DEPARTMENT OF TRANSPORTATION
Office of the Secretary of Transportation

Re: Notification of Regulatory Review:	**)**	
14 CFR Chapters I, II, and III, 23 CFR	**)**	
Chapters I, II, and III, 46 CFR Chapter II, 48	**)**	**Docket No. DOT–OST–2017–0069**
CFR Chapter 12, 49 CFR Chapters I, II, III, V,	**)**	
VI, VII, VIII, X, and XI	**)**	

COMMENTS OF THE CONSUMER FEDERATION OF AMERICA

DECEMBER 1, 2017

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THE CONSUMER FEDERATION OF AMERICA: EXPERTISE AND INTEREST

The Consumer Federation of America[1] (CFA) appreciates the opportunity to provide the Department of Transportation (DOT) and the National Highway Safety Administration (NHTSA) with guidance in its efforts to identify ways to reform and improve regulation.[2] Throughout its 50 years of existence, CFA has been a vigorous and continuous participant in the process of setting regulations to improve the efficiency of energy-using consumer durables and lower the cost of energy borne by consumers.[3]

CFA has been particularly active in the rules that the DOT identifies as falling under this Notice. In the year since the publication of the Technical Analysis Report (TAR) [4] for the National Program,[5] CFA has filed comments on the fuel consumption of vehicles at the National Highway Traffic Safety Administration (NHTSA),[6] the Environmental Protection Agency (EPA),[7] EPA and NHTSA acting jointly,[8] the Department of Transportation (DOT)[9] and the California Air Resources Board (CARB).[10] In addition we testified before the CARB[11] and the Committee on Energy and Commerce on the Midterm Review for Motor Vehicles.[12] CFA has also been active in regulatory proceedings dealing with medium and heavy duty trucks[13] and

[1] The Consumer Federation of America is an association of more than 250 nonprofit consumer groups that was established in 1968 to advance the consumer interest through research, advocacy, and education.

[2] Department of Transportation, Office of the Secretary of Transportation, *In Re Notification of Regulatory Review: 14 CFR Chapters I, II, and III, 23 CFR, Chapters I, II, and III, 46 CFR Chapter II, 48 CFR Chapter 12, 49 CFR Chapters I, II, III, V, VI, VII, VIII, X, and XI,* Docket No. DOT–OST–2017–0069 (hereafter, Notice)

[3] The CFA website (http://consumerfed.org/issues/energy/) provides links to 140 pieces of testimony and reports published in the past ten years dealing with the efficiency of energy-using consumer durables divided roughly equally between appliances and vehicles.

[4] *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 Protection Agency, California Air Resources Board, National Highway Traffic Safety Administration, EPA-420-D-16-900, July 2016.

[5] Environmental Protection Agency 40 CFR Parts 85, 86, and 600, Department of Transportation National Highway Traffic Safety Administration 49 CFR Parts 523, 531, 533. et al.and 600, 2012, *2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas, Emission Standards and Corporate, Average Fuel Economy Standards,* October 15, 2012.

[6] Consumer Federation of America, 2017, *Comments of the Consumer Federation of America, Notice of Intent to Prepare an Environmental Impact Statement; Request for Scoping Comments*, before the National Highway Transportation Safety Administration, Department of Transportation, Docket No. NHTSA-2017-0069, September 25, 2017 (hereafter, CFA NHTSA EIS Comments).

[7] Consumer Federation of America, 2016, *Comments of the Consumer Federation of America*, *In the Matter of Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, before the Environmental Protection Agency*, EPA-HQ-OAR-2015-0827, December 30, 2016 (hereafter CFA Determination Comments).

[8] Consumer Federation of America, 2016, *Comments of the Consumer Federation of America, Evaluation Draft Technical Assessment Report for Model Year 2022–2025 Light Duty Vehicle GHG) Department of Transportation Emissions and CAFE Standards*, EPA– HQ–OAR–2015–0827; NHTSA–2016 0068; FRL–9949–54–OAR RIN 2060–AS97; RIN 2127–AL76, September 26, 2016 (hereafter CFA TAR Comments).

[9] Consumer Federation of America, 2017, *Comments of the Consumer Federation of America, in the Matter of Transportation Infrastructure: Notice of Review of Policy, Guidance and Regulation, before the Department of Transportation*, Docket No. Ost-2017-0057, July 24, 2017 (hereafter, CFA DOT Infrastructure Comments).

[10] Consumer Federation of America, 2017, *Comments of the Consumer Federation of America on the California Air Resources Board Mid-Term Review*, before the California Air Resources Board, March 24, 2017 (here after, CFA CARB Comments).

