditioning
Auto Innovators	Alliance for Automotive Innovation
BEV	Battery electric vehicle
BISG	Belt-integrated starter generator (i.e., a "mild hybrid")
BTW	Brake and tire wear
CAFC	Corporate Average Fuel Consumption for medium-duty chassis-certified pickups and vans
CAFE	Corporate Average Fuel Economy for light-duty vehicles and medium-duty passenger vehicles
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EV	Electric vehicle, inclusive of battery electric, plug-in hybrid electric, and fuel cell electric vehicles
FCEV	Fuel cell electric vehicle
FCIV	Fuel consumption improvement value
GHG	Greenhouse gas
GVWR	Gross vehicle weight rating
HDPUV	Heavy-duty pickup trucks and vans
ICE	Internal combustion engine
MPG	Miles per gallon

MY	Model year
NHTSA	National Highway Traffic Safety Administration
PEF	Petroleum equivalency factor; 10 C.F.R. § 474.3(b)
PEV	Plug-in electric vehicle (including battery electric and plug-in hybrid electric vehicles)
PHEV	Plug-in hybrid electric vehicle
PM	Particulate matter
Proposed Rule	Referring to 88 Fed. Reg. 56128 (Aug. 17, 2023)
SAE	SAE International
Section 1777 State	A state which has adopted California emission regulations under Clean Air Act § 177
SHEV	Strong hybrid electric vehicle
SUV	Sport utility vehicle
ZEV	Zero-emission vehicle (including battery electric and fuel cell electric vehicles)
ZEV Mandate	California zero-emission vehicle standards (13 C.C.R. §§ 1962, 1962.1, 1962.2, and 1962.4)

Appendix A: NHTSA's proposed standards are improperly predicated on alternative fuel vehicles

NHTSA's statutes prohibit consideration of dedicated alternative fuel vehicles in determining the maximum feasible standards.

As in the previous rulemaking setting Corporate Average Fuel Economy ("CAFE") standards for MY 2024-2026, the National Highway Traffic Safety Administration ("NHTSA") includes in its baseline analysis for this Proposed Rule[1] battery electric vehicles carried forward from MY 2026 and additional battery electric vehicles ("BEVs") that it predicts automakers will build and sell in response to California's zero-emission vehicle ("ZEV") Mandate.[2] NHTSA has concluded that it is proper for the agency to do so despite the prohibition in 49 U.S.C. §32902(h) that it "may not consider the fuel economy" of battery-electric vehicles in determining maximum feasible fuel economy under Section 32902(f), because, in NHTSA's view, that section only prohibits the agency from considering incremental BEVs as a compliance option in response to the standards.[3] In the Proposed Rule, NHTSA notes that it "is aware of challenges to this approach in Natural *Resources Defense Council v. NHTSA*, No. 22–1080 (D.C. Cir.)," ("*NRDC v. NHTSA*"), and that its "analysis will account for any judgment in that case that may be final before the issuance of the final rule."[4] While we appreciate NHTSA's recognition that should the D.C. Circuit disagree with its approach, that would have a significant impact on this rulemaking, we were disappointed not to see any analysis in this rulemaking of what the standards would be should the agency exclude BEVs altogether in its baseline analysis.

That said, the Alliance for Automotive Innovation ("Auto Innovators") reiterates here the position it took in the prior rulemaking and in the amicus brief the Association submitted in *NRDC v. NHTSA*, which we incorporate by reference in these comments. To summarize, it is improper for NHTSA to consider the fuel economy of *any* BEVs in its standard-setting—whether those BEVs are in response to the standards or those BEVs are included in the baseline analysis. The prohibition against the consideration of the

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[1] National Highway Traffic Safety Administration, Notice of Proposed Rulemaking: Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027-2032 and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030-2035, 88 *Fed. Reg.* 56128 (Aug. 17, 2023), hereinafter "NPRM".

[2] 13 C.C.R. §§ 1962, 1962.1, 1962.2, and 1962.4.

[3] *See* NPRM (*supra* note 1) at 56319.

[4] *Id.*

fuel economy of BEVs set forth in Section 32902(h) is categorical and includes no exceptions. The statute provides:

> In carrying out subsections (c) [amending CAFE standards], (f) [determining maximum feasible average fuel economy standards], and (g) [promulgating other amendments] of this section, the Secretary of Transportation—
>
> (1) may not consider the fuel economy of dedicated automobiles;
>
> (2) shall consider dual fueled automobiles to be operated only on gasoline or diesel fuel; and
>
> (3) may not consider, when prescribing a fuel economy standard, the trading, transferring, or availability of credits under section 32903.[5]

Notably, the statute does not state that NHTSA may consider the fuel economy of BEVs so long as it refrains from doing so as a compliance option, as NHTSA would read the statute. It says that the agency "may not consider the fuel economy of dedicated automobiles" for any purpose whatsoever. NHTSA seeks to include BEVs to mandate a transformation of the industry. Congress has not authorized such a mandate; NHTSA has overstepped its authority.

At the Oral Argument for *NRDC v. NHTSA,* held on September 14, 2023, NHTSA's counsel claimed that including the electric-drive portion of a plug-in hybrid electric vehicle ("PHEV"), a type of dual fueled vehicle, in its standard-setting analysis and adding more BEVs after the compliance years might be wrong, but was a harmless error. However, as noted in the rebuttal, there is a concern that these errors and other errors, alone or in combination, are not harmless and warrant remand and vacatur.

In the NPRM, NHTSA suggests that it is required to consider BEVs in the baseline in order to satisfy its obligations in Office of Management and Budget ("OMB") Circular A–4, which directs agencies to develop analytical baselines regarding the state of the world in the absence of the regulatory action being evaluated.[6] But an OMB Circular does not trump a clear statutory requirement such as 49 U.S.C. §32902(h)(1).[7]

NHTSA's construction of 32902(h)(1) is also belied by its application of subsection (h)(2) concerning dual fueled automobiles. That prohibition is also categorical, and it parallels subsection (h)(1): "in carrying out subsections (c), (f), and (g) of this section," NHTSA

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[5] 49 U.S.C. §32902(h).

[6] *Id.*

[7] *See Chevron, U.S.A. v. Nat. Res. Def. Council*, 467 U.S. 837, 843 n.9 (1984) ("[Courts] must reject administrative constructions which are contrary to clear congressional intent.").

"shall consider dual fueled automobiles to be operated only on gasoline or diesel fuel."[8] In contrast to its construction of subsection (h)(1), NHTSA does *not* craft an exception onto subsection (h)(2) for PHEVs in the baseline. In other words, NHTSA excluded the electric portion of *all* PHEVs in the rulemaking years—both PHEVs for compliance purposes and the PHEVs in the baseline.[9] NHTSA's application of subsection (h)(2) to all of the PHEVs in the model is correct. The agency has offered no explanation for why it is construing subsection (h)(1) differently than subsection (h)(2); there is none. Subsection (h)(1) also applies to all vehicles in the compliance years, and there is no basis to differentiate between BEVs in the baseline and incremental BEVs to comply with the standards. NHTSA's treatment of PHEVs also contradicts its argument that it would be improper to create an "artificial baseline that pretends that dedicated alternative fueled vehicles do not exist."[10] After all, that is precisely what NHTSA has done with respect to PHEVs: it created an "artificial baseline that pretends that" PHEVs operate only on gasoline, and it did so because that is what 49 U.S.C. §32902(h)(2) requires it to do.

NHTSA includes dedicated alternative fuel vehicles in its analysis.

NHTSA has included dedicated alternative fuel vehicles, specifically BEVs, in its analysis, both before and during standard-setting years.

NHTSA's inclusion of alternative fuel vehicles in analysis years prior to standard-setting years is important and meaningful because those years establish a level of fuel economy upon which subsequent standards are built. If alternative fuel vehicles were not included in projections leading up to the standard-setting years, the achieved fuel economy would potentially be lower, which could result in NHTSA finding lower maximum feasible standards in the standard-setting years.

Inclusion of alternative fuel vehicles in the standard-setting years clearly has impacts on NHTSA's determination of maximum feasible standards given that such vehicles

[8] 49 U.S.C. § 32902(h)(2).

[9] *See*, *e.g.*, NPRM (*supra* note 1) at 56201. ("Unlike other technologies in the analysis, including other electrification technologies, Congress placed specific limitations on how we consider the fuel economy of PHEVs and BEVs when setting CAFE standards. We implement these restrictions in the CAFE Model by using fuel economy values that assume 'charge sustaining' (gasoline-only) PHEV operation, and by restricting technologies that convert a vehicle to a BEV or a FCEV from being applied during 'standard-setting' years.") *See also* National Highway Traffic Safety Administration, Draft Technical Support Document: Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027 and Beyond and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030 and Beyond (Jul. 2023), hereinafter "DTSD" at 1-6. ("For the current analysis of the CAFE LD fleet, NHTSA allowed application of PHEVs while disallowing application of BEVs and FCVs during the standard setting years").

[10] NPRM (*supra* note 1) at 56319.

generally have much higher fuel economy than internal combustion engine ("ICE") vehicles, which likely has led to NHTSA proposing higher standards.

Alternative fuel vehicles are included through several pathways in NHTSA's baseline assessment, which forms the foundation for the action alternatives it is considering. These include alternative fuel vehicles that NHTSA projects will be necessary for compliance with California's ZEV Mandate, additional alternative fuel vehicles to the extent that they are more cost-effective than other options in meeting the U.S. Environmental Protection Agency's ("EPA's") greenhouse gas ("GHG") and NHTSA's CAFE regulations through model year ("MY") 2026, and any alternative fuel vehicles that NHTSA's modeling determines would achieve fuel savings equal or better to their incremental costs within 30 months of purchase.[11]

NHTSA projects a significant number of BEVs in both the passenger car and light truck fleets in its rulemaking analysis (Figure 1). Passenger car BEV share exceeds 30% in MY 2026 and grows to over 40% by MY 2032. Light truck BEV share exceeds 15% in MY 2026 and grows to over 25% by MY 2032.

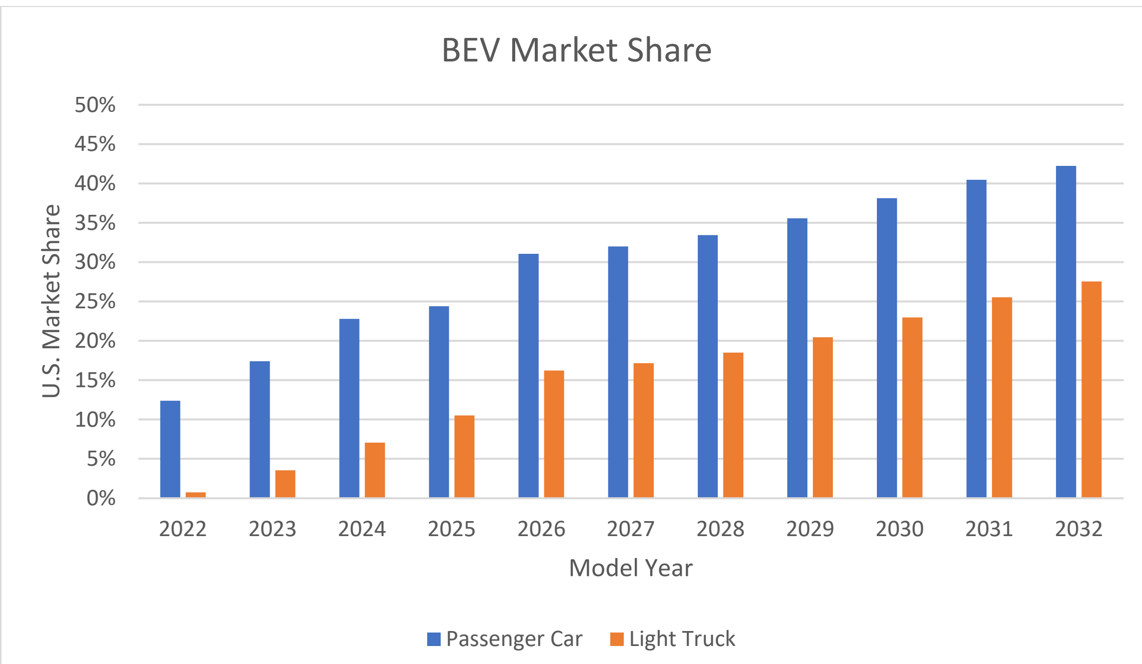

Figure 1: Projected market share of BEVs in NHTSA's rulemaking central analysis for the proposed standards, MYs 2022-2032.[12]

[11] DTSD (*supra* note 9) at 1-25.

[12] NHTSA, rulemaking central analysis Technology Utilization Report output file, scenario 2.00%/Y Pc And 4.00%/Y Lt During 2027-2032, sum of BEV1, BEV2, BEV3, and BEV4 technology penetration rate.

Finally, NHTSA also models additional BEVs in model years after 2032. While these later BEVs would not contribute to the baseline or achieved fuel economy under the proposed standards, they do add additional costs and benefits to the regulatory impact analysis. Therefore, to whatever extent NHTSA considers the benefit / cost analysis in support of its determination of maximum feasible standards, NHTSA also considers alternative fuel vehicles in its determination.

The inclusion of dedicated alternative fuel vehicles has a material impact on the estimated achieved CAFE.

In NHTSA's rulemaking analysis, these BEVs have high average fuel economy (Figure 2). In MYs 2022-2026 BEVs classified as passenger cars have an average fuel economy near or over 400 miles per gallon ("MPG"). Light truck BEVs have fuel economies near or exceeding 300 MPG in MYs 2022-2026. In MY 2027 and later, average BEV fuel economies drop to near 100 MPG as a result of NHTSA's use of a lower Department of Energy ("DOE") -proposed petroleum equivalency factor for BEVs. However, as described below, a BEV fuel economy of 100 MPG still far exceeds that of non-alternative fuel vehicles.

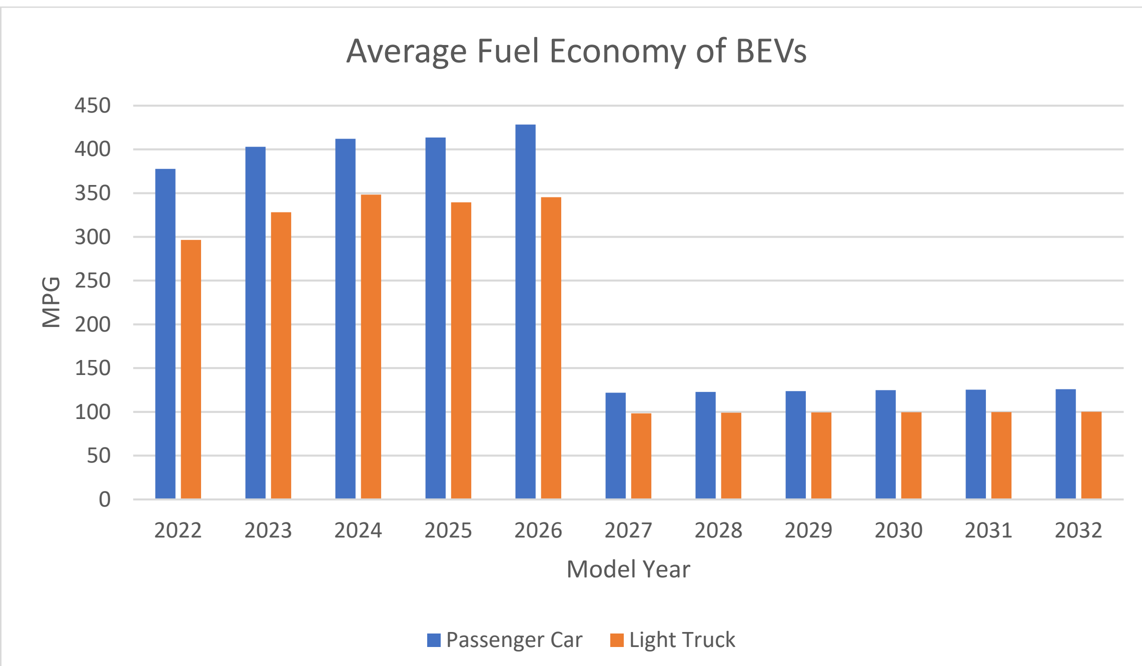

Figure 2: NHTSA-projected sales-weighted average fuel economy of BEVs in the rulemaking central analysis for the proposed standards, MYs 2022-2032.[13]

[13] NHTSA, rulemaking central analysis Vehicles Report output file, scenario 2.00%/Y Pc And 4.00%/Y Lt During 2027-2032, sales-weighted harmonic average of FE Compliance for battery electric vehicles.

Non- alternative fuel vehicles have much lower average fuel economies in NHTSA's analysis (Figure 3). Passenger cars never exceed 50 MPG on average through MY 2032. Light trucks never exceed 40 MPG on average through MY 2032.

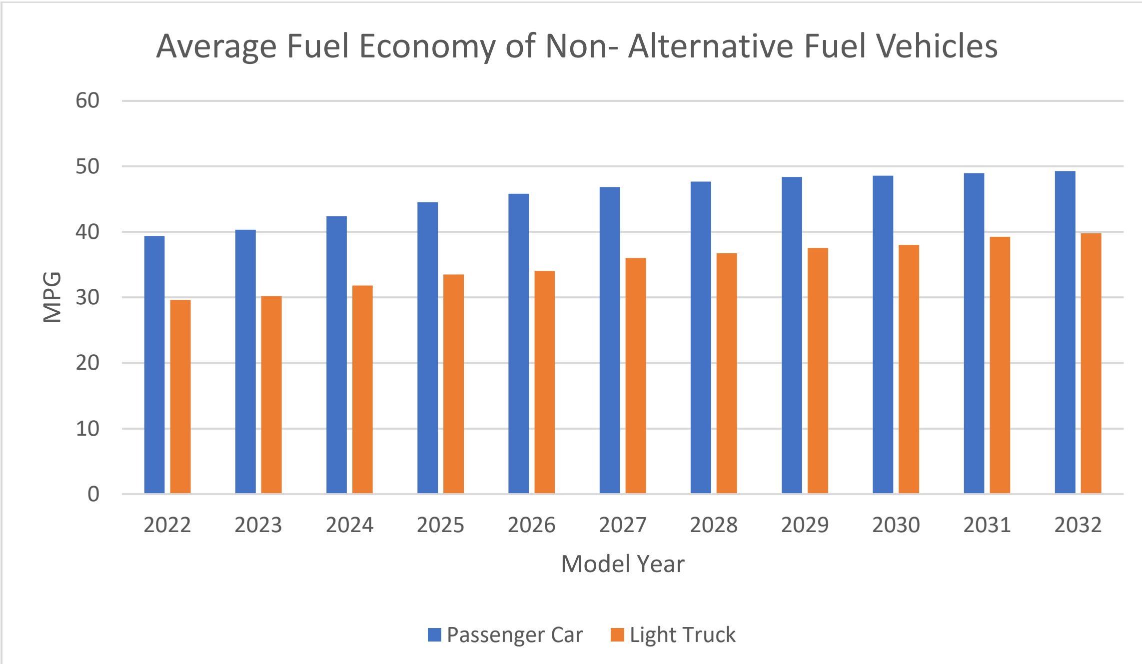

Figure 3: NHTSA-projected sales-weighted average fuel economy of non- alternative fuel vehicles in the rulemaking central analysis for the proposed standards, MYs 2022-2032.[14]

The inclusion of BEVs in NHTSA's rulemaking analysis makes a significant difference in the projected fuel economy of the passenger car and light truck fleets (Figures 4 and 5). For passenger cars, alternative fuel vehicles increase the projected fuel economy of the fleet by 11.5 MPG in MY 2027, growing to 17.1 MPG in MY 2032. For light trucks, alternative fuel vehicles increase the projected fuel economy of the fleet by 4.4 MPG in MY 2027, growing to 7.9 MPG in MY 2032.

[14] NHTSA, rulemaking central analysis Vehicles Report output file, scenario 2.00%/Y Pc And 4.00%/Y Lt During 2027-2032, sales-weighted harmonic average of FE Compliance for vehicles other than EVs.

