Appendix to Joint Summary Comments of Environmental, Advocacy, and Science Organizations on NHTSA's Notice of Proposed Rulemaking: Corporate Average Fuel Economy Standards for Model Years 2024–2026 Passenger Cars and Light Trucks, 86 Fed. Reg. 49,602 (Sept. 3, 2021)
Docket No. NHTSA–2021–0053

I. NHTSA should adopt Alternative 3, which are the "maximum feasible" standards under EPCA

NHTSA has proposed to select "the regulatory alternative that produces the largest reduction in fuel consumption, while remaining net beneficial." Case law confirms that while NHTSA has broad discretion to balance the relevant factors, its balancing must not "undermine the fundamental purpose of the EPCA: energy conservation." *Ctr. for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1195 (9th Cir. 2008). In determining the maximum feasible average fuel economy, NHTSA may, but is not required to, perform a cost-benefit analysis. *See id.* If the agency elects to perform such an analysis, it may adopt the stringency level at which net benefits are maximized, the level at which total benefits equal total costs, or some other reasonable point along the cost-benefit curve. *See id.* In light of Congress' express mandate that NHTSA set the "maximum feasible" standard, the fact that EPCA is intended to be technology-forcing, and the crucial need to reduce oil consumption by and greenhouse gas emissions from the nation's vehicle fleet, NHTSA can and should finalize Alternative 3.

Alternative 3 achieves the greatest reduction in fuel consumption of any of the alternatives considered. NHTSA explains that Alternative 3 "would save consumers the most in fuel costs, and would achieve the greatest reductions in climate change-causing CO_2 emissions. Alternative 3 would also maximize fuel consumption reductions, better protecting consumers from international oil market instability and price spikes." Proposal, 86 Fed. Reg. at 49,803. In fact, NHTSA concludes that "[i]t is therefore likely that Alternative 3 best meets the need of the U.S. to conserve energy," *id.*, which is the "fundamental purpose" of EPCA, *Ctr. for Biological Diversity*, 538 F.3d at 1195. NHTSA also acknowledges, as it must, that this alternative is technologically feasible. Proposal, 86 Fed. Reg. at 49,792 ("...NHTSA is certain that sufficient technology exists to meet the standards—even for the most stringent regulatory alternative.") And indeed, when errors in NHTSA's analysis are corrected, the evidence shows that Alternative 3's benefits do not only equal its costs but significantly exceed them - and those net benefits exceed Alternative 2's net benefits, as well.

First, as explained elsewhere in our comments, *see* section III *infra*., NHTSA's current analysis overstates and overvalues costs, while understating and undervaluing benefits. Changing just a few of NHTSA's unfounded assumptions—the rebound rate, sales elasticity value, compliance technology availability (specifically for high compression ratio technologies), and energy security valuation—significantly alters the net benefits of more stringent standards.[1] With these changes, Alternative 3's benefits exceed its costs by $28.7 billion at a 3% discount rate using the Model Year 1981-2029 analysis, while Alternative 2 shows net benefits of $25.4 billion. As NHTSA noted, Alternative 3 is already more beneficial than Alternative 2 when considered on a Calendar Year basis: as modeled by NHTSA in the Proposal, Alternative 3 is projected to create $132 billion in societal net benefits from 2023-2050 at a 3% discount rate (as compared to $100 billion for Alternative 2), 86 Fed. Reg. at 49,607, Tbl. I-3, while our corrected modeling shows $184 billion in net benefits for Alternative 3 during this time frame (as compared to $139 billion for Alternative 2).

Second, as NHTSA notes, there are external factors that are likely to change its final analysis. In particular, NHTSA observes that if the interagency working group updates the social cost of carbon, "NHTSA will consider those [new] values and whether to include them in subsequent analyses." As NHTSA notes, "their inclusion could exert enough influence on net benefits to suggest that a different alternative could represent the maximum feasible stringency." Proposal, 86 Fed. Reg. at 49,810. We agree that NHTSA should incorporate updates to the social cost of greenhouse gases into its final cost-benefit analysis. Whether or not NHTSA does so, Alternative 3 best fulfills the fuel conservation purposes of the statute, and we thus strongly urge NHTSA to adopt it.

II. NHTSA should acknowledge patent mistakes in the 2020 Final Rule

"Agencies are free to change their existing policies as long as they provide a reasoned explanation for the change." *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125 (2016). In order to change course, NHTSA does not need to demonstrate that the 2020 Final Rule was contrary to statute or arbitrary and capricious. *See generally FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009).

NHTSA should nevertheless acknowledge that its previous rule covering some of the model years addressed by the Proposal—The Safer Affordable Fuel-Efficient (SAFE) Vehicles

[1] For this model run, the following changes were made: (1) the rebound rate was set at 10%; (2) the sales elasticity was set at -0.4; (3) HCR1D and HCR2 technologies were made available throughout the fleet; and (4) the oil security premiums were taken from EPA's recent proposal for light-duty vehicle greenhouse emission standards for Model Years 2023-2026. The bases for these changes are discussed below in section III. We also note, as discussed more fully in section III.J, that it appears NHTSA made an unintended coding error in the way it enabled HCR1D and HCR2 technology in its current modeling; specifically, neither of these technologies was made available in the model's technologies file (i.e., they were not set to "true"), which prevented them from actually being applied to additional vehicles. *See* Model Files Central Analysis/inputs/technologies_000000.xlsx, Sensitivity_Analysis_Inputs/technologies/technologies_02000.xlsx. The revised modeling also corrected this apparent coding error.

Rule for Model Years 2021–2026 Passenger Cars and Light Trucks, 84 Fed. Reg. 24174 (April 30, 2020) ("2020 Final Rule")—was marked by serious errors that require correction regardless of any changes in policy views. The 2020 Final Rule's central reliance on a claim that consumers have an extraordinary preference for "upfront" vehicle cost savings over later fuel-cost savings, *see, e.g.*, 85 Fed. Reg. at 25,111, 25,171, was not just a different policy perspective; it was flat wrong. NHTSA and EPA had already accounted for the fact that purchase prices and fuel costs occur at different times (i.e., for the time value of money) by using a discount rate to convert future costs and benefits to their present value. *Id.* at 24,281. By later assigning even more weight to upfront costs, the Agencies "double-discounted" future cost savings, violating long-established agency practice and guidance, economic theory, and common sense. This is not a reasonable policy judgment; it has no grounding in the statute or established economic or empirical analysis.[2]

In the current Proposal, NHTSA properly moves away from the 2020 Final Rule's approach to upfront costs, instead focusing on EPCA's statutory factors and recognizing all consumer fuel savings.[3] *See, e.g.*, 86 Fed. Reg. at 49,611 & 49,787 (discussing balancing of EPCA statutory factors), 49,620 & 49,753-54 (calculating lifetime fuel savings). NHTSA should acknowledge that this aspect of the 2020 Final Rule was not only inconsistent with the agencies' current policy priorities but was also outside the bounds of reasonable analysis. Nothing in the statute or in rational economic analysis authorized the 2020 Final Rule's reliance on upfront costs as a basis for overriding statutory priorities and the results of conventional cost-benefit analysis. In addition, and as is discussed in more detail below, in assessing consumer impacts, NHTSA should consider following an approach similar to that taken by EPA in its current proposal for light-duty vehicle greenhouse gas emissions, where EPA considered consumer impacts over different phases of a vehicle's lifetime to better understand the equity implications of the proposed standards. See section III.E *infra*.

And the double counting of upfront costs was hardly the only patent error in the 2020 Final Rule that cannot fairly be characterized merely as a differing weighing of policy considerations. The 2020 rule was based upon numerous patent analytical errors—outright mistakes—that severely distorted the analysis underlying the decision to weaken NHTSA's pre-existing and augural fuel economy standards. Many of these errors are described in detail in

[2] *See generally Competitive Enterprise Institute v. NHTSA,* D.C. Cir. No. 20-1145, Brief of Public Interest Organization Petitioners, ECF No. 1880214, at 20-22 (filed Jan. 14, 2021) ("Brief of Public Interest Organization Petitioners*"*). Attached as Exhibit 1.

[3] To the extent NHTSA suggests that there are "opportunity costs" to consumers that result from the standards and that the modeling or fuel savings accounting for the standards should be revised as a result, we disagree. *See, e.g.*, Union of Concerned Scientists, Petition for Reconsideration of NHTSA's Final Rule—The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, Docket No. NHTSA-2018-0067, at 27-33 (filed June 12, 2020) ("UCS Petition for Reconsideration"). Attached as Exhibit 2.

UCS's petition for administrative reconsideration filed with NHTSA.[4] These are not debatable-but-defensible policy judgments, but rather patent errors that NHTSA should acknowledge. The multiple clear analytical mistakes further confirm that the 2020 Final Rule's gratuitous weakening of NHTSA's fuel economy standards must be rescinded.

In rescinding the 2020 Final Rule, NHTSA should also make clear that no alleged reliance interests preclude its change in course. Although reliance interests can be created by longstanding and previously settled policies, *see Dep't of Homeland Security v. Regents of the Univ. of Cal.*, 140 S. Ct. 1891, 1913 (2020), reliance on an agency's decision may be unreasonable where—as here—its validity is questionable in light of existing case law and immediate court challenges. *See Bell Atl. Tel. Cos. v. FCC*, 79 F.3d 1195, 1207 (D.C. Cir. 1996) ("The rule does not upset petitioners' reasonable reliance interests. The state of the law has never been clear, and the issue has been disputed since it first arose."); *see also Mozilla Corp. v. FCC*, 940 F.3d 1, 64 (D.C. Cir. 2019) ("[R]eliance on the rules . . . would not have been reasonable unless tempered by substantial concerns for legal or political jeopardy.").

III. **NHTSA's analysis overstates the costs of more stringent standards, while understating their benefits**

Under NHTSA's modeling, both NHTSA's Preferred Alternative (Alternative 2) and Alternative 3 deliver significant societal net benefits when viewed across calendar years (CY) 2023-2050 and the regulated model years (MY) 2024-2026. NHTSA's modeling estimates CY 2023-2050 net benefits of $100 billion for Alternative 2 and $131.7 billion for Alternative 3. Proposal, 86 Fed. Reg. at 49,608, Tbls. I-8 & I-9 (net benefits at 3% discount rate). Looking just at MY 2024-2026 vehicles, NHTSA's modeling estimates total net benefits of $30.5 billion for Alternative 2, *id.* at 49,621, Tbl. II-10, and $45.9 billion for Alternative 3.[5] While net benefits do not appear as significant when viewed for MY 1981-2029 under NHTSA's modeling in the NPRM, that modeling contains several errors that substantially undercut the net benefits of more stringent standards. As noted above, our corrected modeling shows MY 1981-2029 net benefits for Alternative 2 of $25.4 billion and for Alternative 3 of $28.7 billion, with even greater CY 2023-2050 net benefits. And this corrected modeling revises only a handful of the errors and underestimates discussed below, meaning a fuller and more reasonable accounting would result in even clearer and more significant net benefits for Alternative 3.

[4] *Id.*

[5] These numbers for Alternative 3 were derived from the CAFE model output file "annual_societal_costs_report.csv" (as it appears in NHTSA's modeling files for the central case).

Relative to the 2020 Final Rule, NHTSA has made several improvements to its modeling of fuel economy standards, making its analysis more reasonable and accurate, by, for example, using global social cost of carbon values instead of domestic values. Proposal, 86 Fed. Reg. at 49,732.[6] However, NHTSA's modeling and analysis still includes inputs, assumptions, and methodologies that overstate the costs and understate the benefits of more stringent fuel economy standards. Indeed, as NHTSA explains, its estimates "could change—sometimes dramatically—with different assumptions" about factors and inputs that underlie the agency's modeling. PRIA at 5. NHTSA should correct these errors. Doing so would result in a more accurate assessment of the net benefits of more stringent standards and show even more clearly that Alternative 3 is net beneficial.

A. NHTSA's use of a 15% rebound effect is unreasonably high and unsupported by the evidence, and leads to higher costs and lower benefits for more stringent standards.

NHTSA's Proposal estimates the VMT rebound effect to be 15%. 86 Fed. Reg. at 49,714. This value is a departure from the 10% rebound effect used in prior fuel economy rulemakings (with the exception of the 2020 Final Rule, which also departed from previous rulemakings without adequate justification, but used an even more inaccurate 20% rate). This 15% rebound effect is unjustifiably high. The relevant research supports a maximum rebound effect of 10%, as modeled in NHTSA's sensitivity analysis, and indicates a reasonable value is likely even lower. NHTSA should revise its Proposal to utilize a rebound value no greater than 10%.

The quantitative estimate of the rebound effect—which indicates the amount of additional driving that will occur as the cost of driving decreases due to fuel economy improvements—significantly influences multiple factors considered in promulgating new fuel economy regulations for light-duty vehicles. Additional driving leads to more accidents, road congestion, and noise, while also reducing the fuel savings and emission reductions associated with more stringent standards. Therefore, without a reasonable estimate of the rebound effect, the magnitude of a new rule's costs and benefits cannot be properly understood. And, as

[6] For an explanation of the unreasonableness of using domestic values, s*ee, e.g.,* Competitive Enterprise Institute v. NHTSA, D.C. Cir. No. 20-1145, Brief of State and Local Government Petitioners, ECF No. 1880213, at 89-90 (filed Jan. 14, 2021) (hereinafter State and Local Government Petitioners' Brief), attached as Exhibit 3; Center for Climate and Energy Solutions, Clean Air Task Force, Environmental Defense Fund, Institute for Policy Integrity at New York University School of Law, Montana Environmental Information Center, Natural Resources Defense Council, Sierra Club & Union of Concerned Scientists, Comments on the Consideration of the Social Cost of Greenhouse Gases in Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, Docket No. EPA-HQ-OAR-2021-0208 (Sept. 27, 2021). Attached as Exhibit 4.

NHTSA recognizes, if its assumption about a rebound effect of 15% is too high, applying a more accurate rebound effect value will cause net benefits under the Proposal to increase. PRIA at 5.[7]

1. *NHTSA has provided a thorough justification for a 10% rebound effect, at maximum, in several prior rulemakings.*

The use of a 15% rebound effect is unjustified. Previously, NHTSA has estimated rebound to be 10%, including in both the 2010 and 2012 Final Rules and the 2016 Midterm Evaluation Draft TAR. *See* 2010 Final Rule, 75 Fed. Reg. 25,324, 25,517 (May 7, 2010); 2012 Final Rule, 77 Fed. Reg. 62,624, 62,716 (Oct. 15, 2012); EPA & NHTSA, Draft Technical Assessment Report, Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, at 10-19 to 10-20 (July 2016) ("2016 Draft TAR").[8] In each of these previous actions, NHTSA considered a large body of both historical and recent literature that reported a very broad range of rebound estimates arrived at through a variety of research methods. Historically, NHTSA has correctly acknowledged that rebound research should be weighted based on its relevance to fuel economy regulations in the United States.[9] NHTSA understood that simply averaging all of the rebound estimates from all of the studies was an unreasonable and inadequate method for reaching an accurate estimate of rebound for the vehicles subject to the relevant standards.[10] For example, many of the studies considered old research, data from other countries with vastly different driving habits, or estimates that were not forward-looking to the years when the covered vehicles would be driven. 77 Fed. Reg. at 62,924.

In the 2010 Final Rule, NHTSA concluded that while the historical research dating back to the 1950s suggested higher rebound values, the most recent literature supported a 10% "or lower" rebound effect. 75 Fed. Reg. at 25,517. In the 2012 Final Rule, NHTSA again valued the rebound effect at 10%, and in 2016, NHTSA confirmed that a 10% rebound effect was appropriate. In the 2016 Draft TAR, NHTSA cited multiple studies demonstrating that the rebound effect shrinks as incomes rise, and again explained that older studies were likely to be

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[7] Specifically, NHTSA's modeling shows that, at a 3% discount rate, net benefits are $3.7 billion over the lifetimes of MY 1981-2029 vehicles with a more accurate 10% rebound rate, versus $0.3 billion with the unsupported 15% rebound rate (and -$3.5 billion with an even less realistic 20% rebound rate). *See* PRIA at 227-228.

[8] The 2016 Draft TAR is available at https://nepis.epa.gov/Exe/ZyPDF.cgi/P100OXEO.PDF?Dockey=P100OXEO.PDF.

[9] *See* 2012 Final Rule, 77 Fed. Reg. at 62,924 (noting a focus on U.S. estimates and declining to use estimates of elasticity of demand for gasoline to measure the VMT rebound effect); EPA & NHTSA, *Joint Technical Support Document, Final Rulemaking for 2017-2025 Light Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, Docket No. EPA-HQ-OAR-2018-0283-0654, at 4-25 (Aug. 2012) (2012 TSD) (noting that historical estimates may overstate the rebound effect because the magnitude of the rebound effect declines over time, so more recent studies were entitled to increased weight).

[10] 2012 Final Rule, 77 Fed. Reg. at 62,924; 2012 TSD at 4-22 to 4-26; EPA & NHTSA, *Joint Technical Support Document, Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, at 4-15 to 4-22 (Apr. 2010) ("2010 TSD").

less reliable than more recent research.[11] Also in 2016, NHTSA used a 10% rebound effect in adopting standards for heavy-duty pickups and vans.[12]

2. *The 2020 Final Rule's rebound effect of 20% arbitrarily doubled NHTSA's prior estimates and was unjustified and unsupported.*

When promulgating the 2020 Final Rule, NHTSA arbitrarily doubled the prior 10% estimate of the rebound effect to 20%, without offering any credible support for the massive increase in magnitude. Moreover, despite acknowledging that the criteria used for weighting literature based on the quality of the underlying analysis could make a large difference in estimating the rebound effect, the 2020 Final Rule made no clear effort to lay out such criteria, a shortcoming that is repeated in NHTSA's proposed rule.

The 2020 Final Rule purported to rely on "the totality of empirical evidence, rather than restricting the available evidence," 85 Fed. Reg. at 24,674, but as the 2010 and 2012 Final Rules and the 2016 Draft TAR all make clear,[13] not all "available" evidence is equally relevant to achieving an accurate rebound estimate. Even in the 2020 rulemaking, NHTSA explained that if the agency considered only studies using recent U.S. data, and if higher weight were assigned to studies that meet certain quality criteria suggested in the comments they received, the resulting set of studies would make a "reasonable case . . . to support values of the rebound effect falling in the 5-15 percent range" and in fact "more likely to lie toward the lower end of that range." 85 Fed. Reg. at 24,676.

During its interagency review process for the 2020 Rule, EPA (which promulgated the rule jointly with NHTSA) also explained that "[g]iven the broad range of values, EPA believes it is important to critically evaluate which studies are most likely to be reflective of the rebound effect" of future standards, and that "[i]n other words, we can't just take the 'average' rebound estimates from literature."[14] Only by ignoring EPA's guidance and NHTSA's own past practice regarding the importance of properly weighting studies based on relevance and reliability could NHTSA increase the rebound effect to an arbitrary and unsupported 20% in the 2020 Final Rule.

[11] 2016 Draft TAR at 10-10, 10-13 & 10-20.

[12] *Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, Proposed Rule*, 80 Fed. Reg. 40,138, 40,453 (July 13, 2015) ("Since [HD pickups and trucks] are . . . more similar in use to large light-duty vehicles, we have chosen the light-duty rebound effect of 10 percent . . ."); *Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2, Final Rule*, 81 Fed. Reg. 73,478, 73,746 (Oct. 25, 2016) (finalizing use of 10%).

[13] *See, e.g.*, 2010 TSD at § 4.2.4; 2012 TSD at § 4.2.5; 2016 Draft TAR § 10.4.

[14] Docket Entry E.O. 12866, Review Materials for The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2016 Passenger Cars and Light Trucks NPRM, Docket No. EPA-HQ-OAR-2018-0283-0453, Attachment 5, at PDF p. 120 (EPA presentation for Office of Management and Budget regarding Review of CAFE Model GHG Settings), attached as Exhibit 5.

In fact, the 2020 Final Rule's 20% rebound effect has been called "outside reasonable professional judgment" by leading experts in the field—many of whom authored the studies on which NHTSA has relied historically, in the 2020 rulemaking, and for the Proposed Rule.[15]

3. *As in the 2020 Final Rule, NHTSA has failed to adequately justify its departure from the original rationale for a 10% rebound effect, and has failed to support a new 15% rebound effect.*

NHTSA is correct to abandon the poorly considered and wholly unsupported 20% rebound effect used in the 2020 Final Rule, but still fails to return to a rebound value closer to the far more supportable estimate used in its earlier rulemakings. NHTSA's proposal, which repeats much of the same vague and conclusory language used in the 2020 Final Rule, continues to utilize a rebound effect that is unjustifiably high. NHTSA's evaluation of the relevant rebound literature is inconsistent and inconclusive regarding which studies are the most relevant, and NHTSA uses vague descriptions of results, failing to acknowledge various studies' expert judgments.

