COMMENTS ON:
Notice of Intent to Conduct Joint Rulemaking
2017 and Later Model Years Light Duty Vehicle GHG Emissions and CAFE Standards

Environmental Protection Agency
and
National Highway Traffic Safety Administration
Docket No. EPA–HQ–OAR–0799 and NHTSA–2010–0131

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by the

Natural Resources Defense Council (NRDC)

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EXECUTIVE SUMMARY

The Natural Resources Defense Council (NRDC) appreciates the opportunity to comment on the Notice of Intent for Joint Rulemaking to Establish 2017 and Later Model Year Light Duty Vehicle GHG Emission Standards and CAFE Standards implemented by the Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA) (Docket No. EPA–HQ–OAR–0799/NHTSA–2010–0131). NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has 1.3 million members and online activists.

Setting strong, long-term national limits on motor vehicle global warming pollution and fuel economy standards is a necessary and important action for the U.S. to meet the President's stated goals of reducing greenhouse gas (GHG) emissions and reducing our dependency on oil. The first phase of the so-called National Program was the first-ever national action to curb global warming under the Clean Air Act (CAA). The development of the National Program marks a dramatically different, collaborative approach to the development of new standards. The program also established the legitimacy of state leadership by California and 13 other states which have previously adopted California's standards to limit global warming pollution from vehicles. We are pleased to see that the recognition of California and the other 13 states as partners with the U.S EPA and NHTSA has been extended to the next phase of the program.

While past improvements to Corporate Average Fuel Economy (CAFE) have made some progress in reducing GHG emissions, the CAA authority is a far superior statute to control greenhouse gas emissions since it provides the EPA the ability to adopt forward looking standards that are consistent with long-term environmental targets, address all GHG emissions—not just carbon dioxide, and accurately reflect the true carbon impacts of substituting different fuels for gasoline through life-cycle analysis. The adoption of the model year 2012 to 2016 National Program also clearly demonstrates that the pollution and health protections of the CAA can be aligned with the fuel-conservation directive of the Energy Policy and Conservation Act.

The Notice of Intent (NOI) and the companion Technical Assessment Report (TAR) show great promise to help fulfill the national GHG emission and oil demand reduction goals. NRDC's primary comments on the NOI and the TAR are as follows:

- The joint agency TAR supports the conclusion of our own independent analysis as well as others that a 6% improvement rate target (143 grams per mile by 2025) is technically feasible and cost-effective. Although we understand the agency will be conducting additional analysis, it is clear that the 6% improvement rate scenario is the one that provides the greatest GHG and oil benefits and therefore is clearly the most appropriate standard of those included in the TAR for the agencies to propose in next year's Notice of Proposed Rulemaking (NPRM). Furthermore, when using the same accounting convention as the TAR for treating EV upstream emissions as zero, our analysis (conducted jointly with the Union of Concerned Scientists) supports a 7% improvement rate (equivalent to 130 grams of CO_2e/mile by MY 2025) as technically feasible and cost-effective.
- The NOI notes that one goal of the National Program is to allow the manufacturers to build a single national fleet. To fulfill this goal, the agencies should make it possible for an automaker that is in compliance with the more stringent standard, to be also in

compliance with the other standards. While the GHG emissions and fuel economy standards should strive wherever possible to achieve consistency in structure and stringency, there is no practical need for the standards to be identical as demonstrated by the current National Program design that has slightly different provisions such as treatment of air conditioning improvements.

- As we have previously commented on the current National Program, EPA should score advanced technology vehicles, such as plug-in hybrids and electric vehicles, according to their true full fuel cycle GHG emissions impact, which includes upstream electricity generation. A "zero upstream" approach will undermine the model year 2017 to 2025 National Program emission benefits by providing automakers technologies incentives that are not commensurate with their actual environmental performance.
- NRDC opposes a mid-term technology review that could be used to weaken the standard because it creates uncertainty and thereby undermines investments in clean vehicle technologies. Any mid-term review should be limited in scope and be conducted with sufficient lead time to allow manufacturers to choose a viable technology compliance path.
- EPA and NHTSA should establish manufacturer-specific "backstop" standards to ensure that environmental objectives are not undermined by shifts in sales mix and average vehicle size.
- EPA should prohibit any flex-fuel vehicle (FFV) from being banked, transferred or traded because they do not represent real GHG reductions.
- EPA and NHTSA should create greater public transparency by annually publishing data on each manufacturer's credit and debit status, thus ensuring greater public confidence in the program's effectiveness.
- EPA and NHTSA should value the private benefits of fuel savings using a discount rate of no more than 3 percent, which is consistent with OMB guidance and consistent with current DOE practice when evaluating benefits of energy savings from residential appliance standards.
- EPA and NHTSA should update the social cost of carbon used in the benefit calculations of the NPRM.

NRDC looks forward to working with the agencies to developing this important program. More details on our recommendations are provided below.

I. INTRODUCTION

Setting strong, long-term national limits on motor vehicle global warming pollution and fuel economy standards is a necessary and important action for the U.S. to meet the President's stated goals of reducing GHG emissions and reducing our dependency on oil.[1] The first phase of the so-called National Program was the first-ever national action to curb global warming under

[1] In a January 28th, 2010 letter to the IPCC, the U.S. committed to make an economy-wide greenhouse gas emission reduction from 2005 levels "[i]n the range of 17%, in conformity with anticipated U.S. energy and climate legislation, recognizing that the final target will be reported to the Secretariat in light of enacted legislation." A footnote adds this: "The pathway set forth in pending legislation would entail a 30% reduction in 2025 and a 42% reduction in 2030, in line with the goal to reduce emissions 83% by 2050."

the Clean Air Act (CAA). The development of the National Program marks a dramatically different, collaborative approach to the development of new standards. The program also established the legitimacy of state leadership by California and 13 other states which have previously adopted California's standards to limit global warming pollution limits from vehicles. We are pleased to see that the recognition of California (and by extension the other 13 CAA Section 177 states) as partners with the U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA) has been extended to the next phase of the program.

The U.S. EPA's and NHTSA's Notice of Intent (NOI) and Technical Assessment Report (TAR) show the tremendous opportunity for the next phase of the National Program to create a cleaner, more fuel-efficient vehicle fleet. If the potential of the second phase of National Program is fulfilled, America will move further down the road to solving global warming pollution, break our dependence on oil, while saving drivers money at the pump. If the strongest level of the evaluated scenarios is adopted, the second phase of the National Program could save approximately 1.3 billion barrels of oil and up to 590 million metric tons of CO_2e over the lifetime of the model years covered. In contrast, the weakest standards proposed would result in 0.6 billion barrels less oil saved and 250 million metric tons less of CO_2e emissions avoided.

By using good science and smart policy, the design of the proposed National Program standards will ensure low emissions, higher fuel economy and safety all go hand-in-hand. The below comments are intended to help ensure that the second phase of the National Program fulfills its tremendous promise and meets the President's climate and energy security goals.

