September 26, 2016

SUBMITTED ONLINE

Submitted online at: www.regulations.gov

Transmitted by e-mail to: 2016TAR@arb.ca.gov, lieske.christopher@epa.gov, rebecca.yoon@dot.gov

Attention: Docket ID Nos. **EPA–HQ–OAR–2015-0827**
NHTSA–2016-0068

Re: 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

Environmental Defense Fund (EDF) appreciates the opportunity to submit comments on the Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA)'s jointly developed Draft Technical Assessment Report (TAR) that examines important issues related to the fuel economy and greenhouse gas (GHG) emissions standards for model year (MY) 2022-2025 passenger vehicles. We submit these comments on behalf of our more than 1 million members nationwide who care deeply about our nation's energy and climate security. EDF is a non-profit, non-partisan, non-governmental environmental organization that combines law, policy, science, and economics to find solutions to today's most pressing environmental problems.

Climate change poses an urgent threat to public health and welfare, and it is critical to secure rapid reductions in emissions of climate-destabilizing pollutants – especially emissions of carbon dioxide from passenger vehicles, which currently account for more than 20 percent of the United States' carbon pollution.[1] Accordingly, we applaud the agencies' leadership in finalizing the historic Phase 2 fuel economy and GHG standards in 2012,which reflect strong collaboration among EPA, the Department of Transportation, the state of California, auto companies, and the workers who forge

[1] EIA, Annual Energy Outlook (2016), Tables 18 and 19 *See*

cleaner cars. These protective standards, when fully implemented, are expected to significantly reduce climate pollution while saving American families more than a trillion dollars at the pump.

In these comments, EDF highlights the energy and environmental impacts of the passenger car fleet; the compelling findings of the Draft TAR, which underscores the eminent feasibility of the later model year standards; and, in addition to the TAR, the strong technical, economic and legal support for reaffirming these standards. We make recommendations for improving the agencies' costs and benefits analyses. This robust technical and economic record strongly supports, and indeed requires, that EPA move forward swiftly to affirm the Phase 2 standards.

EDF incorporates by reference as part of the administrative record for this proceeding all of the documents cited to herein and the documents attached to these comments.

I. A Strong Greenhouse Gas and Fuel Economy Program Will Enhance Energy Security, Save Consumers Money and Curb Climate Altering Gases

The United States consumes more than 19 million barrels of oil a day,[2] which is nearly a quarter of the oil consumed in the entire world, and more than all European nations combined.[3] More than 70 percent of the oil we consume is used for transportation,[4] with the nation's fleet of cars and light trucks consuming more than 9 million barrels of oil per day.[5]

Our nation's dependence on oil is a threat to national security. In a recent blog, retired Lt. General Richard Zilmer (USMC) wrote about the importance of reducing fuel use at home.

> "Over-reliance on oil ties our nation to far-flung conflicts, sends our troops into harm's way, and endangers them once they're in conflict zones." "Historically, cheaper prices at the pump have led consumers and policymakers alike to put gas savings and efficiency on the back burner. But it's critical for our country to keep pressing ahead with reducing our

[2] EIA, Petroleum Statistics, US Petroleum Consumption (2015) *See* http://www.eia.gov/dnav/pet/pet_cons_psup_dc_nus_mbblpd_a.htm (last accessed September 12, 2016).
[3] EIA, Petroleum Statistics, Total World Petroleum Consumption (2014) *See* https://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5&pid=5&aid=2 (last accessed September 12, 2016).
[4] EIA, Petroleum Basic Statistics (2015) *See* http://www.eia.gov/energyexplained/index.cfm?page=oil_home#tab2 (last accessed September 12, 2016).
[5] EIA, Annual Energy Outlook (2016) Table 7 *See* https://www.eia.gov/forecasts/aeo/tables_ref.cfm

> oil dependence. That's especially true given this year's government review of fuel economy standards. Ensuring that the cars and trucks we drive every day go farther on every gallon of gas makes our nation stronger."[6]

Additionally, because more than 40 percent of all domestic oil consumption is attributable to cars and light trucks, historically volatile oil prices can have economic implications for both consumers and commercial spending.[7] Reducing our dependence on oil requires improving fuel consumption from our fleet of cars and trucks.

Our substantial consumption of petroleum likewise has significant environmental consequences. The combustion of oil in our nation's fleet of light-duty vehicles emits about 20 percent of total U.S. GHG emissions.[8] The science is clear: rising concentrations of heat-trapping gases like carbon dioxide in the atmosphere are destabilizing our climate and causing severe impacts to our health and wellbeing. We applaud recent efforts to curb GHG pollution domestically and internationally, which are essential to protect against catastrophic climate change. The Clean Car and Clean Truck standards are crucial components of U.S. efforts to reduce carbon pollution and help avert the most damaging effects of climate change.

The need to reduce GHG pollution grows more urgent every year. In 2014, we experienced the hottest year on record – a record that was recently surpassed by even higher average global temperatures in 2015.[9] In the contiguous United States, record high temperatures outpaced record low temperatures at a rate of 2.46 to 1 over the past year—a disparity that has grown starker with each decade.[10] In March 2015, the global concentration of carbon dioxide in the atmosphere surpassed 400 parts per million for the first time in recorded history, and it continues to rise.[11]

We are already seeing—and paying for—the impacts of climate change on our communities. The National Climatic Data Center reports that the United States experienced ten climate disasters that each caused more than a billion dollars of damage