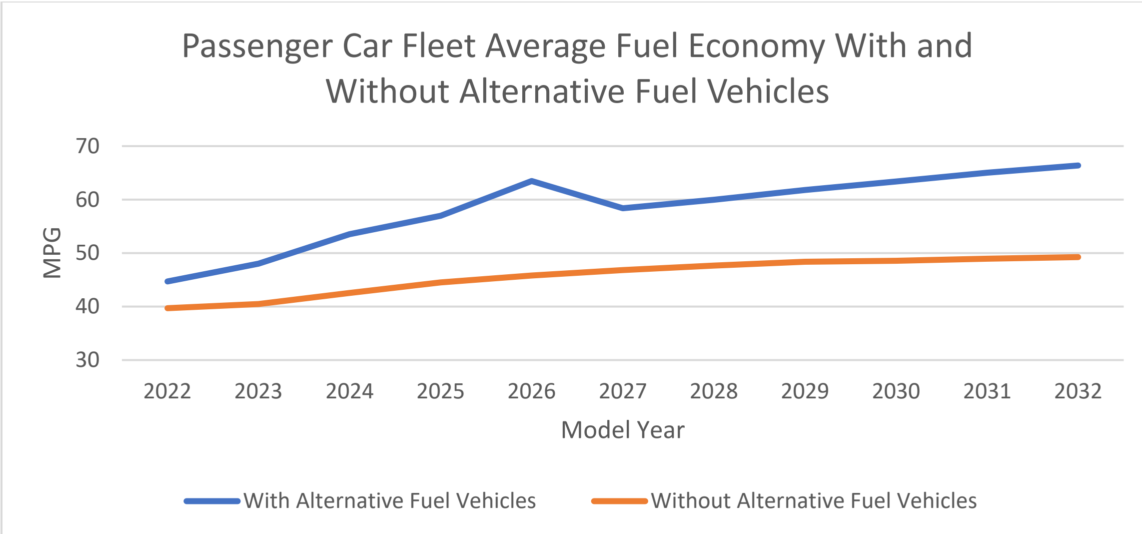

Figure 4: NHTSA-projected sales-weighted average fuel economy of the passenger car fleet with and without alternative fuel vehicles, MYs 2022-2032.[15]

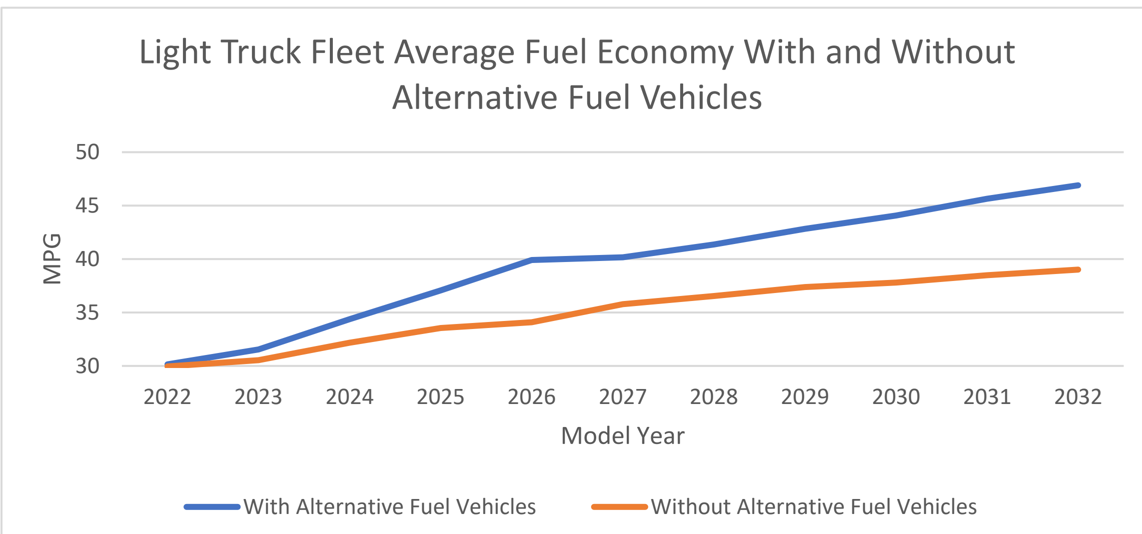

Figure 5: NHTSA-projected sales-weighted average fuel economy of the passenger car fleet with and without alternative fuel vehicles, MYs 2022-2032.[16]

[15] NHTSA, rulemaking central analysis Vehicles Report output file, scenario 2.00%/Y Pc And 4.00%/Y Lt During 2027-2032, sales-weighted harmonic average of FE Compliance for passenger car vehicles grouped as alternative fuel (including BEVs and FCVs) and non- alternative fuel (including PHEVs given NHTSA's exclusion of electric operation of PHEVs in MYs 2027-2032).

[16] NHTSA, rulemaking central analysis Vehicles Report output file, scenario 2.00%/Y Pc And 4.00%/Y Lt During 2027-2032, sales-weighted harmonic average of FE Compliance for light truck vehicles grouped as alternative fuel (including BEVs and FCVs) and non- alternative fuel (including PHEVs given NHTSA's exclusion of electric operation of PHEVs in MYs 2027-2032).

Without dedicated alternative fuel vehicles, NHTSA's proposed standards exceed technological feasibility for numerous manufacturers and a significant portion of the fleet.

To better understand the impacts of BEVs (alternative fuel vehicles) on projected compliance to the proposed standards and other alternatives, Auto Innovators ran an additional sensitivity case that minimized BEVs in the analysis and that prevented civil penalty payment unless no other option was available. The following changes were made to the input files to enable this:

- Model runtime settings (*See* Attachment 4 - Summary_NoEV_NoFine.txt.)
    - Consistent with rulemaking central analysis settings
- Market data input file (*See* Attachment 5 - market_data_LD_NoEV_NoFine.xlsx.)
    - MY 2022 sales volume for all BEVs set to "1" (minimize existing BEV impacts)
    - Penalty payment preference set to "No" for all manufacturers (force technology to greatest extent within other model constraints)
- Parameters input file (See Attachment 6- parameters_ref.xlsx.)
    - No changes
- Scenarios input file (See Attachment 7 - scenarios_LD_NoEV.xlsx.)
    - Set standard-setting flag to "True" for MYs 2023-2032 (prevent credit carry-forward/trade/transfer)
    - Set dual fuel option to "0" for MYs 2023-2032 (ignore PHEV electric operation)
- Technologies input file (See Attachment 8 - technologies_NoEV.xlsx.)
    - Set BEV and FCV penetration caps to 0% (prevent addition of new BEV variants)

The results for both passenger car and light truck fleets demonstrate the technological challenges of meeting the proposed standards without the alternative fuel vehicles that NHTSA is prohibited from considering (Tables 1 and 2). Over a third of passenger cars are in fleets that do not meet the proposed standard in MYs 2027-2032. For light trucks almost a third of production is in fleets that do not meet standards in MY 2027. In MY 2028, over three quarters of vehicles are in fleets that do not meet the proposed standard, and in MY 2029 and later nine out of every ten vehicles are in a fleet that does not meet the proposed standard without BEVs.

Table 1: Passenger car performance to the proposed standards without BEVs, maximizing technology application. Excludes Karma, Lucid, and Tesla. Data based on analysis of Compliance Report output file from Auto Innovators model run described above.

Model Year	Number of Passenger Car Fleets That Do Not Meet Standard	Percent of Production in Fleets That Do Not Meet Standard
2027	15	36%
2028	14	33%
2029	15	36%
2030	15	36%
2031	14	40%
2032	17	48%

Table 2: Light truck performance to the proposed standards without BEVs, maximizing technology application. Excludes Karma, Lucid, and Tesla. Data based on analysis of Compliance Report output file from Auto Innovators model run described above.

Model Year	Number of Light Truck Fleets That Do Not Meet Standard	Percent of Production in Fleets That Do Not Meet Standard
2027	8	32%
2028	11	76%
2029	14	91%
2030	14	91%
2031	13	91%
2032	14	92%

NHTSA should not include the California ZEV Mandate in its analysis, but if does so, aspects of the modeling need correction.

Inclusion of the California ZEV Mandate in the baseline makes it appear easier to achieve higher fuel economy levels than would be reasonable without alternative fuel vehicles. As we describe in more detail above, we believe that NHTSA's inclusion of the ZEV Mandate is illegal, regardless of how NHTSA attempts to do so. Setting aside the legality of its inclusion, aspects of NHTSA's modeling of the ZEV Mandate inflate the number of projected dedicated alternative fuel vehicles, exacerbating our concern that NHTSA has proposed CAFE standards beyond the maximum feasible level.

First, although California and certain Clean Air Act § 177 states ("Section 177 States") have adopted final regulations for the ZEV Mandate beyond MY 2025, enforcement of the regulation requires a waiver from EPA that has yet to be granted. Therefore, unless and until EPA grants such a waiver, NHTSA should not consider the ZEV Mandate to be in effect beyond MY 2025. As noted by EPA in its multi-pollutant proposal, it only included the ZEV Mandate as a sensitivity case given that California had yet to submit a waiver request at the time that NPRM was prepared, and EPA "is not prejudging the outcome of any waiver process or whether or not certain states are able to adopt California's regulations under the criteria of [Clean Air Act] section 177.[17]

In addition, it is uncertain whether the California ZEV mandate will remain as currently written, and whether states that have adopted it will remain in the program. The ZEV Mandate requires manufacturers to sell only EVs in California by 2035, with interim targets leading up to that level, including 68% EV sales in 2030.[18] While automakers will almost certainly plan to comply with the regulation, great uncertainty remains in automakers' capacity to do so (given the nascent state of EV supply chains), market conditions (e.g., affordability), and the development of the requisite charging infrastructure and supporting distribution grid upgrades. These risks exist in California and are even greater in some of the Section 177 states. Although we are unaware of any plan from California to amend the ZEV Mandate, it has a long history of setting aspirational targets and then adjusting if necessary.[19] Similarly, there is a history of some Section 177 states adopting and then abandoning the ZEV Mandate.[20] If NHTSA's standards are premised on the current ZEV Mandate program, and adoption by various states and circumstances change, NHTSA has a more challenging path to adjust standards.[21]

NHTSA has also erred in its modeling of the ZEV Mandate by failing to account for the nuances of Section 177 State adoption of the ZEV Mandate. NHTSA models 17 states as subject to the California ZEV Mandate.[22] NHTSA presumes compliance with the ZEV Mandate for each of these states in every year of its modeling of compliance with CAFE standards.[23] In reality, not every state has adopted the ZEV mandate for every

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[17] U.S. Environmental Protection Agency, Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 *Fed. Reg.* 29184, 29334 (May 5, 2023), hereinafter "EPA NPRM".

[18] 13 C.C.R. § 1962.4(c)(1)(B).

[19] For a detailed recounting of these changes, please see *California: ZEV*, TransportPolicy.net, https://www.transportpolicy.net/standard/california-zev/ (accessed Oct. 12, 2023).

[20] Arizona, for example, adopted California's standards in 2008 and then repealed them in 2012. Jessica Testa, *AZ Repeals Emission Rules Mirroring Calif. Standards*, Arizona Daily Star (Jan. 11, 2012), https://tucson.com/business/local/az-repeals-emission-rules-mirroring-calif-standards/article_4c8d395e-4d48-5b49-adc2-14dc6d77bb95.html.

[21] Not only are federal requirements more demanding than those of California when a regulation is reconsidered, given the statutory prohibition against NHTSA including electric vehicles in determining maximum feasible standards, what reason for change could NHTSA give? It would be difficult for NHTSA to cite changes in underlying assumptions regarding electric vehicle technology when NHTSA is not supposed to consider alternative fuel vehicles in setting maximum feasible standards in the first place.

[22] *See* DTSD (*supra* note 9) at 2-76, note 211.

[23] *Ibid.* ("We consider all ACC II states together, and do not model specific states' years of joining.")

year with some joining later than others, some having years where the ZEV mandate is not enforceable due to timing of regulatory action, some having adopted the mandate for only a limited number of years, and yet others in the process of adopting, but not having completed final regulatory action. While NHTSA acknowledges that it has glossed over these issues to "ease" its modeling burden,[24] the lack of more exact accounting conveniently also adds additional alternative fuel vehicles to its analysis without even the cover of a regulatory requirement. Table 3 provides the status of state adoption of the ZEV Mandate for the states included by NHTSA in its analysis. Note that many states have not completed final action for model years after 2025 and that many will not have an enforceable requirement in MY 2026.

Table 3: Status of ZEV Mandate adoption for states NHTSA modeled ZEV requirements for in MYs 2023 and later.

State	Model Years Formally Adopted	Model Years Under Formal Consideration
California	Through 2035	
Colorado	2023 - 2025	2027-2032
Connecticut	Through 2025	2027-2035
Delaware		2027-2035
Maine	Through 2025	2027-2032
Maryland	Through 2025	2027-2035
Massachusetts	Through 2035	
Minnesota	2025	
Nevada	2025	
New York	Through 2035	
New Jersey	Through 2025	2027-2035
New Mexico	2026 [/1]	2027-2032
Oregon	Through 2035	
Rhode Island	Through 2025	2027-2035
Vermont	Through 2035	
Virginia	2025 [/2]	
Washington	2025-2035	

[/1] New Mexico adopted 13 C.C.R.§ 1962.2, enforceable in MY 2026. However, this section is only applicable through MY 2025.
[/2] By its express terms, Virginia has adopted only ACC I, which sunsets after MY 2025.

NHTSA also likely exaggerates the number of BEVs that will be built by acknowledging, but otherwise ignoring, the flexibilities built into the ZEV Mandate. These include technology options, credit banking/trading, and compliance strategies.

The ZEV Mandate allows a portion of the requirement to be met with PHEVs. Instead of modeling a portion of the requirement as met with PHEVs, NHTSA assumes that the entire requirement will be met with BEVs, which have a higher fuel economy than

[24] *Ibid.*

PHEVs in its CAFE model. NHTSA has demonstrated the ability to make assumptions about individual manufacturer strategies, and to model those actions. For example, NHTSA models CAFE civil penalty payment preferences on an individual manufacturer basis.

There are also additional flexibilities in the ZEV Mandate that will help ease the transition to more challenging requirements. There are seven primary flexibility options that NHTSA did not consider that may help ease the glide path of the CARB ZEV Mandate. First, a manufacturer may use banked ZEV credits to satisfy its annual ZEV requirement. Second, a manufacturer may pool its credits by over-complying with its annual ZEV requirement in one state and using the excess credits to satisfy its annual ZEV requirement in another state. Third, a manufacturer that produces fuel cell electric vehicles (“FCEV”) for sale in California, or in a state that has adopted California’s program, can receive extra credits based on percentage of sales volume of the manufacturer's FCEV sales in the state where they sell the most FCEVs (known as the “annual proportional FCEV allowance"). There are, however, limits on these first three options: (1) each option is capped in terms of the number of values a manufacturer may use to satisfy its annual ZEV requirement; and (2) the pooled, proportional, and historical credits that are converted to values are available to be used only through MY 2030. Fourth, a manufacturer may earn a partial vehicle value for the manufacture and sale of a PHEV that does not meet the minimum standards for a full ZEV credit. Fifth, a manufacturer may earn a vehicle value greater than one for the sale of a ZEV pursuant to any of three environmental justice program options. Sixth, a manufacturer may earn early compliance vehicle credits. Like the partial vehicle value opportunities, the early compliance vehicle values are capped and may only be used during specified model years. Finally, as mentioned, a manufacturer participating in the CARB program in more than one state may trade ZEV credits with other manufacturers who are subject to the annual ZEV requirement in those states.

NHTSA also ignores credit banking and trading in modeling ZEV Mandate compliance. Given the rapidly accelerating stringency of the ZEV Mandate in future years, it seems likely that manufacturers will include credit banking in their compliance strategies, which could affect the number of BEVs required for compliance. Moreover, the rapidly increasing stringency of the ZEV Mandate may also drive manufacturers to purchase credits from other manufacturers that exclusively build BEVs (e.g., Tesla). The purchase of credits from such companies would effectively lower the number of BEVs that the purchasing manufacturer would need to build to comply with the ZEV Mandate.

Finally, NHTSA’s modeling of the ZEV Mandate presumes that manufacturers will comply by selling BEVs in place of ICE vehicles while maintaining overall sales. An alternative compliance pathway is simply to sell fewer ICE vehicles, an approach that might be taken if supply chains do not develop sufficiently, or if there is insufficient market demand for EVs in one or more states that have adopted the ZEV Mandate. At least one manufacturer has already taken initial steps in this direction.[25]

In short, NHTSA's modeling of the ZEV Mandate seems intentionally designed to maximize the number of BEVs added to the baseline for analysis of future standards. NHTSA should not model the ZEV Mandate at all, consistent with 49 U.S.C. §32902(h)(1) and (2). However, if NHTSA does include the ZEV Mandate in its analysis, we recommend the following changes.

- The ZEV Mandate should not be included past MY 2025 if EPA has not granted a waiver for 13 C.C.R. § 1962.4.

- The ZEV Mandate should only be modeled for states in years where final regulatory action to adopt it has occurred. This could easily be accomplished by modifying assumptions on the fraction of U.S. production that the ZEV Mandate applies to in each year.

- NHTSA's modeling should include PHEVs as a pathway for ZEV Mandate compliance, particularly for manufacturers that are already building PHEVs and those that have announced plans to do so. For those manufacturers, NHTSA should assume the maximum level of allowable PHEVs towards meeting ZEV Mandate requirements.

- NHTSA should assume that manufacturers that build only BEVs will sell associated surplus ZEV Mandate credits to other manufacturers.

- NHTSA should model some level of ZEV Mandate requirement less than the regulation calls for to account for potential use of other flexibilities and/or compliance strategies that do not involve substituting BEV for ICE vehicle sales.

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[25] Patrick George, Stellantis Is Restricting Gas-Only Car Sales in 14 U.S. States Including California and New York, The Autopian (Jun. 16, 2023). Available at https://www.theautopian.com/stellantis-is-restricting-gas-only-car-sales-in-14-u-s-states-including-california-and-new-york/ (accessed Sep. 11, 2023).

Appendix B: Even if NHTSA's approach to alternative fuel vehicles is allowable, the proposed standards exceed technological feasibility and economic practicability.

EPCA and its legislative history establish that NHTSA must balance fuel savings against economic interests; high penalty estimates show this balance has not been struck.

EPCA's legislative history establishes that "maximum feasible" standards must be prescribed by weighing the benefits of higher average fuel economy against "the possible implications for the national economy" and "severe strain[s]" imposed on manufacturers.[26] Accordingly, NHTSA's longstanding approach has been to set CAFE standards that are "not so stringent as to threaten substantial economic hardship for the industry."[27] NHTSA relied on this history from the outset in setting standards to emphasize consideration of potential civil penalties: "This in turn requires an analysis of the impacts of civil penalties imposed on the manufacturers at a given standard level."[28] In this case, NHTSA's proposed standards clearly threaten substantial economic hardship, as evidenced by the unprecedented civil penalties projected across the industry.

NHTSA's prediction that its proposed standards will result in widespread and large payments of civil penalties in lieu of compliance is inconsistent with NHTSA's understanding of the purpose of the civil penalties provisions. NHTSA historically has explained that EPCA's enforcement structure and civil penalties for violations of light-duty standards are designed to account for the "inevitable differences in capabilities" of manufacturers that lag behind,[29] penalizing those manufacturers without taking them out of the market entirely. All manufacturers are free to opt to pay the penalties in lieu of compliance.[30] This is in sharp contrast to how NHTSA applies penalties for heavy-duty standards, for which "Congress did not prescribe a specific rate" and the agency can "ensure that any penalties for non-compliance will not be less than the cost of

[26] H.R. Rep. No. 94-700, at 155 (1975).

[27] 50 *Fed. Reg.* 40528, 40545 (Oct. 4, 1985); *see also* 85 *Fed. Reg.* 24174, 25134 (Apr. 30, 2020) (same).

[28] 42 *Fed. Reg.* 33534, 33548 (June 30, 1977).

[29] 45 *Fed. Reg.* 20871, 20876 (Mar. 31, 1980).

[30] See 77 *Fed. Reg.* 62624, 63130-31 (Oct. 15, 2012) (NHTSA has "no authority . . . to prevent manufacturers from turning to payment of civil penalties if they choose to do so").

compliance."[31] Accordingly, in the light-duty context, the civil penalties effectively set an upper limit on economic practicability, and a prediction that billions of dollars in penalties will be owed necessarily means that NHTSA's standards are not economically practicable to achieve as compared to the penalty path.

Contrary to NHTSA's suggestion in the proposal, moderating NHTSA's standards in response to the prospect of billions of dollars in civil penalties being paid industry-wide would not risk "keying standards to the least capable manufacturer."[32] To the contrary, these are precisely the type of "industry-wide considerations" that NHTSA has concluded "Congress intended [the agency] to take . . . into account in determining the maximum feasible CAFE levels."[33] Nor would lowering standards in this case "disincentivize innovation by rewarding laggard performance"—indeed funds would be spent on developing technology rather than on fines paid to the U.S. Treasury.[34] "Economic practicability" might include standards that require a few laggards to pay penalties, but that concept cannot reasonably encompass a scenario in which the cost of compliance for a majority of the market in a given class will exceed the cost of penalties.

NHTSA projects that large numbers of manufacturers and a large portion of vehicles produced in MYs 2027-2032 will fail to meet the proposed standards.

NHTSA describes that setting CAFE standards based on the least capable manufacturer is inconsistent with its interpretation of economic practicability.[35] However, it is highly unusual and inappropriate for NHTSA to propose a standard that it projects a large number of manufacturers, and a large portion of the fleet, will not meet. That this is exactly the outcome NHTSA projects, both for passenger cars and light trucks, and despite including a large number of alternative fuel vehicles, is highly concerning. Such results strongly suggest that the proposed standards exceed technological feasibility and/or economic practicability. While NHTSA may choose how to balance the four statutory factors in determining maximum feasible standards, there should still be a balance—especially where NHTSA's own projections indicate that there is not enough available technology and/or time to apply the available technology to meet the proposed standards. The standards proposed by NHTSA are unbalanced and beyond maximum feasible levels as defined in the statute.

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[31] NPRM (*supra* note 1) at 56368-69.

[32] *Id.* at 56128, 56315.

[33] 68 *Fed. Reg.* 16868, 16872 (Apr. 7, 2003).

[34] See NPRM (*supra* note 1) at 56315.

[35] *Id.* at 56314 *et seq.*

The unbalanced proposed standards are expected to result in large civil penalties. Such penalties detract from capital available to invest in transitioning the fleet to EVs, and provide no environmental or energy-savings benefits. They also harm consumers by increasing vehicle costs without commensurate utility improvements.

Passenger Cars

Despite NHTSA's projection that manufacturers on average will meet the proposed passenger car targets,[36] concerns remain, especially in MYs 2027-2029. At the individual manufacturer level, both a large number of manufacturers and a large portion of passenger car production are projected to fail to meet the proposed targets in MYs 2027-2029 (Table 4). In MY 2027, 42% of passenger car production volume is projected to not meet its applicable fleet average standard, even when including production from manufacturers that only build alternative fuel vehicles. Although the production share meeting its standard improves in MYs 2028 and 2029, it remains one in three vehicles in 2028, and one in five vehicles in 2029.