II. OVERARCHING COMMENTS: MEETING REQUIREMENTS OF THE PRESIDENTIAL MEMORANDUM

The May 21st, 2010 Presidential Memorandum directed the U.S. EPA and NHTSA to develop the next phase of National Program with the following objectives:[2]

1. Consistency with Administration's overall energy and climate security goals: *"The program should also seek to achieve substantial annual progress in reducing transportation sector greenhouse gas emissions and fossil fuel consumption, consistent with my Administration's overall energy and climate security goals,…"*
2. Require the increased production of advanced and emerging technologies: *"…through the increased domestic production and use of existing, advanced, and emerging technologies…"*
3. Enhance competiveness and job creation: *"…should strengthen the industry and enhance job creation in the United States."*
4. Allow for manufacturers to build single fleet to comply with EPA, NHTSA and California Air Resources Board (CARB) standards: *"The national program should seek to produce joint Federal standards that are harmonized with applicable State standards, with the*

[2] Presidential Memorandum Regarding Fuel Efficiency Standards, May 21, 2010. http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards

goal of ensuring that automobile manufacturers will be able to build a single, light-duty national fleet."

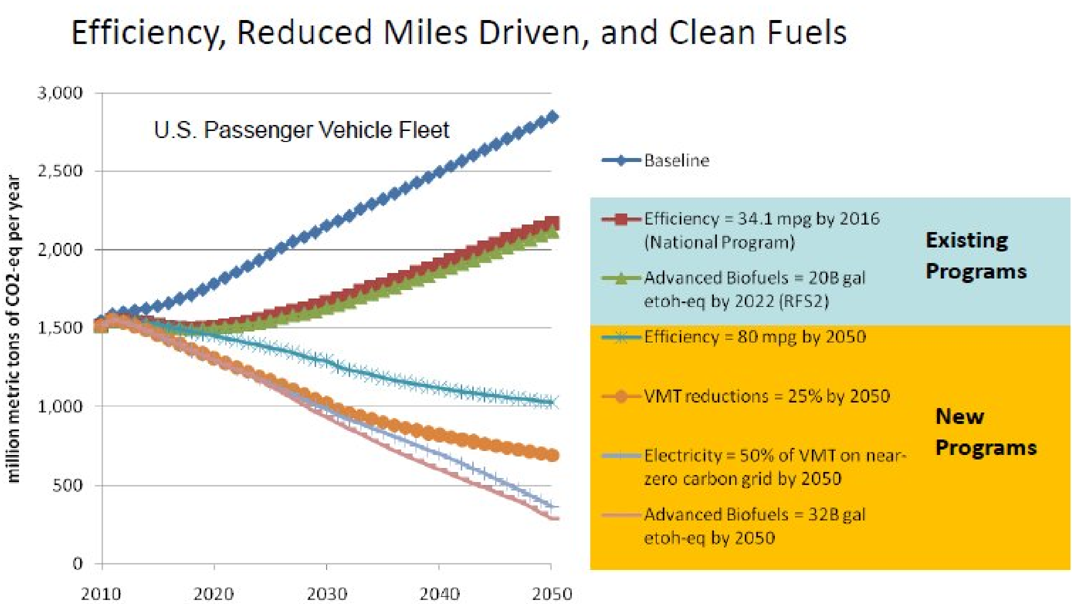
As discussed below, of the four improvement rates analyzed, the 6% scenario is the only level that clearly fulfills the first three objectives.

A. 6% Improvement Rate Scenario Best Fulfills Memorandum Requirement of Consistency with Administration's overall Environmental and Energy Security Goals

The Administration has previously set out a clear objective for achieving substantial reductions in GHGs. In a January 28th, 2010 letter to the IPCC, the U.S. committed to make an economy-wide greenhouse gas emission reduction from 2005 levels "[i]n the range of 17%, in conformity with anticipated U.S. energy and climate legislation, recognizing that the final target will be reported to the Secretariat in light of enacted legislation." A footnote adds this: "The pathway set forth in pending legislation would entail a 30% reduction in 2025 and a 42% reduction in 2030, in line with the goal to reduce emissions 83% by 2050."

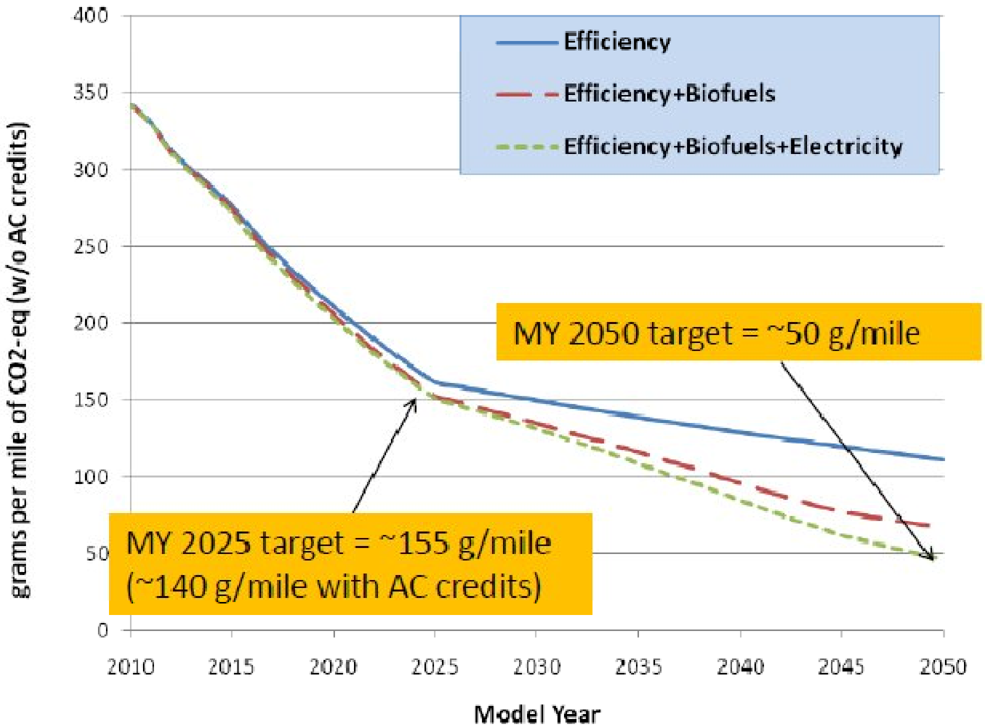
Based on our analysis, achieving these climate and energy security goals requires substantial improvements in passenger vehicle emission performance, even with aggressive implementation of other policies to reduce driving miles and promote low carbon fuels (see Figure 1). Implications for GHG emission standards are shown in Figure 2. We conclude that achieving the 2020 through 2050 GHG reduction goals will require a steady rate of progress in reducing CO_2e emission standards at least out to 2025 of at least 6%/year.

Figure 1: Meeting Administration's GHG Reduction Goals Requires Substantial Improvements in Vehicle GHG Emission Performance



Source: NRDC analysis

Figure 2: 6%/year Scenario is Minimum Rate of Progress Necessary to Meet Administration's GHG Reduction Goals



Source: NRDC analysis

According to Table 3 of the NOI (see below), the 6% improvement rate level of the scenarios examined will save the most oil and reduce the most GHGs. A National Program set at the 6% level would save approximately 1.3 billion barrels of oil and up to 590 million metric tons of CO_2e over the lifetime of the model years covered. In contrast, the weakest standards proposed would result in 0.6 billion barrels less oil saved and up to 250 million metric tons less of CO_2e emissions avoided. Therefore, of the four analyzed scenarios, the 6% improvement scenario—by contributing the greatest to reducing oil consumption and GHG emissions—clearly best fulfills the objective of consistency with the Administration's climate and energy security goals.