---

[6] Lt. Gen. Richard Zilmer, USMC (retired), *On Memorial Day, remembrance, celebration, and oil,* The Hill (May 27, 2016). *See* http://thehill.com/blogs/congress-blog/homeland-security/281373-on-memorial-day-remembrance-celebration-and-oil (Last accessed September 12, 2016).
[7] EIA, Annual Energy Outlook (2016); Table 7 *See* https://www.eia.gov/forecasts/aeo/tables_ref.cfm
[8] EIA, Annual Energy Outlook (2016), Tables 18 and 19 *See* https://www.eia.gov/forecasts/aeo/tables_ref.cfm (Last accessed September 12, 2016).
[9] *See* Climate Nexus, "Earth's Second Consecutive Record Hot Year Signals Alarming Warming Trend," Dec. 21, 2015. *See* http://climatenexus.org/climate-change-and-el-ni%C3%B1o-fueled-2015%E2%80%99s-record-heat#2. (Last accessed September 12, 2016).
[10] *See* Climate Nexus, Extreme Weather, Heat http://www.climatenexus.org/tracking-climate-change (last visited September 15, 2016).
[11] *See* Nat'l Oceanic & Atmospheric Admin., "Greenhouse Gas Benchmark Reached," May 6, 2015, http://research.noaa.gov/News/NewsArchive/LatestNews/TabId/684/ArtMID/1768/ArticleID/11153/Greenhouse-gas-benchmark-reached-.aspx. (Last accessed September 26, 2016).

in 2015, including devastating drought and wildfires in the West, severe storms in the South and Midwest, and flooding along the East Coast.[12] These billion-dollar weather events have become significantly more common during the past several decades.[13] The Third National Climate Assessment, released in 2014, found that if GHG emissions are not reduced, it is likely that American communities will experience more of these kinds of impacts, plus reduced crop yields and livestock productivity; increased prevalence of diseases transmitted by food, water, and insects; and increased risk of illness and death due to extreme heat.[14]

The scientific consensus that climate change poses severe threats is already being felt by impacts on the ground. We must act now to reduce carbon pollution and mitigate these impacts, or the costs to our children and grandchildren will be simply unacceptable.

In 2010, EPA and NHTSA together finalized the first-ever joint GHG and fuel economy standards for light-duty vehicles, and in 2012, the Agencies jointly finalized the historic Phase 2 standards that the Agencies estimated would double the fleet average fuel economy of passenger cars and trucks to 54.5 miles per gallon. Together, the National Program, when affirmed and fully implemented after the midterm evaluation (MTE), is projected to save families more than $1.7 trillion in fuel costs and reduce America's dependence on oil by more than 2 million barrels per day in 2025. In addition, the combined program will cut 6 billion metric tons of GHGs over the lifetime of the vehicles sold in MYs 2012-2025 – more than the total amount of carbon dioxide emitted by the United States in 2010.[15]

It is critical that this rigorous National Program is affirmed and fully implemented so that it can deliver on its potential to greatly reduce our reliance on foreign oil and our contribution to climate altering GHG emissions, while saving Americans over a trillion dollars.

II. The Technical Findings Set Forth in the TAR Underscore Both the Achievability and Declining Costs Associated with Meeting the MY2022-2025 GHG Standards

[12] *See* Nat'l Oceanic & Atmospheric Admin., *Billion-Dollar Weather and Climate Disasters: Overview*, http://www.ncdc.noaa.gov/billions/ (Last visited Jan. 15, 2016).
[13] *See* Nat'l Oceanic & Atmospheric Admin., *Billion-Dollar Weather and Climate Disasters: Time Series*, http://www.ncdc.noaa.gov/billions/time-series (Last visited Jan. 15, 2016).
[14] *See* U.S. Glob. Change Research Program, Climate Change Impacts in the United States: Highlights 34–37, 46–47 (May 2014), http://www.globalchange.gov/sites/globalchange/files/NCA3_Highlights_LowRes-small-FINAL_posting.pdf. (Last accessed January 15, 2016).
[15] EPA Fact Sheet: "EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks," (August 2012). *See* https://www3.epa.gov/otaq/climate/documents/420f12051.pdf (Last accessed September 12, 2016).

In its October 15, 2012 final rule, EPA committed to conduct a midterm evaluation (MTE) of the MY 2022-2025 light-duty standards. The MTE's purpose is to evaluate the MY 2022-2025 standards in light of subsequent technological developments reflected in the current record before the Agency. EPA committed "to make a final decision, by April 1, 2018" to affirm or adjust the standards as appropriate.[16] In June 2016, EPA, together with NHTSA and California's Air Resources Board (CARB), issued the Draft TAR as the first step in EPA's MTE process. It is intended to serve as the primary basis for EPA's appropriateness determination, and to inform NHTSA' rulemaking to finalize MY 2022 to 2025 standards. The conclusions reached in the Draft TAR require that EPA reaffirm the 2022-2025 standards, and EDF strongly urges the agencies to do so expeditiously.

During the MTE and through the Draft TAR, the agencies intend to examine a wide range of factors, including technology advancements, the penetration of more fuel-efficient technologies in the marketplace, consumer acceptance of these new technologies, trends in fuel prices and the vehicle fleet, employment impacts, and others.[17] Even though EPA and NHTSA performed independent analyses in the Draft TAR, both agencies reached the same conclusions:[18]

- "A wider range of technologies exist for manufacturers to use to meet the MY2022-2025 standards, and at costs that are similar or lower, than those projected in the 2012 rule"
- "Advanced gasoline vehicle technologies will continue to be the predominant technologies, with modest levels of strong hybridization and very low levels of full electrification (plug-in vehicles) needed to meet the standards."

These conclusions are based on analyses that reflect the most current assessment of the feasibility of the 2025 standards. There is no question that the auto industry is bringing new technologies to the market at a quicker pace than the agencies projected in the 2017-2025 rulemaking. EPA's primary analysis, which relies on more rigorous data and updated assumptions than the NHTSA analysis, shows MY2025 compliance costs (incremental to MY2021) significantly lower than those projected in the final rule ($252 lower for cars and $197 lower for trucks).