Table 4: Summary of projected passenger car compliance under the proposed standards, MYs 2027-2032.[37]

Model Year	Total Passenger Car Fleets /1	Number of Fleets Worse Than target	Total Passenger Car Sales	Sales in Fleets Worse Than Target	Percent of Sales Worse Than Target
2027	29	13	4,965,137	2,063,061	42%
2028	29	10	4,973,490	1,655,625	33%
2029	29	7	4,869,116	1,005,275	21%
2030	29	4	4,789,410	260,562	5%
2031	29	1	4,763,801	21,643	0%
2032	29	1	4,765,585	21,649	0%
2027-29			14,807,743	4,723,961	32%

/1 Includes both import and domestic passenger car fleets. Includes manufacturers that only sell alternative fuel vehicles (e.g., Tesla).

These compliance challenges lead to substantial projected civil penalties (Figure 6). Cumulative civil penalties under NHTSA's proposed passenger car standards reach over $1 billion by 2029, and are over $500 million in 2027 alone. The timing of these penalties is also a challenge, coming exactly when manufacturers will be attempting to quickly ramp up EV manufacturing and production.

[36] *Id.* at 56137, Table I-4, comparison of Passenger Cars Estimated Required to Estimated Achieved.

[37] Auto Innovators analysis of NHTSA central rulemaking analysis Compliance Report.

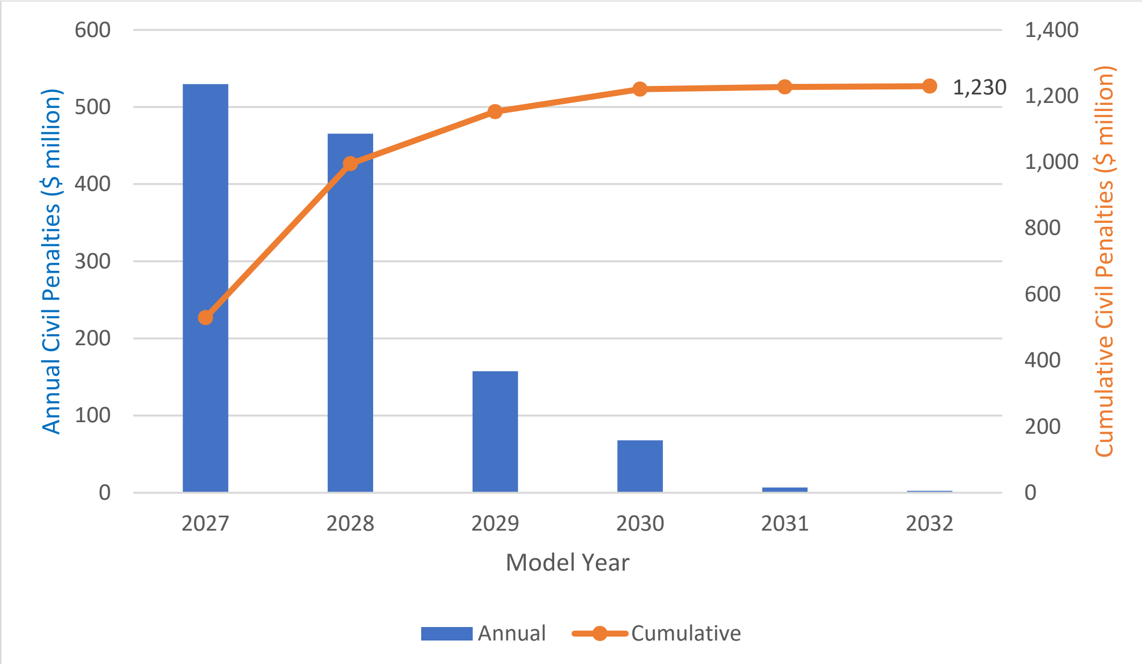

Figure 6: Total CAFE civil penalties from passenger car fleets under the proposed standards, MYs 2027-2032.[38]

<u>Light Trucks</u>

NHTSA proposes to increase light truck CAFE stringency at a rate of 4% per year, double that of its proposal on passenger cars. NHTSA's compliance projections reveal how herculean the challenge of such standards would be, especially following the massive stringency increases already finalized for MYs 2024-2026.

Even including alternative fuel vehicles and manufacturers that only build alternative fuel vehicles, NHTSA projects that the average light truck will fail to meet the proposed standards in every year of the proposal (Figure 7).

[38] *Id*. Includes civil penalties from the baseline (no action scenario) and incremental penalties from the proposed standards.

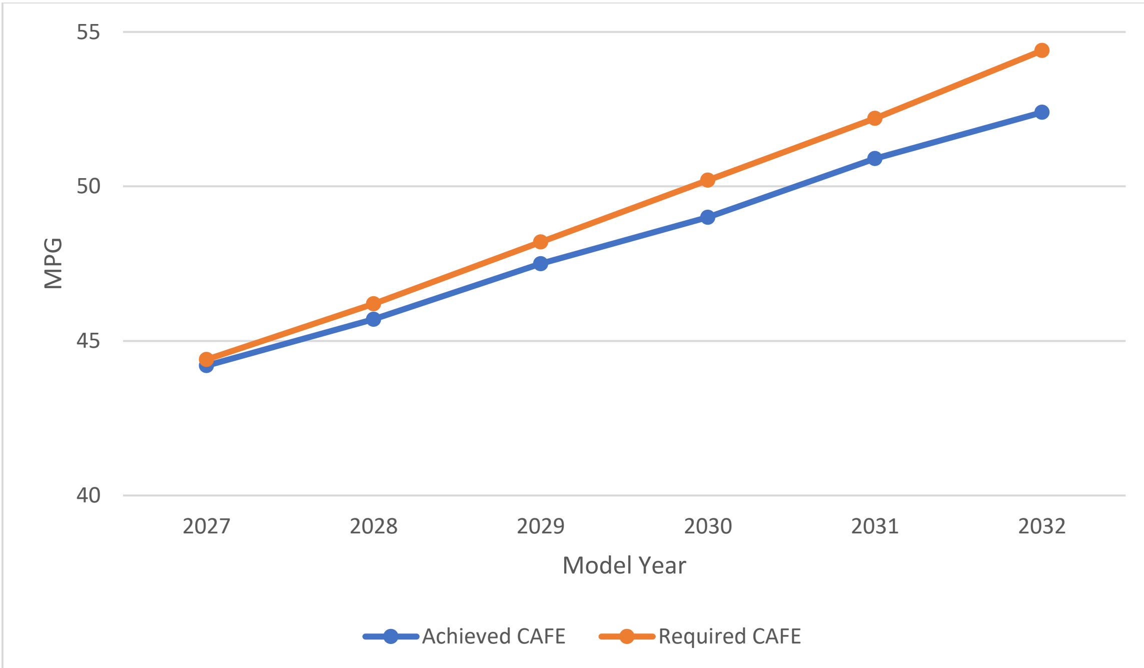

Figure 7: Projected achieved and required CAFE for light trucks under NHTSA's proposed standards.[39]

Compliance challenges abound with the proposed light truck standards, with nearly half of the light trucks projected for MYs 2027-2032 in fleets that do not meet the proposed standards even with the alternative fuel vehicles included by NHTSA (Table 5). Over half of the light truck fleets are worse than the proposed standards in 2027-2029.

Table 5: Summary of projected light truck compliance under the proposed standards, MYs 2027-2032.[40]

Model Year	Total Light Truck Fleets /1	Number of Fleets Worse Than Target	Total Light Truck Sales	Sales in Fleets Worse Than Target	Percent of Sales Worse Than Target
2027	17	11	10,657,275	5,532,985	52%
2028	17	10	10,787,446	5,177,043	48%
2029	17	10	10,665,662	5,118,635	48%
2030	17	8	10,397,001	4,402,302	42%
2031	17	8	10,150,795	5,573,605	55%
2032	17	6	10,064,094	5,133,536	51%
2027-32			62,722,273	30,938,106	49%

/1 Includes manufacturers that only sell alternative fuel vehicles (e.g., Tesla).

[39] NPRM (*supra* note 1) at 56137, Table I-4, Light Trucks: Estimated Required and Estimated Achieved.

[40] Auto Innovators analysis of NHTSA central rulemaking analysis Compliance Report.

Projected civil penalties from the light truck fleet add up quickly (Figure 8). Over the course of the projected MYs 2027-2032 program, civil penalties for light trucks exceed $13 billion.

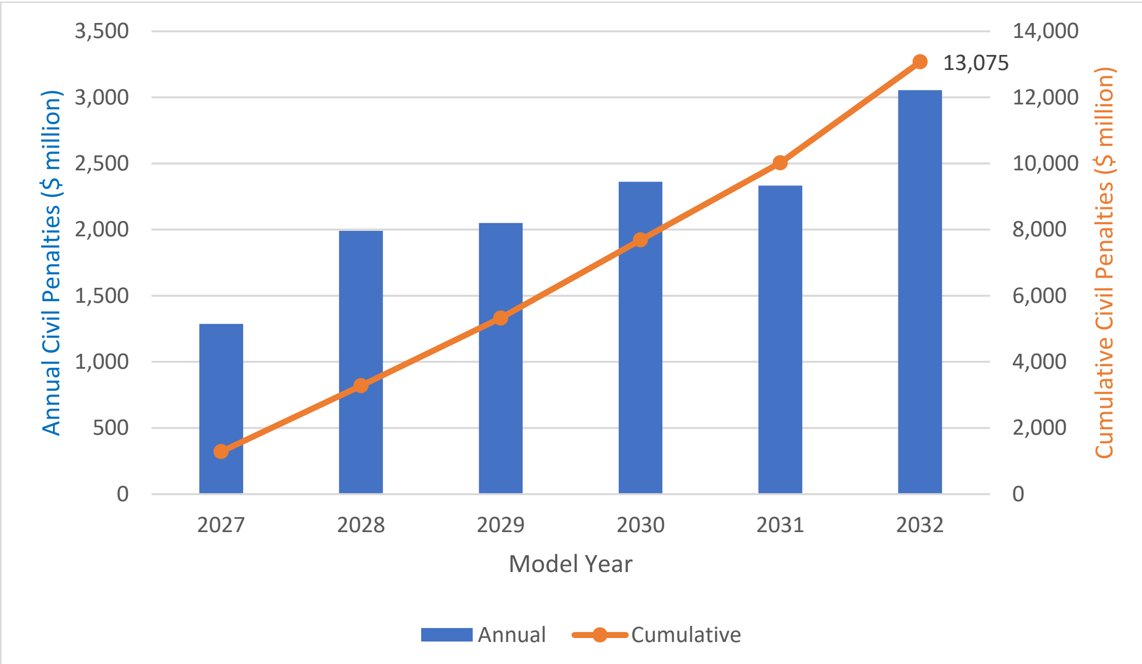

Figure 8: Total CAFE civil penalties from light truck fleets under the proposed standards, MYs 2027-2032.[41]

As demonstrated above, we are concerned that the proposed standards are arbitrary and capricious as there is not a rational connection between the facts and the proposal when a significant number of manufacturers and a large portion of the fleet – for both passenger cars and light trucks – will be subject to civil penalties. The proposed stringency of the standards needs further refinement to avoid exceeding technical feasibility and economic practicability.

NHTSA inappropriately considers credit banking in its consideration of maximum feasible standards.

NHTSA is prohibited from considering the trading, transferring, or availability of credits from exceeding average fuel economy standards when considering maximum feasible fuel economy standards.[42]

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[41] *Id.* Includes civil penalties from the baseline (no action scenario) and incremental penalties from the proposed standards.

[42] 49 U.S.C. § 32903(h)(3).

Yet, this is exactly what NHTSA appears to be doing in its discussion of projected manufacturers' performance to the proposed standards and alternatives. NHTSA downplays the importance of the number of manufacturers that do not meet the targets in their analysis, stating,

> Manufacturers do not have to meet their fuel economy targets exclusively through technology application in any given model year. Manufacturers may make up deficits between their target and achieved fuel economies through the use of over-compliance credits from another fleet (e.g., PC to LT and vice versa), model year (subject to carry forward restrictions) or civil penalty payments.[43]

"Use of over-compliance credits from another fleet" clearly refers to the transfer of credits from one fleet to another. "Model year (subject to carry forward restriction)" is a reference to the use of credits from exceeding average fuel economy standards in an earlier year. Both are prohibited from NHTSA's consideration of maximum feasible standards.

In the standard-setting years, NHTSA constrains their analysis model from using credits from transfers or exceedance of standards.[44] However, the mindset of NHTSA is revealed in its discussion of the manufacturer-specific results from its modeling. As noted above, a large number of manufacturers with a significant portion of annual production are projected to fail to meet the proposed standards, resulting in large civil penalties. Instead of discussing these issues, NHTSA immediately points to credit transfers and over-compliance credits.

Proposed passenger car standards result in net costs.

NHTSA estimates that the proposed passenger car standards will result in net costs of \$4.5 to \$5.1 billion.[45] While the benefit / cost analysis alone is not a reason to accept or reject a regulatory alternative, net costs should be considered an indicator that the proposed standards may exceed economic practicability.

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[43] National Highway Traffic Safety Administration, Preliminary Regulatory Impact Analysis: Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027 and Beyond and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030 and Beyond (Jul. 2023), (hereinafter "PRIA") at 8-5.

[44] Examination of NHTSA's central rulemaking Scenarios input file. ("Standard Setting" flag set to "true" for model years 2027-2032 in all alternatives. The draft CAFE model documentation describes "when the modeling system is evaluating compliance of the light-duty fleet with the CAFE program, credit transfers and credit carry-forward are not considered during the years that are identified as "standard setting." Model documentation at 114.)

[45] PRIA (*supra* note 43), Appendix I at I-14 (Table 12).

Additional analysis demonstrates concerns with feasibility of the proposed standards.

NHTSA's central rulemaking analysis assumes the willingness of some manufacturers to pay civil penalties in lieu of complying with CAFE standards.[46] Disabling this option for those manufacturers yields further insight into the technological feasibility of NHTSA's proposed passenger car and light truck standards. Namely, if all manufacturers are assumed to be unwilling to pay civil penalties (unless there is no other choice), standards that still result in civil penalties exceed the modeled availability of technology to meet them or otherwise violate other constraints (e.g., lead-time necessary for technology application given vehicle design cycles).[47]

To test this aspect of feasibility, Auto Innovators used the CAFE Model to assess NHTSA's proposal and alternatives with all manufacturers presumed to be unwilling to pay civil penalties. The following modifications were made to modeling inputs from NHTSA's central rulemaking analysis.

- Model runtime settings (See Attachment 9 - Summary_ NoFine.txt.)
  - Consistent with rulemaking central analysis settings.
- Market data input file (See Attachment 10 - market_data_LD_NoFine.xlsx.)
  - Penalty payment preference set to "No" for all manufacturers (force technology to greatest extent within other model constraints).
- Parameters input file (See Attachment 6 - parameters_ref.xlsx.)
  - No changes.
- Scenarios input file (See Attachment 11 - scenarios_LD_ref.xlsx.)
  - No changes.
- Technologies input file (See Attachment 12 - technologies_ref.xlsx.)
  - No changes.

<u>Passenger Cars Without Manufacturer Willingness to Pay Civil Penalties</u>

Our analysis that assumes no manufacturer is willing to pay penalties unless there is no other choice reveals clear issues with the technological feasibility of the proposed passenger car standards, especially in the first several years of the program (Table 6). This is problematic given that this analysis includes alternative fuel vehicles (although prohibited) as in NHTSA's primary rulemaking analysis. With civil penalty payments not an option for any manufacturer, the model should add technology to the extent possible under other modeling constraints related to technological feasibility and economic

[46] NPRM (*supra* note 1) at 56148.

[47] Even if all or most manufacturers are theoretically able to meet the proposed standards (or other alternatives) under such an analysis, such an outcome in and of itself if not dispositive to whether those standards are the maximum feasible under 49 U.S.C. § 32902. NHTSA would still need to consider economic practicability and other statutory factors to make such a determination.

practicability. However, even under those conditions, over 40% of passenger cars do not meet the proposed standard in MY 2027, nearly 30% do not meet the proposed target in MY 2028, and an overall 27% of passenger cars do not meet the proposed targets in MYs 2027-2029.

Table 6: Summary of projected passenger car compliance under the proposed standards, MYs 2027-2032.[48]

Model Year	Total Passenger Car Fleets [/1]	Number of Fleets Worse Than Target	Total Passenger Car Sales	Sales in Fleets Worse Than Target	Percent of Sales Worse Than Target
2027	29	11	4,966,263	2,029,308	41%
2028	29	9	4,974,291	1,439,413	29%
2029	29	5	4,885,101	591,354	12%
2030	29	3	4,797,961	196,192	4%
2031	29	2	4,758,688	138,586	3%
2032	29	0	4,769,301	0	0%
2027-29			14,825,655	4,060,075	27%

[/1] Includes both import and domestic passenger car fleets. Includes manufacturers that only sell alternative fuel vehicles (e.g., Tesla).

<u>Light Trucks Without Manufacturer Willingness to Pay Civil Penalties</u>

With penalty payment preferences turned off, the (lack of) technological feasibility of the proposed light truck standards is also starker than in NHTSA's primary analysis (Table 7). The NHTSA compliance model projects that over 40% of the light trucks sold in the MYs 2027-20232 period would be subject to civil penalties not by choice, but by the simple fact that there is insufficient technology to meet the proposed standards despite the inclusion of a significant volume of alternative fuel vehicles. Even in the best year (MY 2030), over one in every three light trucks is projected to belong to a light truck fleet that cannot meet the proposed standards.

This analysis clearly demonstrates, similar to the prior section, that the proposed standards are arbitrary and capricious as there is not a rational connection between the facts and the proposal when a significant number of manufacturers and a large portion of the fleet – for both passenger cars and light trucks – will be subject to civil penalties. This section further establishes that the proposed stringency of the standards must be revised to avoid exceeding technical feasibility and economic practicability.

[48] Auto Innovators analysis of NHTSA's central rulemaking analysis with preferences for civil penalty payment disabled, Compliance Report output file.

Table 7: Summary of projected light truck compliance under the proposed standards, MYs 2027-2032.[49]

Model Year	Total Light Truck Fleets [/1]	Number of Fleets Worse Than Target	Total Light Truck Sales	Sales in Fleets Worse Than Target	Percent of Sales Worse Than Target
2027	17	8	10,657,628	4,883,127	46%
2028	17	7	10,788,790	4,452,120	41%
2029	17	7	10,652,891	4,396,083	41%
2030	17	5	10,377,664	3,761,142	36%
2031	17	6	10,139,429	5,313,421	52%
2032	17	5	10,038,363	4,969,064	50%
2027-32			62,654,765	27,774,957	44%

[/1] Includes manufacturers that only sell alternative fuel vehicles (e.g., Tesla).

[49] *Id.*

Appendix C: NHTSA incorrectly asserts that light trucks have more room to improve than passenger cars.

NHTSA asserts that light trucks have more room to improve than passenger cars. In part, NHTSA bases their position on a presumption that light trucks make use of fewer technologies in the baseline fleet. Setting aside alternative fuel vehicles (which NHTSA is not supposed to consider in setting standards), NHTSA's presumption is generally incorrect.

It is also arbitrary for NHTSA to simplify the issue to one of light trucks having lower fuel economy than passenger cars on average as was done at NHTSA's hearing on September 28.[50] Vehicles classified as light trucks are generally physically larger, which increases their weight and frontal area, decreasing fuel economy. They also frequently include other features which also negatively impact fuel economy including four-wheel drive capability and other features for off-road operation and/or cargo-carrying capability.

Historical Improvements in Passenger Cars and Light Trucks

NHTSA states: "Passenger cars [in contrast to light trucks] have been improving at a rapid rate for many years in succession . . . ."[51]

S&P Global Mobility provides an annual report to Auto Innovators that includes numerous characteristics of passenger car and light truck fleets, and additional detail for sub-fleets such as cars, car utility vehicles, truck utility vehicles, minivans, and pickup trucks (the "Baseline Study").[52] For example, data includes 2-cycle fuel economy performance with and without EVs, roadload energy requirements (how much tractive energy is needed for a particular vehicle to drive the regulatory test cycles), and calculations of powertrain efficiency (the ratio of tractive energy required to fuel energy supplied). This data can be used to test NHTSA's position that passenger cars have historically improved at a higher rate than light trucks.

Figure 9 shows average 2-cycle fuel economy for passenger cars and light trucks for MYs 2012-2022. Setting aside alternative fuel vehicles, passenger cars improved from 34.5 MPG to 39.2 MPG (12% improvement on a fuel consumption basis). Light trucks

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50 Remarks of Acting NHTSA Administrator Ann Carlson, Public Hearing: Corporate Average Fuel Economy Standards Recording 1 at 00:07:14. Available at https://bit.ly/3FzHk4B (accessed October 13, 2023). ("Light trucks start from lower fuel economy, so they have greater room to improve fuel economy.")

51 NPRM (*supra* note 1) at 56133.

52 S&P Global Mobility, Model Years 2012 to 2022 Baseline Study (Jan. 20, 2023), hereinafter "Baseline Study." Summary report and referenced data tables available by request.

improved fuel consumption more than passenger cars, moving from an average 24.2 MPG to 29.6 MPG (18% improvement).