As the Proposed Rule states, academic literature related to the fuel economy rebound effect "is extensive and covers multiple decades and geographic regions." 86 Fed. Reg. at 49,714. During the rulemaking process for the 2020 Rule, numerous public comments suggested criteria for weighting literature based on the quality and applicability of the underlying analysis.[16] In the NPRM, NHTSA acknowledges that the criteria used to determine the relevance of particular studies does in fact make a large difference in the rebound estimate. For example, while NHTSA asserts that considering *all* of the available rebound literature "without categorically excluding studies on grounds that they fail to meet certain criteria" results in a "plausible range for the rebound effect [of] 10-50 percent," 86 Fed. Reg. at 49,714, the agency also explains that one reasonable method for prioritizing the most relevant rebound estimates would suggest "that the rebound effect is likely in the range from 5-15 percent and is more likely to lie toward the lower end of that range." *Id*. NHTSA explains that the parameters applied to arrive at this plausible range include restricting the relevant studies to those that use recent data and data from the United States, and assigning higher weight to studies that use multiple odometer readings (rather than household surveys) to measure vehicle miles traveled,

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[15] *See* Competitive Enterprise Institute v. NHTSA, D.C. Cir. No. 20-1145, Brief of Amici Curiae Economists in Support of Coordinating Petitioners, ECF No. 1881059, at 6 (filed Jan. 21, 2021) (Amicus Brief of Economists). Attached as Exhibit 6.

[16] *See* EPA & NHTSA, *Final Regulatory Impact Analysis, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks*, Docket No. EPA-HQ-OAR-2018-0283-7671, at 964-65 (updated July 2020) ("2020 FRIA") (listing eight such criteria).

account for endogeneity of fuel economy, and measure driving changes based on fuel economy versus fuel price. *Id*.

Despite identifying this possible set of key criteria relevant to fuel economy rebound, NHTSA makes no meaningful attempt to explain why it then does not apply this criteria set and focus on the most relevant studies. Instead, NHTSA merely continues to use vague and undefined terms like "central tendency" and "the totality of the evidence" to make its estimations, without providing clear calculations, valuations, parameters, or criteria. *Id.* at 49,714-715. Yet it is well established that when agencies consider a range of studies, they should focus on those that are similar to the relevant policy context.[17] NHTSA does state, without explaining, that it evaluated "individual studies based on their particular strengths" in order to arrive at a "plausible range for the rebound effect" of 10 to 50 percent. *Id.* at 49,714. In a footnote, NHTSA includes a list of studies it seems to prefer, explaining that they "are derived from extremely robust and reliable data, employ identification strategies that are likely to prove effective at isolating the rebound effect, and apply rigorous estimation methods," but the agency still fails to explain whether or how it weighted these studies, or exactly why it chose these to the exclusion of others. *Id.*; TSD at 469. For example, two of these preferred studies (Anjovic & Haas (2012) and DeBorger et al. (2016)) are drawn from European data, despite NHTSA's previous acknowledgement of the "very different vehicle use and driving patterns between Europe and the U.S." 2020 Final Rule, 85 Fed. Reg. at 25,241. NHTSA declines to exclude or give less weight to estimates using data from Europe, even though Europe's greater population density, more extensive public transit services, and generally much higher fuel prices would be expected to lead to a rebound effect far different from in the United States.[18]

EPA recently proposed revised greenhouse gas (GHG) standards for light-duty vehicles for MY 2023 and later, in which it returned to using the well-established and more justified 10% rebound effect.[19] While the 10% estimate is likely still too high (as discussed below), EPA's analysis, in contrast to NHTSA's approach, defined relevant factors for weighting studies and clearly articulated which studies satisfy these parameters. EPA explained that "it is important to critically evaluate which studies are most likely to be reflective of the rebound effect that is

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[17] *See, e.g.*, U.S. Office of Management and Budget, Circular A-4 (Sept. 17, 2003) at 25, https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf. Attached as Exhibit 7.

[18] Science Advisory Board (SAB) Consideration of the Scientific and Technical Basis of the EPA's Proposed Rule titled The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, EPA-HQ-OAR-2018-0283-7659, at 27 (Feb. 27, 2020) ("SAB Report") (stating that "the rebound estimate [should] be reconsidered to account for the broader literature, and that it be determined through a full assessment of the quality and relevance of the individual studies rather than a simple average of results," and "recent papers using strong methodology and U.S. data should be weighted more heavily than older papers, or those from outside the U.S., or those with weaker methodology"). Attached as Exhibit 8.

[19] *See* EPA, Proposed Rule, *Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards*, 86 Fed. Reg. 43,726, 43,769-70 (Aug. 10, 2021) ("2021 EPA NPRM"), attached as Exhibit 9.

relevant" to a rulemaking, and that "one cannot just take the 'average' rebound estimates from literature to use for the VMT rebound effect" for a proposed rule.[20] Specifically, EPA's proposed rule identified four factors for weighting rebound studies that reflect their relevance to the proposed rulemaking: (1) geography/timespan relevance (priority given to U.S. studies as opposed to international estimates); (2) time period of study (priority given to recent studies, including recent studies that were excluded from the 2020 Final Rule); (3) reliability/replicability of studies (priority given to studies using odometer readings vs. household surveys such as the 2009 National Household Travel Survey); and (4) statistical/methodological basis (priority given to studies employing a strong statistical/methodological basis). EPA DRIA at 3-12. EPA further explained why these factors are important and why they lead to more accurate estimates of the rebound effect for the rulemaking. As a result, EPA provided a clear and well-reasoned basis for its decision to give more weight to studies based on these four key criteria, and thus to conclude that the seven papers listed in Table 3-4 of EPA's Draft RIA should be given the most significant weight in developing the rebound estimate used in its proposed rule.[21] *See id.* at 3-13 to 3-14.

Another oversight in NHTSA's review of the rebound literature is its failure to consider the best estimates provided by the authors of several of the most relevant studies cited. As NHTSA makes clear in its chart detailing recent estimates of the rebound effect for light-duty vehicles, many studies report wide ranges of estimates.[22] This is done "in order to demonstrate how results depend on varying assumptions, but often the studies' authors have clearly stated assessments regarding which set of assumptions is most justified."[23] Thus, many estimates in an author's cited "range" might actually be estimates that the authors themselves view as unreliable.[24]

NHTSA, however, appears to disregard the authors' preferred estimates in its TSD for the Proposal, merely citing ranges that contain many inaccurate and unlikely rebound values. TSD at 468. For example, while Gillingham et al. (2015) produced a range of estimates from 8% to 22%, as shown in Table 4-16 of NHTSA's TSD, the authors stated that they considered their best estimate to be 10%.[25] But this study also found that "a high percentage of the vehicles are

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[20] EPA, Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards, Draft Regulatory Impact Analysis, at 3-12 (Aug. 2021) ("EPA DRIA"). Attached as Exhibit 10.
[21] These seven studies include two recent studies that consider U.S. national data—Greene (2012) and Hymel & Small (2015)—and five recent studies that consider state-level odometer data—Gillingham (2011), Gillingham et al. (2015), Langer et al. (2017), Wenzel & Fujita (2018), and Knittel & Sandler (2018).
[22] For example, NHTSA's TSD cites several studies that report very wide ranges of estimates, e.g., Waddud (2009) (1-25%) and Weber & Farsi (2014) (19-81%). TSD at 468.
[23] Amicus Brief of Economists at 11.
[24] *Id.*
[25] Gillingham, K. et al., Heterogeneity in the Response to Gasoline Prices: Evidence from Pennsylvania and Implications for the Rebound Effect, 52 Energy Econ. 41-52 (2015). Attached as Exhibit 11.

almost entirely inelastic in response to gasoline price changes" and that "the lowest fuel economy vehicles in the fleet drive the responsiveness, with higher fuel economy vehicles highly inelastic with respect to gasoline price changes."[26] While Gillingham et al. (2015) does not offer an alternative best rebound estimate for higher fuel economy vehicles (which would include all those subject to the rulemaking), it is fair to assume that the 10% estimate is at the high end of reasonable estimates for the purposes of this rulemaking.[27]

Similarly, although Hymel and Small (2015) reports a range of estimates of 4% to 18%, also shown in Table 4-16 of NHTSA's TSD, the authors have explained that their most realistic estimate is either 4% or 4.2%.[28] Accurately considering the most relevant estimate is especially important because Hymel and Small (2015) noted that their data indicated that fuel economy rebound could be lower than fuel price rebound, meaning that even the 4.0% and 4.2% values could be too high.[29] Properly considering the most relevant best estimate from Hymel and Small (2015) would mean that the two most reliable rebound estimates based on U.S. national data are 10% (Greene (2012)) and around 4% (Hymel and Small (2015)), offering even clearer support for a rebound effect of 10% *at maximum*.

Additionally, NHTSA should cite the most relevant estimate from Wenzel and Fujita (2018). NHTSA's Proposal cites a range of values for Wenzel and Fujita (2018), from 7% to 40%. TSD at 469, Tbl. 4-16. Wenzel and Fujita also found, however, that as a vehicle's fuel economy increases, the rebound effect declines. By their estimation, vehicles with "high" fuel economy[30]

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[26] *Id.* at 41.

[27] NHTSA also includes another Gillingham study, Gillingham (2014), in its table of recent estimates. Setting aside other reasons that this paper might not fit an agency's specified key criteria for prioritizing studies, this paper specifically considers the response to the 2008 gasoline price shock in California. Gillingham explained in a follow-up paper in 2020 that the Gillingham (2014) results should not be used for developing an estimate of the VMT rebound effect for fuel economy or GHG standards. *See* EPA DRIA at 3-6; Gillingham, K., Policy Brief: The Rebound Effect and the Proposed Rollback of U.S. Fuel Economy Standards, 14 Rev. of Env't Econ. & Pol'y 136 (2020), attached as Exhibit 12.

[28] *See* Small, Kenneth, A., Comment Letter on Proposed MY 2021-2026 Standards, Docket No. NHTSA-2018-0067-7789, at 1 (Sept. 14, 2018) ("A better characterization of the most recent study would be that it finds a long-run rebound effect of...4.0 percent or 4.2 percent under two more realistic models that are supported by the data"). Attached as Exhibit 13.

[29] Hymel, K. & K. Small, The Rebound Effect for Automobile Travel: Asymmetric Response to Price Changes and Novel Features of the 2000s, 49 Energy Econ. 93, 97 (2015), attached as Exhibit 14; *see also* Greene, D., *Rebound 2007: Analysis of U.S. Light-Duty Vehicle Travel Statistics*, 41 Energy Pol'y 14 (2010) (finding that fuel prices had a statistically significant impact on VMT, but fuel efficiency did not), attached as Exhibit 15. NHTSA appears to cite this paper as Greene (2012), *see* TSD at 468, possibly based on additional related research done by Greene for EPA, *see* 2016 Draft TAR at 10-14 (referring to "research conducted by David Greene (2012) under contract with EPA" and citing the 2010 Energy Policy paper).

[30] Wenzel and Fujita's "high" threshold was 23 mpg for cars, 16 mpg for small pickups/SUVs, 13 mpg for larger pickups, 20 mpg for CUVs, 18 mpg for minivans, and 14 mpg for full vans. Wenzel, T. & K. Fujita, *Elasticity of Vehicle Miles of Travel to Changes in the Price of Gasoline and the Cost of Driving in Texas*, Lawrence Berkeley National Laboratory Report LBNL-2001138 at 34 (2018). Attached as Exhibit 16.

would have a rebound effect of only 5.2%. The vehicles subject to the Proposal would be within this "high" fuel economy category, and therefore the 5.2% rebound effect would be most applicable to this rulemaking context.

NHTSA's TSD discusses prominently a meta-analysis of the rebound literature (identifying and considering 74 rebound studies), Dimitropoulos et al. (2018).[31] NHTSA asserts that the study reports a rebound range of 15% to 49% for populations with "income levels, development densities, and fuel prices that are currently representative of the U.S." TSD at 470. NHTSA relied on this same study in the 2020 Final Rule, and rebound experts objected to NHTSA's conclusions as "misleading" in the litigation over that rule.[32] They explained that Dimitropoulos et al. (2018) reports 27 values of the rebound effect, depending on Gross Domestic Product (GDP) per capita, gasoline price per liter, and population density.[33] Of these 27 values, however, the lowest value in their cited range (15%) corresponds most closely to current U.S. conditions.[34] In addition, Dimitropoulos et al. (2018) estimated rebound effect values for the year 2017. *See* Dimitropoulos (2018) at 172 (noting that the paper's "[e]stimates refer to the year 2017") & Tbl. V. According to Dimitropoulos et al. (2018), the rebound effect declines over time (according to the study's fixed-effects model, by about 0.7 percentage points per year), and also declines as income increases (according to the study's fixed-effects model, by about 0.4 percentage points for each $1,000 increase in GDP per capita). Applied to this rulemaking, these effects would imply a rebound of no greater than 10.1% for 2024,[35] with "very large decreases in the rebound effect" for the time period over which the Proposed Rule would affect driving.[36]

Finally, NHTSA attempts to justify the use of a 15% rebound effect by stating that the 15% rebound effect "aligned well with FHWA's estimated elasticity for travel (14.6%)." Proposal, 86 Fed. Reg. at 49,714-715. NHTSA explains this value as the "fleetwide elasticity of travel with respect to cost of operation," TSD at 457, or the "price elasticity of demand for VMT," which "estimates the response to changes in the cost per mile of travel (from all sources)," not just changes in fuel economy. *Id.* at 469. NHTSA acknowledges that using this

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[31] Dimitropoulos, A. et al., *The Rebound Effect in Road Transport: A Meta-Analysis of Empirical Studies*, 75 Energy Econ. 163-79 (2018). Attached as Exhibit 17.
[32] Amicus Brief of Economists at 12.
[33] *Id.*
[34] This is the value for per-capita GDP of $60,000, per-liter gasoline price of $0.50, and a population density of 20 people per square kilometer. *See* Amicus Brief of Economists at 11-12 (citing Dimitropoulos et al. (2018) at 172 tbl. V).
[35] This 10.1% value is calculated by reducing the 15% estimate for 2017 by 0.7 percentage points per calendar year, based on Dimitropoulos et al. (2018)'s estimate for the rebound effect's decline over time. Because the rebound effect also decreases with increasing income, and per capita GDP has grown and is expected to continue to grow, this implies a rebound effect for the relevant years that is even lower than this 10.1% value.
[36] Amicus Brief of Economists at 12 (citing Dimitropoulos et al. (2018) at 171).

value for the rebound effect "asserts that changes in fuel prices and fuel economy have symmetrical effects," *id.*, and states that using a different value for the rebound effect "creates an asymmetry between responses to fuel price and changes in fuel economy." *Id.* at 457. But the rebound literature indicates that this asymmetry actually exists, and that fuel economy rebound is in fact likely lower than fuel price rebound.[37] Thus, FHWA's use of 14.6% for the estimated elasticity for travel from all sources is no basis on which to justify setting the rebound effect value for changes in fuel economy. Moreover, NHTSA does not explain how FHWA's modeling arrived at its estimation, nor what research or calculations it is based on. NHTSA acknowledges that "the user can still define a value for the rebound effect that differs from" FHWA's estimated elasticity for travel and that this "decision is left to the user," TSD at 457, so NHTSA should base its own rebound estimation on the relevant research and literature before the agency, which supports a value well below 15%.

Given NHTSA's unclear and imprecise explanation of the rebound literature, NHTSA should reconsider its 15% rebound effect value, and apply a rebound effect value of no greater than 10%. NHTSA should clearly articulate the criteria upon which it prioritizes and weights studies, listing the relevant studies to which it gives the most weight (and explaining why this is so). Additionally, NHTSA should correct the large ranges presented for some relevant studies by instead including the authors' preferred and most relevant estimates.

[37] Hymel & Small (2015) at 97. *See also* section III.A.4 of this comment, *infra*, for a more complete discussion of the difference between fuel price and fuel economy effects on rebound.

One possibility would be to utilize the same general criteria that EPA laid out in its recent proposed rule, which resulted in the following most relevant studies:

Author	Year	Estimate of Rebound Effect[38]	Description/Time Period
U.S. National[39]			
Greene	2012	10%	Aggregate 1966-2007
Hymel and Small	2015	4.2%	State-level 2000-2009
State-Level Odometer[40]			
Gillingham	2011	1%	California 2001-2009
Gillingham et al.	2015	10%	Pennsylvania 2000-2010
Langer et al.	2017	12%	Ohio 2009-2013
Wenzel and Fujita	2018	5.2%	Texas 2005-2010
Knittel and Sandler	2018	13%	California 1998-2010
Un-weighted Average		7.9%	

[38] This chart is recreated from EPA DRIA at 3-13 to 3-14, Tbl. 3-4, but the rebound effect estimates are updated to include the authors' preferred estimates for Hymel and Small (2015) and Wenzel and Fujita (2018).

[39] Greene (2012); Hymel & Small (2015) at 98, Tbl. 2 & 103, Tbl. 8.

[40] Gillingham, K., *The Consumer Response to Gasoline Prices: Empirical Evidence and Policy Implications*, Stanford University Ph.D. Dissertation (2011), https://stacks.stanford.edu/file/druid:wz808zn3318/Gillingham_Dissertation-augmented.pdf, attached as Exhibit 18; Gillingham et al. (2015); Langer, A. et al., *From Gallons to Miles: A Disaggregate Analysis of Automobile Travel and Externality Rates*, 152 J. Pub. Econ. 34 (2017), attached as Exhibit 19; Wenzel & Fujita (2018) at 34; Knittel, C. & R. Sandler, *The Welfare Impact of Second-Best Uniform-Pigouvian Taxation: Evidence from Transportation*, 10 Am. Econ. J.: Econ. Pol'y 2018, 211 (2018), attached as Exhibit 20.

4. *Even a 10% rebound effect is too high, and NHTSA should consider using a rebound effect of a lesser magnitude.*

Historical rulemakings and use of weighted criteria amply support that 10% is at the *maximum* end of appropriate rebound values, and using a 15% rebound effect is unsupportable.

A number of other factors suggest that even focusing on the existing estimates from the best and most relevant studies could lead to a rebound estimate that is by far too large, and that the true fuel economy rebound effect may even be zero. First, a substantial body of research indicates that fuel price or fuel cost rebound effects are higher than fuel economy rebound effects, meaning that rebound may be more responsive to fuel prices than fuel efficiency. Both Greene (2012) and Hymel and Small (2015) came to this conclusion. Other studies cited by NHTSA, such as Small and Van Dender (2007) and West et al. (2015), also concluded the same. Kenneth A. Small has explained that his studies indicate that the fuel economy rebound effect "*is statistically indistinguishable from zero*," and that "[t]his is also true of the vast majority of other studies that have tried to measure separately these two responses."[41] He further explained that "the most defensible result empirically is that people do respond to fuel prices as expected, but that they do not respond to fuel economy at all," and that "Small and Van Dender (2007) make this point explicitly, and point out that we are therefore assuming a positive [fuel economy] rebound effect when actually we cannot prove that it's greater than zero."[42] Greene (2012) also found that the impact of fuel efficiency on VMT was not statistically significant, a point referred to in the 2016 Draft TAR to suggest that the relevant rebound effect for policymaking purposes "could be zero." 2016 Draft TAR at 10-14. Because many of the studies cited by NHTSA—and some of those included in EPA's most recent list of seven preferred studies—consider fuel prices rather than fuel efficiency, the most accurate rebound estimate would likely be much lower than those estimates.

Another fact that indicates that even a 10% rebound effect is too high is that the rebound effect's magnitude diminishes over time, largely due to increasing income and

[41] Kenneth A. Small, Comment Letter at 2 (emphasis added).

[42] *Id.* In the 2020 Final Rule, EPA relied on Linn (2016) to support an argument that fuel economy rebound is greater than fuel price rebound. Linn (2016), however, described the separate coefficients for fuel price and fuel economy changes as statistically insignificant. Linn, J., *The Rebound Effect of Passenger Vehicles*, 37 Energy J. at 277 (2016). Attached as Exhibit 21. Moreover, Linn also explained that self-reported VMT data (as was used for his research) "may be noisy when compared to VMT calculated from multiple odometer readings," and that therefore studies that use VMT based on multiple odometer readings—such as all of those enumerated above—"should have lower measurement error, and yield preferable estimates from a statistical point of view." Joshua Linn, Comment on Proposed MY 2021-2026 Standards, NHTSA-2018-0067-7188, at 2 (Oct. 11, 2018). Attached as Exhibit 22.

decreasing driving costs, a fact that NHTSA has historically understood.[43] As incomes rise over time, any fuel efficiency improvement will have less of an effect on the total vehicle miles traveled, and thus the rebound effect will decline. In both 2010 and 2012, NHTSA chose to use a 10% rebound effect as "a reasonable compromise between historical estimates and projected future estimates."[44] The 2012 Final Rule noted, however, that several high-quality studies indicated that the rebound effect's magnitude was significantly diminishing over time as incomes rise.[45] This income effect on rebound makes clear that the projected future estimates are in fact much more accurate than historical estimates. Moreover, more than 10 years have passed since the 2010 Final Rule found a 10% rebound effect to be a good compromise, and income has continued to grow since that time, supporting a substantially diminished rebound effect.