---

[16] 77 Fed. Reg. (October 15, 2012) at 62624 ("2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule.")
[17] U.S. Environmental Protection Agency webpage at: https://www3.epa.gov/otaq/climate/mte.htm (last accessed September 12, 2016).
[18] U.S. Environmental Protection Agency, National Highway Traffic Safety Administration, California Air Resources Board, "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," (July 2016) Page ES-2. ("Draft TAR")

One important conclusion of the Draft TAR is that "manufacturers are adopting fuel economy technologies at unprecedented rates. Car makers and suppliers have developed far more innovative technologies to improve fuel economy and reduce GHG emissions than anticipated just a few years ago."[19] EPA analyzed industry's recent MY compliance status with the GHG standards and found that the auto industry is significantly over-complying with the GHG standards for MY2012-2014.[20] Even though the GHG standards decreased 12 grams per mile (g/mile) between MY2012 to 2014, auto companies reduced their compliance levels on average by 14 g/mile. This is in addition to an 11 g/mile over-compliance in 2012. In MY2014, the industry over-performance was 13 g/mile. MY2015 compliance data is not yet complete, but there is no reason to believe that industry-wide over-compliance will not continue. Furthermore, 20 of 24 manufacturers carried a positive credit balance into MY2015. This has occurred while the industry has experienced an unprecedented period of growth and an all-time sales record in 2015.[21]

The agencies also conclude in the Draft TAR that the cost, effectiveness, and feasibility of the individual technologies needed to comply with the future standards are "generally consistent" with those projected in the final rulemaking.[22] The agencies did, however, include several new technologies and developments in the draft TAR that were neither foreseen nor included in the analysis supporting the 2017-2025 final rulemaking. Examples of these technologies include the application of direct injection Atkinson Cycle engines to non-hybrids, greater penetration of continuously variable transmissions (CVT), and greater use of diesel engines. The agencies concluded that these additional technologies contribute to lower cost compliance pathways.[23]

Accounting for the above technologies is important. However, the agencies failed to include several other emerging technologies that would also likely reduce costs and increase feasibility. The agencies acknowledge in the draft TAR that "the automotive industry is innovating and bringing new technology to market at a rapid pace and neither respective agency analyses reflects all of the latest and emerging technologies that may be available in the 2022-2025 timeframe."[24] Examples of technologies that the agencies did not consider include electric turbocharging, variable compression ratio, skip-fire cylinder deactivation, and P2-configuration hybrids. These technologies offer the possibility of even lower compliance costs and are a key aspect of the continued progress

[19] U.S. Environmental Protection Agency webpage at: https://www3.epa.gov/otaq/climate/mte.htm (last accessed September 12, 2016).
[20] Draft TAR, Page 3-14.
[21] EPA, "Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 – 2015," December 2015. *See* https://www3.epa.gov/otaq/fetrends-complete.htm
[22] 77 Fed. Reg. (October 15, 2012) at 64648 ("2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule.")
[23] Draft TAR, Page 5-1.
[24] Draft TAR, Page ES-4.

manufacturers will make in emissions reductions and fuel economy. Consideration of these technologies would reinforce and strengthen the agencies' conclusion that manufacturers' compliance efforts are outpacing 2012 projections—and very likely those projected in the draft TAR. We urge the agencies to include these and any other emerging technologies in their final determinations and rulemakings.

A recent independent assessment by the International Council on Clean Transportation (ICCT) of gasoline engine technology trends also indicates that the pace of technology adoption is faster than projected in the 2025 final rulemaking. The study, a collaboration between ICCT and key automotive suppliers (BorgWarner, Eaton, and the ITB Group), concludes that the fuel efficiency of gasoline engines has improved at a faster pace than the agencies projected because of technology advances such as gasoline direct injection, high-compression engines with cooled exhaust gas recirculation, improved stop-start systems, and dynamic cylinder deactivation. It further concludes that the penetration, cost, and efficiency improvements of these technologies are "all on track or ahead of the rulemaking assessments in every way" and "there may be a larger role for these engines than previously estimated."[25] This study further corroborates the cost and innovation conclusions the agencies reached in the draft TAR.

We believe that the draft TAR firmly provides the basis to determine that the MY2022-2025 standards remain appropriate. EPA should move ahead expeditiously to prepare and issue a proposed determination that reaffirms the existing standards.

III. The Agencies' Analyses Should Be Strengthened and Better Aligned

The Draft TAR indicates that even though the agencies worked collaboratively "in an array of areas" during the development of the report, the "EPA GHG and NHTSA CAFE assessments were done independently."[26] The TAR notes that, "independent and parallel analysis can provide complementary results."[27] EDF believes there are improvements that can be made to the analyses that would further reinforce this conclusion and bring them closer in line.

Each agency utilized certain different data sources and dramatically different modeling techniques in their respective analysis. As a consequence, the agencies project

[25] Aaron Isenstadt and John German (ICCT); Mihai Dorobantu (Eaton), "Naturally aspirated gasoline engines and cylinder deactivation," Working Paper 2016-12 (June 21, 2016). *See* http://www.theicct.org/sites/default/files/publications/ICCT_NAengines_201606.pdf (Last accessed September 12, 2016).
[26] Draft TAR, page ES-6.
[27] Draft TAR, page ES-6.

substantially different pathways for compliance with the MY2022-2025 GHG and CAFE standards. Not surprisingly, the cost projections for each agency's projected compliance pathway are also different. NHTSA's cost projections for cars are $500 higher than EPA's. NHTSA's truck costs are $190 higher.