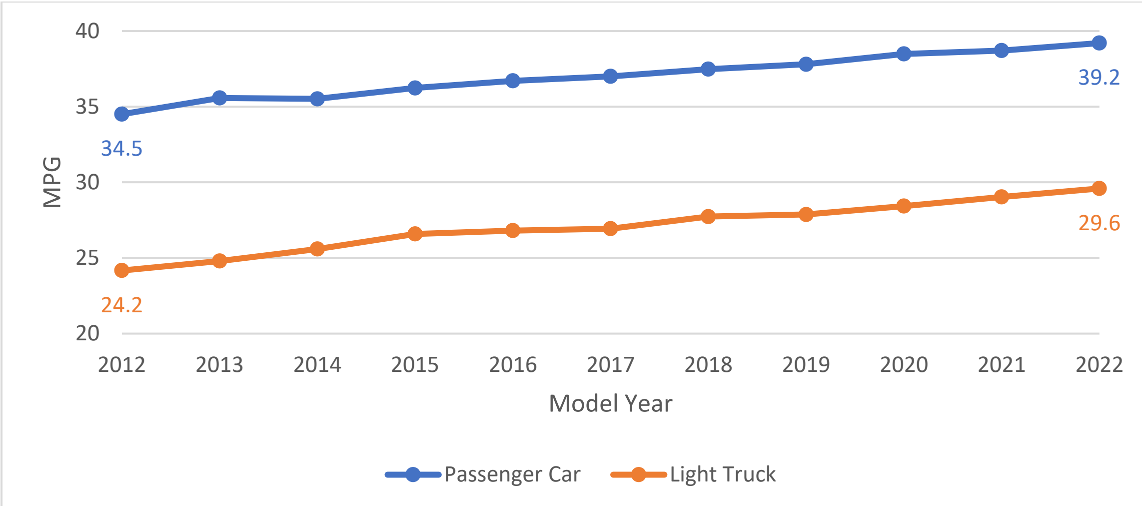

Figure 9: Average 2-cycle fuel economy for passenger cars and light trucks excluding EVs, MYs 2012-2022.[53]

When split into sub-fleets, we observe that utility vehicles, vans, and pickups have all generally improved fuel consumption more than cars (Figure 10).

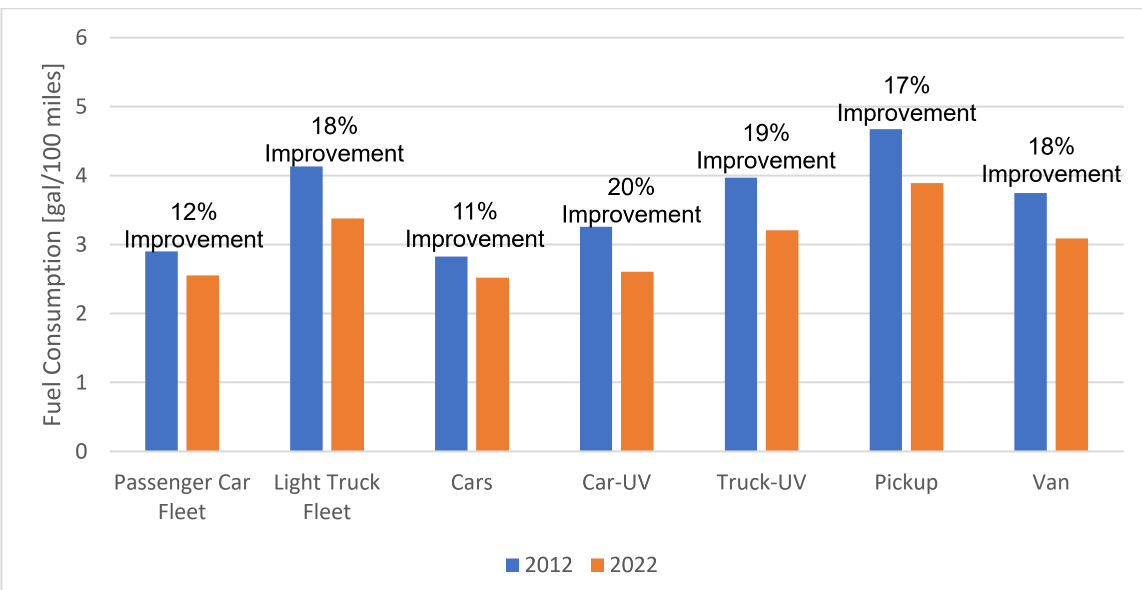

Figure 10: Passenger car and light truck fuel consumption improvements from MY 2012 to MY 2022, excluding EVs.[54]

[53] *Id.*, detail data set.

[54] *Id.*

The powertrain efficiency of the car and truck fleets, excluding EVs are the same – 24% (Figure 11). Sub-fleets show little variation, varying from 23% to 24%.

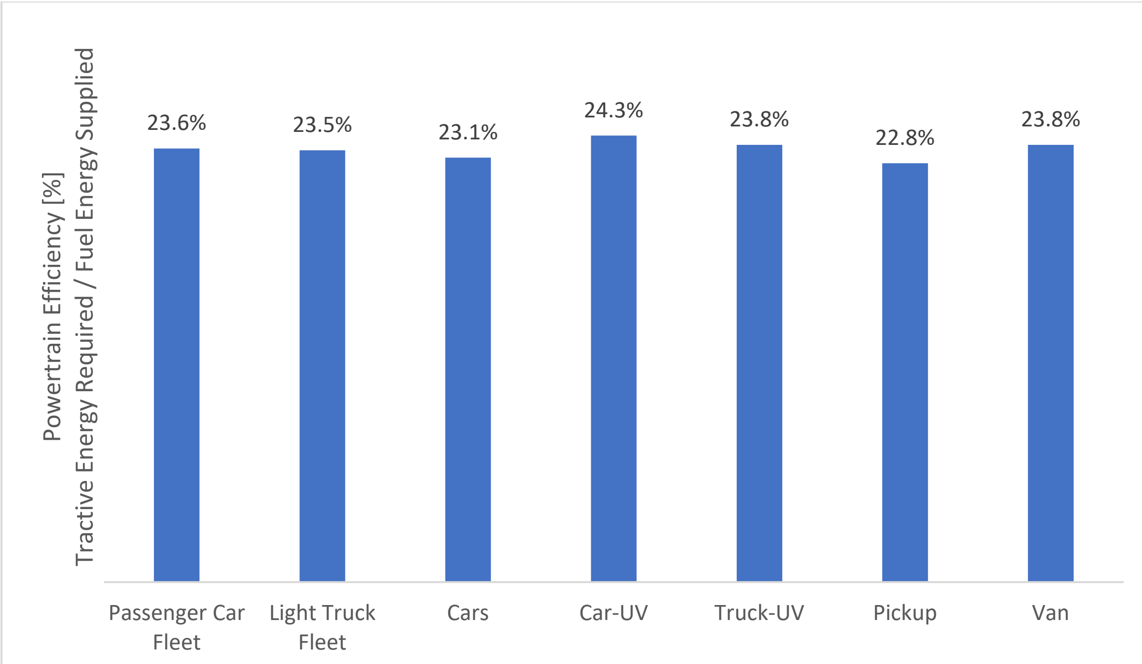

Figure 11: Passenger car and light truck powertrain efficiency excluding EVs, MY 2022.[55]

Light trucks have also generally decreased roadload[56] more quickly than passenger cars over the past decade (Figure 12). In fact, the passenger car fleet (and car sub-fleet) both saw average roadload increases.

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[55] *Id.*

[56] Roadload is a function of vehicle weight, aerodynamic characteristics, tire rolling resistance, and other miscellaneous energy requirements to accelerate and move the vehicle over a test cycle, in this case the combined city / highway test cycles.

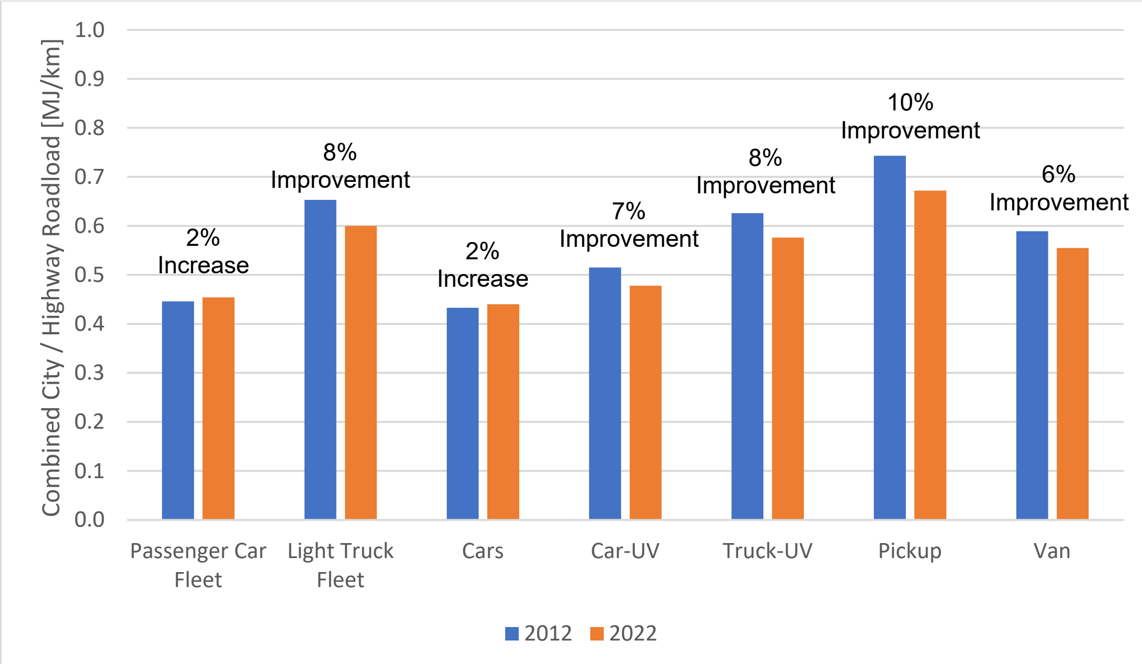


Figure 12: Passenger car and light truck roadload changes excluding EVs, MY 2012 to 2022.[57]

Current and Projected Technology Levels

NHTSA's modeling also belies its belief that light trucks will generally have lower baseline technology use than passenger cars.

NHTSA's projections for electrification technologies (including engine stop-start systems, mild hybrid systems, strong hybrids, and EVs) are shown in Figure 13. The passenger car fleet currently (MY 2022) has a higher fraction of non-electrified vehicles than the light truck fleet. That trend is projected to continue. Light trucks currently have (and are expected to continue to have) a greater penetration of engine start-stop systems ("SS-12V") and strong hybrid electric vehicles ("SHEV"). Trends for mild hybrid systems (belt integrated starter generator or "BISG") are similar and low for passenger cars and light trucks. The only electrification technologies where passenger cars currently have a higher penetration rate than light trucks are for EVs (alternative fuel vehicles), which NHTSA is prohibited from considering in its evaluation of maximum feasible standards. Based on this data, we generalize that light trucks currently have greater electrification technology levels (to the degree that NHTSA can consider), and by the start of the MYs 2027-2032 program will still have greater technology levels.

[57] Baseline Study (*supra* note 52), detail data set.

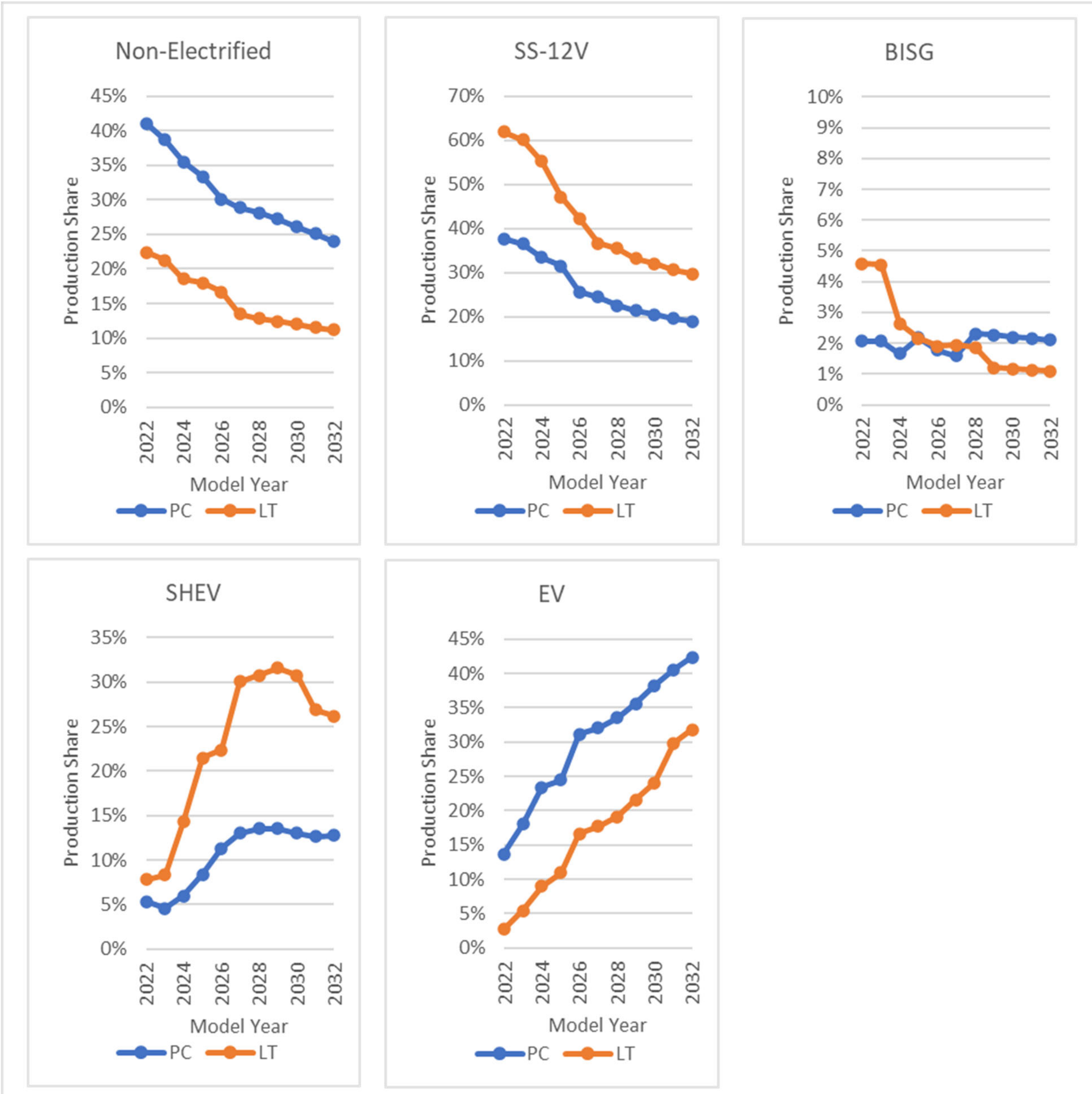


Figure 13: NHTSA-projected baseline electrification technology application, MYs 2022-2032.[58]

ICE engine technologies are broad with overlapping benefits. To compare passenger car and light truck technology application, we split the ICE engine technologies into four categories as shown below. Categorization is based on progress along NHTSA's

[58] NHTSA central rulemaking analysis Technology Utilization Report, technology penetration for the no action alternative.

engine technology pathways.[59] In calculating penetration rates we exclude technologies from NHTSA's hybridization paths, PHEV path, and electric vehicle path so that the penetration rates represent a share of vehicles without strong electrification.

- Basic technologies
    - Single overhead cam (SOHC)
    - Dual overhead cam (DOHC)
- Low-level technologies
    - Turbocharging and downsizing, baseline level (TURBO0)
    - SOHC engine with advanced cylinder deactivation (ADEACS)
    - DOHC engine with advanced cylinder deactivation (ADEACD)
    - High compression ratio engine (HCR)
- Mid-level technologies
    - Turbocharging and downsizing with cooled exhaust gas recirculation (TURBOE)
    - Turbocharging and downsizing with cylinder deactivation (TURBOD)
    - Turbocharging and downsizing, level 1 (TURBO1)
    - Turbocharging and downsizing, level 2 (TURBO2)
    - High compression ratio engine with cooled exhaust gas recirculation (HCRE)
    - High compression ratio engine with cylinder deactivation (HCRD)
    - Advanced Diesel (ADSL)
- High-level technologies
    - Variable compression ratio (VCR)
    - Variable turbo geometry (VTG)
    - Variable turbo geometry, electric (VTGE)
    - Turbocharging and downsizing with DOHC and advanced cylinder deactivation (TURBOAD)
    - Diesel engine improvements (DSLI)

Results are shown in Figure 14, below. NHTSA projects that light trucks have a somewhat higher usage of basic ICE technologies than passenger cars. In a corresponding trend, passenger cars make somewhat higher use of low-level ICE technologies. This trend is not necessarily demonstrative of overall technology penetration and potential for light trucks to improve more than passenger cars. As previously noted, engine stop-start systems are much more prevalent on light trucks than passenger cars, potentially achieving similar benefits in combination with basic engine technologies as passenger cars see with low-level ICE technologies. Light trucks make higher use of mid-level ICE technologies than passenger cars, and both fleets exhibit similar use of high-level ICE technologies. Based on these trends, it

[59] National Highway Traffic Safety Administration, Draft CAFE Model Documentation (Jul. 2023), hereinafter "Draft CAFE Model Documentation" at 29 (Figure 2) and 33 (Figure 6).

appears that baseline ICE technology penetration is similar or higher for light trucks as compared to passenger cars.

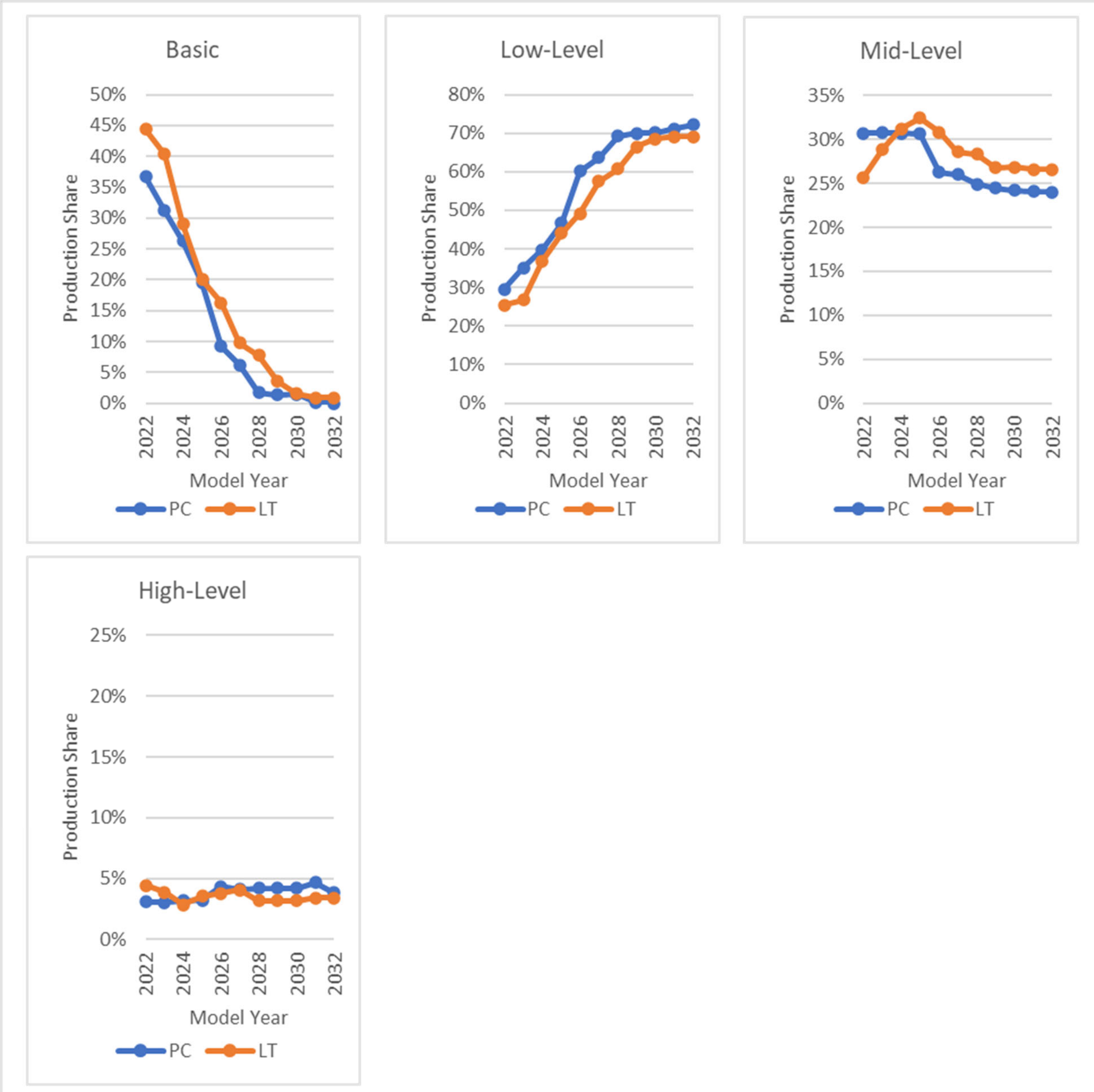


Figure 14: NHTSA-projected baseline ICE technology penetration for passenger cars and light trucks, MYs 2022-2032.[60]

[60] NHTSA central rulemaking analysis Technology Utilization Report, technology penetration for the no action alternative; Auto Innovators analysis.