NHTSA should give more weight to the fact that the rebound effect varies with income over time. Various papers have confirmed that the rebound effect is declining over time. In fact, the income effect on rebound is particularly important in the context of setting LDV fuel economy regulations for two reasons. First, even the most recent relevant studies on which rebound estimates are based consider data only from 2013 and earlier. The historical growth rate of per capita personal income was 1.4% between 2001 and 2019, and thus income growth since 2013 would indicate a declining rebound effect even in the time since the most recent data utilized were collected. Second, NHTSA's final standards will affect the fuel efficiency—and therefore the rebound effect—for vehicles that will be driven for the next several decades. Private forecasts estimate approximately 1.6% growth in real personal income per year over the next 30 years, meaning that when most vehicles subject to the regulations are retired, incomes will be 61% higher than they are today.[46] AEO 2021 projected incomes to rise an average of 1.9% per year through 2050.[47] This income growth would be expected to cause a large reduction in the magnitude of the rebound effect, supporting a rebound effect for the vehicles subject to NHTSA's final standards of a magnitude well below 10%.

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[43] *See, e.g.*, 2016 Draft TAR at 10-14 and 10-20; 2012 Final Rule, 77 Fed. Reg. at 62,924, 62,995; *accord* Small, K. & K. Van Dender, *Fuel Efficiency and Motor Vehicle Travel: The Declining Rebound Effect*, 28 Energy J. 25 (2007), attached as Exhibit 23; Hymel, K. et al., *Induced Demand and Rebound Effects in Road Transport*, 44 Transp. Rsch. Part B 1220 (2010), attached as Exhibit 24.

[44] 2012 Final Rule, 77 Fed. Reg. at 62,924.

[45] NHTSA, Corporate Average Fuel Economy for MY 2017-MY 2025 Passenger Cars and Light Trucks: Final Regulatory Impact Analysis, at 851-52 (2012) (citing Small & Van Dender (2007) (finding average rebound to be 22% for 1966-2001, but declining to 11% when looking at only 1997-2001); Hymel et al. (2010) (finding that average rebound for 1966 through 2004 was 24%, but rebound by 2004 was only 13%); Greene (2012) (estimating the rebound effect would be 8.1% in 2030, using 1966-2007 data)).

[46] Amicus Brief of Economists at 15-16; 2020 Final Rule, 85 Fed. Reg. at 24,675 n.1763.

[47] U.S. Energy Information Administration, Annual Energy Outlook 2021, Table 20: Macroeconomic Indicators, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2021&region=0-0&cases=ref2021&start=2019&end=2050&f=A&linechart=&sourcekey=0. Attached as Exhibit 25.

B. NHTSA's safety analysis is flawed and likely overstates any safety impacts.

1. *NHTSA incorrectly focuses on total fatalities rather than fatality rate, and should not consider fatalities that occur as a result of increased driving in its safety analysis.*

A new regulation's impact on fatalities can be evaluated in two ways: (1) by calculating the total change in fatalities, or (2) by calculating the change in the fatality rate, or the number of fatalities per mile. A change in the total number of fatalities can have many causes, which could be imposed by new standards or could result from other external factors not compelled by the standards. For example, if more driving occurs over a period of time, fatalities over that period of time may also increase, but this is not necessarily imposed by the technological or other changes that are made to fulfill the requirements of new standards. Historically, therefore, NHTSA has focused on fatalities-per-mile, correctly defining vehicle safety as "societal fatality rates per vehicle miles traveled." 2012 Final Rule, 77 Fed. Reg. at 62,740 n.313; 2016 Draft TAR at 8-1 n.A.

Only in the 2020 Final Rule did NHTSA move away from this fatalities-per-mile estimate, in order to make that rule appear to have greater safety implications than it actually did. But the vast majority of the fatalities projected by the 2020 Final Rule were due not to changes in the fatality rate, but to projected increased driving under the standards (i.e., purported "rebound" driving due to the decreased cost of driving), and these rebound fatalities should not be the focus of the safety analysis for fuel economy regulations.[48]

An increase in traffic accidents resulting from individuals choosing to drive more cannot be viewed as actually *imposed by* new standards, and these decisions to drive more are choices made by individual consumers. *See also* State and Local Government Petitioners' Brief at 58-61. NHTSA has explicitly recognized this fact, stating that "[r]ebound miles are not imposed on consumers by regulation," but are "a freely chosen activity resulting from reduced vehicle operational costs." PRIA at 118. As NHTSA explains, while the agency considers safety in its analysis, "[t]he primary objective of CAFE standards is to achieve maximum feasible fuel economy." *Id.* at 100. It would be unreasonable for NHTSA to use a projection that individuals may drive more—and therefore might get into more traffic accidents—to undermine its statutory obligations to improve fuel efficiency. Even in the NPRM for the 2020 Rule, NHTSA recognized that nothing in more stringent standards "compels consumers to drive additional miles. If consumers choose to do so, they are making a decision that the utility of more driving

[48] As in the 2020 Final Rule, NHTSA has inexplicably decided to offset only 90% of rebound-driving costs, despite the substantial mobility benefits of any rebound driving, making it more appropriate to offset all rebound costs with equal benefits.

exceeds the marginal operating costs as well as the added crash risk it entails." 83 Fed. Reg. 42,986, 43,107 (Aug. 24, 2018). NHTSA's safety analysis should focus on the fatality rate per mile, not the number of miles people choose to drive.

Considering the impacts of increased driving in the analysis of safety could be used to undermine many different standards. There are many government actions that lead to increases in driving, but the government does not decline to take these steps because of the increased accidents that might occur from increased driving. For example, highway funding could be a government action that would increase driving, and personal income tax cuts might also put additional money in people's pockets which could lead to increased driving. Governments do not consider the fatalities due to this increased driving in making these policies, and NHTSA should not do so here. In fact, increased driving is generally seen as a societal good. Had Congress intended for fatalities solely due to a possible increase in miles traveled to be a determinative factor, it would have said so. *Whitman v. Am. Trucking Associations*, 531 U.S. 457, 469 (2001) (stating that when a "factor is *both* so indirectly related to" a criterion of consideration "*and* so full of potential for canceling the conclusions drawn from" that consideration, "it would surely have been expressly mentioned").

NHTSA's modeling initially shows sales and scrappage impacts having the dominant safety influence (though this assumption is inaccurate, as explained below), but "by the early 2030s the on-road fleet is mostly composed of vehicles that have the same advanced safety technologies as newer vehicles, so the influence of this factor declines." PRIA at 119. Indeed, when looking at the change in fatalities by calendar year, incremental fatalities due to rebound begin to outpace incremental fatalities due to sales/scrappage by 2035 under Alternative 2, PRIA at 122, and by 2036 under Alternative 3, and this trend continues through 2050, with total projected rebound-related fatalities for both Alternative 2 and Alternative 3 exceeding projected fatalities due to sales/scrappage effect.[49] The projected fatalities attributed to sales/scrappage effects actually become increasingly negative under Alternative 2 and Alternative 3 starting in 2041 and continuing through 2050 (the last calendar year modeled)—meaning, the sales/scrappage effects under the standards start leading to reductions in projected fatalities.[50] Moreover, the vast majority of the change in nonfatal injuries and their accompanying costs under the Proposal are due to the rebound effect as well, and these non-fatal injuries likewise should not be the focus of NHTSA's safety analysis. PRIA at 122, Tbl. 5-5 & 123, Tbl. 5-7.

[49] These results were derived from the CAFE model output file "annual_societal_costs_report.csv" (as it appears in NHTSA's modeling files for the central case).
[50] *Id.*

Despite the fact that using fatality rate rather than total fatalities is the relevant safety measure for understanding the impacts of a new regulation, and noting that "[f]atalities expected during future years under each alternative are projected by deriving a fleet-wide fatality rate (fatalities per vehicle mile of travel)," Proposal, 86 Fed. Reg. at 49,737, NHTSA does not appear to provide any actual fatality rate data with regard to the safety impacts of the Proposal.[51] Using the fatality rate, NHTSA's standards likely would have no meaningful impact on safety. Analyzing safety implications in terms of fatality rate helps focus the analysis on whether new regulations actually make driving less safe, rather than simply revealing the impacts of additional driving. This approach is consistent with NHTSA's statutory obligations to decrease U.S. reliance on gasoline.

2. *NHTSA's analysis overstates safety impacts from more stringent standards.*

The bases for all of NHTSA's fatality and non-fatal accident estimates overstate their effects. NHTSA should reconsider these underlying parameters in order to make the estimates of the safety impacts of the Proposal more reasonable.

First, as discussed above in section III.A, the rebound estimate used by NHTSA—the foundation for a number of the projected fatalities under the Proposal—is too high, leading to unrealistically large projected fatalities due to rebound in NHTSA's modeling. Revising NHTSA's rebound effect modeling assumptions to a more accurate (lower) value will produce more accurate (lower) estimates of the safety impacts of the Proposal.

Second, the agency's estimate of fleet turnover—a key source of estimated fatalities in the model—is premised on an estimate of the impact of more stringent standards on new vehicle sales that is too high, using a price elasticity of -1 instead of something more reasonable, such as within the range of -0.2 to -0.4, as is also discussed elsewhere in these Comments. *See also* State and Local Government Petitioners' Brief at 55-57. Using a more accurate value for price elasticity of demand would result in faster fleet turnover and fewer safety impacts. For example, using a more realistic price elasticity of demand of -0.4 decreased total projected fatalities for both Alternative 2 (from 1,822 to 1,211) and Alternative 3 (from 2,624 to 1,706).[52]

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[51] NHTSA's TSD also discusses recent history and baseline forecast of overall fatality rate for occupants of cars and light trucks, including an illustration of these values. *See* TSD at 647-48. But NHTSA does not appear to report similar fatality rate data for its Proposal or Alternatives.

[52] These values are derived from the CAFE model output file "annual_societal_effects_report.csv" (as it appears in NHTSA's modeling files for their central case). To derive these values, the NHTSA data file was taken directly from NHTSA's central case modeling output files. The revised sales elasticity outputs were taken from the corresponding

Moreover, NHTSA explains with regard to sales and fleet turnover, "[t]he model finds that price increases from the proposal will depress new vehicle sales, but we note that this is dependent on the input assessment that consumers value 30 months of fuel savings when making their purchase decisions." PRIA at 61 n.48. If consumers value more fuel savings—which is arguably the case, as explained in section III.H, *infra*, of these Comments—then the incorrect sales modeling would further influence the inaccuracy of the safety impacts. As the agency explains, "[i]f NHTSA is incorrect about the undervaluation of fuel economy in the context of regulatory standards and its effect on car sales, correcting the assumption should result in improved safety outcomes…" Proposal, 86 Fed. Reg. at 49,711.

Finally, the analysis of the fatalities from mass reduction in vehicles—the third and final source of estimated fatalities in NHTSA's modeling—is based on mass reduction coefficients that NHTSA has acknowledged are not statistically significant. *Id.* at 49,721 (noting that the effect of mass reduction technologies employed to meet increased standards on vehicle safety "is not statistically significant"); PRIA at 109; *see also* 83 Fed. Reg. at 43,111. In addition, recent technological developments in vehicle safety engineering and design make clear that reducing vehicle mass does not necessarily make vehicles less safe. *See, e.g.*, State and Local Government Petitioners' Brief at 57-58. Automakers can and do use improved methods of mass reduction to minimize safety impacts, such as by replacing steel with new materials that are stronger and lighter,[53] or applying mass reduction technologies to larger and heavier vehicles but not to smaller vehicles, which would actually have safety *benefits* rather than costs.[54] Regardless, the incremental fatalities projected to result from mass reduction under the Proposal are small. *See* 86 Fed. Reg. at 49,744 ("Mass reduction has a relatively minimal impact on safety and diminishes as stringency increases").

Regardless, as NHTSA explains, even with the flaws in its models, changes in "vehicle safety effects are relatively minor under all action alternatives, and thus not dispositive." Proposal, 86 Fed. Reg. at 49,810.

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output file for the associated runs. The calculations were validated by replicating the fatality statistics for the NHTSA data.

[53] *See, e.g.*, Van Auken, R.M., *Comments on the Preliminary Regulatory Impact Analysis of the Proposed Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks*, DRI-TR-18-07 (Oct. 25, 2018), attached as Exhibit 26; Peterson, G., *Vehicle Lightweighting: A Review on Safety of Reduced Weight Vehicles*, Consumers Union (Oct. 24, 2018), attached as Exhibit 27.

[54] *See, e.g.*, NRDC, Comments on Lightweighting Assumptions in NPRM (2018) and Volpe CAFE Model (October 2018). Attached as Exhibit 28.

C. NHTSA's energy security benefit values are derived from inaccurate oil security premiums used in the 2020 Final Rule, and should be recalculated.

1. *Energy security remains an important consideration with respect to U.S. oil consumption.*

Reducing U.S. reliance on oil enhances U.S. energy security, and—with energy security in mind—Congress has specifically directed the U.S., and NHTSA in particular, to conserve energy. Energy Policy and Conservation Act of 1975, 42 U.S.C. § 32902(f). Energy security impacts remain an important benefit of reduced domestic oil consumption, as will occur under more stringent standards. Even in the 2020 Final Rule, NHTSA acknowledged that energy security externalities were "paramount" (along with climate change externalities) among the various externalities "in their extent, magnitude, and economic importance." 2020 FRIA at 116.

Despite the increases in domestic oil production that have made the United States an energy exporter, NHTSA must continue to consider the energy security impacts of standards for at least three key reasons. First, U.S. refineries continue to import heavy crude oil from potentially unstable regions of the world, and sudden disruptions of supply pose a threat to U.S. financial and strategic interests. For example, NHTSA's Proposal assumes that for every gallon change in oil demand as a result of the new standards, oil imports will be reduced by at least approximately 0.95 gallons, TSD at 572, meaning that most of the decline in demand would be applied to decreased oil imports.[55] Second, oil exporters that have a large share of global production have the ability to raise or lower the price of oil by exerting the monopoly power associated with OPEC to restrict oil supply relative to demand, which could cause oil price shocks that have greater impacts when nations are heavily reliant on oil. *See, e.g.*, EPA DRIA at 3-16. Third, Congress has specifically directed NHTSA to consider the need to conserve energy when setting maximum feasible standards. EPCA 42 U.S.C. § 32902(f). *See also Center for Auto Safety v. NHTSA*, 793 F.2d 1322, 1340 (D.C. Cir. 1986) (recognizing that "Congress intended energy conservation to be a long-term effort that would continue through temporary improvements in energy availability"); *Center for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1195 (9th Cir. 2008) (holding that NHTSA must resolve its balancing of statutory factors in favor of the need of the U.S. to conserve energy). For these reasons, it remains important to consider the costs of oil imports beyond simply the market price paid for the oil.

[55] NHTSA's TSD and parameters files use this 95% figure, which is calculated as 50% (the change in imports of refined fuel) plus 90% of the remaining 50% (the change in imports of crude oil), or 50% plus 45%. *See* TSD at 572 n.786.

2. *NHTSA's oil import and refining assumptions that underlie the energy security benefits do not accurately reflect current realities.*

In previous rulemakings, including the 2020 Final Rule, NHTSA assumed that 50% of the change in domestic fuel consumption as a result of the regulations would lead to a change in imports of refined fuel, and of the remaining 50% refined domestically, 90% would come from imported crude. NHTSA uses these same oil import and refining values in the Proposal.

These assumptions are misguided. In particular, the assumption that 50% of a change in gasoline demand would come from a change in imports of refined oil (rather than a reduction in domestic refining) is unjustified given the already small proportion of U.S. gasoline demand that is supplied by foreign-refined oil. Because the United States already has negligible imports of refined gasoline, the realistic result of a domestic decline in gasoline demand is that the majority of the decrease in demand will be represented in a decrease in domestic refining. The Energy Information Administration's models have found a strong positive correlation between domestic demand and domestic refining. For example, AEO 2018 data indicated that the vast majority (92%) of a change in domestic gasoline demand would be satisfied by domestic refining.[56] AEO 2021 had the opportunity to observe what actually results from a decrease in demand for transportation fuels, as gasoline demand in 2020 dropped to 90% of its 2019 levels, largely due to the pandemic. AEO 2021 explained that this lower demand for transportation fuels resulted in a decrease in the amount of crude oil processed at U.S. refineries—giving a timely example of the effects of a decrease in domestic demand.[57] As global oil demand "is unlikely to catch up with its pre-Covid trajectory," and "[g]asoline demand is unlikely to return to 2019 levels, as efficiency gains and the shift to electric vehicles eclipse robust mobility growth in the developing world,"[58] there will not be global capacity to absorb substantial additional exports of refined gasoline. NHTSA's assumption that only 50% of the decrease in domestic gasoline fuel consumption under the Proposal will lead to a decrease in domestic fuel refining is unjustified, and NHTSA should reconsider this value.

3. *NHTSA continues to use the inaccurate oil import reduction factor and oil security premiums used in the 2020 Final Rule.*

NHTSA's Proposal should update and correct two key inputs used to calculate the energy security benefits of a decline in U.S. demand for oil: (1) the oil import reduction factor,

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[56] *See* Brief of Public Interest Organization Petitioners at 14-15.
[57] *See* U.S. Energy Information Admin., Annual Energy Outlook 2021, Narrative, at 3-4 (Feb. 2021), https://www.eia.gov/outlooks/aeo/pdf/AEO_Narrative_2021.pdf (AEO 2021). Attached as Exhibit 29.
[58] Int'l Energy Admin., Oil 2021: Analysis to 2026, at 4 (Mar. 2021), https://iea.blob.core.windows.net/assets/1fa45234-bac5-4d89-a532-768960f99d07/Oil_2021-PDF.pdf. Attached as Exhibit 30.

and (2) the macroeconomic oil security premiums. In updating and correcting these inputs, NHTSA would more accurately estimate the energy security benefits of new standards.

a) NHTSA should update its oil import reduction factor after correcting the underlying import and refining assumptions.

The oil import reduction factor, an important input for calculating the energy security benefits of a regulation, explains what percentage of a decrease in oil demand will decrease imports of foreign oil. In the 2010, 2012, and 2020 Final Rules, NHTSA calculated this value to be 95%, based on its underlying assumptions regarding oil imports and refining.[59] Because NHTSA's underlying assumptions regarding refining impacts are inaccurate, as discussed above, NHTSA should recalculate this oil import reduction factor after correcting the underlying assumptions.

b) NHTSA's estimated oil security premiums are based on inaccurate characterizations of the underlying research, and should be corrected.

Oil security premiums measure the extra cost of importing oil beyond the price paid for the oil itself (or, in the case of a reduction in demand, the extra benefit of reducing oil imports beyond the actual expenditures saved). The main input to calculating the oil security premium is the macroeconomic benefit, which measures the potential macroeconomic disruptions and increased oil import costs to the economy resulting from oil price spikes or "shocks," or the value of avoiding these costs due to less domestic reliance on oil.

In estimating the macroeconomic benefit used to calculate oil security premiums, NHTSA has historically relied on research conducted by Oak Ridge National Laboratory (ORNL). NHTSA has estimated macroeconomic oil security premiums based on ORNL's methodology developed in 1997 and updated in 2008 for a series of past rulemakings including the 2010 and 2012 Final Rules and the heavy-duty vehicle fuel economy Phase I and Phase II standards.[60] The Proposal for the 2020 Final Rule also relied on the ORNL literature and methodologies for estimating the oil security premiums.

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[59] The 2020 Final Rule calculated the oil import factor as 50% plus 90% of 50%, or 50% plus 45%. 85 Fed. Reg. at 24,729 n.1899.

[60] Leiby, P.N., *Estimating the Energy Security Benefits of Reduced U.S. Oil Imports, Final Report*, ORNL/TM-2007/028, Oak Ridge National Laboratory (Rev. Mar. 14, 2008), attached as Exhibit 31; Leiby, P.N. et al., *Oil Imports: An Assessment of Benefits and Costs*, ORNL-6851, Oak Ridge National Laboratory (Nov. 1997), attached as Exhibit 32; *see also* Uria-Martinez, R. et al., *Using Meta-Analysis to Estimate World Oil Demand Elasticity*, ORNL Working Paper (2018), attached as Exhibit 33.

It was only in the 2020 Final Rule that NHTSA abandoned this research and methodology, purporting to rely instead on a single paper, Stephen A. Brown, *New estimates of the security costs of U.S. oil consumption*,[61] to drastically reduce oil security premiums. NHTSA's Proposal utilizes these same oil security premiums as the 2020 Final Rule, again citing Brown (2018). The reliance on Brown (2018) in the 2020 Final Rule and this Proposal is inappropriate for two reasons.