Most, if not all, of these differences can be attributed to a few key areas of disparity between each agency's primary analyses. We urge the agencies to better align their assumptions and analyses by addressing these key differences. We focus below on the areas that are particularly problematic and have the potential to explain most of the differences in costs and technology projections. If the agencies were better aligned on their modeling input assumptions, we expect the results of their individual analyses would be in close agreement similar to the 2012-2016 and 2017-2025 joint final rules. Even absent these adjustments, however, we emphasize that the analyses are in general agreement and both point to the need to swiftly affirm the standards.

a. ICM Versus RPE

The compliance costs estimated by the agencies consist of two components: direct costs and indirect costs. The direct costs include the cost of materials and the labor costs associated with manufacturing and installing the technology. Indirect costs may include items such as research and development, marketing, corporate overhead, and dealer support. Historically, both agencies applied a retail price equivalent (RPE) multiplier to estimate indirect costs. RPEs are derived by dividing the total revenue of a manufacturer by the direct manufacturing costs and then applied to the direct cost to estimate the technology cost. The use of RPEs assumes that the indirect costs, as a percentage, are the same for all new technologies. The main concern with RPEs is that they likely overestimate costs for low complexity technologies, and are likely to underestimate costs for high complexity technologies.

To address this concern, EPA developed an alternative approach to deriving indirect costs called indirect cost multipliers (ICM). ICMs are based on RPEs that are modified to better account for the complexity (low, medium, or high) and the timeframe (near term or long term) under consideration for each technology. By doing this, the multiplier more accurately reflects only those components that would be expected to change as a result of the regulation.

The original development of the ICM approach was done under contract for EPA by RTI International and published as a peer review journal article in 2009.[28] Since then, the ICM

[28] Rogozhin, A., et al., "Using indirect cost multipliers to estimate the total cost of adding new technology in the automobile industry," International Journal of Production Economics (2009).

methodology has been used by both EPA and NHTSA and has withstood public review during both the light-duty Phase 1 and Phase 2 rulemakings. In addition, a recent National Research Council report concluded that the ICM approach was conceptually superior to the RPE approach.[29]

Both agencies also used this methodology to estimate indirect costs in the 2017-2025 rulemaking.[30] However, in its analysis for the Draft TAR, NHTSA reverted to the use of RPEs for their primary cost estimates. NHTSA fails to reconcile their decision to use RPEs with the record that clearly supports ICM as the better approach to deriving indirect costs. By NHTSA's own calculations in the draft TAR, the use of ICMs would reduce NHTSA's estimated average per-vehicle costs in 2025 by $206.[31] We strongly recommend that NHTSA return to the more accurate use the ICM methodology in their primary analysis.

b. Performance Neutrality

Many of the technologies that could be used by manufacturers to comply with the 2025 standards could also be used to improve performance at the expense of fuel efficiency. For example, manufacturers have delivered a dramatic downward trend in 0 to 60 acceleration times over the last 40 years (See Figure 1)[32] while part of this improvement in performance has come at the expense of fuel economy. EPA has elected in the draft TAR, as both agencies had done in the Phase 2 rulemaking, to maintain equivalent performance in order to fairly and consistently compare the relative cost effectiveness of the various technologies. As stated in the draft TAR:

> The agencies agree that it is appropriate to objectively compare technology costs and effectiveness, that maintaining constant vehicle performance is the appropriate way to achieve that goal, and that the NAS's recommendation of "equivalent acceleration performance" is appropriate. Thus, the costs and effectiveness presented in this document are based on the application of technology packages while holding the underlying acceleration performance constant.[33]

---

[29] National Research Council (NRC), "Cost, effectiveness, and deployment of fuel economy technologies for light-duty vehicles," National Academies Press (2015). Online at *www.nap.edu/catalog/21744/cost-effectiveness-and-deployment-of-fuel-economy-technologies-for-light-duty-vehicles.)*

[30] EPA and NHTSA, "Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," EPA-420-R-12-901 (August 2012).

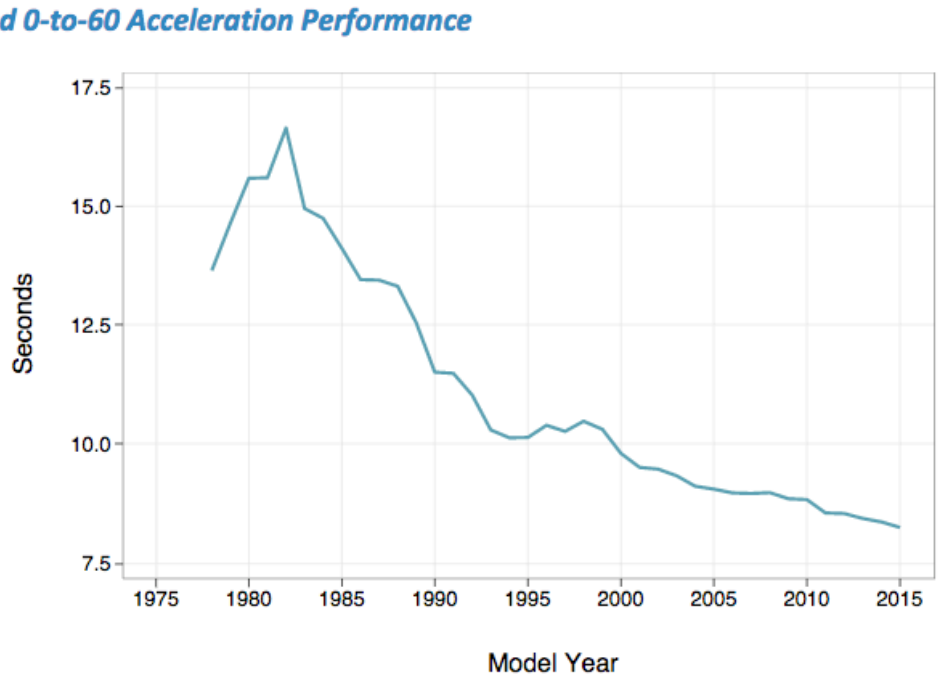
[31] Draft TAR, page 13-93, Table 13.23

[32] EPA, "Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 – 2015," December 2015. Available at: https://www3.epa.gov/otaq/fetrends-complete.htm

[33] Draft TAR, page 5-224.