[11] Consumer Federation of America, 2017, *Statement of Jack Gillis, U.S. Environmental Protection Agency on the Reconsideration of the Final Determination of the Mid-term Evaluation of Greenhouse Gas Emissions Standards for Model Years 2022-2025 Light-duty Vehicles,* Environmental Protection Public Hearing, Washington DC, September 6, 2017 (hereafter CFA EPA Reconsideration Testimony).

[12] Consumer Federation of America, 2016, *Testimony of Dr. Mark Cooper on Midterm Review and an Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles,* Before the Committee on Energy and Commerce Subcommittee on Commerce, Manufacturing, and Trade, Subcommittee on Energy and Power, U.S. House of Representatives, September 22, 2016 (hereafter, CFA Mid-term Congressional Testimony).

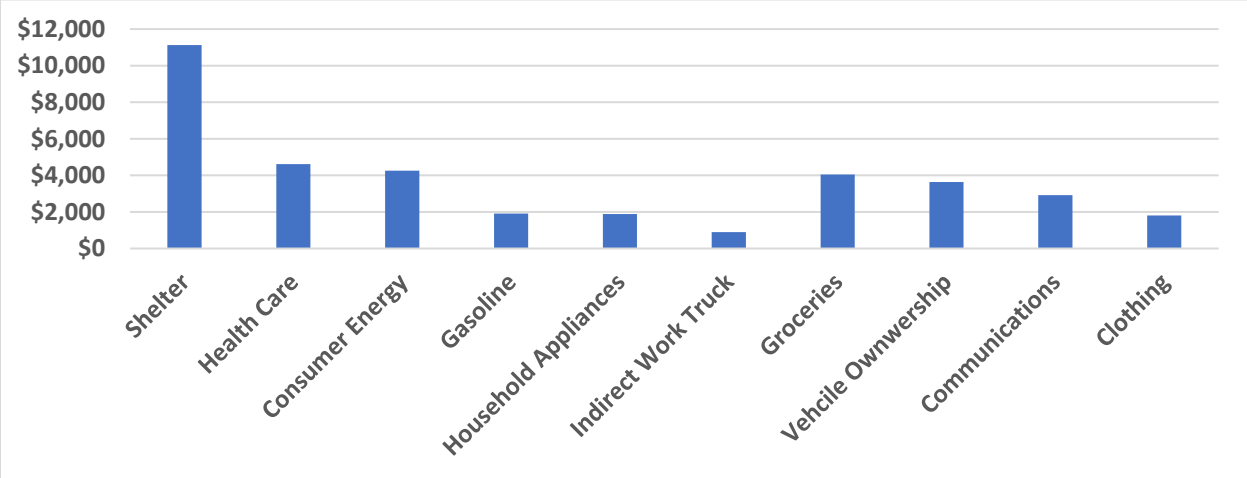
[13] Consumer Federation of America, 2015, *Comments of the Consumer Federation of America, before the Environmental Protection Agency, Department of Transportation, National Highway Traffic Safety Administration, Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium and Heavy-Duty Engines and Vehicles, Phase 2*; Proposed Rule, 40 CFR Parts 9, 22, 85, et al., 49 CFR Parts 512, 523, 534, et al., October 1, 201 (hereafter CFA Work Trucks, 2015)5; *Consumer Federation of America, 2014, Comments of the Consumer Federation of America, Re: Department of Transportation Notice of Intent to Prepare an Environmental Impact Statement for New Medium- and Heavy-duty Vehicle Fuel Economy Standards*— Docket No.: NHTSA-2014-0074, August 8, 2014 (hereafter, CFA Work Trucks, 2014).

published a paper that explains why the fuels used by medium and heavy duty trucks to provide intermediate services to business and industry are an important consumer pocketbook issue.[14] CFA has also participated in complementary activities dealing with energy efficiency standards at the Department of Energy.[15] Our comprehensive analysis of the remarkable success of energy efficiency standards when well-crafted "command-but-not-control" performance standards are adopted, provided as an attachment, is the basis for these comments.

A CONSUMER ISSUE ANALYZED FROM A CONSUMER POINT OF VIEW

While the amount of recent regulatory activity is unusual, it should come as no surprise for three reasons, as these comments show. First, transportation fuels, the source of energy most directly affected by DOT regulations, are a major household expenditure, representing over 3 percent of total expenditures. This makes gasoline one of the 6 largest subcategories listed in the consumer expenditure survey (see Figure 1).