TABLE 3—ESTIMATED TOTAL CO_2e AND FUEL REDUCTIONS FOR THE LIFETIME OF MY 2025 VEHICLES [1, 2, 3]

Scenario	Lifetime CO_2e reduction (million metric tons, MMT)	Lifetime fuel reduction (billion barrels)
3%/year	340	0.7
4%/year	440	0.9
5%/year	520–530	1.1
6%/year	530–590	1.3

Source: NOI, 75 FR 62739 (October 13, 2010)

B. 6% Improvement Rate is the Only Level that Requires the Increased Production of Advanced and Emerging Technologies

As demonstrated by Table 4 of the NOI (see below), the weaker standards do not require plug-in hybrid electric vehicles (PHEVs) or pure electric vehicles (EVs) to meet the standard. The 6% improvement rate level is the only scenario that requires substantial amount of PHEVs and EVs for compliance in all the technology paths. Therefore, the 6% improvement rate scenario is the only level that will create the regulatory certainty that is necessary to ensure that the U.S. auto industry maintains its EV and PHEV investments in the long-term.

TABLE 4—TECHNOLOGY PENETRATION ESTIMATES FOR MY 2025 VEHICLE FLEET

Scenario	Technology path	New vehicle fleet technology penetration: Mass reduction[1] (percent)	Gasoline & diesel vehicles (percent)	HEVs (percent)	PHEVs[2] (percent)	EVs (percent)
3%/year	Path A	15	89	11	0	0
	Path B	18	97	3	0	0
	Path C	18	97	3	0	0
	Path D	15	75	25	0	0
4%/year	Path A	15	65	34	0	0
	Path B	20	82	18	0	0
	Path C	25	97	3	0	0
	Path D	15	55	41	0	4
5%/year	Path A	15	35	65	0	1
	Path B	20	56	43	0	1
	Path C	25	74	25	0	0
	Path D	15	41	49	0	10
6%/year	Path A	14	23	68	2	7
	Path B	19	48	43	2	7
	Path C	26	53	44	0	4
	Path D	14	29	55	2	14

[1] Mass reduction is the overall reduction of the 2025 fleet relative to MY 2008 vehicles.
[2] Our assessment considered both PHEVs and EVs. These initial results indicate a higher relative percent of EVs compared to PHEVs. The agencies do believe that PHEV technology may be used more broadly than what this analysis indicates.

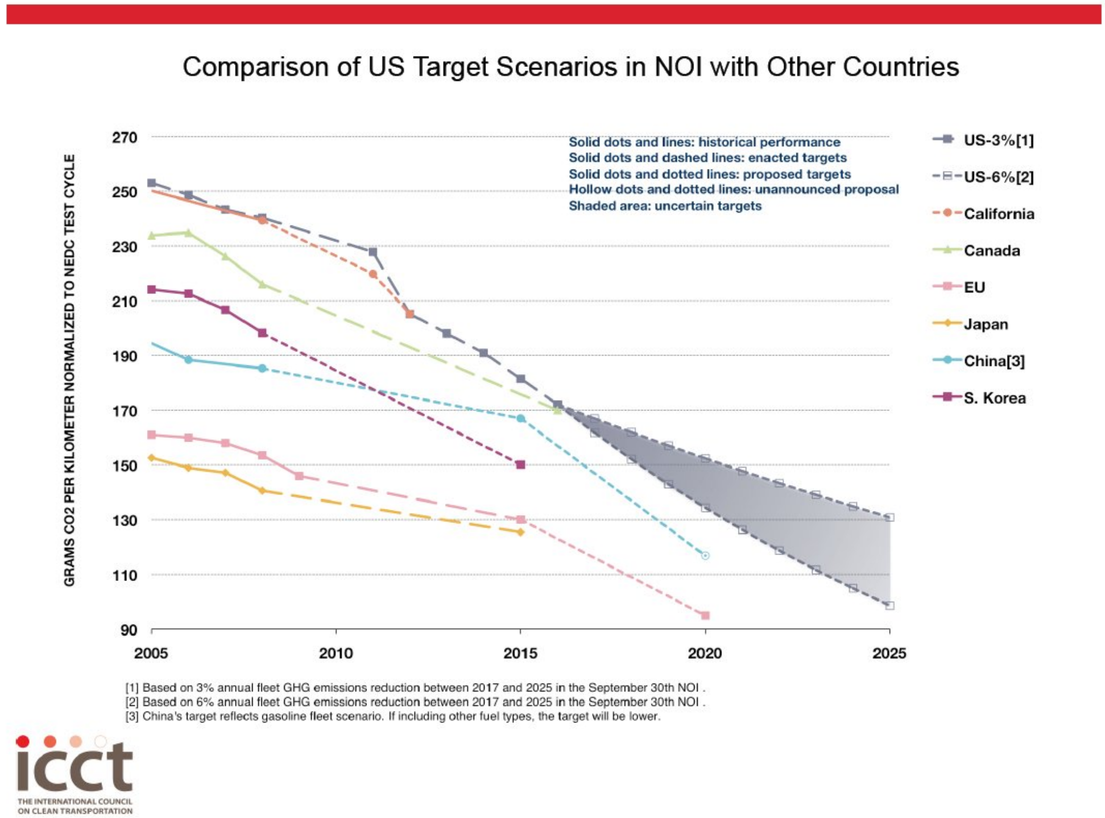
Source: NOI, 75 FR 62739 (October 13, 2010)

C. 6% Improvement Rate is Level that is Necessary to Keep U.S. Auto Industry Competitive Globally

Strong standards are an important part of developing a robust and competitive automotive industry in the United States. We agree with the President's statement that, "America has the opportunity to lead the world in the development of a new generation of clean cars and trucks through innovative technologies and manufacturing that will spur economic growth and create high-quality domestic jobs, enhance our energy security, and improve our environment." 75 FR 62739 (October 13, 2010) at 62741. As other jurisdictions around the world set new performance standards for new vehicles, this rulemaking will be critical to ensuring U.S. competitiveness in the future.

There are two critical aspects to the model year 2017 to 2025 standards when it comes to ensuring that the U.S. auto industry remains competitive globally. The first is the clear recognition of the fact that other key markets – namely the European Union and China—are moving forward with strengthened standards that are likely to require an annual rate of improvement for the years 2015 to 2020 of 6.1% and 6.9%.[3]

[3] Based on International Council on Clean Transportation (ICCT) estimates, China's standards using the European driving cycle ("NEDC") have proposed targets equivalent to 167 grams of CO_2 per km in 2015, 117 grams per km by 2020, which we estimate results in an annual improvement rate of 6.9%. Likewise for the European Union, the proposed 2020 target is 95 grams per km, which we estimate results in annual improvement rate of 6.1% from the enacted target of 130 grams per km in 2015.



While for a variety of reasons, international standards are not necessarily directly comparable, still general trends can be compared and it is especially instructive to compare improvement rates across the regions. As shown in the above chart developed by the International Council on Clean Transportation (ICCT), both the European Union and China have proposed targets that have about the same or more stringent rates of progress.[4] Furthermore, the EU stringency target for 2020, as shown in the above figure, is virtually identical to the 6% annual improvement rate scenario for the U.S. National Program. As a result, a weak U.S. standard of less than 6%/year will result in the U.S. auto industry falling behind in critical fuel economy and advanced vehicle technologies.