We agree that this is the appropriate way to perform the analysis and is consistent with the approach utilized in both the 2012-2016 and 2017-2025 final rulemakings.

However, the Union of Concerned Scientists (UCS) has determined that in NHTSA's Autonomie modeling (performed by Argonne National Laboratory (ANL) for NHTSA), ANL did not hold performance constant. UCS has calculated, through its own modeling, that not holding performance constant resulted in a dramatic increase in NHTSA's estimated compliance costs. If NHTSA had maintained performance neutrality, UCS estimates that NHTSA's 2025 per-vehicle costs would be reduced by more than $200.[34] This is another example of how NHTSA's use of different assumptions has biased their costs on the high side. We recommend that, consistent with EPA's modeling, NHTSA keep performance constant, as it has previously stated is appropriate.



c. Baseline Assumptions

The choice of a baseline fleet is critical because it serves as the foundation for each area of analysis. Most importantly, the baseline captures the penetrations of advanced technologies already present in the fleet, so as to prevent the agencies' models from inaccurately applying technologies to vehicles that already employ them. Otherwise,

[34] Union of Concerned Scientists comments by Dave Cooke submitted to Docket ID# EPA–HQ–OAR–2015-0827 (September 2016).

there is the potential to double-count costs and benefits. Therefore, having complete and accurate baseline data is critical.

EPA uses a 2014 MY baseline because it is the most recent MY for which there is complete data with actual manufacturer volumes and CO2 levels. This 2014 data has undergone extensive quality control by EPA, the manufacturers and the Verify database software, and is available for public review.[35] EPA decided against using 2015 MY as the base year because the data is incomplete and sales volumes are based on manufacturer estimates. EPA concluded that "these differences make using the midyear data a soft basis for projecting the future verse the solid foundation of exact volumes and exact CO2 that final reported data gives."[36]

On the other hand, NHTSA chose to use the 2015 MY as the baseline for their analysis because it is more recent, even though it is incomplete and has not gone through a careful quality assurance process. NHTSA admitted in the draft TAR that "model year 2015 vehicles were still in production when DOT staff compiled available information regarding the 2015 fleet, such that final production and fuel economy values may be slightly different for specific model year 2015 vehicle models and configurations than are indicated in today's analysis." In addition to being incomplete, using the 2015 data likely directionally increases the cost estimates compared to EPA's analysis. We urge the Agencies to use the same baseline based on the most recent complete data.

d. Accounting for California's ZEV Regulation

California's Zero Emissions Vehicle (ZEV) program, which has been adopted by 9 other states, requires a continued increase in the electrification of the passenger car fleet. As a result of the ZEV regulations, manufacturers are expected to produce and sell an increasing number of ZEVs and plug-in hybrid electric vehicles through 2025. EPA correctly accounted for the ZEV regulations by including California's ZEVs in its reference fleet. This ensures that the costs of meeting the ZEV program are not included as part of the national rule. NHTSA, however, in its analysis, failed to account for the ZEV program, therefore inaccurately representing the national fleet and overestimating costs. The agencies acknowledged in the draft TAR that this deficiency "accounts for at least part of the cost differences in the two agencies' analyses as well as for some of the difference in technology penetration rates for full hybrids."[37] We would expect NHTSA's

[35] Draft TAR, page 4-2.
[36] Draft TAR, page 4-9.
[37] Draft TAR page ES-10.

cost to be significantly reduced and more in line with EPA's estimates if it had properly accounted for the ZEV program.

IV. Automakers are Committed to Making Clean Cars and Meeting Standards

In addition to the compelling conclusions in the Draft TAR that the 2022-2025 standards adopted in 2012 are technologically feasible and cost effective, major auto companies have included statements in formal filings with the U.S. Securities and Exchange Commission (SEC), addressing the advances in technology and the viability of strong fuel efficiency and GHG emission standards. A number of automakers – including General Motors and Honda – are on the record in these submissions, affirming their commitment to reduce GHGs, improve fuel efficiency, and develop and deploy advanced technologies to deliver cleaner cars that meet these important safeguards:

- "One of our priorities for research is to continue to develop and advance our alternative propulsion strategy because energy diversity and environmental leadership are critical elements of our overall business strategy. **Our objective is to be the recognized industry leader in fuel efficiency** through the development of a wide variety of technologies to reduce petroleum consumption." *General Motors, Form 10-K, filed 2015, page 4* (*bold added*)

- "We are investing significantly in multiple technologies offering increasing levels of vehicle electrification including eAssist, plug-in hybrid, full hybrid, extended-range and battery electric vehicles … **We are fully committed to improving fuel efficiency and meeting regulatory standards**..." *General Motors, Form 10-K, filed 2016, pages 5 and 6* (*bold added*)

- "We are strengthening and investing in our core business of designing, developing, manufacturing, marketing, financing, and servicing cars, trucks, SUVs, and electrified vehicles … We will add more electrified products for Ford and Lincoln, including the new Focus Electric, which features all-new DC fast-charge capability delivering an 80% charge in an estimated 30 minutes and a projected 100-mile range. Through 2020, we plan to invest $4.5 billion in electrified vehicle solutions." *Ford Motor Company, Form 20-F, filed 2016, page 31*

- "We also continue to research vehicle applications for improving recuperation and re-use of thermal energy and of kinetic energy, thereby reducing energy consumption and related CO2 emissions of conventional and hybrid electric vehicle models … Launching in 2016, the new Chrysler Pacifica Hybrid is expected to achieve an efficiency rating of 80 miles per gallon equivalent (MPGe), based on U.S. Environmental Protection Agency standards and provide

an estimated range of 30 miles solely on zero-emissions electric power." *Fiat Chrysler, Form 20-F, filed 2016, pages 98 and 99*