First, in the 2020 rulemaking, NHTSA failed to provide adequate justification for departing from the established ORNL methodologies and research that had been used and updated for over 20 years to instead rely on a single study. NHTSA's Proposal again fails to justify this drastic change. By contrast, EPA's recent proposal for GHG emission standards for light-duty vehicles returned to the historical ORNL methodology for estimating oil security premiums, and worked with ORNL "to revise the oil security premiums based upon recent energy security literature." 86 Fed. Reg. at 43,792. Specifically, the recent ORNL studies were used to update the inputs for price elasticity of demand for oil and elasticity of GDP to oil price shocks. EPA DRIA at 3-25. These updates looked at historical and recent data, and properly incorporated AEO 2018 (and will incorporate AEO 2021), making them more current and accurate than those used in the Brown (2018) paper, which relied on world oil market conditions that prevailed in 2014 and on AEO 2012 and AEO 2016, for its estimates.

The second reason that the Proposal's sole reliance on Brown (2018) rather than the historical ORNL methodology is improper is that neither the Proposal nor the 2020 Final Rule actually appear to have used Brown's best or most accurate estimates for oil security premiums. Instead, the much lower macroeconomic oil security premiums used in the Proposal and the 2020 Final Rule appear to be in line with estimates that Brown (2018) suspects are inaccurate.

Brown (2018) acknowledges that while "individuals may prefer newer research to older," with respect to oil security premiums there remain many questions with regard to whether the newer research can adequately "represent how world oil markets and the U.S. economy would respond to a sizable oil supply disruption."[62] In contrast to other factors for which the most recent research may be the most reliable, there are several reasons why this is not true of oil security premiums.

Specifically, Brown (2018) discusses the "lack of big oil supply disruptions in the modern era," explaining that "the differences between the current U.S. economy and that of the 1970s" means that "the effects of any oil price shocks are likely smaller than was estimated with data

[61] 13 Energy Policy 171-92 (2018), attached as Exhibit 34.
[62] *Id.* at 180.

from the era in which the big oil price shocks occurred."[63] Brown (2018) makes clear, however, that "[b]ecause we have not observed a modern economy with large oil supply disruptions, we have no reliable method to quantify the effects of these disruptions,"[64] citing research "that the world has not seen a major oil supply disruption since 2003, which raises the concern that newer research, which relies on recent data, may not capture the effects of major oil supply disruptions."[65] Thus, Brown (2018) estimated *three* different oil security premiums—one relying on the old literature, one on the new literature, and a "combined" value that integrated both bodies of data and estimations. Brown (2018) made clear which value was most appropriate for setting policy—the combined value—explaining that this "combined" value "might best reflect the uncertainty in what we know about the oil security premiums."[66]

The oil security premiums in Brown (2018) derived from the combined values—the estimates that study considered most reflective of reality—are in the range of $3.67 per barrel (in 2015) to $6.08 per barrel (in 2040).[67] The Proposal and the 2020 Final Rule, however, citing Brown (2018), estimated the macroeconomic oil security premium to range from $1.43 in 2023 to $2.61 in 2050. TSD at 571, Tbl. 6-25; 2020 Final Rule, 85 Fed. Reg. at 24,728-29, Tbl. VI-200. Brown (2018) appears to advise *against* using oil security premiums as low as those applied in the Proposal and the 2020 Final Rule. The values used in the Proposal appear closest to the estimates Brown (2018) derives from *only* the recent research, which the paper explains may not be the most reliable. Moreover, Brown (2018)'s recent-literature-only estimations for price elasticity of demand for oil of -0.0175 and elasticity of GDP of -0.018 (the inputs for calculating the oil security premiums) are significantly lower values than those indicated by any other comprehensive studies.[68]

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[63] *Id.* at 180-81.
[64] *Id.* at 181.
[65] *Id.* (citing Huntington, Hillard G., *Measuring Oil Supply Disruptions: A Historical Perspective*, 116 Energy Policy (2018); Van Robays, I., *Macroeconomic Uncertainty and Oil Price Volatility*, 78 Oxf. Bull. Econ. Stat. 671-693 (2016)).
[66] Brown (2018) at 181.
[67] *Id.* at 179.
[68] *Compare* Brown (2018) at 174 Tbl. 5 *with* R. Uria-Martinez (2018) (finding a weighted short-run price elasticity of demand for world oil of -0.07); Oladosu, G. et al., *Impacts of Oil Price Shocks on the U.S. Economy: A Meta-Analysis of Oil Price Elasticity of GDP for Net Oil Importing Economies*, 115 Energy Pol'y at 523 (2018) (finding an elasticity of GDP of -0.02), attached as Exhibit 35; Krupnick, A., *Oil Supply Shocks, U.S. Gross Domestic Product, and the Oil Security Problem*, Resources for the Future Report (2017) at 11-12 (finding a blended price elasticity of demand for oil "to better capture the uncertainty involved in calculating the oil security premiums" because "the older literature has not been wholly overtaken by the new" of -0.055 and a blended elasticity of GDP of -0.028), attached as Exhibit 36. *See also* EPA DRIA at 3-19 to 3-20.

NHTSA should therefore reconsider its oil security premiums and bring them more in line with the most accurate research, and in doing so should consider the most recent ORNL studies[69] and Brown (2018)'s preferred "combined" values.

4. *NHTSA's exclusion of the military and monopsony benefits in the calculation of oil security premiums means that the energy security benefit estimates in the Proposal are conservative, and reductions in oil use as a result of more stringent fuel economy standards are likely to have an even greater benefit than those quantified in the NPRM.*

In addition to the macroeconomic oil security premium, military and monopsony benefits are considered energy security benefits of reduced U.S. oil demand. While NHTSA has historically refrained from applying these values in any quantified way, it is important to recognize that energy security benefits that take into account only the macroeconomic oil security premiums could be low estimates. NHTSA is encouraged to further consider methodologies for quantifying the energy security benefits of reduced fuel consumption in the future, and to acknowledge that their current analysis may be conservative.

D. <u>NHTSA's corrections to the benefits of the PM2.5 reductions from more stringent standards provide more realistic estimates, but NHTSA continues to understate other air quality benefits.</u>

1. *NHTSA improves its monetization of health benefits attributable to tailpipe PM2.5 emission reductions and its process for monetizing upstream PM2.5 health benefits.*

Fine particulate matter is a harmful criteria air pollutant that has been found to cause a variety of adverse human health impacts ranging from cardiovascular effects to premature mortality. EPA, Integrated Science Assessment for Particulate Matter (Dec. 2019) at ES-9 to ES-11, Tbl. ES-1, attached as Exhibit 37. PM2.5 is emitted both by vehicles' tailpipes as well as from upstream sources such as refineries and power plants. For the NPRM, NHTSA updated the resources it relied on in monetizing the impact of reductions in PM2.5 attributable to the Proposal, as well as the resources it relied on in monetizing upstream PM2.5 health benefits. Because past rules largely understated benefits by using flawed processes for monetizing the benefits of reductions in PM2.5, NHTSA is correct to reevaluate these estimations.

In its 2020 Final Rule, NHTSA relied on a 2018 technical support document from the EPA Office of Air and Radiation to estimate benefits per ton (BPT) attributable reductions in PM2.5.

[69] Uría-Martinez (2018); Oladosu (2018). *See also* Krupnick (2017).

EPA, Technical Support Document: Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors (Feb. 2018) ("2018 PM2.5 TSD"), attached as Exhibit 38. These sectors include on-road mobile sources, electric generating units, and refineries. 2018 PM2.5 TSD at 7, Tbl. 1.

The 2018 PM2.5 TSD utilized a three-step process to generate estimates of the BPT for each of 17 emissions sectors. *Id.* at 4-5. First, as relevant to direct PM2.5 emissions, EPA conducted photochemical modeling to predict annual average ambient concentrations of primary PM2.5 attributable to each of the 17 emission sectors. *Id.* at 4. Second, EPA used its 2017 Benefits Mapping and Analysis Program—Community Edition to estimate and monetize the health impacts associated with the attributable ambient concentrations of PM2.5. *Id.* Finally, EPA calculated BPT for PM2.5 by dividing the monetized benefits and avoided impacts of the emissions from each sector by the sector-specific emissions. *Id.* at 5.

The 2018 PM2.5 TSD found that the BPT for a ton of PM2.5 differed significantly between source categories. This is due to factors such as proximity to populations, geographic distribution of sources, and information about where emissions are released (e.g., stack height). *Id.* at 6. Most pertinently, EPA found that PM2.5 emission reductions from refineries provide significantly greater health benefits on a per-ton basis than those from electricity generation: $430,000-980,000/ton (2015$) for refineries versus $180,000-410,000/ton (2015$) in 2030 using a 3% discount rate. *Id.* at 20, Tbl. 11. The relative results hold across years and discount rates. *Id.* at 14-21, Tbls. 5-12.

In the Proposal, NHTSA no longer relies on the 2018 PM2.5 TSD to monetize the benefits of PM2.5 reductions from tailpipe emissions. Instead, NHTSA utilizes a BPT estimate from Wolfe et al. (2019)[70] that improves the accuracy of the agency's tailpipe health benefit assessment. Wolfe et al. (2019) "computes monetized damage costs per ton values at a more disaggregated level, separating on-road mobile sources into multiple categories based on vehicle type and fuel type." Proposal, 86 Fed. Reg. at 49,719. The BPT values from Wolfe et al. (2019) "provide better resolution by mobile sector and geographic area, two features that make them especially useful for quantifying the benefits of reducing emissions from the onroad light-duty sector." 2021 EPA NPRM, 86 Fed. Reg. at 43,790. The use of the BPT estimates from Wolfe et al. (2019) will likely improve NHTSA's monetization of tailpipe PM2.5 emission benefits from the Proposal.

For upstream emissions estimations in the 2020 Final Rule, NHTSA made a fundamental error in its monetization of upstream emissions. Upstream emission changes due to more stringent standards would come from a variety of sources including electricity generating unit

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[70] P. Wolfe, et al., *Monetized Health Benefits Attributable to Mobile Source Emission Reductions Across the United States in 2025*, 650 Sci. Total Env't 2490-2498 (2019).

sources, petroleum extraction, storage and transport sources, as well as sources upstream from the refinery. Proposal, 86 Fed. Reg. at 49,716-718. These impacts are countervailing: stronger fuel economy standards will reduce fuel consumption and therefore reduce refinery production; however, they likely will increase vehicle electrification (including from plug-in hybrids) and therefore increase electric generation. Previously, “health impacts were split into two categories based on whether they arose from upstream emissions or tailpipe emissions,” *id.* at 49,718, and by categorizing all upstream emissions together, NHTSA was effectively netting increases in power plant emissions against decreases in refinery emissions without accounting for the differential in health benefits.

In NHTSA’s Proposal, the agency makes an effort to reach more accurate PM2.5 benefits estimates, by separately quantifying and monetizing upstream emission impacts for five upstream sectors—petroleum extraction; petroleum transportation; refineries; fuel transportation, storage and distribution; and electricity generation—before netting those impacts. TSD at 495. By separately reporting criteria pollutant health effects for refining and electricity generation, NHTSA is able to “reflect the differences in health impacts arising from each emission source sector.” *Id.* This works toward correcting the previously understated benefits of the PM2.5 reductions from more stringent standards.

2. *NHTSA’s failure to quantify and monetize health benefits resulting from reductions in ozone and air toxics attributable to more stringent standards results in an understatement of the benefits of the rule.*

Although NHTSA recognizes the importance of quantifying the health and environmental benefits of the Proposal, NHTSA understates the non-GHG benefits of more stringent standards by failing to quantify benefits associated with reductions of several pollutants.

One source of underestimate is NHTSA’s exclusion of benefits attributable to ozone and air toxics. Ground-level ozone is a widespread criteria air pollutant that inflames lung tissue and is associated with a number of respiratory and cardiovascular health impacts. Motor vehicles contribute to ozone formation through their emissions of both nitrogen oxides and volatile organic compounds, either of which can catalyze the formation of ozone depending on the relative amounts of each in the ambient air. NHTSA, Corporate Average Fuel Economy Standards Model Years 2024-2026, Draft Supplemental Environmental Impact Statement (Aug. 2021) (“Draft SEIS”) at 92. NHTSA notes that “the complex, non-linear photochemical processes that govern ozone formation prevent us from developing reduced-form ozone, ambient NOx, or other air toxic BPT values,” which NHTSA recognizes as “an important limitation” when using the BPT approach. TSD at 495; *see also* Proposal, 86 Fed. Reg. 49,735. Incorporation of these categories would have increased the net benefits of the Proposal.

E. <u>NHTSA's assessment of consumer impacts likely understates benefits to consumers, and the agency should consider refining its assessment to provide more insight into the implications of stronger fuel economy regulations.</u>

Under EPCA, NHTSA is tasked with considering "economic practicability" in the setting of motor vehicle standards, which NHTSA states includes considering the "overall consumer impacts" of a regulation, Proposal, 86 Fed. Reg. at 49,792. And while consumer impacts are by no means the dispositive factor in standard setting, *see id.* at 49,793 (noting that it is "well within the agency's discretion to deviate from the level at which modeled net benefits are maximized if the agency concludes that the level would not represent the maximum feasible level for future CAFE standards"), NHTSA has historically considered consumer impacts in evaluating proposals to modify its standards. NHTSA's assessment of consumer impacts appropriately includes various categories of consumer costs and benefits, as did previous rulemakings.[71] However, NHTSA should consider breaking down consumer impacts over discrete segments of the lifespan of the vehicle to provide additional information about the equity impacts of the Proposal to vehicle owners. Finally, NHTSA's failure to calculate the fuel price reductions attributable to stronger fuel economy standards causes NHTSA to further understate consumer benefits.

1. *NHTSA's Proposal benefits consumers.*

In evaluating consumer costs of more stringent standards, NHTSA includes technology costs, lost consumer surplus, and ancillary costs of higher vehicle prices (such as sales tax, financing, registration, and insurance). *See* PRIA at 160, Tbl. 6-6; Proposal, 86 Fed. Reg. at 49,722. Although NHTSA's valuation of lost consumer surplus is already minimal (from $1 per vehicle to $17 per vehicle, *see* PRIA at 160, Tbl. 6-6), if NHTSA's sales modeling is inaccurate and the assumed sales elasticity of -1.0 is wrong and/or consumers value more than 30 months of fuel savings, then there would be even fewer lost sales due to higher vehicle prices and the lost consumer surplus costs would be even lower. (*See* sections III.G and III.H, *infra*, for a discussion of sales elasticity and consumer valuation of fuel savings.)

On the benefits side, NHTSA includes three categories of benefits: fuel savings, refueling benefits (including considering EV charging time), and additional mobility. Proposal, 86 Fed.

[71] To the extent NHTSA suggests that there are "opportunity costs" to consumers that result from the standards and that the modeling or fuel savings accounting for the standards should be revised as a result, we disagree. *See, e.g.*, UCS Petition for Reconsideration at 27-33.

Reg. at 49,722-731. NHTSA could also consider changes to its analysis regarding fuel savings impacts on consumers by accounting for any reduced fuel prices that result from decreased fuel demand, as explained in section III.E.3, *infra*.

In the Proposal, NHTSA concludes that "[o]n balance, consumers of new cars and light trucks produced during the model years subject to this proposed action will experience significant economic benefits." Proposal, 86 Fed. Reg. at 49,721. For example, NHTSA estimates that the Proposal could provide average fuel savings over the lifetimes of MY 2029 vehicles of about $1,280, while increasing the cost of those vehicles by only about $960. *Id.* at 49,605 & 49,620 Tbl. II-8. Moreover, the private benefits outweigh the private costs for all three Alternatives when considering the lifetimes of the total fleet of vehicles produced through 2029 (using a 3% discount rate). PRIA at 187, Tbl. 6-20. For Alternative 2, private benefits outweigh private costs by $11.1 billion at a 3% discount rate, and for Alternative 3, private benefits outweigh private costs by $12.3 billion at a 3% discount rate. *Id.; see also* Proposal, 86 Fed. Reg. at 49,803 (stating that Alternative 3 "would save consumers the most in fuel costs").

2. *NHTSA should consider analyzing and considering vehicle costs spread over the lifetime of the vehicle, which would provide important information about the equitable implications of more stringent standards.*

NHTSA has specifically sought comment "on our current, and possible alternative representations of how consumers value fuel economy when purchasing a new vehicle and while owning and operating it, and how manufacturers implement fuel economy technologies." 86 Fed. Reg. at 49,727. While NHTSA does alternatively estimate consumer benefits in terms of payback times, or the time required for fuel economy improvements to produce positive returns from resulting fuel savings, NHTSA could go further with this analysis to understand the true equity impacts of its Proposal. In EPA's recent proposal to revise GHG standards for light-duty vehicles for MY 2023-2026, EPA broke down its analysis of consumer impacts into five-year increments (viz. the first 5 years; the next 5 years; the third 5 years) and quantified the fraction of incremental technology costs and fuel cost savings that would be experienced by the owner of the vehicle during each of those 5-year periods. 2021 EPA NPRM, 86 Fed. Reg. at 43,798. EPA also calculated a break-even number of miles that the owner or purchaser of a new, 5-year old, and 10-year old vehicle would need to drive for fuel cost savings to offset the incremental technology cost. *Id.*

As EPA explained,"[d]isregarding those benefits [that may accrue to later vehicle owners], which often accrue to lower income households, who more often purchase used cars, would provide a less accurate picture of total benefits to society." *Id.* at 43,785. As EPA observed, less affluent individuals are frequently purchasers of used vehicles. The payback period (in miles) for incremental technology costs decreases with vehicle age (since vehicle resale value decreases in a nonlinear manner). Thus, under EPA's rule, for a 5-year-old MY 2026 vehicle, technology costs would be offset by fuel cost savings after only 31,000 miles, as compared to approximately 106,000 miles for the purchaser of a new vehicle. *Id*. at 43,798.

Consideration of consumer impacts over different phases of the vehicle's lifetime is important for understanding the equity implications of the new standards. More stringent standards are likely to have a disproportionately beneficial effect on purchasers of used vehicles. It is reasonable to consider these equitable impacts in determining fuel economy standards, and NHTSA should consider a similar approach for its final rule.

3. *NHTSA failed to account for the beneficial impacts of reduced fuel prices resulting from stronger fuel economy standards.*

NHTSA further understates the consumer benefits of more stringent standards by ignoring the reduction such standards would cause not just in fuel consumption but also in fuel prices. Both total fuel consumption and the price per gallon of fuel will impact the consumer benefits of new standards. *See, e.g.*, Proposal, 86 Fed. Reg. at 49,793 ("Fuel for vehicles costs money for vehicle owners and operators, so all else equal, consumers benefit from vehicles that need less fuel to perform the same amount of work."); *id*. at 49,809 ("The sensitivity cases suggest that fuel prices exert considerable influence on net benefits—where higher and lower prices not only determine the dollar value of each gallon saved, but also how market demand responds to higher levels of fuel economy in vehicle offerings."). Yet, NHTSA considered the rule's impact only on the former.

To evaluate the consumer benefits of the Proposal, NHTSA used its CCEMS model, which as NHTSA explains, treats fuel price exclusively as an input. *Id.* at 49,625 ("Many of these inputs are developed *outside* of the model and not *by* the model. For example, the model *applies* fuel prices; it does not *estimate* fuel prices."). Consequently, NHTSA did not consider the impact that the rule would have on fuel prices.

Basic principles of macroeconomics affirm that reductions in fuel consumption (i.e., reduced fuel demand) decrease the price of fuel. However, NHTSA nowhere accounts for this fuel price reduction. NHTSA projects that over the lives of vehicles produced prior to MY 2030, Alternative 2 would save about 50 billion gallons of gasoline and Alternative 3 would save 75 billion gallons. *Id.* at 49,607 Tbl. I-3 & 49,615, Tbl. II-6. From a calendar year perspective through 2050, Alternative 2 is expected to save 205 billion gallons of gasoline and Alternative 3 is expected to save 290 billion gallons. *Id.* at 49,607, Tbl. I-3. This substantial reduction in petroleum demand will undoubtedly have an appreciable impact on fuel prices.[72] NHTSA's failure to account for this impact causes NHTSA to further understate the benefits of stronger fuel economy standards to consumers.

F. NHTSA's employment analysis of more stringent fuel economy standards shows positive growth.

NHTSA's own modeling projects long-term employment increases due to the Proposal. As NHTSA explains, "[c]hanges in vehicle prices and fuel costs resulting from CAFE technologies will affect new vehicle sales, which will in turn affect employment associated with those sales," but "production of new technologies used to improve fuel economy will create new demand for production." TSD at 578. NHTSA calculates the long-term employment impacts from the Proposal, finding overall increases in employment when compared to the 2020 Final Rule. Proposal, 86 Fed. Reg. at 49,736; PRIA at 152-53. NHTSA's analysis "shows that the increased labor from production of new technologies used to meet the preferred alternative will outweigh any decreases attributable to the change in new vehicle sales." Proposal, 86 Fed. Reg. at 49,736. Moreover, NHTSA has explained that to be "economically practicable," "standards simply should avoid a *significant* loss of jobs," *Id.* at 49,809 (emphasis original), and here the long-term impact is an employment increase.

