An Analysis of NHTSA's Preliminary Regulatory Impact Analysis of 2021 Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle CAFE Standards

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Table of Contents

Applied Economics Clinic

The Applied Economics Clinic is a 501(c)(3) non-profit consulting group based in Arlington, Massachusetts. The Clinic provides expert testimony, analysis, modeling, policy briefs, and reports for public interest groups on the topics of energy, environment, consumer protection, and equity, while providing on-the-job training to a new generation of technical experts. For more information on the clinic: www.aeclinic.org. Clinic Research Assistant Gabriel Lewis and Researcher Chirag Lala contributed to this white paper under the supervision of Clinic Senior Economist Elizabeth A. Stanton, PhD.

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Dr. Elizabeth A. Stanton is the founder and Director of the Applied Economics Clinic. She has worked for two decades as an environmental economist, and has authored more than 150 reports, policy studies, white papers, journal articles, and book chapters on topics related to energy, the economy, and the environment. She has submitted expert testimony and comments in Minnesota, Louisiana, Indiana, Illinois, Vermont, New Hampshire, Massachusetts, Michigan, Puerto Rico and several federal dockets. Her recent work includes extensive analysis of energy and efficiency planning, testimony related to greenhouse gas regulatory compliance, and analysis of the need for new gas pipelines. Dr. Stanton's articles have been published in Ecological Economics, Renewable Climatic Change, Environmental and Resource Economics, Environmental Science & Technology, and other journals. Dr. Stanton is the primary author of this report and the opinions and conclusions in the report are hers.

Introduction

In August 2021, the National Highway Traffic Safety Administration (NHTSA) released its *Proposed Rulemaking for Model Years 2024-2026 Light- Duty Vehicle Corporate Average Fuel Economy Standards* to replace the 2020 *Safer Affordable Fuel-Efficient (SAFE) Vehicles* rule.[1] Broadly, the 2021 proposal would increase the stringency of *Corporate Average Fuel Economy* (CAFE) standards above the 2020 standards, approximately returning fuel economy standards to the path set in 2012.[2] In this white paper, the Applied Economics Clinic (AEC) discusses the benefits estimated in NHTSA's 2021 Preliminary Regulatory Impact Analysis (PRIA)[3] of the 2021 proposal, giving particular attention to energy security benefits, fuel savings benefits, and drive value benefits. The benefit-cost analysis within NHTSA's 2021 PRIA finds that its proposed fuel economy standards would yield positive net benefits; we find that this estimate is conservative. Benefits that were not included in NHTSA's benefit-cost comparison would, if included, raise NHTSA's net benefits and provide support for stricter fuel economy standards.

Energy Security Benefits in NHTSA's 2021 PRIA

NHTSA estimates that its proposal will reduce total U.S. oil consumption and oil imports, in turn lowering some costs to U.S. consumers and producers caused by fluctuating oil supply and prices.[4] NHTSA's 2021 PRIA includes an oil security premium in the monetized benefits that it compares to costs of the proposed rule and discusses other potential security benefits that are not monetized. Our assessment shows that the agency's 2021 PRIA represents a conservative estimate of the likely energy security benefits of the proposed rule: that is, benefits are at least this high and perhaps higher. Additional benefits that could have been added include limiting the United States' exposure to global petroleum market instability, reduction to the global price of oil, and U.S. military and foreign policy

[1] 86 Fed. Reg. 49,602, September 3, 2021.

[2] For example, we compare passenger car mpg: the 2012 standards require between 45.6 and 61.1 (EPA NHTSA CAFE SAFE Final RIA 2020, p.193 Table V-3: – Characteristics of No-Action Alternative [2012 standard] – Passenger Cars, parameters a and b); the 2020 final standards would between 39.9 and 53.4 (EPA NHTSA CAFE SAFE Final RIA 2020 p. 209, Table V-12 – Characteristics of Alternative 3 (Final Standards) – Passenger Cars); and the 2021 "preferred" standard would require between 49.0 and 65.5 (NHTSA CAFE Tech Support for Proposed Rule Aug 2021, p. 63, Table 1-16 – Characteristics of Alternative 2 – Passenger Cars).