Second, it is well understand that a number of countries are moving forward aggressively with electrification programs including Japan, Germany and China. According to the consulting firm McKinsey & Company, the U.S. is leading the race for EV deployment but China and Germany are not far behind.[5] Chinese government has recently invested $15 billion in its auto industry to become the global leaders in electric vehicles and leap frog over the U.S. auto industry.[6] The U.S. cannot afford to take this new competitor lightly. One only has to look at the wind and solar industries to understand the magnitude of this threat. As discussed in Section II.B, the 6%

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[4]See http://www.theicct.org/info/documents/ICCT_PVStd_NOI_Comparison.pdf.
[5]Loveday, Eric, "Study: U.S. to take lead in EV race, China not far behind", *Autobloggreen,* August 15, 2010.
http://green.autoblog.com/2010/08/15/study-u-s-to-take-lead-in-ev-race-china-not-far-behind/
[6] Friedman, Thomas, "Their Moon Shot and Ours", *New York Times*, September 25, 2010, http://www.nytimes.com/2010/09/26/opinion/26friedman.html?_r=3.

improvement rate is critical to the U.S. auto industry competiveness since it is the only level that creates the regulatory certainty necessary to ensure that the U.S. auto industry maintains and grows its EV and PHEV investments.

D. “Single Fleet” Does Not Require Identical Standards

According to the NOI, “... there was consensus among stakeholders that a National Program should continue and that the program’s design should allow a single national fleet to comply with Federal GHG standards, Federal CAFE standards, and California GHG standards.” 75 FR 62739 (October 13, 2010) at 62748. While there may be broad consensus on such a goal in general, we suspect different stakeholders may have very different interpretations of what this means in practice.

Fulfilling this goal can be achieved by simply allowing an automaker which is in compliance with the most stringent standard to also be in compliance with the other standards. While the programs should strive wherever possible to achieve consistency in structure and stringency, there is no practical need for the standards to be identical in order to meet the goal of “a single national fleet” that can comply with all of the standards. The current National Program clearly demonstrates this is the case because compliance with the 34.1 mpg fleet average under the CAFE requirements does not automatically allow compliance with the 250 gram/mile EPA standard unless the manufacturers undertake additional actions, likely improvements to the air conditioning system.

Indeed, as with the Final Rule for the model year 2012 to 2016 program, due to different statutory authorities, the two standards will continue to include some important differences, such as treatment of hydrofluorocarbon and air conditioning-related CO_2 emissions. We also note that the treatment of electric vehicles under the two standards differ, but this does not stand in the way of the agencies determining that the current National Program represents a “harmonized approach that will allow industry to build a single national fleet that will satisfy both the GHG requirements under the CAA and CAFE requirements under EPCA/EISA.” 75 FR 25324 (May 7, 2010) at 25330.

E. Importance of California and States as Partners

California is clearly recognized as a full partner in setting the next phase of passenger vehicle standards. The President’s memorandum specifically calls out “the continued leadership role of California and other States,” and directs EPA and NHTSA to work with California to produce a technical assessment of the potential for further greenhouse gas reductions and fuel economy improvements through new and emerging technologies that can be deployed in new cars and light trucks through 2025.

The first phase of the National Program established the legitimacy of state leadership by California and 13 other states which have previously adopted California’s standards to limit GHG emissions from vehicles. We are pleased to see that the recognition that California and by extension the other 13 CAA Section 177 states as partners with the U.S. EPA and NHTSA has been extended to the next phase of the program through the directive of the President for the agencies to work with California on the TAR. Given the importance of coordination with California, it is critical for the agencies and California to continue to work in partnership on the Supplemental NOI and the Notice of Proposed Rulemaking (NPRM).

III. TECHNICAL ASSESSMENT AND SETTING OF STRINGENCY

A. 6% Improvement Rate Stringency Level Maximizes Technical Feasibility and is a Cost-effective Standard Level for MY 2025

Of the four scenarios for annual improvement in GHG emissions presented in the NOI, the 6% improvement rate scenario best represents the maximum technically achievable and cost-effective level. Therefore of the four scenarios, the 6% improvement rate scenario is the most appropriate level for setting the stringency of the MY 2025 standards.

The NOI and TAR estimate the payback time for the 6% improvement rate level is just 3.1 to 4.2 years, demonstrating that the 6% improvement rate level is highly cost-effective. 75 FR 62739 (October 13, 2010) Table 2. The agencies found that known technologies could be deployed at an incremental cost of $2,800 to $3,500. Over the lifetime of the vehicle, the net savings to the owner, due to fuel savings offsetting the incremental cost of clean vehicle technologies, ranged from $5,700 to $7,400. A recent public opinion poll conducted by the Mellman Group (while not a consumer survey) demonstrates very strong public support and interest in fuel-efficient vehicles with those levels of fuel savings and payback time.[7] The poll found the strong public support for raising standards to 60 mpg (74% in favor) actually increased when informed that the cost would be roughly $3,000 with a four year payback time (83% in favor).

Our analysis, conducted jointly with the Union of Concerned Scientists (UCS), confirms that an even greater improvement rate level is technically feasible and cost-effective. The NRDC/UCS analysis, which is provided as the Attachment to these comments, finds that a 143 gCO_2e/mi standard for MY 2025 can be achieved at a slightly lower cost, $2740, than the least cost path in the TAR. However, our analysis uses a different accounting convention for PHEVs and EVs of full fuel cycle emissions compared to the TAR's approach of zero upstream. Treating PHEVs and EVs as zero emissions yields a lower model year 2025 emission rate of 130 grams of CO_2e per mile and a 7% improvement rate.

In contrast to the 6% improvement rate scenario, the weak improvement rate scenarios of 3% and 4% fail to significantly advance clean vehicle technology, fail to maximize technical feasibility, and fail to capture substantial benefits in consumer cost savings, CO_2e emission reductions and petroleum demand reductions (see Table 3 of NOI). The results of the TAR demonstrate that these weak improvement scenarios can be met without deploying advanced technology vehicles (i.e., PHEVs and EVs). Even conventional hybrids (HEVs) have very low penetration rates, with four pathways (3%/year Path B and C, and 4%/year Path C) not requiring any greater penetration of hybrids than today's levels (about 3%) even though the model year 2025 standard is 15 years in the future. Furthermore seven out of eight of technology paths in the 3% and 4% improvement rate scenarios have *zero* percent penetration of PHEVs and EVs. According to a recent forecast by Baum & Associates, a "business-as-usual" forecast shows that the number of vehicle model offerings of hybrid, plug-in electric and hydrogen fuel cell vehicles will likely increase more than four-fold over the next five years to over 100 models.[8]

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[7] Mellman Group, September 14, 2010. Poll commissioned by Environment America, Natural Resources Defense Council, and the Union of Concerned Scientists, http://www.ucsusa.org/assets/documents/clean_vehicles/National-Cars-Polling.pdf.

[8] Baum Associates, Fall 2010 Electric Vehicle Forecast Summary, September 2010. Available at http://baum-assoc.com/default.aspx.

Consequently, the weak scenarios of 3% and 4% improvement rates clearly do not represent maximum technical potential.