Under its modeling, NHTSA does project an initial decrease in employment, but this decrease is a small fraction of the over 1 million jobs at baseline for each model year. *See* PRIA at 153, Tbl. 6-1. And the change soon becomes positive by MY 2027 for Alternative 3, and stays positive in NHTSA's estimates through MY 2029, adding from 661 to 3,533 jobs over the baseline depending on the year. *Id*. Thus, as modeled, the Proposal would increase long-term employment over the 2020 Final Rule's status quo. Moreover, NHTSA's model uses a price elasticity of demand of -1.0, which is arbitrarily high. A lower, more reasonable magnitude price elasticity of demand would likely lead to even greater projected increases in employment.[73]

[72] *See, e.g.*, Brief of Public Interest Organization Petitioners at 22-26 (describing the effect greater fuel consumption under the 2020 Final Rule will have on increasing fuel prices).

[73] *See, e.g.,* EPA DRIA at 8-12, Tbl. 8-3 & 8-4 (showing increased employment with a price elasticity value of -0.4 when compared to a price elasticity value of -1.0).

G. <u>NHTSA overstates the impact of stronger fuel economy standards on vehicle sales, leading to an overestimate of the costs and underestimate of the benefits of more stringent standards.</u>

1. *NHTSA's use of a -1.0 elasticity of demand for new vehicles is arbitrarily high and NHTSA should correct it to a price elasticity value that is lower in magnitude.*

NHTSA's Proposal offers no viable support for its use of a -1.0 price elasticity of demand for new vehicles, merely citing to "previous rules" that found "some degree of consensus in the economic literature that the price elasticity of demand for automobiles is approximately -1.0," and then citing four papers, three of which are at least 25 years old.[74] TSD at 411-412. NHTSA should reconsider using -1.0 as the price elasticity of demand applicable to this regulatory context, as this value is inaccurate, unsupported by both historical and recent research, and leads to an artificially high decline in new vehicle sales under the Proposal. Recent research supports a value much lower, such as in the range of -0.2 to -0.4, or even lower.

Using a more accurate value for the price elasticity of demand—one that is lower in absolute value—would provide a more realistic picture of the sales impacts of the fuel economy regulations. The price elasticity of demand for new vehicles is a critical factor to consider in setting light-duty vehicle regulations because without this input NHTSA could not quantify the rule's effect on vehicle purchases. Changes in demand for new vehicles can have an impact on jobs, emissions, safety, and other factors relevant to the net benefits of revised standards.

Vehicles have different price elasticities depending on the timeframe considered, and sales of automobiles tend to be less sensitive to price fluctuations, especially in the long run.[75]

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[74] Specifically, NHTSA's TSD cites the following studies in two footnotes as the sole justification for a -1.0 elasticity: Kleit, A.N., *The Effect of Annual Changes in Automobile Fuel Economy Standards*, 2 Journal of Regulatory Economics, 151-72 (1990), attached as Exhibit 39; Bordley, R., *An Overlapping Choice Set Model of Automotive Price Elasticities*, 28B Transportation Research B, 401-408 (1994), attached as Exhibit 40; McCarthy, P.S. *Market Price and Income Elasticities of New Vehicle Demands*, 77 The Review of Economics and Statistics, 543-547 (1996), attached as Exhibit 41; McAlinden, Sean P., et al., *The Potential Effects of the 2017-2025 EPA/NHTSA GHG/Fuel Economy Mandates of the US Economy*, Center for Automotive Research (Sept. 2016), available at https://www.cargroup.org/wp-content/uploads/2017/02/The-Potential-Effects- of-the-2017_2025-EPANHTSA-GHGFuel-Economy-Mandates-on-the-US-Economy.pdf, attached as Exhibit 42. *See* TSD at 412 nnn.576 & 577.

[75] Howard, P. & M. Sarinksy, *Turbocharged: How One Revision in the SAFE Rule Economic Analysis Obscures Billions of Dollars in Social Harms*, N.Y.U. Inst. for Policy Integrity, at 3 (Nov. 2020), https://policyintegrity.org/files/publications/Turbocharged_How_One_Revision_in_the_SAFE_Rule_Economic_Analysis_Obscures.pdf ("Because automobiles are essential goods in most areas of the United States (and lack any comparable substitute), both economic theory and observed behavior finds that vehicle sales are relatively inelastic—meaning that price fluctuations produce just modest changes in vehicle sales"). Attached as Exhibit 43.

This is because in most areas of the United States vehicles are essential goods.[76] During NHTSA and EPA's 2020 rulemaking, EPA's Science Advisory Board explained that while "a consumer can easily hold on to their existing vehicle a bit longer[,] . . . an old vehicle will not be functional forever, and thus the long-run price elasticity for new vehicles is likely to be smaller [in magnitude] than the short-run elasticity."[77] Therefore, it is common to distinguish between short-run elasticity values (sales effects that take place within one year of a price change)[78] and long-run elasticity values (sales effects beginning approximately five years into the future).[79] In the 2012 Final Rule, NHTSA acknowledged that -1.0 is "generally considered to be a short-run elasticity," 77 Fed. Reg. at 63,102 n.1300, and explained that price elasticity for vehicles is "smaller in the long run" because "though people may be able to change the timing of their purchase when price changes in the short term, they must eventually make the investment" in a new vehicle. *Id.* Thus, the 2012 Final Rule explained, while short-run elasticity may apply very briefly at the start of a program, "over time, a long-run elasticity may better reflect behavior." *Id.* Similarly, the 2016 Midterm Evaluation Proposed Determination, explained that "short run elasticity estimate[s] . . . may not be appropriate for standards that apply several years into the future."[80]

Because analyses of LDV fuel economy standards project sales many years into the future, the long-run price elasticity is the relevant value to apply to the analysis. And because vehicle sales are less elastic in the long run, the price elasticity of demand for vehicles is substantively lower in magnitude in the long run than in the short run.

a) The -1.0 price elasticity value used in the Proposal is wholly unsupported and should not be used here.

Because NHTSA draws the -1.0 price elasticity from the 2020 Final Rule, with very little discussion of the appropriateness of this estimation, it is important to look at how that rule justified this value. In the TSD, NHTSA mentions the previous rulemaking and states that "[b]ased upon the literature, a unit elasticity of -1.0 is a reasonable estimate." TSD at 412. But

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[76] *See, e.g.*, Anderson P.L. et al., *Price Elasticity of Demand* (1997), https://scholar.harvard.edu/files/alada/files/price_elasticity_of_demand_handout.pdf. Attached as Exhibit 44.

[77] SAB Report at 22.

[78] *See* Pindyck, R.S. & D.L. Rubinfeld, *Microeconomics* (8th ed.), at 39 (1989) (describing short-run elasticity as measuring "one year or less"). Attached as Exhibit 45.

[79] *See* Klier, T. & J. Linn, *The Effect of Vehicle Fuel Economy Standards on Technology Adoption*, Resources for the Future Discussion Paper, at 3, 6 (Rev'd 2015), attached as Exhibit 46 (noting that long-run impacts measure across engine design cycles, and that "models contain redesigned engines about once every five years in the United States"); *see also* Amicus Brief of Economists at 20 (noting the long-run time period concerns sales effects that begin approximately five to ten years into the future).

[80] EPA, Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, EPA-HQ-OAR-2018-0283-7640, at A-40 (Nov. 2016) ("2016 Proposed Determination"), attached as Exhibit 47.

the -1.0 price elasticity value was not even "*based upon*" the relevant literature, but rather arbitrarily chosen by NHTSA during the 2020 rulemaking with minimal explanation and no plausible support from the relevant body of literature. NHTSA repeats that error in this rulemaking.

Based on the available research, the Proposal for the 2020 Rule conducted a data analysis and projected an elasticity in the range of -0.2 to -0.3. 83 Fed. Reg. at 43,075.[81] In the 2020 Final Rule, however, NHTSA raised the elasticity estimate more than threefold. NHTSA's entire discussion about this massive change in price elasticity was only two sentences, and the agency included only a few mostly outdated citations. Authors of some of the key papers on price elasticity have called -1.0 a price elasticity number "far outside of any reasonable range that could be supported by the relevant literature."[82]

Experts have advised NHTSA numerous times that -1.0 is not an appropriate number for price elasticity for vehicle sales. During the 2020 rulemaking, one of NHTSA's peer reviewers, Dr. John Graham, explained that the relevant literature "with a proper focus on long-term price elasticity of demand, provides support for a price elasticity of demand that is well below -1.0 (in absolute value)," and that "the -1.0 elasticity figure does not have a solid grounding in economic evidence."[83] Furthermore, EPA's Science Advisory Board advised the agencies that -1.0 was unjustified as a price elasticity of demand for new vehicles, explaining that the value was not based on the relevant body of academic literature (even the 25-year-old literature cited by EPA and NHTSA in the 2020 Final Rule and NHTSA in the Proposal).[84] The Science Advisory Board advised EPA and NHTSA to consider alternatives "both larger and smaller than -0.2 to -0.3," but the agencies disregarded this advice.[85]

The small body of old literature relied on by NHTSA in the 2020 Final Rule, and again here, does not actually support a -1.0 price elasticity of demand for vehicle sales because the studies were primarily short-run estimates of price elasticity, but the long run is the proper time frame to consider. In fact, the papers cited do not support even a *short-run* elasticity of -1.0.[86]

[81] This number was actually incorrectly calculated and too high due to a spreadsheet error identified in a Comment to the 2018 NPRM. It should be -0.07. *See* Stock, J.H. et al., Comment on Proposed Model Year 2021-2026 Standards, EPA-HQ-OAR-2018-0283-6220, at 6-8 (Oct. 26, 2018), attached as Exhibit 48; Amicus Brief of Economists at 26.
[82] Amicus Brief of Economists at 27.
[83] NHTSA CAFE Model Peer Review, NHTSA-2018-0067-0055 (rev. July 2019), Appendix B at B-33 & B-35. Attached as Exhibit 49.
[84] SAB Report at 22-23.
[85] *Id*. at 23.
[86] These points, elaborated upon in this Comment, were initially made by Economists Amici Curiae in the 2020 Final Rule litigation. These economists included James Stock and Benjamin Leard, two key experts in price elasticity of demand for vehicles, on whom EPA has relied in setting its valuations. *See* Amicus Brief of Economists at 18-27.

Specifically, the 2020 Final Rule, 85 Fed. Reg. at 24,617 n.1641-42, and NHTSA's Proposal, TSD at 412 n.576, relied on the following studies:

- McCarthy (1996): Estimated short-run elasticity of -0.87.[87]
- Bordley (1994): Assumed a short-run elasticity of -1.0, but did not estimate this value itself, nor provide justification for this assumption.[88]
- Kleit (1990): Assumed a long-run elasticity of -1.0, but cited another study, Irvine (1983), as the source of this value. Irvine (1983) was a partial literature review of papers published between 1967 and 1978, most of which reported *short-run* elasticity estimates.[89] In fact, the few long-run estimates reported in Irvine support a long-run elasticity of -0.5 to -0.6 when using the median estimate or taking the mean without the outlier estimate.[90] Kleit (1990) did not estimate an elasticity value itself.[91]
- CAR Report (2016): Estimated a mean long-run price elasticity of -0.61 and a short-run price elasticity of -0.79. NHTSA's 2020 Final Rule, however, improperly cited -0.72 as the CAR Report's long-run elasticity estimate. This latter value, according to the CAR Report, was influenced by an "extreme outlier" (published in 1957 using pre-World War II data), which the authors stated should be "excluded from consideration,"[92] making the -0.72 value cited in the 2020 Final Rule inaccurately large. NHTSA's Proposal repeats this mistake, again citing the incorrect -0.72 as the CAR Report's long-term elasticity estimate. TSD at 412 n.577. Moreover, economists James Stock and Benjamin Leard have explained that even -0.61 "based on this literature is still too large," explaining that the CAR Report misreports the elasticity values from the one post-1970 paper that it cites and that "[u]sing the correct value" from the paper "would make the CAR Report's estimated long-run price elasticity even smaller." Specifically, the CAR Report separately reported elasticities for cars and light trucks from Fischer et al. (2007), ignoring substitution between the two, deriving a long-run elasticity based on this paper of -0.82. Because more stringent standards apply to all new light-duty vehicles, the correct elasticity is the *combined* market affected by a

[87] *See* Amicus Brief of Economists at 21; McCarthy (1996).
[88] Amicus Brief of Economists at 21-22; Bordley (1994).
[89] Of the sixteen elasticities cited in Irvine (1983), thirteen are short-run elasticities. *See* Howard (2020) at 5; Irvine, F.O., *Demand Equations for Individual New Car Models Estimated Using Transaction Prices with Implications for Regulatory Issues*, 49 S. Econ. J. 764, 766 tbl. 1 (1983), attached as Exhibit 50.
[90] *Id*.
[91] Amicus Brief of Economists at 22; Kleit (1990); Irvine (1983).
[92] McAlinden (2016) at 28; Amicus Brief of Economists at 23.

price increase, not one supposing that only cars are affected or, alternatively, only light trucks, which Fischer et al. (2007) estimates to be -0.36.[93]

The only long-run estimate from these studies considered in NHTSA's Proposal and the 2020 Final Rule is the CAR Report's -0.61. The other four estimates of between -0.8 and -1.0 are all *short-run* estimates. Moreover, they are the product of wildly outdated evidence, as EPA (which promulgated the 2020 Final Rule jointly with NHTSA) has acknowledged.[94] Three of the studies are between 25-31 years old, but they mostly rely on data from the 1960s and 1970s, with some data even dating back to the 1920s.[95] Thus, *at most*, the literature relied on in the Proposal and the 2020 Final Rule could support a *short-run* estimate of a magnitude close to but less than -1.0. A price elasticity of -1.0 based on this research is "a high-end estimate,"[96] even for the short-run, and it is well-established that price elasticity of demand for vehicles decreases in magnitude in the long-run and should be substantially lower in magnitude.

b) The most recent literature supports a price elasticity value well below -1.0 in magnitude.

The chart below provides a comprehensive review of current and historical long-run and short-run elasticity estimates.[97] The median elasticity of the studies published since 2000 (including an outlier estimate) is approximately -0.35, with a mean of -0.4, and those numbers decrease when looking only at studies published since 2010.[98] There is no basis for a price elasticity estimate of -1.0. NHTSA should revise this input to a more accurate value that is consistent with recent studies. The most recent reliable studies, such as Leard (2021)[99] and Stock et al. (2018), would support values even lower in magnitude than -0.4.

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[93] Amicus Brief of Economists at 23-24 & n.9; McAlinden (2016); Fischer, C. et al., *Should Automobile Fuel Economy Standards be Tightened?*, 28 The Energy J. 1-29 (2007), attached as Exhibit 51.
[94] 2016 Proposed Determination at A-40 ("this assumption [of a -1.0 sales elasticity] is old (stemming from studies conducted two or more decades ago)").
[95] *See, e.g.*, Irvine (1983) at 766 tbl. 1 (cited in Kleit (1990)); McCarthy (1996) (collecting underlying data). Kleit (1990) cites an elasticity of -1.0 based exclusively on Irvine (1983).
[96] Amicus Brief of Economists at 24.
[97] This review included the sources cited by the agencies in the 2020 Final Rule, as well as other relevant sources (in particular those in National Research Council, *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles* (2015), attached as Exhibit 52, and previous EPA rules) and more recent studies.
[98] These values are consistent with a review done by several economists and detailed in an amicus brief filed in the litigation over the 2020 Final Rule. That review considered what the economists viewed as the four most relevant, distinct estimates of long-run elasticity based on original data analysis since 2000, and found a long-run price elasticity of demand for vehicles subject to the Proposal of between -0.03 and -0.61. *See* Amicus Brief of Economists at 25-26.
[99] Leard, B., *Estimating Consumer Substitution Between New and Used Passenger Vehicles*, Resources for the Future Working Paper (rev. Aug 2021), https://media.rff.org/documents/WP_19-01_rev_2021.pdf. Attached as Exhibit 53.

Sales Elasticity Estimates

Author(s)	Year	Time Period	Short-Run	Long-Run
McAlinden et al. (2016) - CAR Report				
Atkinson	1952	1925-1940	-1.33	-
Nerlove	1957	1922-1941; 1948-1953	-0.9	-1.2
Suits	1958	1929-1941; 1949-1956	-	-0.57
Chow	1960	1921-1953	-	-0.7
Suits	1961	1929-1941; 1949-1956	-	-0.675
Hymans, Ackley, and Juster	1970	1954-1968	-1.14	-0.46
Hess	1977	1952-1972	-1.63	-
Trandel	1991	1983-1985	-1.43	-
Levinsohn	1988	1983-1985	-0.82	-
McCarthy	1996	1989	-0.87	-
Bordley	1993	Assumed	-1	-
Fischer, Harrington, and Parry	2007	Not indicated	-1	-0.36
Irvine (1983) (basis for Kleit (1990))				
Dyckman	1975	1929-1962	-1.45	-
Hamburger	1967	1954-1964	-1.17	-

Evans	1969	1948-1964	-3.1	-1.5
Hymans	1970	1954-1968	-1.07	-0.36
Rippe and Feldman	1976	1958-1973	-1.14	-0.6
Carlson	1978	1965-1975	-1.1	-
Additional estimates				
Goldberg	1998	1984-1990	-0.9	-
Juster and Wachtel	1972	1949-1967	-0.7	-
Lave and Train	1979	1976	-0.8	-
McAlinden et al.*	2016	1953-2013	-0.79	-0.61
Berry et al.	2004	1993	-	-1
Stock et al.	2018	1967-2016	-0.27	-0.03 to -0.09
Leard	2021	2013	-	-0.34
Bento et al.	2020	Not indicated	-	-0.13
Dou and Linn	2020	1996 to 2016	-1.5	-

Averages				
Mean			-1.15	-0.6
Median			-1.07	-0.6
Averages of Recent Estimates				
Mean published since 2000			-0.9	-0.4
Median published since 2000			-0.9	-0.35
Mean published since 2010			-0.85	-0.3
Median published since 2010			-0.79	-0.24
*Averages Without Inconsistent Estimates***				
Mean			-1.1	-0.4
Median			-1.07	-0.46
Mean: Published since 2000			-0.9	-0.3
Median: Published since 2000			-0.9	-0.34

* McAlinden et al. (2016) conducted both a literature review, represented at the top of this table, and separately produced its own elasticity estimates, shown here.
** Inconsistent estimates: Nerlove (1957) as long-run elasticity is higher than short-run elasticity; Evans (1969) as elasticities are extreme outliers with long-run elasticity that is elastic contrary to intuition in the literature; and Berry et al. (2004) as estimate was suggested by General Motors staff despite "impl[ying] a large (in absolute value) own-price semi-elasticity of demand equal to −10.56" and conducted sensitivity analysis using -0.2 and -0.4 (the latter producing more realistic own-price semi-elasticity). *See* Leard (2021) at 12.

H. NHTSA's assumption in the sales and scrappage models that consumers value only the first 2.5-years of fuel savings is unfounded and inconsistent with the agency's current and past statements.

As NHTSA indicates, *see* Proposal, 86 Fed. Reg. at 49,710 n. 301, there is significant uncertainty regarding the level at which consumers value future fuel savings when purchasing a vehicle.[100] This is a critical factor in any attempt to estimate changes in new vehicle sales due to changes in standards that improve fuel economy. As a result, it is not currently possible to reliably estimate the sales effects of the fuel economy standards.[101] That said, there are several reasons why NHTSA's selection of 2.5 years (30 months) of fuel savings as consumers' "willingness to pay" ("WTP") value in the sales and scrappage models in the NPRM is too low and arbitrarily so, causing the results of those models to be flawed. As NHTSA notes, this WTP assumption "has important implications for other outcomes of the model, including for VMT, safety, and air pollution emissions projections," and "[i]f NHTSA is incorrect about the undervaluation of fuel economy in the context of regulatory standards and its effect on car sales, correcting the assumption should result in improved safety outcomes and additional declines in conventional air pollutants." Proposal, 86 Fed. Reg. at 49,711.

NHTSA begins its discussion of consumers' WTP for fuel economy improvements by acknowledging that "[t]here is a great deal of work" that attempts to understand WTP, and that "[r]ecent econometric research remains divided between studies that conclude . . . that consumers may value most, if not all of potential fuel savings, and those that conclude that consumers significantly undervalue fuel savings." *Id.* at 49,710 & n.301. NHTSA further states that "[t]he existing research is not conclusive and leaves many open questions," *id.* at n.301, and that "[p]ublished literature has offered little consensus about consumers' willingness-to-pay for greater fuel economy, and whether it implies over-, under-, or full- valuation of the expected discounted fuel savings from purchasing a model with higher fuel economy." TSD at 401. NHTSA states that "[e]mpirical estimates using [discrete choice models] span a wide range, extending from substantial undervaluation of fuel savings to significant overvaluation, thus

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[100] This is consumers' "ex ante" valuation of fuel savings. It is distinct from the "ex post" benefits that will accrue to consumers and society in actual fuel savings, the full value of which must be accounted for in the cost-benefit analysis. *See*, *e.g.*, Gillingham, K., Comments on the NERA-Trinity "Evaluation of Alternative Passenger Car and Light Truck Corporate Average Fuel Economy (CAFE) Standards for Model Years 2021-2026, at 6-7 (Dec. 10, 2018) (attached to Comment from the California Air Resources Board, Docket #EPA-HQ-OAR-2018-0283-7449 (Dec. 19, 2018)). Attached as Exhibit 54. Further, to the extent NHTSA suggests that there are "opportunity costs" to consumers that result from the standards and that the modeling or fuel savings accounting for the standards should be revised as a result, we disagree. *See, e.g.*, UCS Petition for Reconsideration at 27-33.