FIGURE 1: HOUSEHOLD SPENDING ON ENERGY



Source: Bureau of Labor Statistics, Consumer Expenditure Survey, 2016. Indirect Work Trucks, (see Part V), Communications includes wireline and wireless telephone, audio visual and other equipment and fees, which includes broadband and cable.

Factoring in indirect expenditures on fuels consumed by commercial fleets,[16] which consumers pay for in the price of goods and services (Attachment Section XII), would push transportation fuel consumption close to 5%, making it the third or fourth largest household expenditure.[17] Adding the energy consumption of appliances (Attachment Part VI), which these comments show reflect similar market imperfections addressed by energy performance standards, the burden of energy expenditures on households budgets rivals that of health care and

[14] Mark Cooper, 2015, *Paying the Freight*, Consumer Federation of America, attached to CFA Comments *Re: Department of Transportation Notice of Intent to Prepare an Environmental Impact Statement for New Medium- and Heavy-duty Vehicle Fuel Economy Standards*—August 8, 2014. All citations are to Version 2.0, August 2015.

[15] Consumer Federation of America, 2017, *Comments of the Consumer Federation of America before the Department of Energy, In the matter of Request for Information on Reducing Regulation and Controlling Regulatory Costs, before the Department of Energy*, E.O. 13771, 13777, 13783, July 14, 2017 (hereafter, CFA, DOE Deregulation), and Consumer Federation of America, et al., 2015, *Joint Comments of the Consumer Federation of America, National Consumer Law Center, Massachusetts Union of Public Housing Tenants and Texas Ratepayers' Organization to Save Energy*, before the U.S. Department of Energy Building Technologies Program, RE: Notice of Proposed Rulemaking for Energy Conservation Standards for Residential Furnaces, July 10, 2015 (Hereafter, CFA Furnaces, 2015)

[16] https://www.bls.gov/cex/22016/midyear/quintile.pdf.

[17] Spending for household appliances, whose efficiency standards, are governed by a structure of legal authority and administrative rules similar to that affecting appliances, equals gasoline expenditures and makes regulatory reform one of the largest consumer pocketbook issues for the Trump or any administration.

groceries and is much greater than other important household expenditures like vehicle ownership, communications and clothing. In short, energy consumption, in general, and transportation fuel consumption, in particular, are one of the most important consumer pocketbook issues that policymakers must deal with.

Second, triggered four decades ago by the oil price shocks of the 1970s, the use of standards to promote energy efficiency has enjoyed a remarkable degree of bipartisan and public support.[18] This support stems in large measure from the obvious benefit of efficiency and the effectiveness of energy efficiency standards. [19] Efficiency standards deliver massive pocketbook savings to consumers that helps to grow the economy. The national security, public health and environmental benefits are substantial too, but much smaller than the direct consumer and indirect economic benefits. This outcome reflects the fact that the fuel economy/emissions reducing regulations adopted by NHTSA, EPA and CARB are carefully written, effective performance standards that embody the best practices of the "command-but-not-control" approach to regulation.

Third, regulatory reform that threatens to stymie the implementation and enforcement of current fuel economy, energy efficiency and public health/environmental protection standards would impose severe harm on the public. The stakes for consumers are huge (Attachment Part VII). Over the past forty years fuel economy standards have delivered $1.8 trillion in consumer net pocketbook savings, another $1.8 trillion in growth for the economy, and $0.8 trillion of environmental benefits. Adding the benefits of appliance efficiency standards pushes the total pocketbook and economic benefits over $5 trillion and the public health/environmental benefits close to $1 trillion.

Given this strong record of success, a freeze and rollback of current standards and the failure to adopt beneficial future standards would be a huge mistake. In these comments we analyze the past, present and future impact of energy efficiency fuel economy and environmental standards on consumers and the economy using very conservative assumptions. We conclude that they have produced, are producing and are likely to continue to produce massive public benefits.

As these comments show, a freeze and rollback of vehicle standards would rob consumers, the economy and the nation of $1 trillion, in pocketbook, macroeconomic and public health/environmental. Adding harm imposed by a freeze and rollback of appliance efficiency standards would push the total loss to over $2 trillion.