[3] NHTSA. *Preliminary Regulatory Impact Analysis: Proposed Rulemaking for Model Years 2024-2026 Light- Duty Vehicle Corporate Average Fuel Economy Standards*. August 2021 (NHTSA CAFE PRIA).

[4] NHTSA CAFE PRIA, p. 94.

benefits of reducing U.S. dependency on imported oil. NHTSA's relatively conservative assessment of benefits suggests both that its cost-benefit assessment and related conclusions are robust and that a broader monetization of energy security benefits would justify stricter fuel economy standards for vehicles.

1. Exposure to oil market instabilities

U.S. oil consumption is expected to fall as vehicle producers shift production towards vehicles with features and designs that meet NHTSA's proposed fuel economy standards. The resulting fuel saved per mile under these standards means lower total fuel consumption, even if total miles driven stay steady or increase slightly.[5] This decrease in U.S. demand for oil would in principle reduce gross oil imports by some amount, reducing U.S. exposure to oil market instabilities.

NHTSA does not present a numerical estimate of the decrease in gross oil imports that would result from the proposal, instead emphasizing its view that *net* imports would likely remain constant.[6] For comparison, the 2021 EPA Draft RIA, which concerns a proposal that NHTSA considers substantially similar to its own, estimates that EPA's proposed rule would ultimately decrease crude oil imports by about 0.6 million barrels per day (MMBD);[7] imports currently average 7.8 MMBD.[8]

NHTSA notes that the resulting energy security benefits, which it classifies under "Petroleum Market Externalities," are difficult to quantify, but it does tentatively estimate a $1.5 billion net present value (2018 dollars, 3 percent discount) for all vehicles produced from 2022 through 2029.[9] However, NHTSA's supporting technical document generally argues that such benefits are "small, and perhaps trivial".[10] This characterization does not appear to be warranted given the scale of the estimated benefits. These benefits factor into the agency's calculation of the energy security premium.

[5] NHTSA CAFE PRIA, p. 94.

[6] NHTSA CAFE Tech Support for Proposed Rule Aug 2021 p. 570. No estimate appears in the Aug 2021 NPRM, Aug 2021 PRIA, or Aug 2021 Technical Support document.

[7] EPA Draft RIA August 2021, p. 97.

[8] U.S. Energy Information Administration. Annual Energy Outlook 2021. Appendix D. Table D.1 https://www.eia.gov/outlooks/aeo/pdf/appd.pdf.

[9] NHTSA CAFE PRIA, p. 187.

[10] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, p. 559.

NHTSA's estimates of the energy security premium—the additional cost of a barrel of oil due to oil market instabilities—have varied greatly in recent years, and the 2021 PRIA estimates are comparatively low and unusually lacking in error bounds. A higher energy security premium would result in more stringent standards. Below, we compare estimated premia for the year 2025 using 2018 dollars:[11]

- The **2009** EPA-NHTSA National Program NPRM: **$9.67** with error bounds of $4.64 to $15.53.[12]
- In the **2015** EPA-NHTSA Heavy-Duty Phase 2 PRIA this was lowered to **$8.04** ($3.94 to $12.87).[13]
- Under the subsequent administration, the **2018** EPA-NHTSA SAFE PRIA[14] initially estimated **$6.97** ($3.24 to $11.31).
- The **2020** EPA-NHTSA SAFE Final RIA, however, estimated a much lower **$1.50**, with no error margin presented.[15] This reduced value may be a result of the 2020 RIA's reliance on a 2016 paper by Beccue et al.[16] and Brown (2018)[17] rather than the Oak Ridge National Laboratory (ORNL) and Annual Energy Outlook (AEO) studies cited in all other documents mentioned here.
- The **2021** EPA Draft RIA estimate is still comparatively low: **$3.72** ($1.18 to $6.27),[18] reflecting the agency's recent judgments (discussed later in this section) that the United States is less

[11] 2025 energy security premium converted to 2018 dollars using the GDP Implicit Price Deflator. Federal Reserve Economic Data, series USAGDPDEFAISMEI (GDP Implicit Price Deflator in United States, Index 2015=100, Annual, Not Seasonally Adjusted). https://fred.stlouisfed.org.