[101] *See, e.g.*, Comments of the Center for Biological Diversity, et al., on the Proposed Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, Docket #NHTSA-2018-0067-12000, as corrected Docket #NHTSA-2018-0067-12368, Appendix A at 174-75 (Jan. 17, 2019). Attached as Exhibit 55.

making it difficult to draw solid conclusions about the influence of fuel economy on vehicle buyers' choices." *Id*. (citation omitted).

NHTSA then focuses on just three studies—all of which, NHTSA says, "consistently suggest that buyers value a large proportion—and perhaps even all—of the future savings that models with higher fuel economy offer." TSD at 402.[102] Even the other studies that NHTSA mentions in passing support a valuation for consumer WTP higher than NHTSA's 30-month estimation.[103]

After discussing the findings of these three studies, NHTSA states that for the Proposal the agency has adopted a value of consumer WTP for fuel economy that is "more conservative" than that suggested by those three studies—specifically 2.5 years, *id*. at 405, which "is a small fraction, approximately one fourth of the expected present value of future fuel savings over the typical life of a light-duty vehicle," 86 Fed. Reg. at 49,729. *See also* TSD at 406 ("Depending on the discount rate buyers are assumed to apply, this amounts to 25-30% of the expected savings in fuel costs over its entire lifetime"). NHTSA purports to justify this value by stating that, "Manufacturers have consistently told the agencies that new vehicle buyers will pay for about 2 or 3 years' worth of fuel savings before the price increase associated with providing those improvements begins to impact affect [sic] sales." TSD at 405; *see also* 86 Fed. Reg. at 49,710 ("Manufacturers have repeatedly informed the agency that consumers only value between 2 to 3 years-worth of fuel savings when making purchasing decisions"). NHTSA states that the agency "assumes the same valuation, 2.5 years (i.e., 30 months) of undiscounted fuel savings, in all components of the analysis that reflect consumer decisions regarding vehicle purchases and retirements." TSD at 405.

As a threshold matter, there is a disconnect between NHTSA's discussion of consumers' WTP for fuel economy—which focuses on three studies showing high valuation— and the agency's ultimate adoption of a 2.5-year valuation. NHTSA calls the use of 2.5 years a

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[102] These three studies are Sallee, et al., 2016; Allcott & Wozny, 2014; and Busse, et al., 2013. *See* TSD at 402-403. *See also* 2020 Final Rule, 85 Fed. Reg. at 24,610 ("recent research seems to show that such behavior [consumer undervaluation of fuel savings from investing in higher-efficiency vehicles] is not widespread, if it exists at all").
[103] *See* TSD at 404-405 (citing Gillingham, K., et al., *Consumer Myopia in Vehicle Purchases: Evidence from a Natural Experiment*, 13 American Economic Journal: Economic Policy (2021), https://iaee2021online.org/download/contribution/fullpaper/1338/1338_fullpaper_20210403_051944.pdf (finding consumer WTP between 16-39 cents per dollar of fuel savings, assuming an annual discount rate of 4%); Leard, B., et al., *How Much Do Consumers Value Fuel Economy and Performance? Evidence from Technology Adoption*, Review of Economics and Statistics (forthcoming 2021) (finding consumer WTP $0.54 for $1 of discounted expected fuel savings); National Academies of Sciences, Engineering, and Medicine, *Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy 2025-2035* (2021) ("NASEM (2021)"), https://doi.org/10.17226/26092, at Ch. 11.3.4, attached as Exhibit 56 (finding that "when the fuel economy of all new vehicles is increasing as a consequence of fuel economy standards, consumers might approximately fully value expected fuel savings).

"conservative approach," TSD at 405, but in the context of the sales and scrappage models, that is not true. A higher WTP would reduce the effective sales price difference under the proposed standards, which would decrease the impact of the standards on sales and scrappage effects. And as NHTSA acknowledges, there is a great deal of uncertainty in the literature, especially with respect to the role of fuel economy regulations on consumers' WTP for fuel savings. As NHTSA notes, a recent report of the National Academies of Sciences explained that "when the fuel economy of all new vehicles is increasing as a consequence of fuel economy standards, consumers might approximately fully value expected fuel savings." TSD at 405.[104] In that context, NHTSA's selection of a 30-month WTP value for the sales and scrappage models is not "conservative," but unreasonably low, at only one quarter of total savings in future fuel costs.

In addition to these flaws in NHTSA's analysis, the ultimate premise upon which the agency bases its estimate of consumer WTP for fuel economy improvements is unsubstantiated. NHTSA states that the agency chose 2.5 years of valuation because "[m]anufacturers have consistently told the agencies that new vehicle buyers will pay for about 2 or 3 years' worth of anticipated fuel savings." TSD at 405. NHTSA also acknowledges, however, that the manufacturers could be wrong, noting that "the same manufacturers, for example, long assumed that consumers would not pay extra for safety features." *Id*. Moreover, in the 2012 Final Rule, NHTSA cited evidence that manufacturers believed that consumers valued 2-4 years of fuel savings, 77 Fed. Reg. at 63,103,[105] meaning a mid-point of that range would be 3 years of valuation. There is no explanation provided by NHTSA in the Proposal for when or why manufacturers' perception of consumer valuation of fuel savings might have changed. In addition, in the 2012 Final Rule, NHTSA identified several problems and risks with relying on manufacturers' estimates. See *id*. at 63,103 ("Although some manufacturers have indicated in public remarks or confidential statements to NHTSA that their plans to apply fuel-saving technology depend on fuel prices and consumers' willingness to pay for fuel economy improvements, the agency does not have specific and robust information regarding how manufacturers interpret consumers' valuation of fuel savings."); *id*. ("it is possible that manufacturers are providing more or less fuel economy than consumers wish to purchase, because they do not correctly understand consumers' valuation of fuel economy"); *id*. at 63,104 (noting "the considerable uncertainty associated with consumer valuation of fuel savings and manufacturers' understanding of that valuation").

[104] *See also* NASEM (2021) at Ch. 11.3.4.

[105] "A recent paper by David Greene examined studies from the past 20 years of consumers' willingness to pay for fuel economy and found that 'the available literature does not provide a reasonable consensus,' although the author states that 'manufacturers have repeatedly stated that consumers will pay, in increased vehicle price, for only 2–4 years in fuel savings' based on manufacturers' own market research." *Id*. (citation omitted).

In addition, NHTSA's assumption of a 2.5-year WTP value for consumers is inconsistent with the agency's previous position on the relative values of consumers' WTP for fuel economy and manufacturers' perception of consumers' WTP for fuel economy. As NHTSA described in the 2012 Final Rule, these are two different perspectives and there are reasons why they are not the same.[106] Given the uncertainty regarding the values for the two perspectives, NHTSA's sales analysis in the 2012 Final Rule looked at different pairings of consumer valuation of fuel savings (specifically, 1 year, 3 years, and 5 years[107]) with manufacturers' perception of consumers' valuation of fuel savings (specifically, 0 years, 1 year, 3 years, and 5 years). In that analysis, NHTSA explained that consumer valuation will generally be higher, stating: "NHTSA believes it is unlikely that manufacturers and consumers would value improvements in fuel economy identically, and believes that on average, manufacturers will behave more conservatively in their assumptions of how consumers value fuel economy than how on average consumers will actually behave. NHTSA expects that in practice the number of years fuel is valued by manufacturers will be shorter than the number of years fuel is valued by consumers." 77 Fed. Reg. 63,107.

In the Proposal, NHTSA has assumed that automakers believe that consumers value 2.5 years' worth of fuel economy improvements, and thus that automakers will apply fuel economy technology that pays for itself within those 2.5 years voluntarily. As a result, based on its prior reasoning, the level of consumer valuation of fuel savings would be greater than that value. NHTSA cannot now use the same level for both without providing a reasonable explanation for the change of position from its prior analysis.

Even just a small increase in consumer valuation of fuel savings in the sales and scrappage models has meaningful impacts on the agency's analysis. For example, in the Union of Concerned Scientists' Petition for Reconsideration of NHTSA's 2020 Final Rule, which also used the 2.5-year consumer WTP assumptions, the Petitioner ran the sales and scrappage

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[106] *See* 77 Fed. Reg. 63,102-03 (with the section heading, "How do consumers value fuel economy?") and 63,103-04 (with the section heading, "How do manufacturers believe consumers value fuel savings attributable to higher fuel economy?"). Commenters also discussed this in a letter to EPA's Science Advisory Board, explaining why "[g]iven historical evidence and market failures, a flat baseline fleet is the appropriate assumption [for manufacturer's application of fuel economy technology], while some level of consumer willingness to pay for fuel savings should be used in modeling sales"; this letter was subsequently submitted to both EPA and NHTSA. Center for Biological Diversity, et al., Comments for the EPA Science Advisory Board Jan. 22, 2020 Teleconference, Docket #NHTSA-2018-0067-12452, at 15-16 (Jan. 10, 2020). Attached as Exhibit 57.

[107] In including this value, NHTSA noted that it is "the average length of a loan." 77 Fed. Reg. at 63,105; *see also id*. at 63,103 (discussing "Turrentine and Kurani's in-depth interviews of 57 households," which found "almost no evidence that consumers think about fuel economy in terms of payback periods," and that when asked questions in those terms, "some consumers became confused while others offered time periods that were meaningful to them for other reasons, such as the length of their car loan or lease") (citing Turrentine, T.S. and K.S. Kurani, Car Buyers and Fuel Economy, 35 Energy Policy 1213–1223 (2007)).

models using a 3-year valuation instead of the agencies' 2.5-year valuation.[108] Using the agencies' estimates of both car and truck VMT with a 3-year WTP resulted in additional benefits of more stringent standards. For example, using the 3-year WTP decreased the net benefits of the fuel economy standards in the 2020 Final Rule (making the previous more stringent standards more beneficial by comparison), and also decreased the avoided accident-related fatalities projected under the 2020 Final Rule.[109] The same general principle would apply to NHTSA's Proposal. That is, if consumers are willing to pay for more than 2.5 years of fuel savings—something that NHTSA acknowledges is reasonable—the net benefits of the Proposal compared to the baseline would increase, meaning that the current benefits calculation results in an underestimation of the Proposal's benefits.

I. NHTSA's projections for VMT reductions due to COVID-19 do not match real-world trends and understate the fuel savings from more stringent standards.

NHTSA's projections for aggregate vehicle miles traveled do not track real-world trends since 2020, leading NHTSA to underestimate the benefits in fuel savings that would be shown with more accurate estimates. NHTSA notes that in 2016 and 2017, the annual VMT estimates of the Federal Highway Administration (FHWA) matched the CAFE modeling figures, and that this "consistent agreement" held through 2019. TSD at 472. Yet observed VMT decreased in 2020 (relative to 2019) due to decreased driving and mandated travel restrictions due to the COVID-19 pandemic. *Id*. NHTSA observed that in December 2020 VMT was 13% lower than it was in 2019, and the agency used that modified reference point to "project a reasonable path

[108] In the 2020 Final Rule, the agencies also erred in assuming a set amount of VMT (35,000 miles) for the first 2.5 years of a vehicle's life instead of using the agencies' own VMT estimates in the CAFE Model. For the evaluation conducted for the Union of Concerned Scientists' Petition for Reconsideration of NHTSA's 2020 Final Rule, the Petitioner used the agencies' actual VMT estimates for the first 3 years of a vehicle's life, and did separate model runs using car VMT and truck VMT, respectively, as upper and lower bounds of the effects. These values represent expected values for each class based on the mileage schedule and survival table found in the CAFE Model parameters file for the 2020 Final Rule. The car VMT used was 45,842, and the pickup VMT used was 53,600. *See* UCS Petition for Reconsideration at 47. We note that in the Proposal, NHTSA continues to rely on the 35,000-mile VMT value as representative of the first 30-months of fuel savings for a new vehicle. However, the VMT values in the Proposal are again higher than this assumption. If one bases the total on all Year 1 VMT, Year 2 VMT, and 50% of Year 3 VMT, the VMT for the first 30 months of a new vehicle in the Proposal is 38,733 for cars, 39,730.5 for vans and SUVs, and 45,488 for pickup trucks. *See* NHTSA input file "parameters_0000000.xlsx," "Vehicle Age Data" sheet. Even if NHTSA maintains a 30-month consumer valuation of fuel savings, NHTSA should update the corresponding VMT value in the sales model to be consistent with the VMT values in the overall analysis.

[109] Specifically, Petitioner's calculations showed a decrease in net benefits of the CAFE standards in the 2020 Final Rule when using a 3-year WTP for car VMT by $6.6 billion (from -$13.1 billion to -$19.7 billion) at the 3% discount rate and by $4 billion (from $16.1 billion to $12.1 billion) at the 7% discount rate. For truck VMT, the net benefits of the CAFE standards in the 2020 Final Rule decreased by $11.4 billion (from -$13.1billion to -$24.5 billion) at the 3% discount rate and by $6.8 billion (from $16.1 billion to $9.3 billion) at the 7% discount rate. It also reduced the avoided accident-related fatalities by between 190 (using car VMT) and 327 (using truck VMT). *Id.*

for VMT growth relative to pandemic levels that eventually returns to a growth trend similar to before the pandemic, but at a lower level of total VMT." *Id.* at 472-473.

Yet real-world figures show that overall VMT rebounded much faster than NHTSA expected. According to the FWHA's monthly Traffic Volume Trends report, every month since March 2021 has shown an increase in VMT as compared with that same month the previous year. For example, in March 2021 the seasonally adjusted VMT was 18.5% higher than in March 2020.[110] April 2021 was 56.5% higher than the same value the previous year; May 2021 was 31.1% higher; June 2021 was 14.9% higher; July 2021 was 13.1% higher.[111] As of August 2021, the most recent month analyzed, cumulative travel increased by 12.2% over the previous year.[112]

While NHTSA's reliance on preliminary figures might have been necessary during the promulgation of the NPRM, the agency should revisit its assumptions in the Final Rule. In particular, NHTSA should rely on the most recent Traffic Volume Trends reports of the Federal Highway Administration, which show that VMT has rebounded to pre-pandemic levels far faster than the agency expected. Higher VMT estimates will show higher overall benefits for NHTSA's proposed rule, and even higher benefits for Alternative 3.

J. NHTSA's assumptions and modeling of high compression ratio technologies overly restricts these technologies, improperly increasing the costs of more stringent standards.

In the compliance modeling for the Proposal, NHTSA arbitrarily blocks high compression ratio (HCR) technology from adoption in the fleet, improperly inflating the compliance costs of the standards and the projected purchase price increases for new vehicles. NHTSA also made what appear to be coding errors in modeling the application of these technologies, further restricting their adoption even beyond what the agency intended.

First, NHTSA does not allow any HCR technology (1) on vehicles that have 405 or more horsepower, (2) on pickup trucks and vehicles that share engines with pickup trucks, or (3) for

[110] Federal Highway Administration, Traffic Volume Trends Report (March 2021), available at https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21martvt/21martvt.pdf. Attached as Exhibit 58.
[111] Federal Highway Administration, Traffic Volume Trends Reports (May 2021), available at https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21maytvt/21maytvt.pdf, attached as Exhibit 59; Federal Highway Administration, Traffic Volume Trends Report (June 2021), available at https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21juntvt/, attached as Exhibit 60; Federal Highway Administration, Traffic Volume Trends Report (July 2021), available at https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21jultvt/, attached as Exhibit 61.
[112] Federal Highway Administration, Traffic Volume Trends Report (August 2021), available at https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21augtvt/21augtvt.pdf. Attached as Exhibit 62.

some manufacturers that are heavily performance-focused, and have demonstrated a significant commitment to power dense technologies. TSD at 188. In addition, NHTSA has blocked “HCR2” technology - which is based on the Atkinson Cycle engine technology and adds cylinder deactivation and cooled exhaust gas recirculation - from being adopted by any vehicle. *Id.* at 200. NHTSA’s justifications for these restrictions are unfounded and arbitrary, as has been explained numerous times before. *See, e.g.*, State and Local Govt. Pet’rs’ Br. at 68-70; UCS Petition for Reconsideration for NHTSA’s 2020 Final Rule at 10-13, 70-72. In the Final Rule, NHTSA should allow the adoption of HCR and HCR2 technology in the fleet without these restrictions.

It also appears that NHTSA has made coding errors in its modeling of these technologies, improperly blocking them even beyond what the agency intended. NHTSA failed to allow “HCR1D” technology (an Atkinson-enabled engine with cylinder deactivation, *see* TSD at 171-72) to be adopted in compliance modeling in the central analysis even though it intended for that technology to be available, *id*. This is seen in the technologies file for the modeling, where the “availability” of HCR1D is left blank (i.e., not set to “true”), causing that technology to be unavailable for adoption in the modeling.[113] The same error appears to have occurred in the sensitivity case where NHTSA intended to allow HCR technologies, including HCR2, for all automakers and vehicle types (*see* PRIA at 223 (“No HCR skip” case)). While NHTSA appears to have removed the “skip” codes for these technologies for vehicles, they did not make them “available” in the technologies file (i.e., neither HCR1D and HCR2 were made available in the technologies file), meaning that NHTSA modeled the broader application of “HCR0” and “HCR1” (*see* TSD at 172 for definitions of these technologies), but not of HCR1D and HCR2. NHTSA should correct these coding errors in the final rule, and also use the assumptions in this sensitivity case for the central analysis for the reasons described above.

IV. <u>NHTSA need not finalize its fuel economy standards at the same time as EPA finalizes revised GHG emission standards</u>

Commenters urge NHTSA to finalize its rulemaking as soon as possible, and certainly before April 2022. However, if, as is very likely given the agencies’ current pace, EPA finalizes its revised light duty vehicle greenhouse gas emission standards before NHTSA finalizes this rulemaking, NHTSA should take EPA’s new standards fully into account before finalizing its own rule.

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[113] Model Files Central Analysis/inputs/technologies_000000.xlsx, Sensitivity_Analysis_Inputs/technologies/technologies_02000.xlsx.

There is no doubt that NHTSA and EPA need not proceed by means of a joint rulemaking. No statute or regulation states that they must. Instead, NHTSA and EPA, like other federal agencies, may comment on each other's proposals along with the public, *see* 42 U.S.C. § 7607(d)(4)(B)(i), and also during the interagency review process, *see id.* § 7607(d)(4)(B)(ii). EPA must consider any "significant comments, criticisms, and new data" NHTSA offers in comments. *Id.* § 7607(d)(6)(B). But nothing compels the agencies to proceed in tandem.

NHTSA previously has conducted joint rulemakings with EPA at the President's urging, *see* Presidential Memorandum, Improving Energy Security, American Competitiveness and Job Creation, and Environmental Protection Through a Transformation of Our Nation's Fleet of Cars and Trucks, 75 Fed. Reg. 29,399, 29,399 (May 21, 2010); Executive Order 13,432 § 3(a), *reprinted at* 72 Fed. Reg. 27,717, 27,717 (May 14, 2007), or as an exercise of discretion. But neither agency has suggested that joint rulemaking is required by statute or regulation, and past practice is not binding.

In the instant case, NHTSA should finalize its rulemaking as soon as it can take EPA's final rule into account. EPA, which issued its proposal first, will very likely be able to publish a final rule before NHTSA can do so. When setting CAFE standards for future model years, NHTSA must consider EPA's emission standards as "other motor vehicle standards of the Government." 49 U.S.C. § 32902(f); *see* Proposal, 86 Fed. Reg. at 49,793 (noting that, since EPA first set standards for vehicular GHG emissions, "NHTSA has considered [them]" under this provision); 2020 Final Rule, 85 Fed. Reg. at 25,137 (NHTSA considering fuel economy effects of EPA's GHG standards before prescribing MY 2021-2026 CAFE standards). NHTSA will be better able to thoroughly consider EPA's imminent new standards if it waits until they are finalized. We thus urge NHTSA to complete its rulemaking when NHTSA can fully consider the effect of EPA's newest, final vehicle emissions standards.

V. NHTSA Should Eliminate the Proposed Full-sized Pickup Truck Incentives and Eliminate, or at Minimum Reduce and Reform, the Off-Cycle Credits Program

Because the full-sized pickup truck credits and the additional off-cycle credits NHTSA proposes erode its standards' real-world results without concomitant gains, Commenters urge NHTSA not to promulgate them. NHTSA should also either end the off-cycle credit program altogether, or, at a minimum, fundamentally reform it so that any credits bestowed actually equal the real-world fuel economy improvement they claim to achieve.