B. EPA and NHTSA are Obligated to Set Standard at Least at 6% Improvement Rate

The urgent need of the United States to reduce global warming pollution and dependence on oil mean that the agencies should establish a National Program that at least meets the 6% improvement rate level.[9] The agencies' analysis shows that a program based on the 6% improvement rate scenario maximizes societal benefits, in terms of GHG and oil reductions in NOI Table 3, and also provides the largest consumers benefits, in terms of net vehicle owner savings in NOI Table 2. As discussed above, the 6% improvement rate scenario is technically feasible and cost-effective therefore consistent with requirements of the Clean Air Act for regulating GHG emissions.

Maximizing societal benefits is an appropriate test for setting CAFE standards as well. NHTSA should set standards where the total cost of technology to improve vehicle efficiency is matched by the benefits received from doing so. Under the Energy Policy and Conservation Act (EPCA), NHTSA must set fuel economy standards at the "maximum feasible" level. While achieving the maximum feasible level, the agency is required to consider four factors: (1) "technological feasibility," (2) "economic practicability," (3) "the effect of other motor vehicle standards of the Government on fuel economy," and (4) "the need of the United States to conserve energy." 42 U.S.C. § 32902(a), (f). These four considerations should not be equally weighted since it is clear that the goal of EPCA is to reduce the nation's dependency on oil and that the nation's "need to conserve energy" is more urgent than ever. Therefore it is important to understand that the primacy of EPCA's energy conservation factor requires NHTSA to save the maximum amount of oil, limited only by constraints of technological feasibility and economic practicability.

1. NHSTA Should Not Use a Marginal Cost-Benefit Tests to Determine Standard

The NOI notes that the "future Joint NPRM will consider a number of alternative levels of stringency, including an alternative which is estimated to maximize net benefits." 75 FR 62739 (October 13, 2010) at 62748. A common approach for maximizing net benefits is a marginal cost-benefit analysis. Especially due to limitations in this approach, NRDC opposes the use of a marginal cost-benefit test to determine stringency of any standards under EPCA/EISA and the National Program.

As discussed in our previous comments to NHTSA, it is within NHTSA's discretion to use a total cost-benefit analysis rather than a marginal cost-benefit analysis, and that a total cost-benefit test is more appropriate for carrying out the agency's mandate under EPCA to achieve the greatest oil savings possible within the constraint of economic practicability.[10] While we acknowledge that the court in *CBD v. NHTSA* did not void NHTSA's election of a marginal cost-benefit analysis, as pointed out in *CBD v. NHTSA*, "Under this methodology, the values that

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[9] As discussed in Section III.A, our joint analysis with UCS shows that an even higher level, 7% improvement rate and 130 grams per mile for MY 2025 standard, is feasible and cost-effective

[10] Natural Resources Defense Council (2005) "COMMENTS ON THE: Notice of Proposed Rulemaking Average Fuel Economy Standards for Light Trucks, Department of Transportation, National Highway Traffic Safety Administration, Docket No. 2005-22223," submitted November 22, 2005.

NHTSA assigns to benefits are critical."[11] Failure to assign reasonable input assumptions results in a proposed standard that fails the statutory requirement to be the "maximum feasible." In many cases, the inputs to a marginal cost-benefit analysis are difficult to determine and range widely in the literature. Choosing inappropriate values for parameters such as the cost of fuel, the value of avoided carbon emissions, the appropriate discount rate, and the value of military security could all undervalue the benefits of reducing fuel consumption and result in a weak CAFE standard that fails to meet the test for maximum feasibility. Especially due to these limitations, total cost-benefit analysis is the appropriate approach for NHSTA to adopt.

Further, we strongly support the application of appropriate discount rates of no more than 3 percent for societal concerns and no more than 7 percent for consumer calculations in this rulemaking. We also urge the agencies to include a high gas price scenario as part of the analysis for the NPRM. Given the importance of enhancing U.S. energy security, the agencies should evaluate scenarios where gas prices are higher than the Energy Information Administration's Reference Case.

IV. REGULATORY FLEXIBILITIES AND OTHER KEY ISSUES

A. Regulatory Flexibilities

In general, NRDC supports provisions that provide manufacturers greater flexibility in compliance as long as it does not undermine the technology-forcing or the emissions benefits of the program. We support extending the Averaging, Banking and Trading (ABT) credit provisions.

NRDC appreciates the EPA's interest in encouraging creative approaches to GHG reductions that are not captured in the test cycle ("off cycle credit program"). However, in order to maintain the integrity of the standard, any granting of credits must be based on a sufficient data to scientifically verify that the reductions are real, quantifiable, enforceable and surplus. To ensure full transparency, any approval of off-cycle credits should be open to public input prior to final agency decisions.

We support maintaining the current provision to treat MY 2016 and later flexible fuel vehicles (FFVs) similarly to conventional fuel vehicles, in that FFV emissions are based on actual CO_2 results from emissions testing on the fuels on which it operates unless it can be demonstrated a low carbon ethanol fuel is being used in the vehicles. This is the only approach which is consistent with EPA's obligation to accurately quantify and credit emissions from vehicles fueled on different alternative fuels. There is no legal basis in the CAA for EPA to create a crediting system, for example, which is analogous to the EPCA/EISA FFV credits for CAFE compliance since such a system does not result in emission reductions that are real, quantifiable, and enforceable.

At this point, we see no evidence that the temporary lead-time assistance credits need to be extended to the MY 2017 to 2025 National Program. The basis for the original lead-time assistance credits was to allow less capable manufacturers time to transition to the new National Program. Given that MY 2017 is more than five model years in the future, we do not see any reason to continue these credits.

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[11] *Center for Biological Diversity v. NHTSA,* 508 F.3d 508, 529 (9th Cir. 2007).

1. Treating Advanced Technology Vehicles as "Zero" Emissions Undermines Pollution and Technology Benefits of Program

EPA states in the Notice of Intent that it will fully evaluate the issue of how to account for the upstream greenhouse gas emissions from electric drive vehicles as part of the NPRM. We support the full consideration of this issue and believe that any additional regulatory decisions are not appropriate for the Supplemental NOI in November 2010.

We fully support the development and deployment of electric drive vehicles. However, we are also concerned that applying a 0 g CO_2/mi upstream emissions factor for these vehicles allows manufacturers to use these credits in other parts of their fleet, resulting in higher actual greenhouse gas emissions. For instance, if electric vehicles represent between 10% of new sales in MY 2025, providing a 0 gCO_2/mi credit would reduce the overall greenhouse gas benefits of the program by approximately 10%.

NRDC believes the emission scoring for all vehicles should be based on their true full fuel cycle emission impacts. The TAR analysis assigns electric-drive vehicles, such as plug-in hybrid electric vehicles, battery electric vehicles and hydrogen fuel cell vehicles, an emissions rate of 0 gCO_2/mi. However, in reality these vehicles have non-zero emissions rates due to the upstream production and transmission of their fuel source, electricity or hydrogen. As we discussed in our comments to the MY 2012 to 2016 rule, EPA should specify an upstream emissions factor for these fuels to be used for calculating their GHG emissions compliance value. The upstream emissions factor should be multiplied by a vehicle's efficiency to determine its emissions per mile.

Finally, as the agencies point out in the TAR, there are other programs and incentives outside of the National Program that are intended to incentivize and speed the deployment of electric drive vehicles. We believe it is more appropriate to use robust complementary policies as the primary instrument to support electric drive versus credits under the National Program.