NHTSA's evaluation of transmission technologies is summarized in Figure 15. As with ICE technologies, there is a broad range of transmission technologies with significant design differences, but similar benefits. We binned these into two categories and recalculated penetration rates without strong hybrids and EVs, generally based on the number of transmission speeds for planetary transmissions, and on the 'level' of transmission for continuously variable transmissions ("CVTs"). Dual clutch transmissions ("DCTs") were assessed as 'high-level'.

- Low-Level Technologies[61]
    - 5-speed automatic transmission (AT5)
    - 6-speed automatic transmission (AT6)
    - 7-speed automatic transmission, level 2 (AT7L2)
    - Continuously variable transmission (CVT)
- High-Level Technologies
    - 8-speed automatic transmission (AT8)
    - 8-speed automatic transmission, level 2 (AT8L2)
    - 8-speed automatic transmission, level 3 (AT8L3)
    - 9-speed automatic transmission, level 2 (AT9L2)
    - 10-speed automatic transmission, level 2 (AT10L2)
    - 10-speed automatic transmission, level 3 (AT10L3)
    - 6-speed dual clutch transmission (DCT6)
    - 8-speed dual clutch transmission (DCT8)
    - Continuously variable transmission, level 2 (CVTL2)

Transmission technology utilization within the non-strongly electrified fleet is similar for both passenger cars and light trucks.

[61] A 7-speed level 2 transmission could easily also be binned as a high-level technology. However, it makes little difference to this analysis. In NHTSA's analysis there are very few of these transmissions, and they are replaced by others long before the standard-setting years under consideration in this rulemaking. One might also quibble whether a 6-speed DCT is a 'low' or 'high' level technology, but this technology is in relatively low use, which limits the impact of the choice of bins in either case.

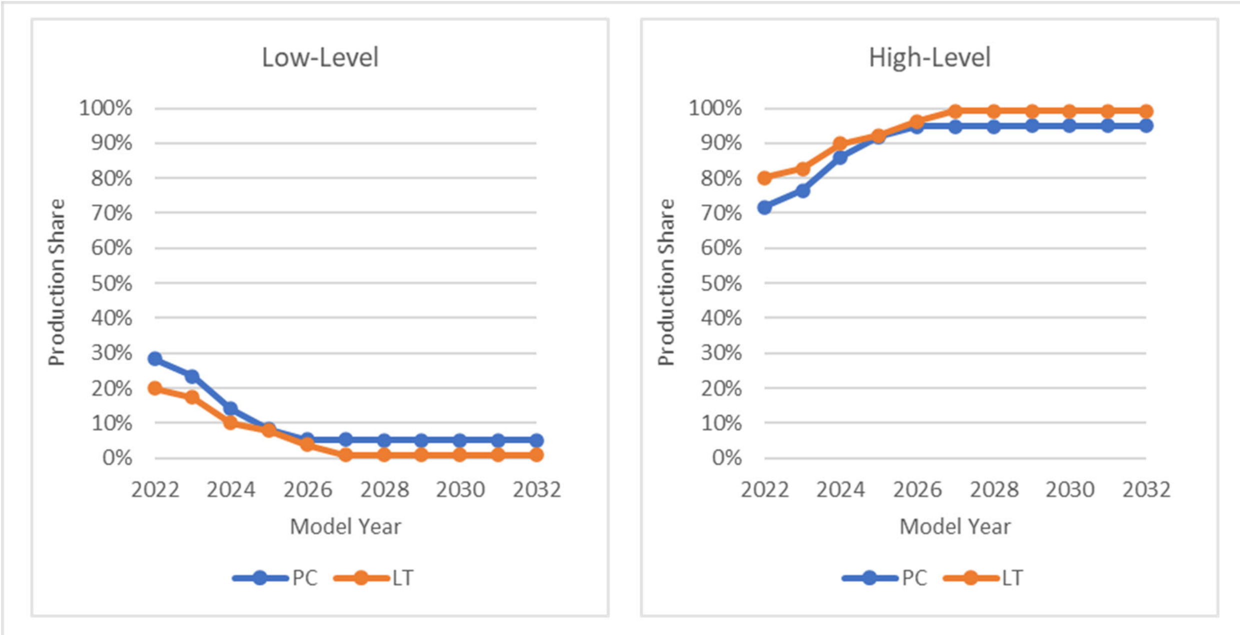
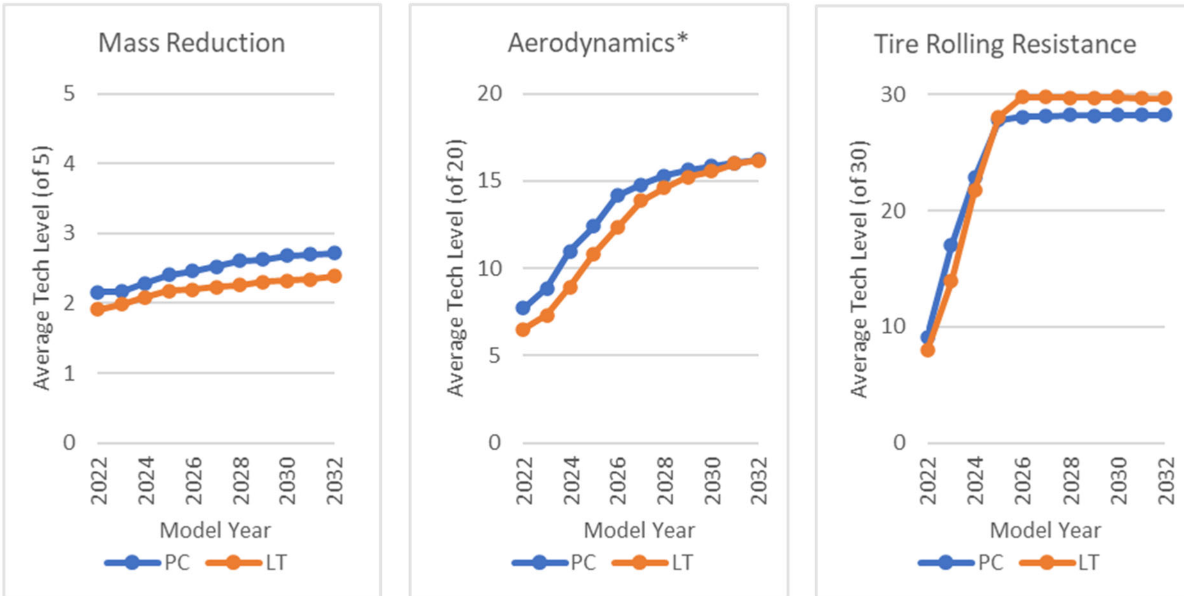


Figure 15: NHTSA-projected baseline transmission technology penetration for passenger cars and light trucks, MYs 2022-2032.[62]

The level of average road load technologies[63] also shows similar baseline technology levels for passenger cars and trucks (Figure 16). On a sales-weighted basis, passenger cars are projected to have somewhat, but not much greater, use of mass reduction and aerodynamic technologies in the baseline, with the reverse in the case of tire rolling resistance improvements. For aerodynamic improvements we note, and agree with, NHTSA's assessment that pickup trucks will generally not be able to achieve the highest level of aerodynamic improvement modeled by NHTSA, which potentially skews the average aerodynamic improvement level for trucks slightly downward.

[62] NHTSA central rulemaking analysis Technology Utilization Report, technology penetration for the no action alternative; Auto Innovators analysis.

[63] Calculated as a penetration weighted average of the available technologies.



* NHTSA constrains application of the highest level of aerodynamic improvements from pickup trucks. Auto Innovators agrees with this approach. Given the prevalence of pickups in the light truck fleet, this exclusion likely skews the light truck data somewhat lower.

Figure 16: NHTSA-projected baseline roadload technology penetration for passenger cars and light trucks, MYs 2022-2032.[64]

Overall, light trucks appear to have similar or higher levels of technology penetration in the baseline than passenger cars, calling into question NHTSA's assertion of lower technology use on light trucks as supporting proposed standards that increase twice as fast as those of the proposed passenger car standards.

Based on the above information, it is inappropriate to propose increasing standards for light trucks at twice the rate of passenger cars. The proposed standards should be revised to apply any changes to the stringency evenly across vehicle types and product mixes.

[64] NHTSA central rulemaking analysis Technology Utilization Report, technology penetration for the no action alternative; Auto Innovators analysis.

Appendix D: Air conditioning efficiency and off-cycle fuel consumption improvement programs remain important and applicable to both ICE and electric vehicles.

Off-cycle and air conditioning (“A/C”) efficiency fuel consumption improvement values (“FCIVs”) have been an important part of NHTSA’s CAFE program since 2017. These programs have encouraged the development of new technologies and have resulted in real-world fuel economy improvements beyond those that would have been achieved on laboratory test cycles alone.

Auto Innovators believes that such flexibilities still play an important role moving forward. They are a potential lever for addressing uncertainties in the transition to electric vehicles, particularly in the early years of the proposed 2027-2032 program when the market is rapidly accelerating volumes of electrified vehicles to meet very stringent targets.

Instead, NHTSA proposes and is taking comments on eliminating and/or phasing down FCIVs, including paring back the off-cycle credit menu and limiting fuel economy improving technologies to the ICE fleet. The result of this will be abandonment of fuel economy benefits from prior rulemakings.

The A/C efficiency and off-cycle FCIVs are balanced to produce a verifiable real-world result. NHTSA’s (and EPA’s) proposal to change these systems will inappropriately unbalance those results, leaving unprecedented rates of electrification as the main flexibility left to meet fleetwide stringency targets.

<u>A/C Efficiency FCIVs</u>

The air conditioning efficiency FCIVs should be maintained.

Auto Innovators disagrees with NHTSA’s proposal to eliminate A/C efficiency FCIV for electrified vehicles.

The A/C efficiency credit program has been a success, resulting in verified fuel economy improvements and conservative credit values.

Much has been done to improve the robustness of the program, and the SAE International (“SAE”) Interior Climate Control Committee has helped, having developed the testing and specifications for hardware technologies on the A/C efficiency technology menu. SAE’s development of the hardware validation specifications taken together with EPA’s AC17 test procedure improvements ensure a robust and verifiable fuel economy benefit.

Many automakers have utilized the A/C efficiency program. While NHTSA may consider the air conditioning efficiency FCIV system voluntary, it has been relied upon by manufacturers to meet CAFE standards. NHTSA itself has assumed the benefits of the A/C efficiency FCIV system in setting CAFE targets.

Removal of A/C efficiency FCIVs for BEVs is also an additional stringency increase. If NHTSA finalizes its proposal to remove FCIVs for BEVs, it should make an additional adjustment to the level of the proposed standards to account for this loss of flexibility that has previously been assumed in setting standards.

A/C efficiency improvements benefit both ICE vehicles and BEVs.

The A/C efficiency technology menu has been successful in recognizing and encouraging A/C system improvements. Due to their expense, the technologies on the A/C efficiency menu were not widely deployed in the fleet prior to the creation of A/C efficiency GHG credits and the corresponding CAFE FCIV. The A/C efficiency menu provided the needed business justification to widely deploy the included technologies in light-duty vehicles. The EPA Trends Report demonstrates the dramatic year-over-year growth in the use of A/C efficiency technologies.[65] Twenty automakers have deployed high levels of A/C efficiency technology in mass market vehicles, including in PHEVs and BEVs.

The current A/C efficiency FCIVs should remain available to both the ICE and BEV fleets during the transition from ICE to BEV vehicles. Keeping the FCIVs (and therefore the technologies that they encourage) improves range, preserves customer comfort, and ensures lower energy consumption regardless of source. Continuing the A/C efficiency program ensures the continued application of existing technologies and also encourages future innovation in this area. Limiting eligibility for A/C efficiency FCIVs to only ICE vehicles makes sense only once the transition to BEV mass volumes is more robust. A subsequent rulemaking is the appropriate time to possibly revisit this issue once BEV A/C system architecture is better developed and mature.

Current A/C efficiency FCIVs also reflect benefits for BEVs.

The A/C efficiency FCIVs developed for the technology menu were based on ICE vehicles but also apply to BEVs. The system benefits between ICE vehicles and BEVs are the same in that less energy is needed to condition the cabin regardless of fuel source.

The A/C efficiency FCIVs related to reduced reheat, automatic recirculation algorithms, and PWM controlled blowers are dependent on system operation. Their energy savings

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[65] U.S. Environmental Protection Agency, The 2022 EPA Automotive Trends Report (Dec. 2022) at 92 *et seq.* Available at https://www.epa.gov/automotive-trends/download-automotive-trends-report#Full%20Report (accessed Sep. 28, 2023).

are equivalent whether in an ICE or BEV vehicle and are independent of the powertrain type.

Oil separator technology is deployed in both BEV electric compressors and ICE vehicle compressors. The efficiency benefit is proportional to the refrigerant flow exiting the compressor and that in turn is based on the vehicle cabin thermal load. The differences in efficiency between BEVs and ICE vehicles are similar under the same conditions. BEV compressors are independently driven, having their own motor and inverter. They are efficiently controlled to deliver a consistent speed which yields a greater oil separator benefit. The BEV version of an oil separator may be underrepresented in terms of menu value.

The FCIVs for internal heat exchanger technology in ICE vehicles are not usually applied to a BEV. BEVs generally have efficiency improvements incorporated into the heat exchanger designs. Both heat exchange technology improvements are quantified by bench testing per SAE specifications. The additional benefit that a BEV provides is underrepresented in terms of the menu FCIV.

Compressor efficiency depends on how the compressor is driven. Isentropic and volumetric efficiency improve as the compressor is driven at greater speeds. Belt driven compressors such as the fixed displacement or internally controlled variable displacement compressors are least efficient among the compressor types since they are controlled by engine speed. Electronically controlled variable compressors are also belt driven and suffer from the same engine speed issues but are more efficient since they can vary their output and tailor it more directly to cabin load.

The most efficient variable displacement compressor is the electric scroll variant that is independent of engine operation and used on EVs. The compressor is driven to the most efficient operating point for the given cabin thermal load. In this case, the electric scroll type of variable displacement compressor is more efficient than those on ICE vehicles. The benefit of this technology is underrepresented in the technology menu FCIV.

Evidence of the conservative nature of the menu credits exists with the Denso ESB compressor off-cycle applications that were approved by EPA and NHTSA. FCIVs for this compressor are above those of the menu and apply exclusively to BEVs and PHEVs.

The A/C efficiency menu FCIVs, while developed for ICE vehicles, remain conservative for BEVs. Given that NHTSA assigns a fuel economy to BEVs based on their electric efficiency via the DOE petroleum equivalency factor (“PEF”), recognition of energy efficiency improvements via A/C efficiency technologies is especially appropriate in the CAFE program.

Industry will continue to work with EPA and NHTSA if new technology menu FCIVs that correctly recognize these technologies in BEVs is deemed necessary. Measuring the efficiency benefits in a BEV is straightforward and can be based on measured energy consumption. Eliminating FCIVs for BEVs due to the credits' basis on ICE vehicles is not the appropriate solution.

Additional A/C efficiency FCIVs should be added.

Several air conditioning efficiency technologies have been approved under the alternative method off-cycle FCIV program. These technologies provide on-road greenhouse gas emission and energy consumption improvements. We recommended to EPA and do the same to NHTSA that air conditioning efficiency technologies approved under the off-cycle program's alternative methodology be included in the air conditioning efficiency technology menu, and that the credit / FCIV caps on the menu be adjusted accordingly.

Solar thermal control off-cycle technology FCIVs should be moved to the A/C efficiency technology menu.

The technologies on the A/C efficiency technology list interact with technologies on the solar-thermal control submenu of the off-cycle technology list and need to be considered in that context. Given that EPA and NHTSA are considering phasing out off-cycle technology menu credits and FCIVs, we recommend that the solar thermal control technologies be moved to the A/C efficiency technology list and that A/C efficiency credit and FCIV caps be adjusted accordingly. The solar thermal control technologies reduce air conditioning system load, thereby reducing energy consumption and related GHG emissions and energy consumption from operation of the A/C system.

NHTSA's modeling of air conditioning efficiency FCIVs appears to exceed their availability under NHTSA's proposal.

NHTSA proposes to eliminate air conditioning efficiency FCIVs for BEVs, effective MY 2027. However, NHTSA notes that they "allow AC efficiency technologies to reach the regulatory caps by MY 2027."[66] Examination of the central rulemaking Market Data Input File's *Credits and Adjustments* tab indicates that these maximum values are also carried forward through MY 2050 despite NHTSA's included assumptions for growing BEV penetration over the course of the rulemaking years. If NHTSA finalizes its proposal to eliminate A/C efficiency FCIVs for BEVs and includes BEVs in its rulemaking analysis (despite statutory prohibitions), it should adjust assumed levels of A/C efficiency FCIVs in its analysis.

<u>Off-Cycle Technology FCIVs</u>

EPA and NHSTA are considering sunsetting the off-cycle credit program by eliminating 5-cycle and alternative method credits in MY 2027 and by lowering the technology menu credit and FCIV caps over several years with a final elimination in MY 2031.

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[66] DTSD (*supra* note 9) at 3-177.

Such actions not only increase the stringency of the rulemaking, but also disincentivize and disregard the proven real-world GHG and energy savings these technologies provide.

As documented in previous rulemakings, peer-reviewed research, national laboratory studies, and public applications for credits, off-cycle technologies provide direct GHG benefits and energy savings benefits. They can continue to provide such benefits in MY 2027 and beyond and should remain a part of NHTSA's CAFE program.

Automobile manufacturers and suppliers have invested significant resources to develop these technologies, manufacturers have included them as part of their compliance plans, and the technologies will continue to provide real-world benefits.

Off-cycle FCIVs should be continued. If some total reduction is deemed necessary besides the natural occurrence from increased BEV volumes, the considered phasedown should not be as rapid as proposed, nor occur prior to MY 2032, thereby encouraging continued investment in off-cycle emission and fuel consumption improvements.

We support NHTSA's decision to allow PHEVs to retain full benefits of the off-cycle FCIV program without changes. The real-world benefits from off-cycle FCIV technologies apply to these vehicles just as they do to ICE and BEV vehicles both in terms of reduced fuel consumption and improved all-electric range. PHEVs should continue to be treated the same as ICE and BEV vehicles with all the individual FCIV programs.

Menu-based off-cycle technology FCIVs should not be eliminated.

EPA and NHTSA are considering a phase-out of menu-based off-cycle credits and FCIVs for vehicles equipped with internal combustion engines, eliminating them after MY 2030.

The off-cycle technologies on the predefined list still provide real-world benefits beyond those observed in CAFE testing. There is no reason to eliminate them entirely. This is particularly true for ICE vehicles. The average fuel economy of non-EVs was approximately 32.3 MPG in MY 2022.[67] Off-cycle technologies can still provide meaningful fuel economy improvements for these vehicles.

Auto Innovators recommends that NHTSA maintain technology list-based off-cycle FCIVs.

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[67] Baseline Study (*supra* note 52).

The off-cycle technology program should not be phased out.

NHTSA is considering following EPA's proposal to phase-down menu-based off-cycle technology compliance adjustments. EPA justifies its proposal in part by noting that with increasing volumes of electric vehicles, fewer ICE vehicles will be on the road to justify continued credit levels. In general, a phase-down of the off-cycle credit cap is unnecessary if the goal is to simply reduce fleet average credits. Many of the off-cycle technologies on the credit menu are not available to BEVs, such as engine oil heaters, transmission oil heaters, engine stop-start systems, and high efficiency alternators. As the production and market share of BEVs increase, the lower availability of off-cycle credits applicable to BEVs will result in lower fleet average credits.

As noted above, Auto Innovators opposes the proposal to limit off-cycle credits to vehicles equipped with internal combustion engines. However, we note that such a proposal in combination with expanded EV market share also effectively phases out menu-based off-cycle credits. Thus, an action to set a separate, declining cap on menu-based off-cycle technology FCIVs is duplicative and unnecessary. If off-cycle technology FCIVs are limited to only vehicles equipped with internal combustion engines, there should not be a declining cap on menu-based off-cycle FCIVs.

If NHTSA decides to phase out the off-cycle technology program, it should not be phased out prior to MY 2032.

Nevertheless, if NHTSA decides to proceed with a phasedown in the off-cycle technology menu cap, the phasedown under consideration by EPA is too rapid. Off-cycle technology FCIVs should not phased out before MY 2032.

NHTSA estimates that roughly 67 million ICE vehicles will be sold in MYs 2027-2032.[68] To disincentivize continued or potentially new off-cycle credit technologies so early in a phasedown would severely impact decisions on investment and implementation of them. If the FCIV cap was not reduced so quickly early in the MYs 2027-2032 program, additional costs and investments might still be justified by automakers.

In a previous rulemaking, the cap on off-cycle credits was recognized as important enough to increase the allowed amount from 10 g/mile equivalent to 15 g/mile equivalent beginning MY 2023. In response to this increased incentive, OEMs likely invested in additional off-cycle technologies, but due to the development time to implement and fund some of this technology, production would not necessarily occur that soon. Now, because of the rapid phase-down under consideration, the development and application of some off-cycle technologies may no longer be

[68] NHTSA central rulemaking analysis, Technology Utilization Report and Compliance Report; analysis by Auto Innovators.

worthwhile, stranding investments and foregoing potential benefits both before and during the proposed MY 2027-2032 program.

If there are concerns about off-cycle technology benefits, the better solution is to reassess those benefits, not to eliminate the program.