A. NHTSA should not reinstate full-size pickup truck incentives.

Since 2012, NHTSA has allowed credits intended to incentivize the application of mild (0.0011 gallon/mile) or strong (0.0023 gallon/mile) hybrid technologies to full-sized pickup trucks if manufacturers meet minimum production thresholds or if the vehicles achieved 15 or 20 percent better performance than similar internal combustion pickup trucks. Proposal, 86 Fed. Reg. at 49,831-33. The incentives constitute "phantom," or windfall, credits because they come in addition to the fuel efficiency improvements these trucks already achieve when the technology is installed. Nonetheless, the incentives were intended to spur the advancement of hybrid technology and its application to these vehicles on a wider scale in the early years of the program. But in the ensuing nine years, no manufacturer has applied for them, and the 2020 Final Rule terminated them at the end of MY 2021. *Id*. at 49,833.

NHTSA nevertheless proposes to reinstate them to further incentivize advanced technology penetration into this market segment. It does not, however, show that manufacturers would not install the technology absent the extra incentives, particularly since automakers (and the public) will already reap the benefits that come from the resulting fuel economy increase – for automakers, by increasing their fleets' average fuel efficiency, and for the public, in the form of higher fuel efficiency and pollution harm reduction.

To justify extending these credits, NHTSA points, counterintuitively, to the ongoing electrification of full-size pickup trucks. *Id*. Full electrification has indeed already penetrated the light duty truck segment, with extremely positive consumer uptake. As of early June 2021, Ford had reached 100,000 reservations for its 2022 Ford F-150 electrified full-size truck.[114] Rivian's electric R1T will be released this year.[115] General Motors is planning an electric version of its popular Chevrolet Silverado for 2023.[116] Tesla's electric Cybertruck production is slated for 2022.[117] And Bollinger's electric B2's production is also slated for 2022.[118] While this trend clearly shows that automakers are turning to the much more meaningful solution of electrification "due to [its] exceptional fuel saving benefits," Proposal, 86 Fed. Reg. at 49,833, it does not demonstrate a need to incentivize the much less effective hybrid technologies.

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[114] Howard, P., *Demand soars for Ford's electric F-150 Lightning: 100,000 pre-orders placed*, Detroit Free Press (June 10, 2021), https://www.freep.com/story/money/cars/ford/2021/06/10/ford-f-150-lightning-electric-demand-reservation-orders/7633277002/, attached as Exhibit 63.
[115] Loveday, E., *Electric Trucks - Every Upcoming Pickup Truck For 2021-2022*, InsideEVs (July 6, 2021), https://insideevs.com/car-lists/electric-trucks/, attached as Exhibit 64.
[116] Dorian, D., *2023 Chevrolet Silverado EV*, Car and Driver, http://www.caranddriver.com/chevrolet/silverado-ev (last visited Oct. 25, 2021), attached as Exhibit 65.
[117] *Tesla Cybertruck: Everything we know so far*, Electrek, https://electrek.co/guides/tesla-cybertruck/ (last visited Oct. 25, 2021), attached as Exhibit 66.
[118] *FAQs*, Bollinger Motors, https://bollingermotors.com/faqs/ (last visited Oct. 25, 2021), attached as Exhibit 67.

Nonetheless, NHTSA would in effect *double* the windfall by applying both the incentives for alternative fueled vehicles and full-size pickup truck hybridization credits to these vehicles. *Id.*

NHTSA also states that, because some manufacturers have now announced plans to make qualifying trucks, credits should be reinstated because of "the potential role incentives could play in increasing the production of these technologies." *Id.* But again, since manufacturers are already applying hybridization at a time when no credits are in place, reinstating them can only serve as windfalls that reduce the overall effectiveness of NHTSA's rulemaking.

There is no evidence additional incentives are needed to spur the development of less-polluting trucks. We urge NHTSA not to reinstate them.

B. NHTSA should not increase the cap for off-cycle credits and should instead reduce and reform the off-cycle program.

Off-cycle credits find their genesis in the proposition that some technologies can produce real-world fuel economy improvements even though those reductions are not captured or measured for compliance by the so-called two-cycle testing system. Although any real-world improvements could be measured for the vast majority of these technologies by employing a five-cycle test (which, for example, captures results at high vehicle speeds, acceleration or cold temperatures), that test procedure is more expensive and time-intensive. Under both test procedures, testing is done by manufacturers; neither NHTSA nor EPA engage in testing when reviewing and approving off-cycle credit applications. Proposal, 86 Fed. Reg. at 49,834-35. In the 2012 Final Rule, NHTSA for the first time promulgated regulations allowing it to consider off-cycle credits both in its standard setting and in its compliance calculations (and thus in its "unconstrained" analysis) beginning with MY 2017. *Id.* at 49,655, 49,798, 49,834.

Manufacturers currently use three ways to obtain off-cycle credits: (1) They install pre-approved technology from a category list, or "menu," and receive pre-set credit values, with minimal or no data submittal or testing requirements. EPA approves the application if the technology meets regulatory definitions. *Id.* at 49,834. (2) Manufacturers test the technology and its emission benefits using the five-cycle testing procedure and submit the results for EPA approval. *Id*. at 49,834-35. (3) Manufacturers can seek EPA review, through a notice and comment process, to use an alternative methodology on a case-by-case basis demonstrating the benefits of the off-cycle technology on their vehicle models. *Id.* at 49,835.

NHTSA now proposes not only to retain the program, but to increase the cap for the first pathway for credit approval (it proposes no cap for credits approved under the latter two pathways). *Id*. at 49,838. However, the agency has noted that EPA previously expressed considerable reservations about the substance of the program, having capped menu credits to 10 g/mile per model year, and then declined to increase the cap, "[d]ue to the uncertainties associated with combining menu technologies and the fact that some uncertainty is introduced because off-cycle credits are provided based on a general assessment of off-cycle performance, as opposed to testing on the individual vehicle models." *See id.* at 49,837. In other words, it is far from clear whether new technologies manufacturers claim fall within the menu categories actually deliver the real-world results for which they receive credit. These uncertainties arise from a number of individual factors, and are compounded by their combination: the lack of data submission; the lack of testing; and the practice of "one-size-fits-all installation" by which carmakers install the same technology not just on the specific vehicle type and model they tested, but also on many or all of the other cars and trucks in their fleets, without submitting any test data on the level of emissions reductions, if any, they generate on these different and diverse vehicles.[119] Another uncertainty comes from automakers' summing the fixed credit amounts allocated to each new menu credit they receive with already existing menu credits, without any verification -- by them or by any agency -- that the summed technologies, all installed in the same vehicles, are in fact additive, in the summed amount or any other, under real-world conditions.

NHTSA's Proposal describes serious and fundamental additional procedural concerns. NHTSA explains that since 2017 the off-cycle application process has caused "significant challenges in finalizing end-of-the-year compliance processes for the agencies." 86 Fed. Reg. at 49,836. In particular, NHTSA explains that some manufacturers do not seek early reviews to determine technology eligibility, a review process NHTSA describes as of "critical importance," *Id.* at 49,835, even though automakers may begin their technical development and testing as much as six years before applying for credits, *id*. NHTSA reports that some manufacturers miss deadlines and submit applications late – or even retroactively, and explains that as a result, EPA "has had to identify and correct multiple testing and analytical errors after the fact." *Id.* NHTSA describes the current situation as follows:

> The backlog of retro-active and pending late off-cycle requests have delayed EPA from recalculating NHTSA's MY 2017 finals and from completing those for MYs 2018 and 2019. Fifty-four off-cycle non-menu requests have been submitted to EPA to date.

[119] Off-cycle technologies receive a one-size-fits-all credit amount even though their application in any particular vehicle may result in wholly different emissions reductions. For example, credits are fixed for active or passive cabin ventilation and active engine or transmission warm-ups, regardless of the characteristics of the vehicle.

> Nineteen of the requests were submitted late and another seven apply retroactively to previous model years starting as early as model year 2015. Since these requests represent potential credits or adjustments that will influence compliance figures, CAFE final results cannot be finalized until all off-cycle requests have been disposed. . . . [¶] These late reports amount to more than just a mere accounting nuisance for the agencies; they are actively chilling the credit market.

Id. at 49,836. In short, the off-cycle credit program has prevented NHTSA from being able to calculate, or inform the public about, manufacturer compliance results since MY 2017, the last year for which NHTSA has issued compliance results. The program is so bogged down that they impede vital functions.

Despite its acknowledgment of the interacting uncertainties concerning whether off-cycle credits properly reflect actual emissions reductions, and despite its account of a vast, time-consuming and expensive backlog impeding accurate compliance calculations, NHTSA now proposes to increase the menu credit cap to 15 g/mile, beginning with MY 2024.

NHTSA should reject the proposed cap increase. If it retains the off-cycle program, it should further restructure off-cycle credits as soon as possible to provide more comprehensive data and necessary guardrails to avoid the problems described above. NHTSA's description of the current state of the application process demonstrates it is not performing as intended, despite efforts since the 2020 Final Rule to improve it. 86 Fed. Reg. at 49,836. Disregarding pleas from the agencies for more and early information, manufacturers are not keeping them apprised of the technologies for which they plan to request credit. They routinely fail to heed the various application process deadlines, submitting applications late – and even retroactively. *Id.* The number of unresolved credit applications, their timing, uncertainty about whether technology fits within a menu category, and the existing backlog has impeded vital functions at NHTSA – including the accurate measurement of compliance levels and the timely conveyance of this information to the public. Indeed, as of October 24, 2021, NHTSA still had not made public manufacturers' performance data since MY 2017 or for any of the model years thereafter.

At a minimum, NHTSA should not add to the problem by expanding the menu program cap – particularly since the process is already overwhelming the agencies, even though many manufacturers have not yet reached the existing cap. NHTSA should not expand a program that EPA and NHTSA both acknowledge is rife with substantive and procedural problems. The time and money spent, which is already extraordinary and deeply disruptive, would only increase, as would the uncertainty about actual results. And yet, NHTSA would still not be in possession of comprehensive testing data across the fleet.

In addition to rejecting the proposed cap increase, we strongly urge NHTSA to codify provisions that prohibit, without exception, the submission of any application that has missed any of the applicable deadlines, which should not be subject to negotiation but fixed by regulation. These changes are clearly needed to avoid otherwise inevitable additional processing time, expense and delay in determining and reporting compliance results. As NHTSA has explained, manufacturers plan for off-cycle submissions years before the submission deadlines, and there is no reason to introduce additional delay, expense, and uncertainty about compliance and the status of approved credits. In light of the serious problems of the entire off-cycle process, we also urge NHTSA not to add more technologies to the menu list. The process should not be "streamline[d]," as NHTSA suggests, 86 Fed. Reg. at 49,837, but instead should be curtailed or eliminated or, at a minimum, reformed and made sound. To that end, NHTSA should require the submission of much more comprehensive testing results to assure accuracy, particularly for menu credit applications to vehicles in which the technology has not been tested and in instances requesting automatic, and untested, "summing" of menu credits. To be viable, the program must be able to demonstrate that the credits it awards actually reduce fuel consumption in the real world, and not only on paper.

Commenters agree that NHTSA, at a minimum, should finalize its proposal to deny credits for technology impairing safety, strip credits that do not provide the intended fuel savings, and implement its proposed definitional changes.

VI. <u>NHTSA should work with the Department of Energy to ensure the equivalent petroleum-based fuel economy values imputed to EVs do not undermine the CAFE program</u>

Current Department of Energy (DOE) regulations impute an artificially high fuel economy value to electric vehicles (EVs) for use in CAFE compliance calculations. These imputed values are not directly relevant to the determination of what standards are maximum feasible in the current rulemaking because of the statutory limitation on "consider[ing] the fuel economy of [EVs]" in making that determination. *See* 49 U.S.C. §§ 32901(a)(1), (8), § 32902(h). But these imputed values are relevant to the effect the standards have in the real world. Because CAFE is a fleet average standard, an artificial increase in EV fuel economy far above the average means that automakers do not need to improve the fleet efficiency of their below-average ICEVs nearly as much to comply with the standard. Some Commenters here have submitted a petition to DOE to update its EV equivalency regulations,[120] and, as explained below, NHTSA should work with DOE to ensure that any updates to their regulations further the goals of the CAFE program.

In calculating automakers' compliance with CAFE standards, the EPA Administrator is required to include in the average calculation "equivalent petroleum based fuel economy values" for any EVs an automaker produces. 49 U.S.C. § 32904(a)(2)(B). These values are "determined by the Secretary of Energy" "based on the following factors:

> (i) the approximate electrical energy efficiency of the vehicle, considering the kind of vehicle and the mission and weight of the vehicle.
>
> (ii) the national average electrical generation and transmission efficiencies.
>
> (iii) 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.
>
> (iv) the specific patterns of use of electric vehicles compared to petroleum-fueled vehicles."

Id. DOE is supposed to review EV equivalency values "each year" and "propose necessary revisions based on" these factors. *Id*.

DOE last updated the equivalency value regulations in 2000. *See* Electric and Hybrid Vehicle Research, Development, and Demonstration Program; Petroleum-Equivalent Fuel Economy Calculation, Final Rule, 65 Fed. Reg. 36,986 (June 12, 2000). These regulations for calculating a petroleum-equivalency factor (PEF) are, at a minimum, out of date, as inputs such as the "U.S. average fossil-fuel electricity generation efficiency" have changed since 2000. *See id.* at 36,987.

DOE's PEF calculations also include a "fuel content" factor with a fixed value of "1/0.15." *Id*. This factor originates not from the required Section 32904 factors above, but rather from Section 32905 applicable to alternative liquid and gaseous fueled vehicles. *See* 49 U.S.C. § 32905; 65 Fed. Reg. at 36,987. The 0.15 comes from the "15 percent unleaded gasoline by volume" found in the liquid alternative fuels E85 and M85. *See* Electric and Hybrid Vehicle Research, Development, and Demonstration Program; Petroleum-Equivalent Fuel Economy Calculation, Proposed Rule, 64 Fed. Reg. 37,905, 37,907 (July 14, 1999). In effect, the fuel

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[120] NRDC & Sierra Club, Petition for Rulemaking to Update Department of Energy Regulations at 10 C.F.R. part 474: Electric and Hybrid Vehicle Research, Development, and Demonstration Program; Petroleum-Equivalent Fuel Economy Calculation (Oct. 22, 2021), attached as Exhibit 68.

content factor adds "a multiple of 6.67" to every EV's imputed fuel economy. 65 Fed. Reg. at 36,987. While acknowledging that this multiple "substantially overstate[s]" the "true energy efficiency" of the vehicles, *see* 64 Fed. Reg. at 37,907, DOE proposed to include it for reasons of "consistency" and to "help to accelerate the early commercialization of [EVs]." *Id*. at 37,906, 37,908.

Whatever the merits of this approach in 2000, in 2021 the early commercialization of EVs has already occurred and EVs comprise a significant and increasing share of new motor vehicle sales each model year.[121] NHTSA should work with DOE to help DOE understand this and other changed circumstances to help ensure that the fuel economy imputed to EVs is "based on" the 49 U.S.C. § 32904 factors and is not set at a level that undermines the overarching statutory goals of energy and fuel conservation. The "fuel content factor" is, at a minimum, not required by Section 32904. To be sure, Commenters believe that producing significant and increasing numbers of EVs should be an available means for automakers to comply with increasingly stringent CAFE standards. But the relative energy efficiency of EVs compared to ICEVs, coupled with the ongoing shift to increasingly efficient electricity generation from renewable sources, should ensure that EVs will inherently compare favorably to leading ICEVs in terms of energy consumption. The statute further provides DOE additional discretion—through consideration of factors subject to less precise quantification such as "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," 49 U.S.C. § 32904(a)(2)(B)(iii)—to adjust the PEF to a final value that will optimize the overall real-world reduction in fuel consumption and achieve the core purpose of EPCA's fuel economy chapter. Given the timing for promulgating near-term MY LDV CAFE standards, it may be most beneficial for NHTSA to integrate any updated DOE regulations for later MY rulemakings.

VII. NHTSA has unlawfully adjusted the Minimum Domestic Passenger Car Standard

As it did in the 2020 Final Rule, NHTSA has again unlawfully weakened the Minimum Domestic Passenger Car Standard (MDPCS) by "adjusting" the projected total passenger car fleet fuel economy from the central analysis. *See* Proposal, 86 Fed. Reg. at 49,789.

In setting CAFE standards, NHTSA projects the fuel economy for the fleet as a whole, including for passenger cars. These projections are premised on the "footprint" size of a

[121] *E.g.* The White House, Press Release, *FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks* (Aug. 5, 2021) ("President Biden Outlines Target of 50% Electric Vehicle Sales Share in 2030 . . . ."), *available at* https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/, attached as Exhibit 69.

vehicle[122]—essentially, "smaller vehicles will have more stringent targets than larger vehicles." *Id*. at 49,611. As a result, analyzing the impacts of the standards requires NHTSA to make projections about the footprint size of the vehicles in the fleet, as this affects average fleetwide fuel economy levels—and thus fuel consumption and emissions, as well as compliance costs.[123]

In addition to setting CAFE standards, EPCA also requires that domestic passenger car fleets meet a minimum standard, which is calculated as "92 percent of the average fuel economy projected by the Secretary for the combined domestic and nondomestic passenger automobile fleets manufactured for sale in the United States by all manufacturers in the model year, which projection shall be published in the Federal Register when the standard for that model year is promulgated in accordance with 49 U.S.C. 32902(b)." Proposal, 86 Fed. Reg. at 49,788 (citing 49 U.S.C. 32902(b)(4)).

But in the NPRM, NHTSA proposes to "adjust" the average fuel economy of all passenger cars from the central analysis and instead base the MDPCS on that. NHTSA defended using an adjusted projection for the domestic-car standard by asserting that its projections of average fuel economy in prior rulemakings proved to be somewhat too high. 86 Fed. Reg. at 49,789. Those prior projections underestimated demand for larger passenger cars, which have lower fuel economy, meaning that the minimum domestic standards were 1.9% more stringent than if they had been calculated based on subsequent actual sales. *Id*. Consequently, NHTSA "offset" its actual projection of average passenger-car fuel economy by 1.9% and used the adjusted projection to set minimum domestic passenger-car standards. *Id*.

As in the 2020 Final Rule, NHTSA states that it "recognizes industry concerns that actual total passenger car fleet standards have differed significantly from past projections," and additionally notes that "[s]ome of the largest civil penalties for noncompliance in the history of the CAFE program have been paid for noncompliance with the MDPCS," and that a properly calculated MDPCS "may pose a significant challenge to certain manufacturers." *Id*.

But none of these are lawful or reasonable bases for altering a statutorily defined standard. The inconsistent projections are arbitrary, capricious, and contrary to law. NHTSA either believes the projections underlying its core analysis of the fleetwide standards, or it does not. NHTSA cannot rely on one projection to justify and project costs and benefits of its fleetwide standards and then rely on another, inconsistent projection to support the statutorily

[122] Footprint is defined as "the product of vehicle wheelbase and average track width," 86 Fed. Reg. at 49,627, and "vehicle footprint is roughly measured as the rectangle that is made by the four points where the vehicle's tires touch the ground," *id.* at 49,611.
[123] "[E]ach manufacturer thus will have a CAFE average standard for each year that is almost certainly unique to each of its fleets, based upon the footprints and production volumes of the vehicle models produced by that manufacturer." 86 Fed. Reg. at 49,628.

required minimum domestic passenger-car standard. *See Gas Appliance Mfrs. Ass'n v. DOE*, 998 F.2d 1041, 1048 (D.C. Cir. 1993) ("[The agency] cannot use one set of conditions for the standard itself, and another, more favorable set, to estimate the proposed compliance method's likely achievements for cost/benefit purposes.").

It appears that NHTSA conducted a sensitivity analysis that adjusted the average passenger-car fuel economy in the central analysis to be consistent with the trend it found for passenger car footprints from 2008-2020. Proposal, 86 Fed. Reg. at 49,790. That analysis shows that MY 1981-2029 net benefits would increase to $3.8 billion, PRIA at 227, Table 7-2, and resulted in MDPCS for MY 2024-26 closer to NHTSA's "adjusted" levels, 86 Fed. Reg. at 49,791.

While we have not analyzed the basis for the passenger-car 2008-2020 estimates in detail, and question whether the trend will continue to progress linearly, it is clear that NHTSA needs to reconcile its position and rely on a single projection of future passenger car footprints and fuel economy for the central analysis and for setting the MDPCS.

VIII. More stringent standards promote environmental justice and equity

NHTSA's Proposal will provide benefits to environmental justice communities by reducing harm from climate change and pollution exposure, and Alternative 3 would bring even greater benefits to vulnerable populations that suffer the brunt of pollution and climate change harms. NHTSA appropriately recognizes that environmental justice communities are disproportionately affected by climate change and pollution impacts from light duty vehicles and upstream emissions, and addressing these harms by providing these communities relief more quickly—a priority for this Administration—is another compelling reason that NHTSA should adopt Alternative 3.