B. Other Key Issues

1. Duration of NHTSA Standards

The NOI notes that NHTSA has certain requirements under EPCA and EISA regarding the period of model years that the CAFE standard can cover. These requirements should not affect the overall stringency of the national program. As discussed above, the national program should allow automakers to comply with all standards under the national program by deploying a fleet that meets the requirements of the most stringent standard in the program. If NHTSA is obligated to set CAFE standards based on an analysis of potential of only MY 2017 to 2021 technologies, the MY 2017 to 2025 fleet requirements can still be defined by longer-view GHG standards. The CAFE standard should not constrain the overall stringency of the National Program.

2. Non-regulatory Incentives Should be Considered in the Context of this Rulemaking

Regarding non-regulatory incentive the NOI states "While these are useful approaches for promoting low GHG technologies, they cannot be accomplished by the agencies in the upcoming rulemaking." 75 FR 62739 (October 13, 2010) at 62750. However, this does not preclude the agencies from considering existing federal and state incentives when assessing the level of the standard and determining what is technically and economically feasible. Indeed, the agencies must consider such incentives if they are to make an accurate assessment of likely penetration rates for advanced technology vehicles. Market incentives available in MYs 2012 to 2016, such as retooling, purchase and infrastructure, will accelerate deployment of advanced technology vehicles and enable greater market penetration in MYs 2017 to 2025.

3. Mid-term Review Should Not Undermine Technology Innovation

The NOI states that the "agencies believe it is appropriate to consider a mid-term technology review." 75 FR 62739 (October 13, 2010) at 62749. NRDC opposes such a mid-term technology review if the purpose is to assess whether the standard should be weakened. Such a program will be, in our opinion, a self-fulfilling prophecy by creating a perverse incentive for the industry to hold back investments and development of advanced technologies. We believe this is the dynamic unintentionally created by the CARB when in 1990 it adopted a biennial technology review for its LEV program (including ZEV).

If the agencies adopt such, we recommend that only one review take place with sufficient lead time for all automakers to put itself onto a technology pathway for compliance. As illustrated by the multiple technology paths that the agencies created for each stringency level, successful compliance with the performance-based National Program standards does not depend on the success of a specific technology. Indeed, history has shown the industry consistently innovates to deploy even more technologies, at lower cost, than what regulators originally predicted.

C. Other Key Issues Not Raised in NOI

1. GHG-Standards Need "Backstop" Standards to Ensure Environmental Objectives Are Not Undermined by Shifts in Sales Mix

Current GHG standards lack a regulatory "backstop" mechanism to ensure the National Program goals for MY 2016 fleetwide average emission levels and the cumulative greenhouse gas and oil consumption reductions described in Section I are met. Such mechanisms are necessary because under an attribute-based system that has separate car and light truck standards, the fleet sales mix could shift to larger, higher-emitting vehicles and to a greater proportion of light trucks, resulting in greater fleetwide emissions and oil consumption thus undermining the achievement of the program goals.

To prevent intentional and unintentional market shifts from undermining the environmental and oil savings benefits of the Program, we recommend EPA and NHTSA reconsider the adoption of backstop mechanisms in the future joint NPRM.

2. Agencies Should Update Social Discount Rates Used in Benefit Calculations of the NPRM

In order to fully calculate and appreciate the economic benefits that the National Program would bring by reducing GHG emissions, it is very important that the economic analysis correctly account for the social cost of carbon (SCC). We strongly recommend that EPA and NHTSA rely on SCC values that correct errors used to determine current values published by the Interagency Task Force on Social Cost of Carbon.

The analysis by the Interagency Task Force makes several methodological errors that systematically bias the SCC downwards including the following:

- Failing to account for many damages (as enumerated in the Task Force's document detailing its derivation of the SCC),
- Neglecting to employ the full range of recommended discount rates for benefits and damages that are incurred by future generations (discount rates of 2.5%, 3%, and 5% were chosen, while OMB and EPA guidelines specify that 1% to 3% represents an appropriate range),
- Failing to consider discounting methodology well established in the mainstream economics literature that takes into account risk aversion to uncertainty in future interest rates—uncertainty that implies declining discount rates over time should be used, and
- Failing to weigh damages to poor countries, who are expected to bear the most burdens from climate change but contributed to it the least, more heavily than those experienced by wealthy countries.

Every qualification in the Task Force's report is that if anything, the SCC is likely to be biased downward.

NRDC commented on the SCC methodology during the rulemaking process for the joint EPA/NHTSA Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for MY 2012 to 2016. Many of the issues raised remain unaddressed, which undercuts the benefits of the National Program and could result in a standard that does not maximize societal benefits.

ATTACHMENT

THE TECHNOLOGY TO REACH 60 MPG BY 2025

Putting Fuel-Saving Technology to Work to Save Oil and Cut Pollution

Increasing the fuel efficiency of new cars and trucks is a critical step towards cutting America's oil dependence and reducing the carbon pollution that causes climate change. Fuel economy standards have been instrumental in increasing vehicle efficiency over the past four decades. The Obama administration is now developing new standards covering model years 2017 through 2025. Strong standards should be implemented to maximize the use of cost-effective, fuel-saving technology.

Known technologies can dramatically cut the fuel consumption and carbon pollution from passenger vehicles over the next fifteen years. By relying on technology and innovation, the auto industry can build a range of clean, fuel-efficient cars and light trucks—from conventional gasoline vehicles to hybrid-electrics to electric drive vehicles—that average 60 miles per gallon (mpg) and emit no more than 143 grams of CO_2 per mile by 2025. Expert assessments from the Massachusetts Institute of Technology (MIT), the University of Michigan (UM), the University of California, Davis (UC Davis), and the U.S. Environmental Protection Agency (EPA) show that we know how to put the needed clean vehicle technology to work and that it is poised for broad use across America's fleet of cars and trucks.

Vehicle Technologies

Conventional gasoline cars and trucks are already improving thanks to new standards from the Obama administration, hybrids are already on the road, and different kinds of electric-drive vehicles are expected on the market in 2010. All of these technologies have significant potential to grow, both in market share and their ability to save fuel and cut emissions, and each will have a key role in delivering a model year (MY) 2025 fleet that achieves 60 mpg.

Improving Gas Cars and Trucks

Studies by MIT and UC Davis show that conventional cars and trucks that rely completely on an internal combustion engine (ICE) could cut fuel use and greenhouse gas emissions by as much as

45% in the next 20 years compared to vehicles with the same size and performance (e.g. 0-60 miles-per-hour acceleration) on the market in recent years.[1]

These improvements come from optimizing gasoline spark-ignition engine platforms for fuel efficiency. Aerodynamic drag and rolling resistance are improved through better shapes and fuel-efficient tires. Overall weight of the vehicle is reduced by 10-20 percent through improved design and the application of stronger substitutes to today's steel. Engines are downsized to match the optimized platform while maintaining performance thanks to improved friction reduction, more efficient valve controls, better fuel-air mixing through gasoline direct-injection and turbocharging. Transmissions also evolve to reduce friction and optimize power application from the engine to the wheels through 6-speed dual-clutch transmissions with more automatic shift controls.