- "**Honda will step up its efforts to create better, cleaner and more fuel-efficient engine technologies** … [w]ith the long-term goal of reducing total CO2 emissions by 50% compared to year 2000 levels by 2050, Honda has set an interim target to reduce CO2 emissions from its global products by 30% by 2020. Honda will strengthen its efforts to realize reductions in CO2 emissions through its entire corporate activities including its supply chain … In the electrical technologies, development has been underway for plug-in hybrids that Honda regards and expects as the future of EVs, and development is also underway for zero emission vehicles such as fuel cell vehicles and battery EVs ahead of an expected eventual rise in demand." *Honda Motor Co., Form 20-F, filed 2016, Pages 27 and 59* (*bold added*)

- "The standards of fuel economy are stringent, and Toyota strives to meet the fuel economy standards by further developing fuel-efficient technology, alternative fuel technology and other advanced technology … Toyota is promoting research and development into the early commercialization of next generation environmentally friendly, energy-efficient and safe-vehicle technology and is making efforts to produce vehicles that are friendly to people and the environment by focusing on the following areas:
    - further improvements in hybrid technologies, including in functions and cost, and contributions to the environment through advancements;
    - improvement in gasoline engine fuel economy technology as well as improvement in technology in connection with more stringent emission standards;
    - promoting improvements in functions and fuel economy of clean diesel engines;
    - development of electric vehicles, fuel cell vehicles and other alternative fuel vehicles; and
    - development of technology designed to promote driving and vehicle safety."

  Toyota Motor Corporation, Form 20-F, filed 2016, pages 39 and 47

In addition to commitments made in SEC filings, a number of manufacturers are already producing vehicle models that meet or surpass future standards. For example, the Ford-150, the most popular truck in the U.S., has models that already meet standards for 2021, as do the Toyota Rav4, Chevy Malibu hybrid and Chevy Cruze.[38] The 2014 Toyota Highlander meets standards for 2020 and the Honda Civic and the Scion iA meet 2023

[38] CFA Press Release, "New Report: Automakers Beating Expectations With Fuel-Efficient Offerings," (April 25, 2016). *See* http://consumerfed.org/press_release/new-report-automakers-beating-expectations-with-fuel-efficient-offerings/

standards.[39] The Chevrolet Volt, Toyota Prius, Chevrolet Spark and Smart ForTwo meet standards for 2025.[40] Every Mazda model now meets or beats the fuel efficiency target for its vehicle class, a first-ever achievement for an automaker that relies on internal combustion engines.[41] Manufacturers are on a clear path to meeting the 2022-2025 standards.

The Clean Car standards have already been delivering tremendous benefits to Americans, and the technologies needed to meet the standards are readily available. Reaffirming the standards is critical to continue to drive technological advances, and make sure that our families and communities continue to get the significant health, environmental, national security and economic benefits of this historic program.

V. EPA Must Affirm the 2022-2025 Standards

In establishing and administering the National Program for light-duty vehicles, both EPA and NHTSA operate under ambitious and forward-looking statutory requirements. The agencies' authorizing statutes for the light-duty program contemplate establishing standards based on a consideration of advanced and emerging technologies.[42] This forward looking framework, coupled with the findings in the joint Draft TAR—documenting that the Phase 2 standards can be achieved at even lower costs and with greater benefits than the agencies originally estimated—require that EPA affirms the Phase 2 standards for MY 2022 through 2025. Indeed, anything less than a swift and clear decision to affirm the standards would be arbitrary and unlawful. [43]

The Clean Air Act requires the Administrator to ensure Section 202 standards take effect "after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of

---

[39] *Id.*
[40] *Id.*
[41] *Id.*
[42] See, e.g., Natural Res. Def. Council, Inc. v. Envtl. Prot. Agency, 655 F.2d 318 (D.C. Cir. 1981) (upholding EPA's 1980 PM standards for light-duty diesel vehicles, and noting, "[t]he legislative history of both the 1970 and the 1977 amendments demonstrates that Congress intended the agency to project future advances in pollution control capability," and "[i]t was expected to press for the development and application of improved technology rather than be limited by that which exists today." (internal quotations and citations omitted).
[43] Pursuant to the judicial review provisions of the Clean Air Act, a court reviewing EPA's GHG emission standards may reverse the action if it is found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law. 42 U.S.C. § 7607. Similarly, NHTSA's CAFE standards are subject to the Administrative Procedure Act, which authorizes a reviewing court to hold unlawful an agency action found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law. 5 U.S.C. § 706.

compliance within such period."[44] Likewise, NHTSA's fuel economy standards must represent "the maximum feasible average fuel economy level that the Secretary [of Transportation] decides the manufacturers can achieve in that model year."[45] These technology-forcing mandates contemplate evaluation of current and future technologies when establishing greenhouse gas and fuel economy standards for light-duty vehicles.

In promulgating the Phase 2 standards in 2012, EPA, NHTSA, and CARB committed to jointly develop the TAR to help evaluate the agencies' technology-based findings in the Phase 2 rulemaking and determine the ongoing appropriateness of standards set for the later model years of the program— 2022 through 2025. [46] While EPA's MTE satisfies the agency's commitment to review technology developments in light of the model years covered under the Phase 2 standards, and NHTSA's assessment will help form the basis for a statutorily required new rulemaking for MY 2022-2025 standards,[47]the TAR represents an important opportunity for both agencies to evaluate the stringency of the standards in light of how today's reality compares to their projections in 2012.

EPA's regulations outline a set of factors that the agency will consider in making this assessment, including factors that address the pace and costs of technological development and benefits that the standards will deliver, among others. [48] The preamble to the Phase 2 rulemaking sets forth a similar list of considerations. [49] The agency's assessment of these factors and subsequent decision with respect to the MY 2022–2025 standards is both cabined and informed by section 202(a)'s technology forcing mandate.