A. More stringent standards would bring greater benefits to environmental justice communities.

1. *Improving vehicle fuel economy would bring climate change benefits to environmental justice communities.*

Improving the fuel economy of light duty vehicles will indirectly help reduce the significant harm that climate change inflicts on environmental justice communities. For calendar years 2023 through 2050, Alternative 2 would avoid 205 billion gallons of gasoline consumption and 1,845 million metric tons of CO_2 emissions, providing net benefits of $100 billion. Proposal, 86 Fed. Reg. at 49,607, Tbl. I-3. Under Alternative 3, the emissions reductions and benefits are even larger: Alternative 3 would avoid 290 billion gallons and 2,615 million metric tons of CO_2 emissions, with net benefits of $132 billion. *Id*. Looking out through 2100, Alternative 2 would decrease light duty vehicle greenhouse gas emissions by 7 percent compared to the No Action Alternative (retention of the SAFE standards) and Alternative 3 would reduce light duty vehicle greenhouse gas emissions by 10 percent. Draft SEIS at S-14.

These reductions are significant on a national and global scale because greenhouse gas emissions from cars are a consequential portion of national and also international greenhouse gas emissions. Emissions from the transportation sector are the largest source (35%) of greenhouse gas in the country, and light duty vehicles are the largest portion of that (58%), thus contributing 20 percent of all United States' greenhouse gas emissions. Draft SEIS at S-13, Fig. S-3 (reporting data from 2019). The United States is responsible for a large portion—approximately 15 percent—of global CO_2 emissions, and is the second largest emitter in the world.[124] As the Supreme Court found in *Massachusetts v. EPA*: "A reduction in domestic emissions would slow the pace of global emissions increases, no matter what happens elsewhere." 549 U.S. 497, 500 (2007).

Reducing climate harm as an indirect consequence of improving light duty vehicle fuel economy will benefit environmental justice communities because, as NHTSA has aptly described, climate change disproportionately affects these communities. Proposal, 86 Fed. Reg. at 49,795. As NHTSA explained, "[i]n terms of exposure to climate change risks, the literature suggests that across all climate risks, low-income communities, some communities of color, and those facing discrimination are disproportionately affected by climate events." *Id.* Climate impacts, such as increasing temperatures, "disproportionately affect minority and low-income populations because of socioeconomic circumstances, histories of discrimination, and inequity," Draft SEIS at 7-16, and "[c]ommunities overburdened by poor environmental quality experience increased climate risk due to a combination of sensitivity and exposure." 86 Fed. Reg. at 49,795. Adverse effects are particularly acute for urban populations experiencing inequities and health issues, which have greater susceptibility to climate change, "underscoring the potential benefits of improving air quality to communities overburdened by poor environmental quality." *Id.* Finally, indigenous peoples in the United States "face increased health disparities that cause increased sensitivity to extreme heat and air pollution." *Id.*

Since the publication of NHTSA's Proposal, EPA published an important new analysis of the disproportionate climate impacts on vulnerable populations. The study quantifies the increased risks of climate change on socially vulnerable populations in six categories: Air Quality and Health; Extreme Temperature and Health; Extreme Temperature and Labor; Coastal Flooding and Traffic; Coastal Flooding and Property; and Inland Flooding and Property, using

[124] UCS, *Each Country's Share of CO_2 Emissions* (updated Aug. 12, 2020), https://www.ucsusa.org/resources/each-countrys-share-co2-emissions, attached as Exhibit 70.

data on where people live as an indicator of exposure.[125] The report concludes that Black and African American individuals will likely face higher impacts of climate change across all the impacts analyzed compared to most other demographic groups. Black and African Americans are 40% more likely to live in communities with the highest increase in premature mortality from extreme temperatures, and 34% are more likely to live in areas with the highest increases in asthma diagnoses with 2°C (3.6°F) of global warming.[126] Hispanic and Latinos are also significantly more likely to live in areas where impacts are projected to be highest.[127] Low-income individuals and those without a high school diploma have 25-26% greater risk of living in areas with the highest extreme temperature labor hours lost.[128]

And as we witness time and again with each unfolding disaster, the most vulnerable populations suffer most from climate change fueled extreme events. Taking recent events in this country as illustrative examples, it is economically disadvantaged, low-wage outdoor workers, homeless and elderly people who died from heat stroke in the Northwest heat wave,[129] an event that researchers found would have been "virtually impossible without human-caused climate change."[130] In New Orleans, the people who could not evacuate before disastrous Hurricanes Katrina or Ida struck land are those who do not have the means or ability to.[131] In New York City, people who could only afford to live in illegal basement apartments died as a result of flooding.[132] During the western wildfire season, those without homes or means do

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[125] EPA, *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts*, EPA 430-R-21-003 (2021) at 5, *available at* https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf, attached as Exhibit 71.

[126] *Id.* at 79.

[127] *Id.* at 76.

[128] *Id.* at 77.

[129] *E.g.*, Irfan, U., *Extreme heat is killing American workers*, Vox (Jul. 21, 2021), https://www.vox.com/22560815/heat-wave-worker-extreme-climate-change-osha-workplace-farm-restaurant, attached as Exhibit 72; Geranios, N., *Pacific Northwest strengthens heat protections for workers*, AP News (Jul. 9, 2021), https://apnews.com/article/business-science-health-environment-and-nature-washington-c463fc55ab6b601cf70b2fd73644f973, attached as Exhibit 73; Peterson, D., *New data shows scope of heatwave-related homeless deaths*, KOIN (Jul. 23, 2021), https://www.koin.com/news/special-reports/new-data-shows-scope-of-heatwave-related-homeless-deaths, attached as Exhibit 74; Bella, T., *Historic heat wave in Pacific Northwest has killed hundreds in U.S. and Canada over the past week*, The Washington Post (Jul. 1, 2021), https://www.washingtonpost.com/nation/2021/07/01/heat-wave-deaths-pacific-northwest/, attached as Exhibit 75.

[130] World Weather Attribution, *Western North American extreme heat virtually impossible without human-caused climate change* (Jul. 7, 2021), https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change/, attached as Exhibit 76.

[131] *E.g.,* Willingham, L., *"We can't afford to leave": No cash or gas to flee from Ida*, The Denver Post (Aug. 29, 2021), https://www.denverpost.com/2021/08/29/hurricane-ida-no-money-evacuate/, attached as Exhibit 77; *see also* Wade, L., *Who Didn't Evacuate for Hurricane Katrina?*, Pacific Standard (Aug, 31, 2015, updated June 14, 2017), https://psmag.com/environment/who-didnt-evacuate-for-hurricane-katrina, attached as Exhibit 78.

[132] Haag, M. & J. Bromwich, *Most of the apartments where New Yorkers drowned were illegal residences*, The New York Times (Sept. 3, 2021), https://www.nytimes.com/live/2021/09/03/nyregion/nyc-flooding-ida#nyc-illegal-basement-apartment-ida, attached as Exhibit 79.

not have the luxury of filtered air to protect their lungs.[133] To help address the urgency of the climate crisis on vulnerable populations, NHTSA must adopt the more stringent Alternative 3.

2. *Significant decreases in vehicle and upstream non-GHG emissions over time will provide benefits to environmental justice communities.*

In addition to resulting in significant GHG reductions, NHTSA's Proposal will reduce tailpipe emissions over time as well as upstream emissions from refineries, Draft SEIS at 7-16, both of which will benefit environmental justice communities, *id.* at 7-11 – 7-12.

Proximity to refineries has been found to be correlated with incidences of cancer and leukemia. Draft SEIS at 7-11. At the same time, non-white groups are significantly overrepresented in areas surrounding refineries. As NHTSA notes, a 2003 study found that 56 percent of people living within three miles of oil refineries in the United States are minorities, nearly double the national average. Draft SEIS at 7-12 (citing O'Rourke & Connolly (2003)). By reducing gasoline consumption, NHTSA's proposal will decrease refinery emissions and benefit nearby communities. As noted above, reductions in gasoline consumption are substantially greater under Alternative 3—290 billion gallons between calendar year 2023 and 2050 as compared with 205 billion gallons for Alternative 2—resulting in greater refinery emission reductions and larger environmental justice benefits.

Cleaner, more fuel-efficient vehicles will also benefit communities living in proximity to roadways. As NHTSA explains, living near high-traffic roadways can result in adverse cardiovascular and respiratory impacts. Draft SEIS at 7-12 (citing studies). At the same time, "[s]tudies have consistently demonstrated a disproportionate prevalence of minority and low-income populations that are living near mobile sources of pollutants and therefore are exposed to higher concentrations of criteria air pollutants in multiple locations across the United States." Draft SEIS at 7-12 (citing Hajat et al. 2013). By burning less fuel, more fuel-efficient vehicles emit less pollution and improve the air quality near roadways.

Notably, the immediate benefits more stringent standards will provide from reductions in upstream refining and over time from tailpipes vastly outweigh any potentially small non-GHG emissions increases from rebound driving and upstream electricity generation. Focusing on harmful fine particulate (PM2.5) emissions, reducing refinery emissions may be more beneficial to environmental justice communities as a whole than reducing emissions from electric generation. NHTSA has concluded that refineries have far higher health benefits per ton

[133] *E.g.,* Kardas-Nelson, M., *Racial and Economic Divides Extend to Wildfire Smoke, Too*, InvestigateWest (Sept. 21, 2020), *at* https://www.invw.org/2020/09/21/racial-and-economic-divides-extend-to-wildfire-smoke-too/, attached as Exhibit 80.

of emission reductions than do electricity generating units due in part to greater proximity to population.[134]

B. Upstream electricity generation emissions will continue to decrease as clean energy generation continues to displace fossil energy.

President Biden's Climate Executive Order 14008 commits to achieve a carbon-free electricity sector no later than 2035, and to "deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; . . . and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure."[135]

Relatedly, EPA is or soon will be reconsidering at least two major rules regarding electric utility generating units that may further increase the already-comparatively expensive operating costs of coal plants. EPA is reconsidering revised CO2 standards for existing fossil fuel-fired power plants under Clean Air Act section 111(d) after the Court of Appeals for the D.C. Circuit's remand in *American Lung Association v. EPA*. 985 F.3d 914, 995 (D.C. Cir. 2021) (holding that "the ACE Rule must be vacated and remanded to the EPA so that the Agency may 'consider the question afresh in light of the ambiguity we see.'"). Continued operation of coal-fired power plants may also be affected by EPA's review of the Mercury and Air Toxics Standards hazardous air pollutant rules[136] and possibly the national ambient air quality standards for PM2.5.

Even without new policies and rules requiring coal plants to internalize pollution costs, clean energy generation continues to increase while fossil fuel use is declining. The cost of clean energy generation technologies has fallen dramatically over the previous decade and is increasingly below the cost of conventional fossil fuel generation.[137] The U.S. Energy Information Administration reported that electricity generation from renewable sources

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[134] *See, e.g.*, TSD Tbls 6-22 & 6-23 (estimating benefit per ton of PM2.5 reduced from upstream electricity generation in 2030 using a 3% discount rate at $190,000-$430,000 as compared to $450,000-$1,000,000 per ton of PM2.5 reduced from refineries under the same assumptions).

[135] Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7619, 7622-24 (Jan. 27, 2021), attached as Exhibit 81.

[136] EPA, RIN 2060-AV08 on Spring 202 Unified Agenda, https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=2060-AV08, attached as Exhibit 82.

[137] Lazard, *Levelized Cost of Energy Analysis*, Version 14,0 (Oct. 19, 2020), *available at* https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/, attached as Exhibit 83.

surpassed coal in 2020 and will continue to rapidly increase in share of U.S. electricity generation.[138]

C. To help address upfront affordability impacts for low income consumers, the Biden administration should develop targeted incentives for environmental justice communities.

The Proposed Standards would reduce the total cost of vehicle ownership over its lifetime.[139] Proposal, 86 Fed. Reg. at 49,605. Although NHTSA did not break down the benefits over the lifetime of the vehicle, analysis by EPA of its proposed MY 2023-2026 GHG standards showed that the reduced fuel consumption EPA projects will be associated with its proposed tighter greenhouse gas emissions standards would benefit lower-income used-vehicle purchasers more than new vehicle purchasers by offsetting the used vehicle cost with fuel cost savings much more quickly than for new vehicle purchases, 2021 EPA NPRM, 86 Fed. Reg. at 43,737, 43,798; *see* consumer impact section III.E *supra*. Lower-income households may benefit more from operating cost reduction than they are harmed by the upfront cost increase because "they own fewer vehicles per household, spend more on fuel than on vehicles on an annual basis, and those fuel expenditures represent a higher fraction of their household income." 2021 EPA NPRM, 86 Fed. Reg. at 43,804.[140] Increasing fuel economy further by adopting Alternative 3 would help bring more electric vehicles to the market faster, lowering upfront vehicle costs sooner, and increasing affordability for potential low-income purchasers as more electric vehicles are moved to the used car market.[141] Nevertheless, to help prepare for an electric vehicle future, this Administration should develop a suite of programs to address the barriers to electric vehicle adoption in environmental justice communities.

President Biden's E.O. 14008 directs federal agencies to develop programs to address adverse health and environmental impacts as well as accompanying economic challenges faced by disadvantaged communities.[142] This administration should address affordability implications

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[138] U.S. EIA, *EIA expects U.S. electricity generation from renewables to soon surpass nuclear and coal* (Jan. 30, 2020), https://www.eia.gov/todayinenergy/detail.php?id=42655, attached as Exhibit 84; *see also* U.S. EIA, *Renewables became the second-most prevalent U.S. electricity source in 2020*, (Jul. 28, 2021), https://www.eia.gov/todayinenergy/detail.php?id=48896, attached as Exhibit 85.
[139] NHTSA notes that the Proposal "could reduce average undiscounted fuel outlays over the lifetimes of MY 2029 vehicles by about $1,280, while increasing the average cost of those vehicles by about $960 over the baseline." 86 Fed. Reg. at 49,605.
[140] *See also* Bauer et al., ICCT, When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption (Feb. 2021) at 17, https://theicct.org/sites/default/files/publications/EV-equity-feb2021.pdf. Attached as Exhibit 86.
[141] *See, e.g., id*.
[142] *See generally* E.O. 14008, 86 Fed. Reg. 7,619, 7,622-24 (Feb. 1, 2021).

of this Proposal and future increased vehicle electrification through targeted policy mechanisms that direct dollars to the consumers who most need it.

Studies have shown that low-income EV buyers are more responsive to incentives,[143] and have suggested gradually increasing eligibility requirements by income.[144] State policies offer examples of income-qualified policies that could be considered.[145] California provides grants and affordable financing to help income-qualified Californians purchase or lease hybrid or electric vehicles.[146] Pennsylvania offers an additional rebate for purchase of hydrogen fueled, battery and plug-in vehicles for low-income residents.[147]

For policy recommendations, we encourage review of The Greenlining Institute's "Electric Vehicles for All: An Equity Toolkit."[148] Greenlining recommends that up-front vouchers or "instant cash rebates" like Connecticut's program[149] are the most effective purchase incentive tool because they reduce the price of the vehicle at the time of purchase. Although tax credits can lower annual income taxes, because a purchaser has to wait until tax season for the benefit, and because low-income individuals usually have low tax liability, these mechanisms are less equitable.[150] The Greenlining Institute also notes that financing assistance like loan loss guarantees for financial institutions or programs that buy down interest rates for consumers can improve loan options for potential low-income EV purchasers.[151]

Policymakers can also ensure targeted deployment of public charging stations to support affordability and access for environmental justice communities. One California pilot

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[143] Jenn, A. et al., An in-depth examination of electric vehicle incentives: Consumer heterogeneity and changing response over time. Transportation Research Part A: Policy and Practice 132 (2020), 97–109, at 108, https://doi.org/10.1016/j.tra.2019.11.004, attached as Exhibit 87; Muehlegger, E. & D.S. Rapson, Subsidizing low- and middle-income adoption of electric vehicles: Quasi-experimental evidence from California (Working Paper 25359), National Bureau of Economic Research (2018, rev. 2021), at 3, https://www.nber.org/papers/w25359, attached as Exhibit 88.

[144] Jenn et al. (2020), at 108, *supra* note 143.

[145] National Conference of State Legislatures, State Policies Promoting Hybrid and Electric Vehicles, (August 20, 2021), https://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx, attached as Exhibit 89.

[146] California Air Resources Board, Clean Vehicle Assistance Program, https://cleanvehiclegrants.org/, attached as Exhibit 90.

[147] Pennsylvania Dept. of Envtl. Prot., Alternative Fuel Rebates for Consumers, https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Alternative-Fuels-Incentive-Grant/Pages/Alternative-Fuel-Vehicles.aspx, attached as Exhibit 91.

[148] The Greenlining Institute, Electric Vehicles for All: An Equity Toolkit, https://greenlining.org/resources/electric-vehicles-for-all/#tab3-section2, attached as Exhibit 92.

[149] Connecticut Dept. of Energy and Envtl. Prot., CHEAPR (Connecticut Hydrogen and Electric Automobile Purchase Rebate), https://portal.ct.gov/DEEP/Air/Mobile-Sources/CHEAPR/CHEAPR---Home. Attached as Exhibit 93.

[150] The Greenlining Institute, *supra* note 148.

[151] *Id.*

program has committed to deploying a minimum of 15 percent of its charging stations to disadvantaged communities, with a “stretch” goal of 20 percent.[152]

IX. NHTSA should Consider Adopting a Mix-shift Backstop

In each of its light-duty vehicle rulemakings since 2009, and again in this Proposal, NHTSA has acknowledged that its standards are for individual vehicles and vary based on vehicle-type (i.e., car or truck) and vehicle size (or “footprint”), and that, as a result, the projected level of fuel savings in the rules are estimates and likely will not actually be met, as the real-world fleet will likely differ from the agencies’ projections. Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011, 74 Fed. Reg. 14,196, 14,409-12 (March 30, 2009); Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324, 25,368-70 (May 7, 2010) (2010 Rule); 2012 Final Rule, 77 Fed. Reg. 62,624, 63,020-23. For that reason, commenters have urged the agency to set a “backstop,” or minimum standard below which actual performance may not fall.

Commenters have repeatedly pointed out that, because the targets in attribute-based standards assume a particular fleet mix between passenger vehicles and light trucks during the years of the rulemaking, changes to that fleet mix will alter the fleet-wide fuel efficiency actually achieved. Further, particular features in the compliance curves and different stringency levels for passenger vehicles and light duty trucks incentivize manufacturers to re-classify their passenger cars as light trucks, shifting the fleet mix to trucks and lowering the overall fleet performance. Manufacturers can also manipulate the standards by adding size to vehicle footprints to qualify for weaker standards. *See* 2010 Rule, 75 Fed. Reg. at 25,362-70, 25,608-610; 2012 Final Rule, 77 Fed. Reg. at 63,020-23.

NHTSA has agreed that these concerns are well-founded. *See, e.g.*, 2010 Rule, 75 Fed. Reg. at 25,610; 2012 Rule, 77 Fed. Reg. at 63,022. NHTSA agrees that it has the authority to set backstops, complementing the Congressionally-mandated backstop for domestic passenger cars. *See, e.g.*, 2010 Final Rule, 75 Fed. Reg. at 25,609. *See also Center for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1204-06 (9th Cir. 2008). While acknowledging that implementing additional backstops is squarely within its discretion, NHTSA did not do so because it remained confident its projections would be met and believed the attribute-based standards did not create sufficient grounds for manufacturers to shift their vehicle mix toward the light truck fleet segment. NHTSA stressed that “insufficient time” had passed “in which manufacturers have

[152] The Greenlining Institute, Press Release (March 22, 2016), PG&E, Diverse Coalition Propose Huge Boost in EV Charging Stations in Underserved Communities. Retrieved from https://greenlining.org/issues/2016/pge-diverse-coalition-propose-huge-boost-in-ev-charging-stations-in-underserved-communities/. Attached as Exhibit 94.

been subject to the attribute-based standards to assess whether or not backstops would in fact help ensure that fuel savings anticipated by the agency . . . are met." 2012 Final Rule, 77 Fed. Reg. at 63,022. And the agency twice committed to revisit the issue in its next rulemaking to assess whether this analysis remained correct. 2010 Rule, 75 Fed. Reg. at 25,610; 2012 Final Rule, 77 Fed. Reg. at 63,022.

It is now clear that the fleet mix has dramatically shifted towards vehicles classified as trucks, and thus falling under more lenient fuel efficiency standards, despite the attribute-based system. In MY 2019, the most recent year for which information is available, the fleet mix of sedans and station wagons had shifted to only 33 percent of the fleet, compared to 80 percent in MY 1975; also in MY 2019, the vehicle classification of "truck SUVs," which includes some all-wheel drive cars that are now classified as trucks, reached a record high of 37 percent.[153] In addition, passenger car footprints appear to have increased, as well, as NHTSA acknowledges in connection with its unlawful attempt to alter the MDPCS, discussed above. In part because of these fleet mix and footprint shifts, the fleet average real-world fuel economy results have been lower than those NHTSA previously projected.

Given the agency's recognition of this issue and its prior commitments to conduct ongoing assessments of the need for a backstop, we urge NHTSA to explain why it has not considered one for the instant rulemaking, and to provide assurances that it will also consider it for MY 2027 and later standards.

[153] U.S. Environmental Protection Agency, The 2020 EPA Automotive Trends Report (Jan. 2021) at 13-15, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1010U68.pdf. Attached as Exhibit 95.