[12] EPA-NHTSA National Program NPRM 2009, p. 170. We use estimates for year 2030, since 2025 is not given.

[13] EPA-NHTSA National Program PRIA 2015, https://www.nhtsa.gov/sites/nhtsa.gov/files/ria-epa-420-d-15-002-final.pdf, p. 726.

[14] EPA-NHTSA SAFE PRIA 2018, https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf, p. 1073.

[15] EPA-NHTSA SAFE Final RIA 2020, https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final_safe_fria_web_version_200701.pdf, p. 1050.

[16] Cited as Beccue, Phillip C. and Hillard G. Huntington, An Updated Assessment of Oil Market Disruption Risks - Final, 2016. in EPA-NHTSA SAFE Final RIA 2020, p. 1049.

[17] Brown, Stephen P.A., New estimates of the security costs of U.S. oil consumption, Energy Policy, Volume 13, 2018. Cited in NHTSA CAFE Tech Support for Proposed Rule Aug 2021, p. 570.

[18] EPA Draft RIA August 2021, p. 100.

exposed to oil shocks than previously anticipated.

- The **2021** NHTSA Technical Support Document currently maintains the **$1.50**[19] estimate that was presented in the **2020** EPA-NHTSA SAFE Final RIA, also without presentation of a margin of error.

Following the 2020 FRIA, NHTSA writes that its estimated energy security premia "reflect" the fact that Brown (2018) "finds a range of $0.60 – $3.45 per barrel of imported oil." [20] However, Brown also writes that "it is likely premature to rely heavily on"[21] the more recent estimates which yield the $0.60 – $3.45 range, and instead presents three other ranges as likely more reliable, all with substantially higher midpoints ($3.63, $5.21, $5.31). The NHTSA 2020 FRIA's characterizations of Brown (2018) are therefore misleading at best, leaving the 2021 Technical Support Document's unusually low energy security premia without an adequate basis.

Brown's more recent estimates of the energy security premium ($0.60-3.45) are based upon subjective opinions, and even the larger estimates may be underestimated. These estimates rely heavily upon estimated probabilities of oil supply disruptions that are derived not from observations of actual oil supply disruptions, but rather from Beccue and Huntington's (2016) "structured survey of experts."[22] These experts' opinions are markedly at odds with the data available to them and with subsequent evidence.

The probability distribution reported from Beccue and Huntington's survey has an expected value of 0.56 MMBD lost to disruptions per day, with 93 percent of probability below 3 MMBD and 90 percent probability below 1 MMBD. Actual unplanned global oil production disruptions were substantially higher, 3.6 MMBD in 2016, and had not dropped below 1 MMBD in any month since 2012.[23] The surveyed experts' expectation of a 0.56 MMBD is puzzling in light of these facts.

[19] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, 570.

[20] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, 570.

[21] Brown 2018, p. 175.

[22] Beccue, Phillip, Huntington, Hillard G., 2016. An Updated Assessment of Oil Market Disruption Risks: Final Report. Energy Modeling Forum, Stanford University.

[23] Energy Information Administration, "Today in Energy" JUNE 9, 2016. https://www.eia.gov/todayinenergy/detail.php?id=26592. Drawing from June 2016 Short-Term Energy Outlook.

More recent evidence shows that Beccue and Huntington's 2016 estimates make poor predictions of subsequent oil production disruptions. Total unplanned oil production disruptions were 2.02 MMBD in 2017, 1.85 MMBD in 2018, 3.15 MMBD in 2019, and 4.53 MMBD in 2020.[24] That is, for each year since 2012, losses have occurred that the surveyed experts deemed less than 10 percent probable. Beccue and Huntington's survey results have substantially underestimated the probability and magnitude of oil supply disruptions. Therefore, Brown's estimated oil energy security premia substantially underestimates this factor in NHTSA' calculation of the standard's benefits as well. Consequently, NHTSA would do better to rely on other sources than Brown, such as the Oak Ridge National Laboratory used in previous NHTSA RIAs, and revise its estimated energy security premium substantially upward.