Auto Innovators continues to see the fuel economy benefits of off-cycle technologies and agrees with previous assessments that many technologies are achieving higher on-road benefit amounts than originally estimated. However, we understand that there may be concerns that newer, more efficient vehicles will not see as much benefit from off-cycle technologies. While some concern may be warranted, average estimated technology benefits continue to be applicable for most vehicles. To the extent that the absolute benefits of such technologies may have changed over time, it would be more reasonable for EPA and NHTSA to estimate new absolute benefits or to convert the estimates to a percentage improvement basis using tools such as EPA's Advanced Light-Duty Powertrain and Hybrid Analysis ("ALPHA") model or Argonne National Laboratory's Autonomie model instead of simply dismissing the benefits of such technologies entirely. If NHTSA chooses to reduce the amount of FCIVs allowed, a gradual decrease in values is preferable in order to avoid stranding the investments automakers have made in response to the MYs 2024-2026 CAFE rulemaking. Somewhat steeper cuts to the allowed FCIVs only make sense at the end of the rulemaking, and FCIVs should not be reduced to zero.

NHTSA's modeling of off-cycle technology menu FCIVs appears to exceed regulatory caps.

EPA's regulations cap the amount of off-cycle menu-based credit that a manufacturer can receive in a given model year.[69] For MYs 2023 through 2026 the limit is 15 g/mile on a sales and lifetime miles weighted average of the passenger car and trucks fleets. For all other years it is currently 10 g/mile. While we would certainly be open to uncapped off-cycle FCIVs or a higher cap, we presume that NHTSA's off-cycle FCIVs are capped by reference to the EPA regulations.[70]

NHTSA's modeling of off-cycle credits frequently exceeds the 10 g/mile cap in MYs 2027 and later. Assuming NHTSA intends manufacturers to follow the caps defined by EPA, it should correct its modeling so that off-cycle credits are limited to the capped amount.

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[69] 40 C.F.R. § 86.1869(b)(2).

[70] If NHTSA does not intend off-cycle technology menu FCIVs to be capped, it should make this clear in its regulatory text and coordinate with EPA to ensure this is carried out in CAFE calculations.

The 5-cycle off-cycle technology method should be retained and improved.

NHTSA proposes to eliminate the 5-cycle pathway, effective MY 2027.

Automakers have reviewed their 5-cycle testing plans for off-cycle technologies with EPA. This path is being pursued according to the current regulation, but is a difficult path to follow. The method has not been used to a great extent since originally allowed because the auto industry and EPA concurred that the original formula to calculate credits under the 5-cycle method was in error.

Errors in the formula were finally corrected in 2020. Since then, automakers report that testing has begun to evaluate certain technologies. At the same time, automakers report that the threshold to prove emissions impacts has been very challenging to meet. Therefore, we believe that even the corrected 5-cycle formula has not addressed the problem. Auto Innovators recommends that NHTSA retain the 5-cycle method. Our members are interested in working with EPA to improve the formula to address challenge with the 5-cycle pathway.

If NHTSA decides to eliminate the 5-cycle method, we ask it to consider retaining the method for the same period as technology menu-based FCIVs. Additionally, for vehicles that have 5-cycle method FCIVs approved prior to MY 2027 that remain in production in MY 2027 and later, Auto Innovators recommends that FCIVs continue to be granted (i.e., carried-over). If this is already NHTSA's intent (or final decision), clarifying text should be added to the regulation. Alternatively, NHTSA should consider adding previously approved technologies to the off-cycle technology menu and adjusting the caps as appropriate for the additional technologies.

NHTSA and EPA should take action on pending alternative method off-cycle credit applications and allow carry-over of approved applications to MY 2027 and later.

NHTSA is also proposing to eliminate the alternative method process for off-cycle credits.

Auto Innovators is aware that there are multiple alternative applications that have been submitted by automakers in 2020 to 2023 that are awaiting a decision by EPA and NHTSA, and more that have not been released for public comment, even after multiple technical reviews with EPA to answer questions and supply additional analysis. Even after EPA assurances that the technology is understood and proper explanation has been provided for the public review process, no action has occurred for many months. While we agree that this alternative analysis process is not effective, EPA and NHTSA should follow through under their current regulations and complete action on all submitted applications, even if it requires additional discussion with manufacturers.

For vehicles that have had alternative method off-cycle credits approved prior to MY 2027 that remain in production in MY 2027 and later, Auto Innovators recommends that credit continue to be granted. If this is NHTSA's intent (or final decision), clarifying text should be added to the regulation.

Alternatively, NHTSA should, in coordination with EPA, consider adding previously approved alternative method technologies to the off-cycle credit menu and adjusting the caps as appropriate for the additional technologies. Automobile manufacturers and suppliers have invested significant resources to develop these technologies, manufacturers have included them as part of their compliance plans, and the technologies will continue to provide real-world benefits.

NHTSA should not add additional requirements to the alternative method off-cycle credit application process.

NHTSA proposes to add an additional 60-day deadline for manufacturers to respond to information requests or NHTSA can deny the application for the requested model year.[71]

If NHTSA wishes to expedite the alternative method process, it should be reciprocal. However, adding more deadlines to the process likely is not helpful. While Auto Innovators is not privy to specific data requests and manufacturer responses to them, we believe it is far more likely that any delays in responding are related to challenges in developing the requested data. Adding additional deadlines and mandatory requests for deadline extensions will only serve to add more burden to an already cumbersome process. Manufacturers have a vested interest in getting applications approved as quickly as possible. Frequently, capital has already been invested to develop the technologies or decisions have to be made to enable such investments.

What would be helpful is if NHTSA (and EPA) reviewed applications in a timely manner and were clear with exactly what additional data is needed. From a manufacturer perspective, it seems like many applications are caught in a never-ending loop of providing data only to receive a request for additional data a significant time after having sent a response to the prior request. In sum, this proposed time limit imposed only on manufacturers is inappropriate and should be removed in the final rule.

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[71] NPRM (*supra* note 1) at 56370.

Appendix E: NHTSA needs to address credit transfer caps

Congress intended that NHTSA provide flexibility in the CAFE program through a credit transfer mechanism.

Congress required NHTSA to create a credit transfer program between a manufacturer's compliance categories.[72] Although Congress also set limits on such transfers, its express intent was for a useable but limited credit transfer program. When NHTSA established the credit transfer program, it chose a program design that preserved oil savings for consistency with the energy conservation goal of the CAFE program and for consistency with its credit trading program.[73]

NHTSA's interpretation of the statute leads to a steadily declining flexibility, inconsistent with Congress' intent.

Congress expressed the limits to the credit transfer program as miles per gallon.[74] However, as fuel economy standards increase, the oil savings represented by a mile per gallon decrease (Figure 17). As a result, the credit transfer flexibility afforded under NHTSA's current interpretation and implementation of the credit transfer statute degrades in an exponential fashion.

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[72] 49 U.S.C. § 32903(g). "The Secretary of Transportation <u>shall</u> establish by regulation a fuel economy credit transferring program . . . ." (<u>Emphasis</u> added.)

[73] 74 *Fed. Reg.* 14429 (Mar. 30, 2009).

[74] 49 U.S.C. § 32903(g)(3).

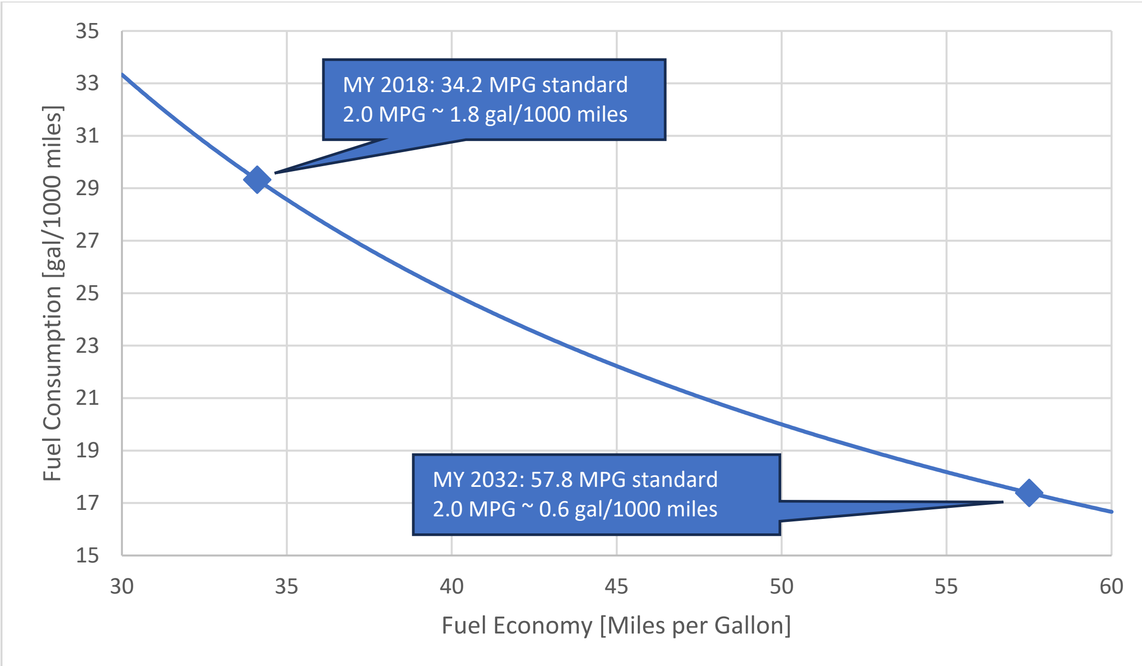

Figure 17: Fuel consumption as a function of fuel economy.

By MY 2032, under the proposed standards, the amount of oil savings represented by the transfer cap is 62% less than that allowed in MY 2022 if NHTSA continues to interpret the statute as it does today and approximately 55% less than when originally established (Figure 18).

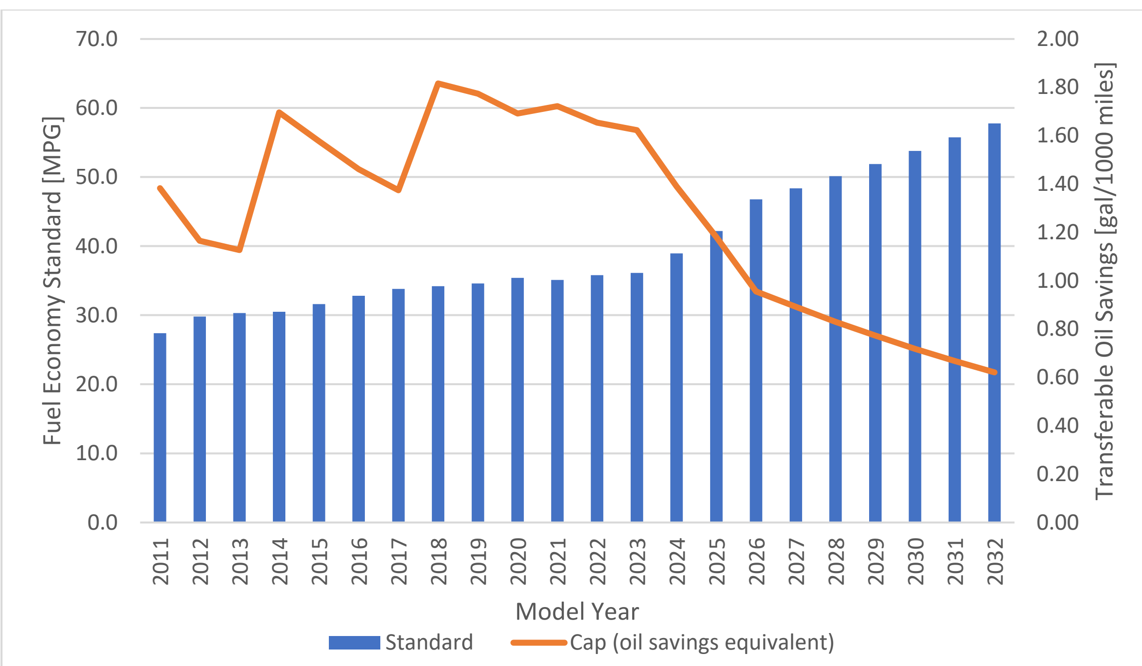

Figure 18: Oil savings associated with the credit transfer cap under NHTSA's current interpretation.

Auto Innovators believes that such a degradation in the credit transfer flexibility is inconsistent with Congress' expressed intent for NHTSA to provide a credit transfer program. That Congress set a gradually increasing cap for the first two years indicates a phase-in to such a program, not that NHTSA should interpret the cap in a manner that leads to its eventual de minimis value as a flexibility. If Congress had intended the credit transfer flexibility to decline over time, it would have stated so, or would have set a declining cap as it did for credits on dual-fueled vehicles.[75] Instead, NHTSA set an increasing cap.[76]

Auto Innovators proposes that NHTSA interpret that statutory cap on credit transfers consistent with its approach to adjusting credits when they are transferred to preserve oil savings.

Auto Innovators proposes that NHTSA interpret the statutory cap on credit transfers in terms of oil savings, effective as soon as MY 2025. The 2025 model year is the first year where the effective credit transfer flexibility (as currently interpreted by NHTSA) becomes significantly as low as any previous time in terms of oil savings. Furthermore, the next CAFE rulemaking is expected to be completed prior to the completion of MY 2024. Alternatively, starting the flexibility earlier would also be a reasonable approach.

To implement our proposal, we suggest that the 2018 and later credit transfer cap of 2.0 miles per gallon be interpreted as equivalent gallons based on the 2018 standards.

Although the statute does not expressly require NHTSA to preserve oil savings when credits are transferred, NHTSA has already chosen to interpret the statute in this manner for consistency with the credit trading program when credits are transferred. Interpreting the transfer cap in terms of oil savings would be both consistent with the CAFE statute's energy-savings intent and consistent with NHTSA's prior interpretation to consider oil savings in the execution of credit transfers.

Additionally, such an approach would also increase alignment between NHTSA's and EPA's approaches to credit transfers, leading to a less complex and conflicted set of federal regulations governing fuel economy and greenhouse gas emissions.

Auto Innovators provides a suggested methodology for implementing its recommendation.

1. Calculate the gallons equivalent factor of the 2.0 MPG credit transfer cap in MY 2018

[75] *See* 49 U.S.C. § 32906(a).

[76] 49 U.S.C. § 32903(g)(3).

a. The average gallons of fuel consumed per vehicle is given by:

$$FC = \frac{VMT}{MPG}$$

Where:

FC = Average lifetime fuel consumed per vehicle in a fleet [gal/vehicle]

MPG = Fuel economy of a fleet [miles/gal]

VMT = Lifetime vehicle miles traveled of a fleet [miles]

b. The excess fuel consumed per vehicle in a fleet that is 2 miles per gallon lower than a given standard (i.e. the transfer cap) can be calculated by:

$$CapEq = \frac{VMT}{(S-D)} - \frac{VMT}{S}$$

Where:

CapEq = Excess fuel consumed per vehicle for a fleet with performance below a given standard [gal/vehicle]

D = The deficit between a fleet's performance and its standard [miles/gal]

S = The fleet's standard [miles/gal]

c. Entering MY 2018 values for VMT and S, and 2.0 MPG for D yields the gallon (per vehicle) equivalent of a 2.0 MPG credit transfer cap in that year.

$$CapEq_{car} = \frac{195{,}264}{40.2 - 2.0} - \frac{195{,}264}{40.2} = \boldsymbol{254\ gallons\ per\ vehicle}$$

$$CapEq_{truck} = \frac{225{,}865}{30.0 - 2.0} - \frac{225{,}865}{30.0} = \boldsymbol{538\ gallons\ per\ vehicle}$$

Where:

$CapEq_i$ = The gallon per vehicle equivalent of a 2.0 MPG cap on transfer credit in MY 2018 [gal/vehicle]

Alternatively, one might consider a single value representing both cars and trucks, using a MY 2018 production weighted VMT and production-weighted standard.

$$CapEq_{combined} = \frac{211{,}189}{34.2 - 2.0} - \frac{211{,}189}{34.2} = \mathbf{384\ gallons\ per\ vehicle}$$

2. Convert the 2.0 MPG cap gallon equivalent factor into the maximum number of credits that may be transferred into a fleet in a future year.

    a. Gallons allowed to be transferred are defined by the equivalent to the 2.0 MPG cap in 2018

    $$CapGallons = CapEq \times n$$

    Where:

    CapGallons = The 2.0 MPG cap in equivalent gallons [gal]

    n = vehicle production in the fleet with a credit deficit that will have credits transferred to it [number of vehicles]

    b. CAFE credits are defined in tenths of a MPG and can be calculated as

    $$Credit = \Delta MPG \times 10 \times n$$

    c. Recognizing that the term "D" in equation 1.c represents the necessary ΔMPG, solving for D, and then substituting that D for ΔMPG in equation 2.b, one can derive the maximum number of credits transferable under a gallon-equivalent cap and set this as the credit transfer limit based on gallons. Full details are provided are provided below.

    $$Transfer\ Limit = \left(S - \frac{1}{\frac{CapGallons}{VMT \times n} + \frac{1}{S}} \right) \times 10 \times n$$

    Where:

    S = Standard for the model year of the fleet receiving transfer credits

Transfer Limit = Maximum number of CAFE credits that can be transferred into the fleet with a shortfall. (One would need to also separately use the adjustment factor to determine how many credits would need to come from the fleet supplying the credit.)

d. Simplifying

$$Transfer\ Limit = \left(S - \frac{1}{\frac{CapEq}{VMT} + \frac{1}{S}} \right) \times 10 \times n$$

Example of maximum credit transfer allowed into a light truck fleet in MY 2024 or later.

$CapEq_{truck}$ = 538 [gallons/vehicle]

(This value is based on MY 2018 as shown in Step 1 and would be a constant value defined in regulation.)

n = 1.5 million [units]

(Illustrative value. This value is from the fleet the credits will be transferred into.)

VMT = 225,865 [miles]

(This value is from the fleet the credits will be transferred into and can be found at 49 CFR 536.4 (c).)

S = 34.2 [miles/gal]

(Illustrative value. This value is from the fleet the credits will be transferred into.)

Transfer Limit = (34.2 – 1/(538/225865 + 1/34.2)) x 10 x 1.5 million = 38,642,500 [credits]

Proposed Regulatory Amendment

Here, we provide our suggested amendment to existing regulations that would capture the concepts described above.

Add paragraph (d) to 49 CFR 536.4

(d) Credit Transfer Limit.

(1) Credit transfers are subject to the limitations of 49 U.S.C. 32903(g)(3).

(i) For model years 2011 through 2013, the maximum number of credits that may be transferred and used to satisfy a credit shortfall equals 10 multiplied by the production volume of the shortfall fleet.

(ii) For model years 2014 through 2017, the maximum number of credits that may be transferred and used to satisfy a credit shortfall equals 15 multiplied by the production volume of the shortfall fleet.

(iii) For model years 2018 through 2023, the maximum number of credits that may be transferred and used to satisfy a credit shortfall equals 20 multiplied by the production volume of the shortfall fleet.

(iv) Beginning with model year 2024, the maximum number of credits that may be transferred and used to satisfy a credit shortfall is the Transfer Limit calculated according to the following formula in figure 1 to this paragraph (d)(5). The number of credits transferred and used to satisfy a shortfall must not exceed the Transfer Limit.

Figure 1 to § 536.4(d)(1)(iv) – Formula for Calculating Transfer Limit

$$Transfer\ Limit = \left(S - \frac{1}{\frac{CapEq}{VMT} + \frac{1}{S}} \right) \times 10 \times n$$

Where:

CapEq = 254 for credits transferred to a passenger car fleet or 538 for credits transferred to a light truck fleet;

n = Vehicle production for the shortfall fleet to which credits will be transferred;

S = Required fuel economy standard for the shortfall fleet to which credits will be transferred;

Transfer Limit = The maximum number of credits that may be transferred to a fleet. The result shall be rounded to zero decimal places; and

VMT = Lifetime vehicle miles traveled as provided in Table 1 to paragraph (c) for the shortfall fleet to which credits will be transferred.

Note: The suggested (d)(1)(i) to (iii) text defines how to calculate the maximum number of credits for model years prior to the change in interpretation to an oil savings basis. Previously, NHTSA simply stated that transfers are limited to statutory caps, leaving it up to manufacturers and NHTSA compliance engineers to calculate the limit in terms of credits. (See 49 CFR 536.3(b)(13).) Given that we are recommending the adoption of a new interpretation and a specific equation in the future, the suggested text at (d)(1)(i) to (iii) would make the regulatory text consistent by adding an explicit explanation of the calculation for model years before the change.

Note: Manufacturers would also need to use the adjustment factor to determine the number of credits needed from a different fleet, but this is already addressed in 536.4(c).

Detailed Derivation of "Transfer Limit"

Here, we describe the mathematical derivation of the term "transfer limit" for NHTSA and other stakeholders' understanding. The derivation is straightforward, but not intuitively obvious as it involves expressing several equations in alternative forms and a couple of substitutions of terms.

1.) The excess fuel consumption that results from a deviation of D from a given standard can be expressed as:

$$G = n \times VMT \times \left(\frac{1}{S - D} - \frac{1}{S}\right)$$

Where:

G = Gallons of fuel (gal)

n = Vehicle production (n)

VMT = Lifetime travel (miles)

S = CAFE standard for a given year

D = A delta MPG deviation from the given standard

Note, the above equation is that of CapGallons without the intermediate step of CapEq above.