---

[44] 42 U.S.C. § 7521(a)(2).
[45] 49 U.S.C. § 32902(a).
[46] 77 FR at 62784 ("EPA, NHTSA and CARB will jointly prepare a draft …TAR to inform EPA's determination on the appropriateness of the GHG standards and to inform NHTSA's rulemaking for the CAFE standards for MY 2022-2025.").
[47] EPCA authorizes promulgation of fuel economy standards for "at least one, but not more than 5, model years" at a time. 49 U.S.C. § 32902(b)(3)(B).
[48] 40 CFR 86.1818-12(h)(1). The full list of factors include: (i) availability and effectiveness of technology, and appropriate lead time for introduction of technology; (ii) cost on producers and purchasers; (iii) feasibility of the standards; (iv) impact of the standards on emissions reduction, oil conservation, energy security, and fuel savings; (v) impact on the automobile industry; (vi) impacts on automobile safety; (vii) impact of the greenhouse gas emission standards on the Corporate Average Fuel Economy standards and a national harmonized program; and (viii) impact on other relevant factors.
[49] 77 Fed. Reg. at 62784 (listing as relevant: 1) development of powertrain improvements to gasoline and diesel powered vehicles; 2) impacts on employment, including the auto sector; 3) availability and implementation of methods to reduce weight, including any impacts on safety; 4) actual and projected availability of public and private charging infrastructure for electric vehicles, and fueling infrastructure for alternative fueled vehicles; 5) costs, availability, and consumer acceptance of technologies to ensure compliance with the standards, such as vehicle batteries and power electronics, mass reduction, and anticipated trends in these costs; 6) payback periods for any incremental vehicle costs associated with meeting the standards; 7) costs for gasoline, diesel fuel, and alternative fuels; 8) total light-duty vehicle sales and projected fleet mix; 9) market penetration across the fleet of fuel efficient technologies; and 10) any other factors that may be deemed relevant to the review).

Related to these factors and discussed in greater detail above, EPA's and NHTSA's TAR assessment both found that the availability of requisite technologies and estimated costs and benefits to industry and consumers make the 2022-2025 standards eminently reasonable. In fact, the TAR indicates that 2012 projections were conservative: the auto industry is already over-complying with the National Program while experiencing six consecutive years of sales increases; manufacturers are already employing a wider range of new technologies, including those not considered in 2012; these advanced technologies are entering the market more quickly; and consumer savings far exceed costs with very short payback periods.[50] While EPA's TAR assessment is more robust than NHTSA's, both agencies' projections likely remain conservative with respect to the pace of innovation and cost reductions.

In light of this record and the agencies' technology-forcing statutory mandates, anything less than a decision to affirm the MY 2022–2025 standards would be arbitrary and unlawful. As described above, the agencies' statutory and regulatory mandates contemplate that standards be established considering available and emerging technologies, existing and projected market penetration of those technologies, and expected costs to manufacturers and consumers—judgments that must exist "within defined statutory limits" and may not be "divorced from the statutory text."[51]

EPA and NHTSA performed a rigorous analysis of these factors in the Phase 2 rulemaking and the TAR only strengthens and reinforces the agencies' original conclusions concerning the achievability and low cost of MY 2022–2025 standards. Where, as here, subsequent facts align with and support the agencies' original conclusions concerning the feasibility and effectiveness of the standards, a decision to weaken those standards would be manifestly arbitrary and capricious. *Cf. FCC v. Fox TV Stations, Inc.*, 129 S. Ct. 1800, 1824 (2009) ("[w]here there is a policy change . . . the record may be much more developed because the agency based its prior policy on factual findings. In that instance, an agency's decision to change course may be arbitrary and capricious if the agency ignores or countermands its earlier factual findings without reasoned explanation for doing so.")[52] The agency may not "disregard contrary or inconvenient factual determinations that it made in the past, any more than it can ignore inconvenient facts when it writes on a blank slate."[53] Here, both point strongly in the same direction, and accordingly, EPA must swiftly affirm the MY 2022–2025 standards.

[50] Draft TAR, Executive Summary.
[51] Massachusetts v. EPA, 549 U.S. 497, 532-33 (2007).
[52] *FCC v. Fox TV Stations, Inc.*, 129 S. Ct. 1800, 1824 (2009) (Kennedy, J., concurring)(plurality opinion). See also id. at 1811 (When an agency's "new policy rests upon factual findings that contradict those which underlay its prior policy," the agency must "provide a more detailed justification than what would suffice for a new policy created on a blank slate.").
[53] *Id*.

VI. Revised Social Cost of Carbon and Social Cost of Methane Estimates Better Characterize the Benefits of the Phase 2 Standards and Strongly Support Affirming the Standards

In addition to the dramatically declining costs of reducing GHG emissions from passenger vehicles, discussed above, recent scientific and technical work likewise better characterizes the benefits of these reductions. As EPA discusses in the Draft TAR, the agency monetized the benefits of CO_2 reductions in the Phase 2 rulemaking using Social Cost of Carbon (SCC) estimates from 2010.[54] EPA declined to monetize benefits associated with non- CO_2 GHG reductions (most notably methane).

The Draft TAR notes several important updates to these values since the Phase 2 standards were finalized. In particular, the current SCC values presented in the *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (May 2013, Revised July 2015) and used in the Draft TAR incorporate several important improvements and provide a more rigorous accounting of the benefits than the 2010 values used as the original basis for the Phase 2 rulemaking. We support EPA's use of these updated values. We also support EPA's collaboration with the Interagency Working Group (IWG), the development of the National Academies of Sciences' committee, "Assessing Approaches to Updating the Social Cost of Carbon," (Committee) that is reviewing the state of the science on estimating the SCC, and EPA's commitment to "evaluate its approach based upon any feedback received from the Academies' panel."[55]

The Draft TAR also notes that, "one limitation of the primary benefits analysis in the 2017-2025 final rulemaking is that it did not include the valuation of non-CO2 GHG impacts (CH4, N2O, HFC-134a)." It is clear that reductions in these harmful pollutants will provide significant benefits to society, and subsequent to finalizing the Phase 2 standards EPA has monetized these benefits using Marten et al.'s (2014) estimates of SC-CH4 and SC-N2O.