NHTSA also underestimates the benefits of reducing U.S. dependency on global oil markets by assuming—without adequate basis—that the United States is well-insulated from global price shocks and supply disruptions. The NHTSA documents claim that "U.S. has achieved self-sufficiency in petroleum production in recent years,"[25] arguing that this insulates the United States from supply shocks. Here, NHTSA is conflating self-sufficiency with (temporarily) positive net exports. While U.S. net oil product exports and net crude oil exports were indeed positive (+0.65 MMBD for total petroleum and other liquids) as of 2020,[26] this does not imply that the United States is self-sufficient. Net imports (adding imports and exports together) are not the same as gross imports (the total amount purchased in the global market and exposed to global price shocks).

The 2021 U.S. Energy Information Administration's Annual Energy Outlook forecast expects U.S. gross crude oil imports to remain between 6.9 and 7.8 MMBD through 2050.[27] Consequently, regardless of whether exports equal or even exceed imports, global supply shocks will still impose costs on U.S. refiners, downstream industries, and consumers. Stricter fuel economy standards and lower fuel consumption could decrease the magnitude of these costs. EPA outlines this logic with laudable clarity in its August 2021 SAFE Draft RIA.[28] Confusingly, NHTSA both agrees with EPA's argument by using a positive energy security premium and disagrees with EPA by claiming that the United States is self-

[24] Energy Information Administration, Short Term Energy Outlook: Dec 2018, Dec 2019, Dec 2020, Oct 2021. https://www.eia.gov/outlooks/steo/archives/oct21.pdf.

[25] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, pp. 553-4.

[26] U.S. Energy Information Administration. Short-Term Outlook Aug 2021. p. 35.

[27] U.S. Energy Information Administration. Annual Energy Outlook 2021. Appendix D. Table D.4 https://www.eia.gov/outlooks/aeo/pdf/appd.pdf.

[28] EPA Draft RIA August 2021 p. 100.

sufficient. A more accurate representation of U.S. interdependency would result in a higher energy security premia and support more stringent standards.

Oil imports are not the only source of U.S. oil market instability. It is becoming increasingly apparent that climate change caused by fossil fuel consumption has a destabilizing effect on oil and energy production and distribution, as well as on global fossil fuel prices. As one example, extreme weather—exacerbated by climate change—can cause supply shortage and price spikes. August 2021's Hurricane Ida, for example, caused a temporary disruption of nine-tenths of crude oil production in the Gulf of Mexico[29] resulting in Gulf Coast gasoline prices rising 49 percent higher than during the same time the previous year.[30] EIA projects that it will take several months for U.S. oil production to make a full recovery; related power outages were expected to persist for several hundred thousand people until the end of September.[31] The most recent report from the Intergovernmental Panel on Climate Change (IPCC)—the world's foremost authority on climate change science—concluded that the frequency and intensity of extreme weather events will increase over the coming decades, particularly if greenhouse gas emissions do not fall quickly and drastically.[32] Overall, lax fuel economy standards increase oil production and consumption, causing more greenhouse gas emissions, more climate change, and an increased frequency of extreme weather events that disrupt foreign and domestic energy supplies.

NHTSA's supporting documents also argue that U.S. exposure to oil supply shocks is now "perhaps trivial"[33] in part because various strategies "are available" to U.S. business and consumers that would in principle "insure"[34] them against these shocks. However, this reasoning is backwards: Insurance against supply shocks represents an additional cost of supply shocks, not an argument that supply shocks are irrelevant.

In addition, NHTSA omits all mention of the U.S. Strategic Petroleum Reserve (SPR) in its PRIA. It only briefly mentions SPR in its Technical Support document, only to say that SPR's total cost "has not

[29] EIA STEO Sept 3 20201, https://www.eia.gov/outlooks/steo/.