The U.S. Environmental Protection Agency (EPA) evaluated a more limited set of technologies for a nearer implementation. EPA found that, even with modest weight reduction and less opportunity for engine optimization, a 34 percent reduction in CO_2 emissions and fuel consumption is possible in large cars for 2016.[2] The gap between the EPA and MIT analyses highlights the opportunities that still remain for conventional gasoline vehicles to reach even greater reductions beyond 2016 as technologies have more time to penetrate the market and more advanced materials (enabling mass reductions of 20 percent vs. EPA's 10 percent) and added engine efficiency improvements become feasible with more lead time.

In our analysis, we are focused on 2025, or about half way between EPA's analysis and those of MIT and UC Davis. Given that, the potential is clearly higher than EPA's 2016 level, while some of the advancements from the other studies may not be ready yet. We therefore assume that internal combustion engines achieve a 40 percent reduction in fuel consumption and CO_2 emissions from MY 2008, to reach 46 mpg. The reduction is a fleet average based on a mix of 67 percent cars and 33 percent light trucks projected by EPA for MY 2016.

Hybridization

Hybrids can combine the significant efficiency improvements available to ICE vehicles with an electric motor and a small battery to go even farther on a gallon of gas. A variety of hybrid powertrains are already in the market with rated fuel efficiency far above their non-hybrid counterparts, as shown in Table 1.

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[1] Kasseris, E.P. and J.B. Heywood. 2007. Comparative analysis of automotive powertrain choices for the next 25 years. SAE Paper No. 2007-01-1605. Warrendale, PA: Society of Automotive Engineers. Burke, A., and H. Zhao. Forthcoming in 2010. Projected fuel consumption characteristics of hybrid and fuel cell vehicles for 2015-2045. EVS-25, November 5-9.

[2] EPA and NHTSA. 2010. Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule. *Federal Register* 75(88): 25323-728, Friday, May 7.

Table 1: Hybrids Cut Fuel Consumption

Vehicles	Hybrid Reduction in Fuel Consumption
Toyota Prius vs. Matrix	44%
Ford Fusion Hybrid vs. Fusion	36%
Honda Civic Hybrid vs. Civic	29%
Ford Escape Hybrid vs. Escape	25%
Chevrolet Tahoe Hybrid vs. Tahoe	19%

The studies from MIT and UC Davis both indicate the potential for a 60 percent reduction in fuel use from hybrids. For our analysis we conservatively assume that hybrids in MY 2025 will cut fuel consumption by an additional 25 percent on top of the fuel savings from the ICE vehicles discussed in the previous section. Hybrid fuel consumption and emissions are therefore 55 percent below a baseline MY 2008 vehicle, or 61 mpg.

As pointed out in a recent University of Michigan study[3], the MIT analysis simply confirms the potential already identified by the Detroit Three automakers over a decade ago. Under the U.S.-sponsored Partnership for a New Generation of Vehicles (PNGV), GM, Ford and Chrysler designed and built 5-passenger hybrid sedans that delivered reductions in fuel use on the order of 66 percent. The three PNGV concept vehicles were diesel-engine hybrids with curb weights about 30 percent below the baseline sedans.

Electrification

Electric vehicles, including pure battery electric vehicles, plug-in hybrid electric vehicles, and fuel cell vehicles dramatically improve efficiency through greater (or complete) reliance an electric motor for propulsion. For this analysis, we focus on vehicles that use on-board batteries recharged from the grid. We assume these vehicles achieve an electric efficiency of 250 Wh/mi, which is about 10 percent less efficient than the expected performance in compliance testing of the upcoming Nissan LEAF.[4] For plug-in hybrid electric vehicles, we assume that by MY 2025, 50 percent of vehicle miles occur on electric drive with the remaining gasoline miles powered by a hybrid drivetrain that is about 15 percent more efficient than non-pluggable hybrids because the larger plug-in vehicle batteries allow for greater energy capture during regenerative braking.[5] These efficiency levels qualify battery electric and plug-in hybrid electric vehicles for

[3] DeCicco, John M. 2010. "A Fuel Efficiency Horizon for U.S. Automobiles." University of Michigan. September 2010.

[4] We chose a less efficient value than the LEAF based on the potential availability of larger plug-in electric vehicles combined with in improvements in electric drive technology between now and 2030. Our assumption is consistent with EPA's 2030 estimate of 250 Wh/mi in EPA. 2010. EPA Analysis of the Transportation Sector: Greenhouse Gas and Oil Reduction Scenarios. Updated March 18, 2010.

[5] This assumption is used in EPA. 2010. EPA Analysis of the Transportation Sector: Greenhouse Gas and Oil Reduction Scenarios. Updated March 18.

fuel economy credit at 328 and 116 miles per gallon-equivalent, respectively, using the CAFE compliance calculation methodology.[6]

While they are very efficient, electric drive vehicles are still responsible for emissions of global warming pollution because the electricity they pull from the grid is produced at a power plant. We assume an upstream emissions factor of 125 gCO_2/mi, consistent with EPA's methodology used in the MY 2012-2016 final rule for the average American grid.[7]

Mass Adoption of Clean Vehicle Technologies

A 60 mpg fleet that emits no more than 143 gCO_2/mi can include a mix of the technologies discussed above. With the certainty of this 2025 requirement, automakers can plan strategically about the evolution of their vehicles platforms and the introduction of new vehicles to incorporate clean technologies. Automakers will pursue the mix of technologies that best fits their business goals, and each automaker may take a different path at any one time. For example, Toyota, Ford, and Honda have been well-recognized leaders in hybrid technology, while they are also aggressively implementing engine improvements from variable valve technologies to Eco-Boost with gasoline direct-injection and turbocharging. On the other hand, Nissan and GM are vying to be first in mass market electric vehicle offerings.

An example of a MY 2025 fleet that could reach 60 mpg would be one made up of 30 percent clean ICE vehicles, 55 percent hybrids and 15 percent electric-drive. Automakers can also improve their air conditioning systems to reduce global warming pollution by the equivalent of 15 gCO_2/mi. Combining the vehicle and air conditioning improvements, and including electricity upstream emissions, the fleet will average 143 gCO_2/mi.

Table 2: Hypothetical 60 mpg Fleet in MY 2025

Vehicle Type	CAFE (mpg)	Emissions (gCO_2/mi)	Market Share
ICE	46	195	30%
Hybrid Electric	61	146	55%
Plug-in Hybrid Electric	116[a]	125	10%
Pure Battery Electric	328[a]	125	5%
Fleet Average	60	158	n/a
Fleet Average with 15 gCO_2/mi AC credit[b]	n/a	143	n/a

Notes:

[a]CAFE compliance values calculated using the electric-drive crediting of 10CFR 474.3 Petroleum-Equivalent Fuel Economy Calculation.