For our gallons-based credit transfer cap, we defined S as the 2018 standard and D as the statutory 2.0 MPG cap.

$$G = CapGallons = n \times VMT \times \left(\frac{1}{S - 2} - \frac{1}{S}\right)$$

Where:

CapGallons = The 2.0 MPG cap in statute expressed as gallons, indexed to the 2018 standard

2.) CAFE credits are calculated as:

$$Credit = \Delta MPG \times 10 \times n$$

Where:

ΔMPG = The difference between fuel economy performance and the standard

10 = 10 credits per MPG (the statutory calculation is expressed in tenths of an MPG)

3.) What we need to calculate is ΔMPG (i.e., “D”) as a function of gallons.

$$G = CapGallons = n \times VMT \times \left(\frac{1}{S - D} - \frac{1}{S}\right)$$

$$\frac{CapGallons}{n \times VMT} = \left(\frac{1}{S - D} - \frac{1}{S}\right)$$

$$\frac{CapGallons}{n \times VMT} + \frac{1}{S} = \frac{1}{S - D}$$

$$\frac{1}{\frac{CapGallons}{n \times VMT} + \frac{1}{S}} = S - D$$

$$D + \frac{1}{\frac{CapGallons}{n \times VMT} + \frac{1}{S}} = S$$

$$D = S - \frac{1}{\frac{CapGallons}{n \times VMT} + \frac{1}{S}}$$

4.) Substituting the final equation of (3) where D represents a ΔMPG into the equation at (2) one gets:

$$Credit = \left(S - \frac{1}{\frac{CapGallons}{VMT \times n} + \frac{1}{S}}\right) \times 10 \times n = Transfer\ Limit$$

“Credit” is renamed as “Transfer Limit” because the equation yields the maximum number of CAFE credits based on the CapGallons.

5.) Recognizing that CapGallons divided by n is CapEq, the equation is simplified so that in regulation and use, one only needs the defined constant CapEq without an extra step of calculating an actual number of gallons.

$$Transfer\ Limit = \left(S - \frac{1}{\frac{CapEq}{VMT} + \frac{1}{S}}\right) \times 10 \times n$$

Appendix F: NHTSA's Heavy-Duty Pickup and Van Proposal and Related Comments on Light-Duty CAFE

NHTSA should finalize a provision to transfer credits from the HDPUV fleet to light trucks.

DOT analysis to support the heavy-duty pickup trucks and vans "HDPUV" rulemaking builds on work from previous rulemakings, and the agency has made significant effort to describe assumptions supporting the rulemaking analysis.[77] NHTSA-projected compliance pathways rely on high penetration rates of relatively low-range battery electric pickup trucks for the proposed light truck and HDPUV fleet standards.

Press releases and battery electric vehicle product announcements make clear that manufacturers intend to commercialize long-range BEVs to compete in the truck and large sport utility vehicle ("SUV") segment. As customers demand longer range BEVs for general convenience and to preserve towing range utility, a significant number of trucks and SUVs will certify to regulatory classes with heavier gross vehicle weight ratings ("GVWR") due to larger, heavier batteries. The resulting weight increases confound NHTSA's projected compliance pathways for the proposed light truck and HDPUV rules. The penetration of BEVs in the light truck fleet may be less than projected with commensurate increases in the HDPUV fleet.

In its closely related rulemaking, EPA proposed modifications to the medium-duty passenger vehicle definition to address this possibility.[78] NHTSA may not have the same discretion to adjust regulatory class definitions in the CAFE and Corporate Average Fuel Consumption ("CAFC") programs to align with EPA. Auto Innovators recommends that NHTSA develop a credit transfer mechanism between HDPUV and light truck fleets to harmonize with EPA.

DOT's analysis uses 'phase-in caps' as a mechanism to represent an upper bound of how quickly manufacturers could scale up production capacity of a technology, and to represent the upper bound of consumer acceptance for certain technologies in the

[77] The *Draft Technical Support Document*, the *Preliminary Regulatory Impact Analysis*, and the supplemental documentation supporting the *CAFE Model* and *Other Technical Work Supporting the Proposal*, including the central analysis inputs like "market_data_HDPUV_ref", "technologies_ref_HDPUV", and "Autonomie-Model-Simulation-Output-Database."

[78] EPA NPRM (*supra* note 17) at 29287.

market.[79] Specifically for low-range battery electric vehicles, the agency has used phase-in caps to account for expected limits in market demand for shorter-range BEVs.[80] In today's proposal, NHTSA's phase-in caps[81] assume that for light-duty vehicles, the industry as a whole could adopt 100% BEVs at the first redesign—as soon as MY 2024 (Table 8). The "Technology Utilization Report" shows penetration rates of BEV1/2 at about triple those of BEV3/4 during the rulemaking period, meaning the agency projects 300+ mile range capable vehicles to be far less common than 250 or less mile range BEVs (Figure 19).

Table 8: Maximum BEV phase-in allowed for light-duty vehicles.

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
BEV1 (200-mile)	2%	2%	2%	3%	3%	3%	3%	3%	3%	3%
BEV2 (250-mile)	20%	21%	22%	24%	25%	27%	28%	29%	31%	32%
BEV3 (300-mile)	47%	53%	60%	67%	73%	80%	87%	93%	100%	100%
BEV4 (400-mile)	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%
Maximum BEV	89%	100%	100%	100%	100%	100%	100%	100%	100%	100%

[79] The purpose and practical use of phase-in caps, in combination with refresh and redesign cycles, is well-documented in prior CAFE rulemakings. In the agency's own words, "Without phase-in caps, the model may apply technologies at rates that are not representative of what the industry is actually capable of producing, which would suggest that more stringent standards might be feasible than actually would be." *Final Regulatory Impact Analysis: The Safter Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks* at 491. Available at https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final_safe_fria_web_version_200701.pdf (accessed Sep. 27, 2023).

[80] *Id.* at 618.

[81] Listed in the "technologies_ref.xlsx" and "technologies_ref_HDPUV.xlsx" input files, *Technologies* tab.

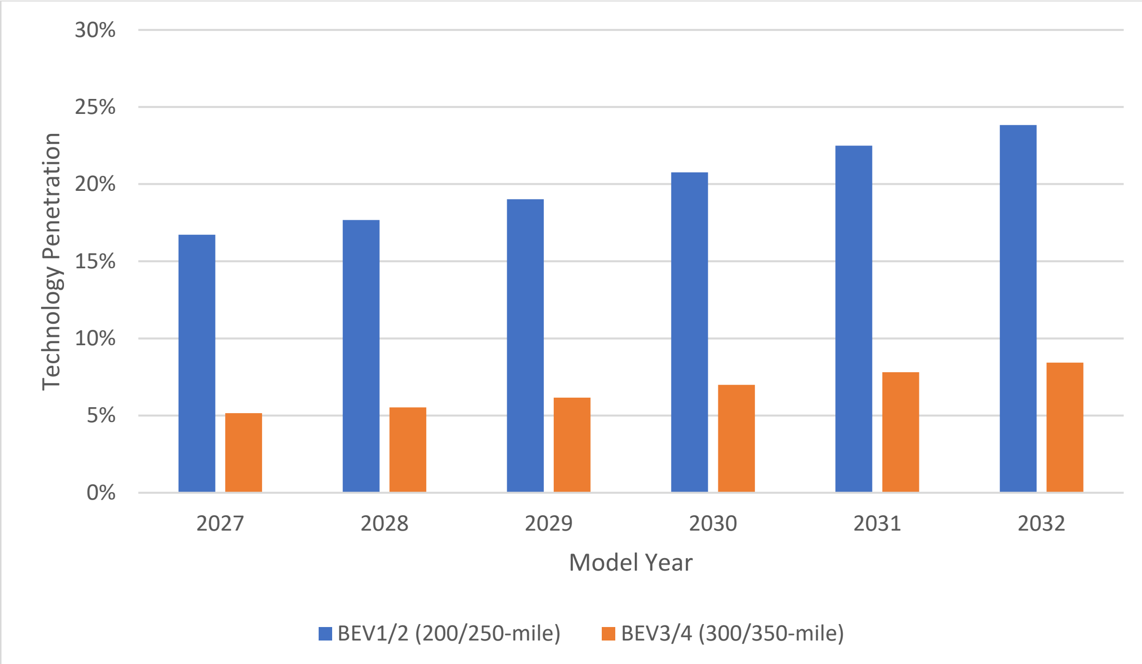

Figure 19: NHTSA-projected light-duty vehicle BEV penetration, MYs 2027-2032 (rulemaking analysis)

The assumptions in the analysis contradict the agency's explanation on "Technology Applicability Rules" in the *Draft Technical Support Document*, which states: "Today's analysis also applies phase-in caps and corresponding start years to prevent the simulation from showing unlikely rates of applying BEVs, such as showing that a manufacturer producing very few BEVs in MY 2022 could plausibly replace every product with a 300- or 350-mile BEV in MY 2026."[82] NHTSA should reassess BEV technology phase-in caps such that the model cannot exceed a reasonable total BEV phase-in (for example, no more than 50% by 2030) and in a way that reflects the prevalence of higher range light-duty BEVs.

The BEV phase-in and applicability assumptions are even more aggressive in the HDPUV analysis, with 100% short-range BEVs possible at first redesign by MY 2028 (Table 9).[83]

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[82] DTSD (*supra* note 9) at 158.

[83] The agency does not make BEV3 or BEV4 technologies available in the "technologies_ref_HDPUV.xlxs" file, on tabs "Pickup2b", "Van2b", "Pickup3", and "Van3".

Table 9: Maximum BEV phase-in allowed for HDPUVs.

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
BEV1 (150/200-mile)	12%	18%	24%	30%	36%	42%	48%	54%	60%	66%
BEV2 (250/300-mile)	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%
BEV3	Not included in NHTSA HDPUV analysis									
BEV4										
Maximum BEV	32%	48%	64%	80%	96%	100%	100%	100%	100%	100%

In NHTSA's words, "Phase-in caps limit the adoption rates of BEVs and FCEVs. These phase-in caps account for current market share, scalability, and reasonable consumer adoption rates of each technology."[84] The phase-in caps used by NHTSA in this proposal are *un*reasonable, and they are a major departure from previous NHTSA rulemakings, without explanation. These new phase-in caps assume too large a portion of the market will adopt vehicles with low range capability (and even more limited towing range). The agency assumptions result in underestimated BEV costs, and overestimated scale and capability of the BEV supply chain this decade, manifesting in economic practicability and technological feasibility concerns with the proposed rule.

In the case of light-duty pickups, large SUVs, and HDPUVs, the agency assumptions do not recognize the need for range in towing-oriented applications. Instead, the agency develops pack sizes based on test cycle ranges that do not consider use conditions that exercise the capability of the vehicles when highly loaded. The agency should consider product announcements and range when developing projections of phase-in caps for major automakers.[85,86,87]

The phase-in caps for BEVs utilized for the MYs 2024-2026 CAFE rulemaking, and similar phase-in caps for prior HDPUV analyses, are more reasonable assumptions than those proposed in the present NPRM. The phase-in caps from the prior CAFE rulemaking (Table 10) better reflect the need for larger batteries and longer range to entice large portions of the market away from ICE and toward BEVs. These phase-in caps also better reflect the current and expected maturity of the ZEV supply chain for

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[84] DTSD (*supra* note 9) at 242.

[85] 2025 Ram 1500 REV, with a range of up to 500 miles, and a 229 kilowatt-hour large battery pack. https://www.stellantis.com/en/news/press-releases/2023/april/all-new-all-electric-2025-ram-1500-rev-unveiled-at-new-york-international-auto-show-with-targeted-range-of-up-to-an-unsurpassed-500-miles

[86] 2025 Cadillac Escalade IQ with a Cadillac-estimated 450 miles of range, and more than 200 kWh of available energy. https://media.cadillac.com/media/us/en/cadillac/news.detail.html/content/Pages/news/us/en/2023/aug/0809-escaladeiq.html

[87] 2024 Chevrolet Silverado EV with EPA-estimated 450-mile range on a full charge offered on 4WT, and GM-estimated 400-mile range on a full charge offered on RST. https://media.chevrolet.com/media/us/en/chevrolet/vehicles/silverado-ev/2024.html

industry in the context of unprecedented investments to bring new production on-line, although our position remains that the potential market for EVs in 2030 will be in the 40-50% range for industry on average.

Table 10: NHTSA light-duty BEV phase-in caps from the MYs 2024-2026 final rule.[88]

			NHTSA CAFE Light-Duty NPRM, MY 2024-2026										
	Phase-in Cap	Start Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
BEV200 (200-mile)	0.09%	1998	2.1%	2.2%	2.3%	2.3%	2.4%	2.5%	2.6%	2.7%	2.8%	2.9%	3.0%
BEV300 (300-mile)	0.70%	2009	8.4%	9.1%	9.8%	10.5%	11.2%	11.9%	12.6%	13.3%	14.0%	14.7%	15.4%
BEV400 (400-mile)	1.25%	2016	6.3%	7.5%	8.8%	10.0%	11.3%	12.5%	13.8%	15.0%	16.3%	17.5%	18.8%
BEV500 (500-mile)	4.25%	2021	0.0%	4.3%	8.5%	12.8%	17.0%	21.3%	25.5%	29.8%	34.0%	38.3%	42.5%
Total BEV			16.7%	23.0%	29.3%	35.6%	41.9%	48.2%	54.5%	60.8%	67.0%	73.3%	79.6%

To better reflect the current maturity of the supply chain, and the willingness of the market to adopt shorter range BEVs, Auto Innovators recommends NHTSA use the following Phase-In caps for rulemaking analysis (Table 11).[89]

Table 11: Auto Innovators-recommended BEV phase-in caps for light-duty vehicles and HDPUVs.

			Alliance for Automotive Innovation, Recommended Phase-in Cap for DOT Analysis, Light Duty and HDPUV (Fall 2023)										
	Phase-in Cap	Start Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
BEV200 (200-mile)	0.18%	2005	2.9%	3.1%	3.2%	3.4%	3.6%	3.8%	4.0%	4.1%	4.3%	4.5%	4.7%
BEV300 (300-mile)	1.6%	2019	3.2%	4.8%	6.4%	8.0%	9.6%	11.2%	12.8%	14.4%	16.0%	17.6%	19.2%
BEV400 (400-mile)	2.3%	2021	0.0%	2.3%	4.6%	6.9%	9.2%	11.5%	13.8%	16.1%	18.4%	20.7%	23.0%
BEV500 (500-mile)	3.4%	2024	0.0%	0.0%	0.0%	0.0%	3.4%	6.8%	10.2%	13.6%	17.0%	20.4%	23.8%
Total BEV			6.1%	10.2%	14.2%	18.3%	25.8%	33.3%	40.8%	48.2%	55.7%	63.2%	70.7%

The Argonne National Laboratory Autonomie simulations relied on by NHTSA provide transparent assumptions about battery size, vehicle weight, and how weight may change as manufacturers apply different combinations of fuel saving technologies on different types of vehicles. (Tables 12-15).

[88] National Highway Traffic Safety Administration, CAFE Compliance and Effects Modeling System, 2022 Final Rule for Model Years 2024-2026 Passenger Cars and Light Trucks, central analysis Technologies input file.

[89] We believe that 40-50% average EV market share in 2030 is achievable if the right policies and supporting conditions are in place. However, it is reasonable that consider that some manufacturers will likely exceed that average while others remain below.

Table 12: ANL-estimated vehicle curb weight for various vehicle category and technology combinations.

ANL Estimated VehicleCurbWeight (lbs.)	Eng 3, AT 8p, MR0, Aero0, Roll0	Eng 12, AT 10p, MR0, Aero0, Roll0	BEV200, MR0, Aero0, Roll0	BEV250, R0, Aero0, Roll0	BEV300, MR0, Aero0, Roll0	BEV400, MR0, Aero0, Roll0
Small SUV Non Performance	3,642	3,583	4,169	4,354	4,632	5,249
Small SUV Performance	3,929	3,874	4,411	4,605	4,892	5,534
Midsize SUV Non Performance	4,193	3,834	4,471	4,672	4,969	5,626
Midsize SUV Performance	4,786	4,482	5,027	5,240	**5,556**	**6,243**
Pickup Non Performance	4,440	4,438	5,004	5,236	5,575	6,316
Pickup Performance	5,161	5,163	5,725	5,975	**6,334**	**7,117**

Table 13: Comparison of ANL-estimated curb weights to engine 12, AT 10p.

ANL Estimated Increase in VehicleCurbWeight (lbs.) vs. Eng 12, AT 10p	Eng 3, AT 8p, MR0, Aero0, Roll0	Eng 12, AT 10p, MR0, Aero0, Roll0	BEV200, MR0, Aero0, Roll0	BEV250, R0, Aero0, Roll0	BEV300, MR0, Aero0, Roll0	BEV400, MR0, Aero0, Roll0
Small SUV Non Performance	60	0	586	772	1,049	1,667
Small SUV Performance	55	0	538	732	1,019	1,660
Midsize SUV Non Performance	359	0	637	838	1,135	1,792
Midsize SUV Performance	304	0	545	758	**1,074**	**1,761**
Pickup Non Performance	2	0	567	798	1,138	1,878
Pickup Performance	-2	0	562	811	**1,171**	**1,953**

Table 14: ANL-estimated vehicle curb weight for various vehicle category and technology combinations.

ANL Estimated VehicleCurbWeight (lbs.)	Eng 3, AT 8p, MR3, Aero2, Roll2	Eng 12, AT 10p, MR3, Aero2, Roll2	BEV200, MR3, Aero2, Roll2	BEV250, MR3, Aero2, Roll2	BEV300, MR3, Aero2, Roll2	BEV400, MR3, Aero2, Roll2
Small SUV Non Performance	3,366	3,305	3,772	3,929	4,160	4,667
Small SUV Performance	3,629	3,578	3,995	4,156	4,396	4,921
Midsize SUV Non Performance	3,605	3,547	4,059	4,226	4,473	5,011
Midsize SUV Performance	4,147	4,145	4,559	4,738	**4,996**	**5,567**
Pickup Non Performance	4,127	4,107	4,539	4,731	5,007	5,606
Pickup Performance	4,780	4,780	5,190	5,393	**5,681**	**6,321**

Table 15: Comparison of ANL-estimated curb weights to engine 12, AT 10p.

ANL Estimated Increase in VehicleCurbWeight (lbs.) vs. Eng 12, AT 10p	Eng 3, AT 8p, MR3, Aero2, Roll2	Eng 12, AT 10p, MR3, Aero2, Roll2	BEV200, MR3, Aero2, Roll2	BEV250, MR3, Aero2, Roll2	BEV300, MR3, Aero2, Roll2	BEV400, MR3, Aero2, Roll2
Small SUV Non Performance	62	0	467	624	855	1,362
Small SUV Performance	51	0	417	578	818	1,343
Midsize SUV Non Performance	57	0	511	679	926	1,464
Midsize SUV Performance	2	0	414	593	**851**	**1,422**
Pickup Non Performance	20	0	432	624	899	1,499
Pickup Performance	0	0	410	613	**902**	**1,541**

The “Market Data” files provide information about observed or estimated curb weight and gross vehicle weight rating.[90] Combining information in the market data files and Autonomie simulations, it is possible to take curb weight increases for BEVs relative to ICE counterparts in Autonomie simulations and add that weight to the GVWR in the market data file (to account for a performance neutral GVWR), to assess how GVWR might migrate with the adoption of BEV technology (Figures 20 and 21).

[90] “Market_data_HDPUV_ref.xlxs” and “market_data_LD_ref.xlxs”, columns “AP” and “AR” on the “Vehicles” tab.

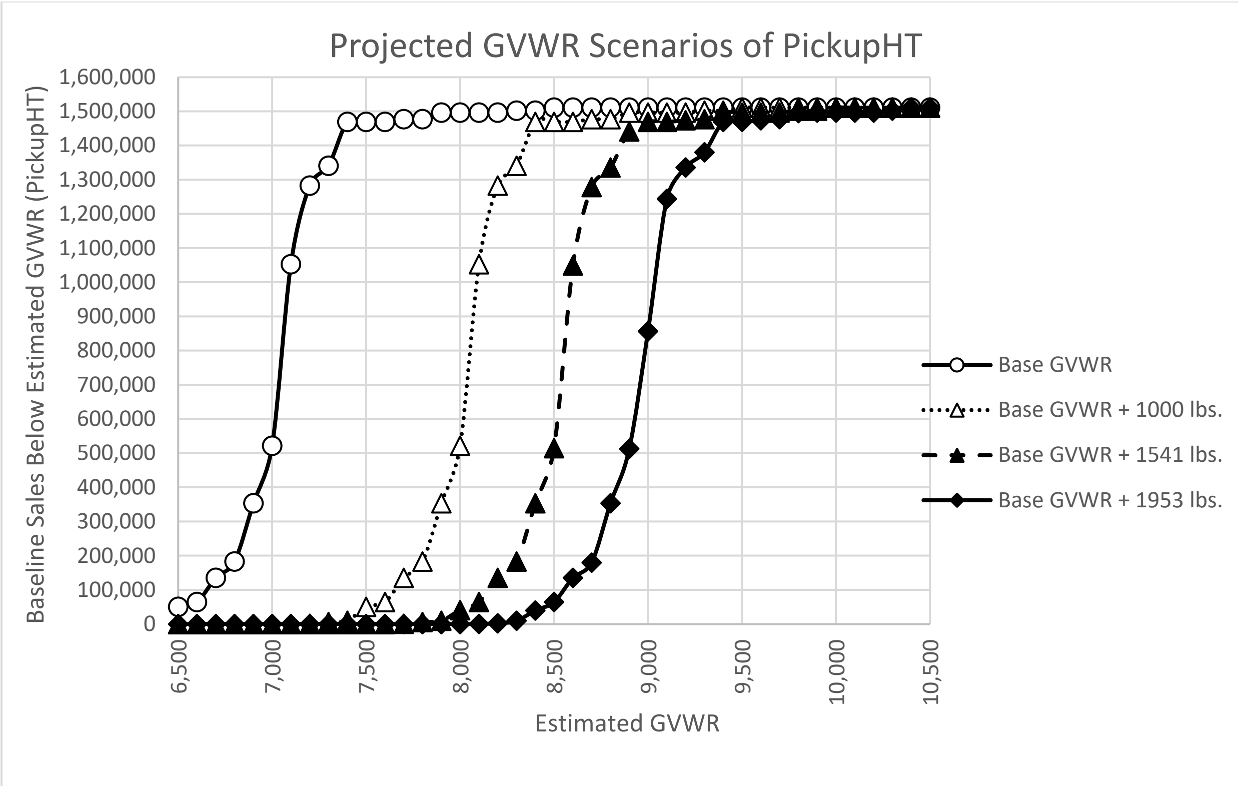

Figure 20: Potential increase in GVWR resulting from electrification of PickupHT vehicles.