[30] EIA Today's Energy Report 09/14/21 https://www.eia.gov/todayinenergy/detail.php?id=49416.

[31] https://www.brproud.com/hurricane-ida/hurricane-ida-power-outages-misery-persist-9-days-later/.

[32] https://www.washingtonpost.com/weather/2021/08/09/ipcc-2021-extreme-weather-climate/.

[33] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, p. 559.

[34] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, p. 557.

appeared to vary"[35] with imports. However, by statute the SPR cannot be used to mitigate routine fluctuations in oil imports; drawdowns or sales are allowed only in case of "severe energy supply interruption."[36] The more relevant question is whether SPR maintenance costs would increase with the repeated large-scale use of SPR to mitigate major U.S. oil shortages in the future, and how these costs might decrease on average if U.S. dependency on imported oil were diminished. NHTSA's PRIA does not address these questions.

Overall, NHTSA appears to conservatively understate the costs of global oil market instabilities, omitting costs of managing oil market volatility and likely underestimating U.S. exposure to global oil markets. The result is a bias towards less strict standards.

2. Monopsony and distributional effects of U.S. oil demand

Because U.S. consumption of petroleum and other liquid fuels amount to 21 percent of global consumption (20.0 MMBD / 96.7 MMBD in Q2 2021),[37] a decrease in U.S. oil demand could lower global oil prices, known as a monopsony effect. NHTSA asserts that a change in prices would not affect net transfers of revenue to the United States, and that the price change would therefore "leave welfare unaffected"[38] in the United States; for this reason, NHTSA omits monopsony effects from the cost-benefit analyses in its August 2021 PRIA.[39]

Here, NHTSA's premise is doubtful: little evidence supports the claim that net transfers would indeed remain constant in the face of price changes. The deduction is also doubtful: even if net transfers did remain constant, it does not follow that total or average U.S. welfare would remain constant. Ultimately, NHTSA's analysis ignores the distribution of costs and benefits across income groups (or other communities) and related social welfare impacts. The probable consequence is an underestimate of the

[35] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, pp. 575-6

[36] The Energy Policy and Conservation Act, Sec 161, states: " Drawdown and sale of petroleum products from the Strategic Petroleum Reserve may not be made unless the President has found drawdown and sale are required by a severe energy supply interruption..." . A definition of "severe energy supply interruption" is provided in Sec 3. of same. From The Office of Fossil Energy and Carbon Management: https://www.energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve/strategic-petroleum-reserve.

[37] U.S. Energy Information Administration. Short-Term Outlook August 2021. p. 35.

[38] NHTSA CAFE Tech Support for Proposed Rule Aug 2021 pp. 553-4.

[39] NHTSA CAFE PRIA p. 97.

total benefit of the 2021 proposed rule. These omitted benefits could be large: in 2015, the EPA-NHTSA PRIA estimated that monopsony transfers from oil producers to U.S. oil consumers would amount to $5.60 per barrel.[40]

In principle, a decrease in global oil prices would leave global net transfers unchanged; the amount of money gained by all oil consumers would equal the amount of money lost by all oil producers. Yet even if global net transfers remained constant, net transfers to the United States need not remain constant. The United States is expected to be a net importer at times and a net exporter of oil at other times.[41] Net transfers to the United States, therefore, will be nonzero and changing over time, meriting inclusion in a formal benefit-cost calculation.

Even if net transfers to the United States remained constant while oil prices decreased, welfare in the United States would be impacted. U.S. oil producers tend to lose welfare from a decrease in oil prices while U.S. oil consumers tend to gain. It is possible that NHTSA's intent is that for the policy under consideration, these gains and losses would cancel each other out in some sense, so that *overall* or *societal* welfare remains constant. However, this implies the value judgment that total welfare lost by oil company shareholders and employees, through decreased dividends and labor income, would be greater than or equal to the total welfare gained by poor and working-class families, through more affordable transportation. The argument is equivalent to saying that all else being equal, doubling of the price of bread or milk would have no important effect on total welfare, because even though consumers might not be able to afford as much food and might be hungrier, producers gain by the same total dollar amount. NHTSA does not defend such propositions in its PRIA.