Accordingly, the updated SCC and SC-CH_4 estimates presented in the Draft TAR are reasonable and an improvement over the values used in the final rulemaking, though still likely understate the true benefits of reducing these pollutants. As economic and scientific research continues to develop in the future, we believe the values should continue to be revised. EDF joined comments submitted by the Institute for Policy Integrity underscoring the reasonableness of the current estimates and offering

[54] Draft TAR, Page 10-44.
[55] *Id.*

recommendations for further improvements.[56] We incorporate those here (See Attachment A).

The critical updates made by EPA in the Draft TAR demonstrate that the benefits delivered by the Phase 2 Rule will be even greater than EPA originally projected, and accordingly, strongly support reaffirming the 2022-2025 standards. Reaffirming the standards is further warranted given a recent Seventh Circuit decision affirming the Department of Energy's (DOE) authority to consider the SCC in promulgating appliance efficiency standards, and likewise upholding key choices about how the SCC estimate was calculated, including that DOE had properly considered all impacts of climate change, even those occurring years from now and outside of the United States.[57] The values in the Draft TAR reflect the same approach the Seventh Circuit upheld as reasonable and further support reaffirmation of the final 2022-2025 standards.

VII. Consumer acceptance and employment impacts

Strong fuel-economy and GHG standards benefit new-vehicle purchasers by providing them with fuel savings. Each year, motorists spend billions on fuel, partially as a result of having chosen relatively fuel-inefficient vehicles. This phenomenon, whereby consumers undervalue energy-efficiency when procuring durable goods, is known as the energy paradox, and is observed across many product markets. While further analysis aimed at better understanding the mechanisms that lead consumers to undervalue energy-efficiency is surely warranted, researchers have concluded that the energy paradox is real, and not simply an artifact of unaccounted for product attributes of consumer preferences. Further, adopting strong fuel-economy standards, which can help to correct of this undervaluation offers a genuine opportunity to create economic value.

Strong fuel-economy and GHG standards benefit used-vehicle purchasers by providing them with better choices. Recent trends in vehicle sales suggest that new-vehicle purchasers do, on average, implicitly discount fuel price variability; consumers believe that today's fuel prices will persist (in real terms) indefinitely. This means that when fuel prices are low, new vehicle purchasers tend to purchase more fuel-inefficient vehicles, and when fuel prices are high they tend to purchase relatively more fuel-efficient vehicles. This pattern has important consequences for the used vehicle market, where the supply of each model and vintage is largely determined by the past choices of new-vehicle purchasers, and the supply of a particular used vehicle model is essentially

[56] Environmental Defense Fund, Institute for Policy Integrity at New York University School of Law, Natural Resources Defense Council, and Union of Concerned Scientists, Comments to Dockets EPA-HQ-OAR-2014-0827 & NHTSA-2014-0132, "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium and Heavy-Duty Engines and Vehicles; Phase 2," (October 1, 2015).
[57] *Zero Zone, Inc. v. DOE*, CITE (7th Cir. 2016).

inelastic. That is, the choices of today's new-vehicle purchasers will determine which vehicles are available to tomorrow's used vehicle purchasers, and determine the fuel economy of the fleet for many years after the original purchase date. To appropriately account for the costs and benefits that accrue to used-vehicle purchasers, the agencies should use the net present value of expected fuel savings over the entire lifetime of the vehicle when calculating consumer benefits.

Strong fuel-economy and GHG standards catalyze technology development and deployment. Even if only a fraction of new-vehicle purchasers undervalue fuel economy, their behavior will impact what sorts of products are marketed, and the rate at which new technology is introduced into the market. There is a growing peer-reviewed literature that suggests learning about new technology leads to greater consumer acceptance, which has prompted many states to adopt information campaigns and policies aimed at stimulating the deployment of new vehicle technology. Unfortunately, the sort of information that could increase new technology adoption is often unavailable or difficult to access. Moreover, auto producers may delay introducing new technology if they incur the costs of teaching consumers about technology, but are unable to capture the spillover benefits.

Strong fuel economy and GHG standards also benefit low-income consumers. As previously discussed, the choices of new-vehicle purchasers determine which vehicles are available to used vehicle purchasers for many years into the future. To the extent that low-income consumers are more likely to purchase a used vehicle, strong fuel-economy standards will increase the supply of fuel-efficient used vehicles available for purchase.

Strong fuel-economy and GHG standards likewise protect American autoworkers. Recent peer-reviewed research suggests that fuel-economy and GHG standards have lead U.S. automakers to offer more diverse sets of products, which are competitive under a wider range of fuel prices. As a result, U.S. automakers are now better positioned to manage significant fuel price swings than they were prior to the 2005 run up in oil prices. For autoworkers, strong standards safeguard against unanticipated changes in the price of fuel, which could otherwise lead to layoffs and lost wages.

The robust Phase 2 program finalized in 2012 by EPA and NHTSA will provide significant fuel cost saving to American families, improve our climate security, and deliver cleaner air to communities. The standards are supported by a broad coalition of stakeholders, including manufacturers, advanced technology innovators, labor, security groups, faith-based groups, moms, consumers, environmental groups and science-based organizations. And the robust technical and economic record strongly supports, and indeed requires, that EPA move forward swiftly to affirm the Phase 2 standards.

Thank you for the opportunity to submit these comments. If you have any questions, please contact Hilary Sinnamon at (208) 720-3218 or hilary@redmtngroup.com.

Sincerely,

Chet France
Consultant to Environmental Defense Fund

Alice Henderson
Legal Fellow

Hilary Sinnamon
Consultant to Environmental Defense Fund

Peter Zalzal
Staff Attorney