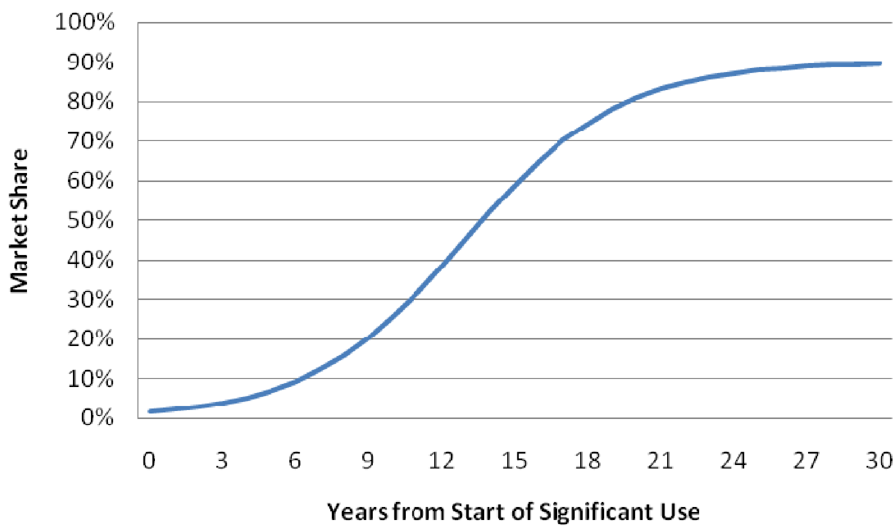
[b]One way manufacturers can reduce their fleet GHG emissions is through improvements to air conditioner efficiency and substitution of A/C refrigerants. Due to its cost effectiveness, we expect automakers will take full advantage of this approach. Consistent with recent EPA analysis and efforts in Europe on refrigerants, a reduction of 15 g/mi could be achieved through these measures.

[6] 10CFR 474.3 Petroleum-Equivalent Fuel Economy Calculation.

[7] This emission factor reflects an average vehicle efficiency of ~250 Wh/mi (covering both smaller and larger vehicles) and grid emissions of ~545 g/kWh (prior to transmission and charger efficiency corrections).

Reaching the new fleet penetrations of 55 percent hybrids and 15 percent electric vehicles is a relatively modest goal. Hybrids would have to reach just over half the market more than 25 years after their introduction in the U.S., while electric vehicles would have to reach only 15 percent of the market about 15 years after their reintroduction. This potential is consistent with recent analysis by the University of Michigan. The University study analyzed the historic penetration of several technologies including a shift from rear- to front-wheel drive (now common in about 80% of new vehicles), use of fuel-injection (now ubiquitous), variable engine cylinder valve controls and multivalve engines. From these historic rates a hypothetical curve for hybrid penetration was developed by University of Michigan, as shown in Figure 1.

Figure 3: Hypothetical Hybrid Penetration



Source: Derived from DeCicco, John M. 2010. "A Fuel Efficiency Horizon for U.S. Automobiles." University of Michigan. September 2010.

Using the hypothetical curve, new technologies can reach 59 percent market share in 15 years after the start of significant use, or by 2025 if we make the very conservative assumption of 2010 as the first year of significant use for hybrids. The University of Michigan study noted, however, that some technologies have grown at much faster rates. Fuel injection and front-wheel drive reached 60 percent in just 6 years and 11 years, respectively. These technologies were adopted rapidly by automakers to meet improved standards for tailpipe pollution and efficiency. Fuel injection improved performance while also enabling 3-way exhaust catalysts. Front-wheel drive was driven by the oil crisis of the 1980's and rapidly improving fuel economy standards.

The rapid technology adoption demonstrates automakers' ability to develop and deploy cleaner technologies faster when a clear signal is provided. Over the last two decades, the pressure for improvements in vehicle efficiency has been limited. Typical lead times have been estimated at

10-15 years.[8] However, volatile oil prices, recession and auto company bailouts during the past few years are focusing efforts. The shift of global vehicle platforms enables round-the-clock engineering and manufacturing processes are continually improved. According to University of Michigan, "standard product development times are now 2-3 years and typical product cycles are 5-6 years…, suggesting that fleetwide changes can be made in less than a decade."[9]

Together, the technology and market share assessments demonstrate a clear pathway to 60 mpg. In Table 2, we summarize the assumptions of our analysis showing one potential make-up of the MY 2025 fleet that reaches 60 mpg and emits no more than 143 gCO_2/mi.

Clean Vehicle Costs

With vehicle fuel economy and greenhouse gas emissions standards set out to MY 2016, we considered the incremental cost of technology from MY 2016 to cleaner MY 2025 vehicles. We considered cost assumptions from MIT, University of Michigan and Consumer Federation of America (CFA). We estimate an average incremental cost of about $2,740 to reach a 60 mpg fleet with the mix of ICE, hybrid and plug-in electric vehicles described above.

Our estimate lies between cost estimates derived from recent assessments by the CFA and University of Michigan. The 60 mpg standard would cost approximately $2625 using the CFA methodology and approximately $3125 using the University of Michigan methodology.

For our assessment, we start with cost analysis by MIT for each vehicle technology category (ICE, hybrids and plug-in vehicles).[10, 11] We rely on the MIT "optimistic" case assumptions but make an adjustment to battery size for pure electric vehicles. Instead of assuming that electric vehicles require 200 mile-range batteries, we use MIT projections to estimate the cost 100 mile range batteries in electric vehicles. We also assume that a 20 percent mass reduction is achievable at no net cost increase. This is more conservative than a recent study by Lotus Engineering that found mass could be reduced by 21 percent with a 2 percent cost decrease.[12]

Retail costs of technology are typically derived by summing the cost of materials and manufacturing and then applying a multiplier that reflects the cost of integration, marketing and distribution to bring the technology to market. We use multipliers of 1.13 for ICE vehicles, 1.26 for hybrids, and 1.39 for electric vehicles. These indirect cost multipliers are consistent with what EPA and NHTSA provided in the MY 2012-2016 final rule.[13]

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[8] DeCicco. Op cit.
[9] Ibid.
[10] MIT. 2008. On the Road in 2035: Reducing Transportation's Petroleum Consumption and GHG Emissions. Report No. LFEE 2008-05. Cambridge, MA: Massachusetts Institute of Technology Laboratory for Energy and the Environment, July.
[11] Kromer, M.A., and J.B. Heywood. 2007. Electric Powertrains: Opportunities and Challenges in the U.S. Light-Duty Vehicle Fleet. Report LFEE 2007-03 RP. Cambridge, MA: Massachusetts Institute of Technology, May.
[12] Lotus. 2010. An Assessment of Mass Reduction Opportunities for a 2017–2020 Model Year Vehicle Program. Report prepared for The International Council on Clean Transportation. March. Available at http://www.theicct.org/2010/03/lightweight-future/.
[13] EPA and NHTSA, Joint Technical Support Document: Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards. April 2010.

The battery costs that we use from the MIT research are aggressive, but realistic when considering the large investments made recently in U.S. battery manufacturing and electric vehicle deployment. The Administration has pledged over $2.4 billion from the American Recovery and Reinvestment Act for electric vehicle technologies and the Department of Energy has been providing significant research funding for batteries for decades. According to a recent report from the White House, the U.S. had only 2 percent of advanced vehicle manufacturing in 2009 but by 2012, U.S. production capacity will account for over 20 percent of global capacity.[14] Projects funded by the Recovery Act are also actively pursuing improvements in battery energy density and extensions of battery life that will lower costs and enhance vehicle marketability.

Conclusion

Using well known clean car technologies, we can achieve a fleet average of 60 mpg and no more than 143 gCO_2/mi by model year 2025. The evaluation of product cycles and historical technology adoption demonstrates that there is ample time over the next 15 years for mass adoption of the needed clean vehicle technologies. Setting a 60 mpg standard will unleash American automotive ingenuity to perfect the technologies, drive down costs and put the U.S. on a path to save at least 44 billion gallons of oil annually by 2030.

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[14] Executive Office of the President of the United States and Vice President of the United States. The Recovery Act: Transforming the American Economy through Innovation. August 2010.