The PRIA's exclusive focus on net transfers and total welfare overlooks important distributional benefits of the proposal. For example, in 2018, households in the bottom 80 percent of the U.S. income distribution spent approximately 3.9 percent of their income on gasoline on average, while those in the top 20 percent spent only 2.8 percent.[42] Consequently, a reduction of gas prices would have a substantially larger proportional impact on the household budgets, and likely the welfare, of the poor

[40] EPA-NHTSA Heavy-Duty Phase 2 PRIA 2015, p. 726. As elsewhere, we convert the 2025 projection (originally in 2012 dollars) to 2018 dollars using the GDP Implicit Price Deflator. Federal Reserve Economic Data, series USAGDPDEFAISMEI (GDP Implicit Price Deflator in United States, Index 2015=100, Annual, Not Seasonally Adjusted). https://fred.stlouisfed.org.

[41] U.S. Energy Information Administration. Short-Term Outlook August 2021. p. 35.

[42] BLS Consumer Expenditure Survey 2018, Quintile tabulation. https://www.bls.gov/cex/tables/calendar-year/mean-item-share-average-standard-error/cu-income-quintiles-before-taxes-2018.pdf

and the middle-class than of the wealthy. If so, the monopsony effect of NHTSA's proposed strengthening of fuel efficiency standards would increase not only total welfare among oil consumers, but also equity.

Ultimately, the transfer of revenue from U.S. oil producers to U.S. oil consumers could have substantial benefits for the most economically disadvantaged, reducing income inequality and—therefore—reducing government expenditures on welfare programs and other transfers. NHTSA omits monopsony effects from their cost-benefit analyses but could include them, which would strengthen its benefit-cost assessment and even provide grounds for stronger standards.

3. Military and foreign policy costs and benefits

Reducing emissions, and consequently reducing dependence on imported oil, has the potential to lower U.S. military and foreign policy costs of safeguarding the U.S. oil supply and reduce revenue to regimes that are considered inimical to U.S. interests. In its 2021 PRIA, NHTSA reviews the literature on these possible benefits but ultimately decides not to include military or foreign policy costs in its benefit-cost analysis, effectively assuming that these costs are zero.[43]

The relevant literature identifies two related obstacles to quantifying military and foreign policy benefits of reducing oil dependency. The first is the "attribution problem": Which costs are attributable to securing oil, versus other objectives? The second is the "incremental analysis" problem: How would costs of securing oil change were oil imports diminished?[44]

For total costs attributable to securing U.S. oil, an estimate of 12-15 percent of the U.S. defense budget is mentioned in a footnote of the NHTSA Technical Support Document, citing a detailed budgetary analysis by Crane et al. in 2009.[45] NHTSA correctly emphasizes the uncertainty which must attend any such estimate; for comparison, EPA's 2021 SAFE DRIA presents estimates ranging from near zero,[46] to "$75–$91 billion [per year], or 12–15 percent of the current U.S. defense budget" (here EPA is also citing

[43] NHTSA CAFE PRIA 2021 p. 97

[44] EPA Draft RIA 2021 p. 94.

[45] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, p. 574, footnote citing following article:
Crane, K., A. Goldthau, M. Toman, T. Light, S. E. Johnson, A. Nader, A. Rabasa, & H. Dogo, Imported Oil and U.S. National Security., Santa Monica, CA, The RAND Corporation (2009) available at https://www.rand.org/pubs/monographs/MG838.html

[46] EPA Draft RIA August 2021 p. 95, citing Moore, 1997.

Crane),[47] to other estimates 4-10 times higher than those of NHTSA.[48] As discussed by Crane et al. (2009), these costs are unlikely to scale proportionally with U.S. oil imports or consumption, so incremental analysis would be difficult and is not presented by NHTSA.