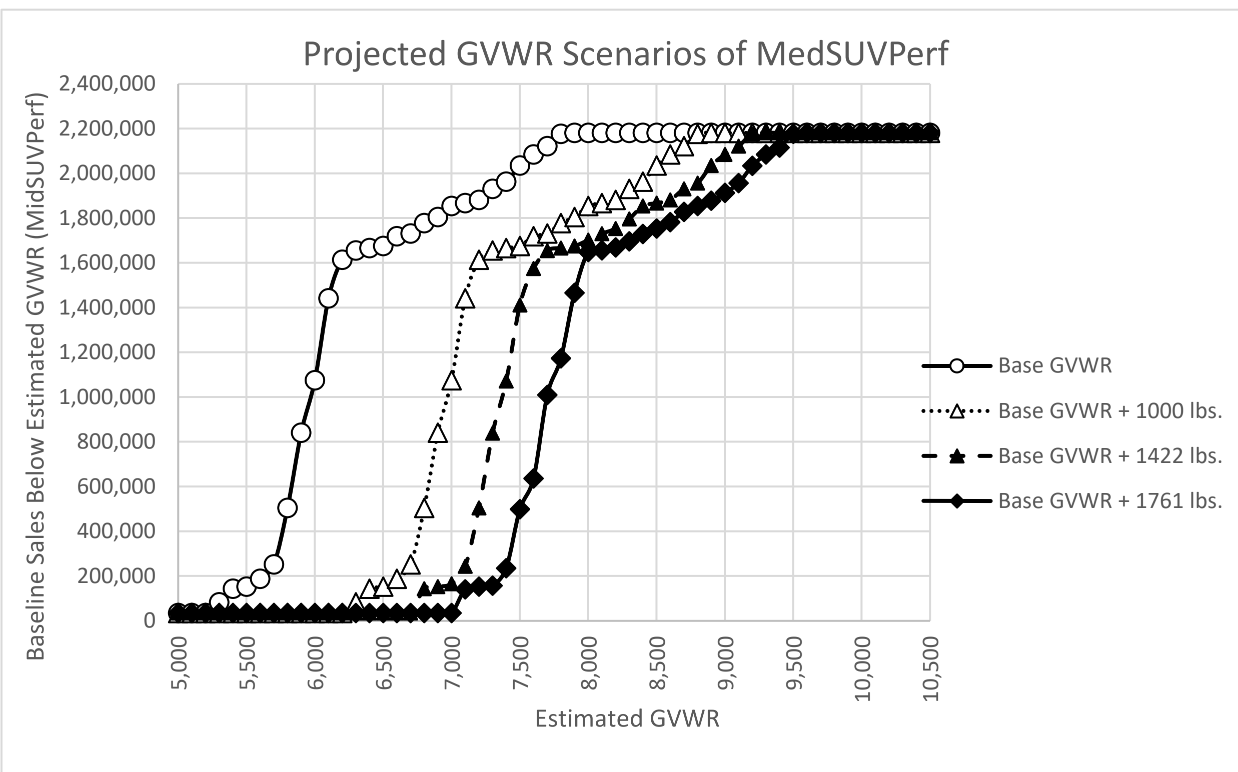

Figure 21: Potential increase in GVWR resulting from electrification of MedSUVPerf vehicles.

Using this methodology with the agency's own data, analysis suggests that 65% - 95% of "Pickup Performance", or "PickupHT" Technology Class vehicles would exceed 8,500 lbs. GVWR with a 400-mile range battery. There are over 1.5 million vehicles in the analysis fleet assigned to the "PickupHT" Technology Class. Similarly, analysis suggests 15% - 25% of "MidsizeSUVPerf" or "MedSUVPerf" Technology Class vehicles would exceed 8,500 lbs. GVWR with a 400-mile range battery. There are nearly 2.2 million vehicles in the analysis fleet assigned to the "MedSUVPerf" Technology Class. Of the total 8.9 million light truck vehicles in the analysis fleet, 1.3 million to 2.0 million light truck vehicles are at high risk of shifting from the light truck CAFE regulatory class to the HDPUV CAFC regulatory class if they add BEV technology.

This is not just a hypothetical concern. Manufacturers producing half ton trucks and large SUVs already have examples of vehicles shifting regulatory classes largely on account of battery weight, integral to the fuel saving technology itself.

To address this concern, Auto Innovators recommends NHTSA finalize a provision to transfer credits from HDPUV to light truck fleets. Applicable statutes do not prohibit NHTSA from creating such a credit transfer program; 49 U.S.C. § 32903 and 40 C.F.R. Part 536 can serve as a guide for this kind of flexibility. Such a program should be designed to provide sufficient flexibility to harmonize with EPA's proposed approach to modifying MDPV definitions and structured in a way that does not favor small or large manufacturers with or without HDPUV fleets. Auto Innovators is open to discussing details of this suggested credit transfer program with NHTSA.

We suggest that a credit transfer mechanism be based on gallons of fuel saved relative to HDPUV standards, using existing useful life definitions for HDPUVs and estimated lifetime miles for light-duty trucks. Gallons of fuel saved relative to HDPUV standards could be calculated at the fleet or subconfiguration level, presuming that the achieved fuel efficiency exceeds the applicable standard, that doing so would not make the manufacturer's HDPUV fleet noncompliant in the current model year, and that the manufacturer did not have any outstanding credit deficits from previous model years.

For example, suppose a manufacturer has a fleet (or subconfiguration) consisting of 5,000 HDPUVs with a target standard of 4.427 gal/100 miles (NHTSA's projected 2030MY average required fuel efficiency level for alternative HDPUV10). Let us also suppose that the fleet or subconfiguration achieves an average fuel efficiency of 4.000 gal/100 miles.

Useful life for Phase 2 HDPUVs is currently 150,000 miles.[91] At this useful life, volume, and efficiency level, the gallons of fuel not consumed relative to the standard would be calculated as follows:

[91] 49 C.F.R. § 535.5(a)(10).

$$5{,}000 \text{ units} \times \frac{4.427 - 4.000 \text{ gal}}{100 \text{ miles}} \times 150{,}000 \text{ miles} = 3{,}202{,}500 \text{ gallons}$$

The assumed lifetime mileage for light-duty trucks is currently 225,865 miles.[92] Suppose the manufacturer's light truck fleet in this MY consists of 200,000 vehicles and has achieved a fleet average fuel economy of 50.0 mpg relative to a fleet average standard of 50.2 mpg (NHTSA's projected 2030MY light truck fleet average required fuel economy for alternative PC2LT4). This fuel economy equates to lifetime light truck fleet fuel consumption for this MY as follows:

$$200{,}000 \text{ units} \times \frac{225{,}865 \text{ miles lifetime VMT}}{50.0 \text{ miles/gal}} = 903{,}460{,}000 \text{ gallons}$$

Lifetime light truck fuel consumption is then reduced by the 3,202,500 gallons not consumed by the HDPUV volume, to 900,257,500 gallons, and light truck fleet average fuel economy is recalculated:

$$\frac{225{,}865 \text{ miles lifetime VMT} \times 200{,}000 \text{ units}}{900{,}257{,}500 \text{ gallons}} = 50.18 \text{ miles/gal}$$

The manufacturer's light truck fleet average fuel economy for this model year is now considered to be 50.18 mpg, and existing credit banking, trade, or transfer mechanisms within the passenger car and light truck fleet regulations could then be used to make up the 0.02 mpg deficit to the light truck fleet average standard.

Such a credit flexibility would encourage manufacturers to improve light truck fleet compliance by electrifying pickups and large sport utility vehicles with long range battery packs, which many customers demand, even if those battery packs cause the vehicle to exceed the light truck GVWR. As shown in this section, manufacturers think it likely that light truck vehicle weights will increase with battery packs, and some of those vehicles will switch from the NHTSA CAFE to the CAFC regulatory class. A credit flexibility as discussed above would improve harmonization with EPA's proposed updates to Medium Duty Passenger Vehicle definition, while still adhering to statutory guidance for CAFE.

Auto Innovators agrees with NHTSA's proposal to maintain HDPUV advanced technology multipliers through MY 2027.

In the draft rule, NHTSA clarifies their adoption of advanced technology credit multipliers in the Phase 2 rule of the Heavy-Duty National Program. The credit multipliers for plug-in hybrid (3.5), all electric (4.5), and fuel cell vehicles (5.5) were adopted as an interim program lasting through MY 2027. In this proposal, the agency further clarifies their

[92] 49 C.F.R. § 536.4(c).

intent to maintain the multipliers through MY 2027 as originally adopted.[93] Maintaining the advanced technology multiplier rewards manufacturers who endeavor to establish and grow the market for these alternative powertrains.

Class 2b and 3 work vehicles in the HDPUV class often require refueling infrastructure distinct from light-duty refueling infrastructure. Refueling infrastructure to support ZEV HDPUVs is not available or is insufficient to support widespread ZEV HDPUV use in many parts of the United States. Maintaining the advanced technology multiplier encourages manufacturers to develop and support the ZEV HDPUV refueling network.

BEV HDPUVs require large batteries, and fuel cell HDPUVs require high power fuel cells and hydrogen pressure vessels. Production capacity and scale does not yet exist in the United States to produce these critical components in large volumes. Maintaining the advanced technology multiplier rewards investment to develop and quickly scale up production capability for ZEV HDPUVs.

Auto Innovators agrees with NHTSA's plan to maintain the advanced technology multipliers through MY 2027. This is consistent with the intent of the Phase 2 rule and avoids disrupting automaker product plans by changing a previously published rule.

We support NHTSA's proposal to retain the "work factor" attribute for HDPUVs.

NHTSA's proposal retains an attribute-based "work factor" standard. NHTSA notes, "The standards are based on the capability of each model to perform work. A model's work factor is a measure of its towing and payload capacities and whether equipped with a 4-wheel drive configuration."[94]

We agree with NHTSA's conclusion that work factor is a reasonable and appropriate[95] attribute for setting fuel consumption standards. Work factor effectively captures the intent of these vehicles, which is to perform work, and has a strong correlation to fuel consumption. Stability in the form of the regulation helps ensure all stakeholders can effectively evaluate the proposed standards and develop plans to meet them.

Electric operation of HDPUVs should be assigned a fuel consumption of zero gallons per 100 miles.

NHTSA notes that they "currently grant BEVs (and the electric-only operation of PHEVs) an HDPUV compliance value of 0 gallons/100 miles . . . ."[96] This has been the

[93] NPRM (*supra* note 1) at 56371.

[94] *Id.* at 56365.

[95] *Id.* at 56313.

[96] *Id.* at 56283.

approach since this segment was regulated.[97] The agency seeks comment on the assignment of 0 gal/100mi for EVs. We support NHTSA's plan to continue assessing 0 gal/100mi for BEVs.

Any change from 0 gal/100mi for EVs would not make sense. The standard is based on the consumption of liquid or gaseous fuels. There are no liquid or gaseous fuels being consumed, so changing an EV from 0 gal/100mi does not inherently make sense. Further, increasing the consumption of an EV to a value greater than 0 gal/100mi would create a disincentive to produce EVs by devaluing their contribution to compliance. The goal of both the Biden administration and NHTSA is to reduce the number of ICE vehicles being produced. Retaining the full benefit of a BEV at 0 gal/100mi is key to achieving that goal.

NHTSA's proposal to not adopt new HDPUV regulations until MY 2030 is consistent with statutory requirements.

Current HDPUV Phase 2 standards continue through MY 2029, and the new standards are proposed to begin in MY 2030. The agency highlights this timing as needed to provide the four years of lead time and three years of stability as required by law.[98] Auto Innovators appreciates NHTSA's acknowledgement of their statutory requirement and agrees wholeheartedly that this proposal is aligned to it. This commonsense requirement from Congress helps to provide enough time for automakers to develop plans to meet new regulatory requirements.

NHTSA should finalize standards through MY 2032 to align with EPA's proposal.[99]

NHTSA proposes new HDPUV standards for MYs 2030-2035 at 10% year-over-year increase. The agency also seeks input on a scenario where the regulatory alternatives would only extend through MY 2032. Auto Innovators is concerned that the proposal exceeds one or more of the maximum feasible improvement factors: appropriateness, cost-effectiveness, and technological feasibility. Instead, Auto Innovators believes setting standards at 10% year-over-year from MYs 2030-2032 would be an appropriate path forward.

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[97] U.S. Environmental Protection Agency and National Highway Traffic Safety Administration, Final Rules: Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 *Fed. Reg.* 57106, 57501 (Sep. 15, 2011).

[98] 49 U.S.C. § 32902(k)(3)(B).

[99] As noted elsewhere, we take the position that NHTSA should not adopt augural light-duty vehicle standards for MY 2032 because this exceeds NHTSA's statutory authority and EPA standards provide any certainty that might be added by a longer-term standard. Aligning at MY 2032 is appropriate for HDPUVs because both NHTSA and EPA have statutory authority to set standards for MY 2032 in the present rulemakings.

A significant reduction in fuel consumption of the HDPUV fleet is expected to come through electrification of the fleet. However, as NHTSA notes, “uncertainty in the input assumptions can have significant effects on outcomes.”[100] We agree. The biggest uncertainty of all, for both the agency and automakers, is market uptake of advanced technology in the HDPUV fleet. This uncertainty underpins the merits of having a shorter rulemaking period. It also reflects the current shortcomings regarding charging station capacity for heavy-duty vehicles and the need for alignment with infrastructure development.

Ending the current rulemaking for HDPUVs in MY 2032 gives the agency and industry an opportunity to reassess technology feasibility, market acceptance and infrastructure readiness and set future rules, with lower or higher year-over-year stringency increases, accordingly.

If NHTSA adopts an HDPUV rule through 2035, annual stringency increases in MYs 2033-2035 should be set to 4% per year, or stringency increases should be 7% per year for MYs 2030-2035.

If NHTSA decides to promulgate a rule through MY 2035, we believe the market and technology uncertainty after MY 2032 can be best addressed by setting the annual rate of improvement to 4% for MYs 2033-2035, aligned with alternative HDPUV4. In other words, set standards for MYs 2030-2032 at 10% year-over-year stringency increase, and for MYs 2033-2035 at 4% year-over-year. Another acceptable path would be to set the year-over-year improvement at 7% for MYs 2030-2035. This would result in the same endpoint stringency as our two-step proposal.

NHTSA should not model payment of civil penalties in lieu of compliance for the HDPUV fleet.

NHTSA has requested comment on modeling of civil penalties for HDPUVs in the final rule.[101] In the NPRM, the CAFE Model did not allow civil penalty payment as an option for NHTSA’s proposed HDPUV standards, as “penalties for noncompliance are significantly higher” in the HDPUV fleet than the passenger car and light truck fleets.

NHTSA’s approach to not considering payment of civil penalties for the HDPUV fleet modeling is appropriate and should continue in the final rulemaking. As NHTSA states in discussing penalty amounts, “It would be contrary to the purpose of the regulation for the penalty scheme to incentivize noncompliance.”[102] Given the high per-vehicle civil

[100] NPRM (*supra* note 1) at 56357.

[101] *Id.* at 56148, note 66.

[102] *Id.* at 56369.

penalties for noncompliance prescribed in 49 CFR 535.9(b), modeling should not treat payment of penalties as a compliance mechanism.

If NHTSA is asking whether it should create an alternative monetary-based compliance pathway, our position at this time is that such a pathway is not desirable. In prior rulemakings, NHTSA set standards that could be achieved by improving the fuel efficiency of HDPUVs. We think that NHTSA should continue this approach, setting standards based on rational technology pathways and avoiding standards that would risk effectively requiring a penalty payment. If NHTSA were to create an alternative monetary-based compliance pathway, it should be simple (e.g., dollars per gallon), and that pathway should not be considered in evaluating potential standards.

Appendix G: Comments on Other Aspects of NHTSA's Proposal

NHTSA inappropriately extends its analysis on multiple variables out to the year 2100, compounding uncertainty.

NHTSA's Proposed Rule and accompanying documents examine numerous variables to 2050, claiming it accounts for the operation of vehicles covered under this rulemaking.[103] However, as NHTSA notes regarding predicting Li-Ion battery costs to 2050, the further into the future modeling occurs, the greater the uncertainty.[104] This uncertainty is compounded with NHTSA even extending some of its analysis to 2100.[105] Modeling to 2050 and as far as 2100 may provide arbitrary results and, at a minimum, exacerbates the uncertainties that underlie multiple assumptions contained in the NPRM.

NHTSA should not simulate the impacts of brake and tire wear until it can be reliably measured.

Auto Innovators disagrees with the way emissions factors have been incorporated into the overall CAFE Model to generate supporting co-benefits based on assumed reductions in criteria emissions. Auto Innovators provided comments[106] on NHTSA's MY24-26 CAFE rule on this topic, and they are as valid today as they were in 2021.

The present NPRM goes even further by including particulate matter ("PM") from brake and tire wear ("BTW"), while acknowledging that the other historical emissions factors are already well-regulated. The understanding of PM from BTW sources and the ability to accurately measure them are in their infancy. Europe's new Euro 7 standard does contain limits for PM emissions from BTW, but it is just aspirational at this point with a test method not yet developed. In the United States, officials at the California Air Resources Board are only just beginning to study PM from BTW. NHTSA describes how its BTW modeling is altered due to limited BTW measurements. NHTSA states that further BTW studies are needed but claims it is "better to have some BTW estimates –

[103] *Id.* at 56140.

[104] *Id.* at 56219.

[105] *Id.* at 56325-27.

[106] Comments from Alliance for Automotive Innovation Docket ID No. NHTSA-2021-0053 October 26, 2021, pages 89-92.

even if imperfect – than not to include them at all . . . ."[107] NHTSA seeks comment on this approach and additional data sources.

Modeling should be based on accurate data, not speculation or when NHTSA acknowledges more studies are necessary. Modeling that assumes co-benefits are being generated from an unregulated and unquantifiable source such as BTW is premature and speculative and should not be included in the supporting analysis for this proposed rule. NHTSA should delay inclusion of PM from BTW until test procedures for measuring it have been developed and adopted by SAE or another standard-setting organization, or the measurement methodology has been published in an EPA or other federal regulation. Once this is met, NHTSA could add PM from BTW in modeling used to support a future rulemaking.

NHTSA should clarify and correct certain aspects of the CAFE model documentation or modeling.

In the Draft CAFE Model Documentation, NHTSA describes that "FE Primary Compliance", "FE Secondary Compliance", and "FE Compliance" in the Vehicles Report output file include adjustments for improvements in air conditioning and off-cycle credits.[108] The documentation also describes that "CAFE" in the Compliance Report output file includes adjustments for improvements in air conditioning and off-cycle credits.[109] Empirically, one can derive the "CAFE" value in the Compliance Report by calculating the sales-weighted harmonic average "FE Compliance" from the Vehicles Report and then adding the agency-estimated air conditioning and off-cycle credits (converted to FCIVs) to that value. Therefore, either "FE Compliance" in the Vehicles Report does NOT include air conditioning and off-cycle credits, or NHTSA is double-counting air conditioning and off-cycle credits in the Compliance Report's "CAFE" value. If this is a documentation error, it should be corrected in the documentation. If, instead, NHTSA is actually double-counting air conditioning and off-cycle credits in its compliance assessment, the modeling needs to be corrected and the standards reconsidered in light of new modeling outputs.

Also, NHTSA should clarify its description of "CAFE (2-cycle)" in the Compliance Report. NHTSA says "CAFE (2-cycle)" is "[t]he value of the achieved CAFE standard, using a "2-bag" test cycle, not including any adjustments for improvements in air conditioning efficiency or off-cycle credits."[110] Empirically, "CAFE (2-cycle)" appears to be the sales-weighted harmonic average of "FE Rated" in the Vehicles Report. For

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[107] NPRM (*supra* note 1) at 56246.

[108] Draft CAFE Model Documentation (*supra* note 59) at 276.

[109] *Id.* at 239.

[110] *Id.* at 239.

BEVs, “FE Rated” appears to represent a fuel economy assuming an energy equivalence of 33,705 Wh/gal. Therefore, it would be helpful to clarify the description of “CAFE (2-cycle)” to note that for BEVs and PHEVs, the value also does not include adjustments for the petroleum equivalency factor and instead represents fuel economy based on the energy content of a gallon of gasoline. Doing so would avoid potential confusion when “CAFE (2-cycle)” fuel economy exceeds “CAFE” in the Compliance Report.[111] In the same vein, it would also be helpful to clarify the descriptions of “FE Rated” and “FE Compliance” in the Vehicles Report description so users understand how electrical energy consumption is converted to fuel economy for these values.

[111] For example, “CAFE (2-cycle)” is lower than “CAFE” in the Compliance Report for Tesla in model years 2027 and later when the PEF used in the model is 31% lower than the energy content of gasoline.