Still, as NHTSA notes, Crane et al. (2009) concluded that "the United States *does* include the security of oil supplies and global transit of oil as a prominent element in its [military] force planning":[49] some nonzero amount of U.S. military expenditure is devoted to protecting oil supplies and should therefore be included in cost-benefit analysis. U.S. wars since 9/11 have imposed a total of $5.4 trillion in U.S. budgetary costs alone—an average of $284 billion per year between 2001 and 2020.[50] If a hypothetical policy that reduced U.S. oil demand had a mere 5 percent chance of diminishing such yearly military expenditures by just 10 percent, then the resulting expected budget savings would be $1.4 billion per year. Even seemingly small probabilities of apparently negligible decreases in military expenditure would yield large expected benefits.

To further support its decision to omit military spending from the cost-benefit analysis, NHTSA's Technical Support Document presents a plot of U.S. military spending and U.S. oil consumption over time, claims that it is difficult to visually discern a correlation, and concludes—apparently without analysis—that no causal relationship exists.[51] This qualitative approach does not provide statistical evidence that military costs of oil consumption are indeed zero.

NHTSA does not discuss the expense of non-military foreign policy in detail, but securing other nations' cooperation with U.S. oil-securing policies is not without cost. NHTSA has not considered the costs of supporting (or refraining from opposing) regimes that are deemed crucial to securing oil, but which otherwise tend to oppose U.S. interests.

Military and foreign policy costs are hard to estimate precisely. Yet to omit them is to estimate that they are precisely zero. Given the extremely high cost of U.S. military and foreign policy ventures, the aims of

[47] EPA Draft RIA August 2021 p. 95, citing Crane et al, 2009.

[48] EPA Draft RIA August 2021 p. 95, citing Stern et al, 2010.

[49] Crane, K., A. Goldthau, M. Toman, T. Light, S. E. Johnson, A. Nader, A. Rabasa, & H. Dogo, Imported Oil and U.S. National Security., Santa Monica, CA, The RAND Corporation (2009). p 74. Available at https://www.rand.org/pubs/monographs/MG838.html

[50] United States Budgetary Costs and Obligations of Post-9/11 Wars through FY2020: $6.4 Trillion. Neta C. Crawford. Watson Institute for International and Public Affairs at Brown University, 2019. p. 3.

[51] NHTSA CAFE Tech Support for Proposed Rule Aug 2021, pp. 574-6

which include safeguarding the U.S. oil supply, such an omission produces an overly conservative underestimate of the net benefits of the proposed fuel economy standards.

Fuel Benefits in NHTSA's 2021PRIA

The NHTSA 2021 PRIA reflects a proposed rule that would raise fuel efficiency relative to the 2020 NHTSA-EPA FRIA, lowering both fuel costs and the time needed for refueling. NHTSA's retail fuel savings benefits appear to be conservative, since U.S. fuel prices are unlikely to remain constant while fuel demand falls, as NHTSA assumes; rather, U.S. fuel prices are generally expected to decrease with less fuel demand, an additional benefit of this standard for consumers.

1. Retail Fuel Savings

NHTSA's 2021 PRIA assumes that fuel prices will remain constant despite decreased demand, but research shows that this is unlikely; fuel prices are expected to fall in the short run (1 month to 1 quarter) and in the longer run. Consequently, the 2021 PRIA is likely to have underestimated consumer fuel savings.

NHTSA's PRIA anticipated reduction in consumer fuel expenditure is equal to the anticipated reduction in total gallons consumed due to CAFE standards, multiplied by average retail fuel prices (including an estimated $0.50 in state and federal fuel taxes).[52] NHTSA argues that fuel prices will remain constant in the face of reduced consumption because U.S. fuel supplies are supposedly almost perfectly responsive to (infinitely elastic with respect to) fuel prices, meaning that any decrease in consumption will be met by a reduction in production, not a decrease in price.[53]

However, NHTSA's assumption that prices will remain constant despite decreases in consumption is implausible in both the short run and the long run. Current estimates uniformly agree that in the short run (one month to one quarter), oil supplies are relatively inelastic with respect to price (less than 0.2)[54] meaning that reduced demand will not correspond to similarly reduced supply and thus will correspond

[52] NHTSA CAFE PRIA, pg. 95. Forecasts of U.S. fuel prices, global petroleum supply and demand, and U.S. imports of crude petroleum and refined petroleum are taken from the Energy Information Administration's World Energy Outlook 2021. NHTSA CAFE PRIA p. 67.

[53] Ibid, pg. 94.

[54] Kilian, 2020. " Understanding the Estimation of Oil Demand and Oil Supply Elasticities". Dallas Federal Reserve. 2020. https://www.dallasfed.org/-/media/documents/research/papers/2020/wp2027.pdf

to markedly declining prices (the opposite of NHTSA's conclusion). In the longer run, the literature suggests that fuel prices will still decline with reduced fuel demand, although less than in the short run; estimates of the long-run price elasticity of oil supplies are on the order of 1.25,[55] which is elastic but far from rendering prices constant. That is, when demand falls, fuel prices are likely to fall, leading to lower consumer fuel expenditures than if prices had remained constant as NHTSA assumes. Consequently, it is reasonable to expect greater consumer benefits than those anticipated by NHTSA.

2. Refueling Time Benefit

By reducing the operating cost of vehicles, improved fuel economy extends driving ranges and reduces the frequency of refueling. Improved fuel economy also reduces the inconvenience from locating gas stations and economizing on the time for passengers and drivers.[56] NHTSA relies on U.S. Department of Transportation (DOT) guidance to value time when assessing benefits from less frequent refueling.[57]

For local personal travel, DOT's value of travel time savings (VTTS) (per person hour as a percentage of total earnings) is assumed to be 50 percent of hourly median income.[58] The latest DOT Guidance uses the 2015 figure of $27.20 per hour for median income and $13.60 for VTTS.[59] Since VTTS is assumed to vary based on the purpose and distance of travel, DOT guidance recommends a VTTS for intercity travel that is 70 percent of median hourly income and 100 percent for business travel (local and intercity).[60] Different hourly income estimates are used to calculate VTTS for local and intercity travel depending on

[55]See the following paper and its sources: EPA, 2014. "Economic Impact Analysis- Petroleum Refineries: Proposed Amendments to the National Emissions Standards for Hazardous Air Pollutants and New Source Performance Standards." p. 4-5. https://www3.epa.gov/ttn/ecas/docs/eia_ip/refineries_eia_neshap-nsps_proposal_02-2014.pdf

[56] NHTSA CAFE PRIA, pg 64.

[57] Ibid, pg. 67; U.S. Department of Transportation, Office of the Assistant Secretary for Transportation Policy, "Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis" https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-valuation-travel-time-economic.

[58] Department of Transportation. 2016. *The Value of Travel Time Savings: Departmental Guidance for Conducting Economic Evaluations Revision 2 (2016). Available at:* https://www.transportation.gov/sites/dot.gov/files/docs/2016%20Revised%20Value%20of%20Travel%20Time%20Guidance.pdf.

[59] Ibid, pg 11.

[60] Ibid, pg. 13.

whether the travel is personal or business in nature.[61] The most recent annual person miles traveled and the distribution of miles travelled for different purposes was collected in DOT's 2001 National Household Travel Survey.[62]

Further examination of the literature would enable an assessment of DOT's VTTS methodology. In particular, the examination should investigate whether the percentages of median income per hour are accurate or realistic assessments of the loss from additional travel time. The lack of updates to either the statistics or the guidance since 2016 is troubling, as is the reliance on a 2001 survey to assess the current quantity of travel and its distribution among various modes in the United States.

Conclusion

NHTSA's 2021 PRIA supporting its proposed fuel economy standards for model years 2024-2026 is a significant improvement over its analyses for the SAFE Vehicles Rules and actions. Notably, NHTSA recognizes that more stringent standards would deliver net benefits to the nation and its people. But despite the improvements, NHTSA's analysis remains overly conservative. It would better demonstrate the benefits of the proposal if it included additional considerations and corrections discussed above.

[61] Ibid, pg. 15.

[62] Ibid, pg. 18.