APPROACH TO ANALYSIS OF REGULATION

We approach the setting of standards from a uniquely consumer point of view, always starting from a basic question:

[18] The Energy Policy Conservation Act was signed by a Republican president and had large majorities in both houses of congress. In fact, eight of the nine major pieces of legislation that effect the energy efficiency of consumer durables were signed by Republican presidents. Both the House and the Senate have voted overwhelmingly in favor of these laws (14 times in all) with over 85 percent voting in favor.8

[19] CFA has argued this throughout its regulatory interventions, starting with fuel economy standards (Consumer Federation of America, 2018, *Comments and Technical Appendices of the Consumer Federation of America, Re: National Highway Traffic Safety Administration Notice of Proposed Rulemaking*; Docket No. NHTSA 2008-0089, RIN 2127-AK29; Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015, July 1, 2008 (hereafter CFA NHTSA, 2008)) and ending, most recently and explicitly in comments on EPA's final determination in the National Program for light duty vehicles (CFA NHTSA/EPA Comments, 2017).

- Are there significant energy expenditures that appear to be wasteful in the sense that there are technologies available that cost less than the savings on energy use? If there appears to be potential savings, we ask:
- Why is there an efficiency gap that imposes unnecessary costs on consumers? If we find market imperfections that prevent the gap from being closed and cost savings from being realized, we then ask:
- Why is a standard an appropriate policy to address the market imperfections? Finding that other policies are inadequate to address the market imperfections, we turn to performance standards and ask:
- How can the standard be best designed to achieve the goal of lowering consumer cost and protecting public health?

Our analysis focuses on how to build an effective standard. The analysis combines a review of the technical economic studies prepared by others and evidence on the market performance of energy using consumer durables to determine whether there are significant potential consumer savings that would result from a higher standard. The design of effective standards is the crucial next step.

These comments summarize the attached analysis of the past, present and future value of energy efficiency, fuel economy/environmental standards to consumers and the nation. The document lays out a comprehensive case to support not only the current standards, but also the continuation of the development of new standards, which is consistent with the underlying legal mandates. As the Notice points out, agencies are charged with reviewing standards to ensure their continuing relevance and usefulness. However, the responsible agencies are also charged with delivering maximum energy conservation and public health/environmental benefits and maximum net economic benefits on a continuous basis, which the Notice seems to have forgotten.

Our approach relies, first and foremost, on comments, testimony and analyses we have prepared since the issuance of the Technical Analysis Report (TAR) in the National Program to increase fuel economy and reduce emissions from light duty vehicles. Where analyses are time sensitive, we update them to the extent possible. We reach farther back in the record before the agencies (to 2008) where the issues are foundational and not subject to variation across time.

In the attached document we use light duty vehicles as the focal point for demonstrating the overall approach. We then show that the same approach applies to medium and heavy-duty vehicles. For each of the main sections, we incorporate consumer attitudes about key issues based on surveys conducted by CFA over the past decade. We also add observations about the efficiency and regulation of household energy consuming durables (like furnaces, refrigerators lightbulbs and computers, etc.). to reinforce the broad applicability of the framework and the compelling nature of the findings.

THE LEGAL TERRAIN OF FUEL ECONOMY/ENVIRONMENTAL RULEMAKING (ATTACHMENT SECTION II)

The analysis of policy options and action must begin with the laws that empower executive branch agencies to take action. These laws, which establish the goals, are supplemented by executive orders that give further general guidance on how to proceed.

Over the past four decades with consistent, bipartisan majorities congress and the executive branch have legislated an effective policy framework built on the recognition of the laws of economics and physics. Legislation and guidance from the executive branch have tried to help the agencies navigate the complex terrain of rulemaking. President Reagan's order (E.O. 12291, 1981) defined the overall structure of the analysis. Presidents Clinton (E.O. 12866, 1993), Bush (OMB-Circular A-4, 2003) and Obama (E.O. 13563, 2011) refined that approach. They have created an institutional structure that has been highly effective. The National Program with the explicit cooperation of three major federal and state regulatory agencies was the culmination of those decades of development.

While policymakers have followed the laws of economics in establishing an institutional framework for evaluating policy, policy must also conform to the laws of physics. Because there is a direct and near perfect physical relationship between energy consumption and pollution emissions, one of the clear impacts of efficiency standards, whether instituted for energy, environmental, or public health reasons, is a reduction in pollution (see Figure 2).

The near perfect correlation between the emission of pollutants and consumption of petroleum products in vehicles creates a powerful and inevitable connection between environmental protection and consumer pocketbook savings. The same is true for other fossil fuels used directly by consumers or to produce electricity. The least cost approach to emissions reductions is to improve the efficiency of vehicles and appliances by reducing their energy consumption. All the agencies involved in setting standards, EPA, NHTSA, DOT, DOE be they emissions, appliances, or fuel economy are required to consider this economic benefit.

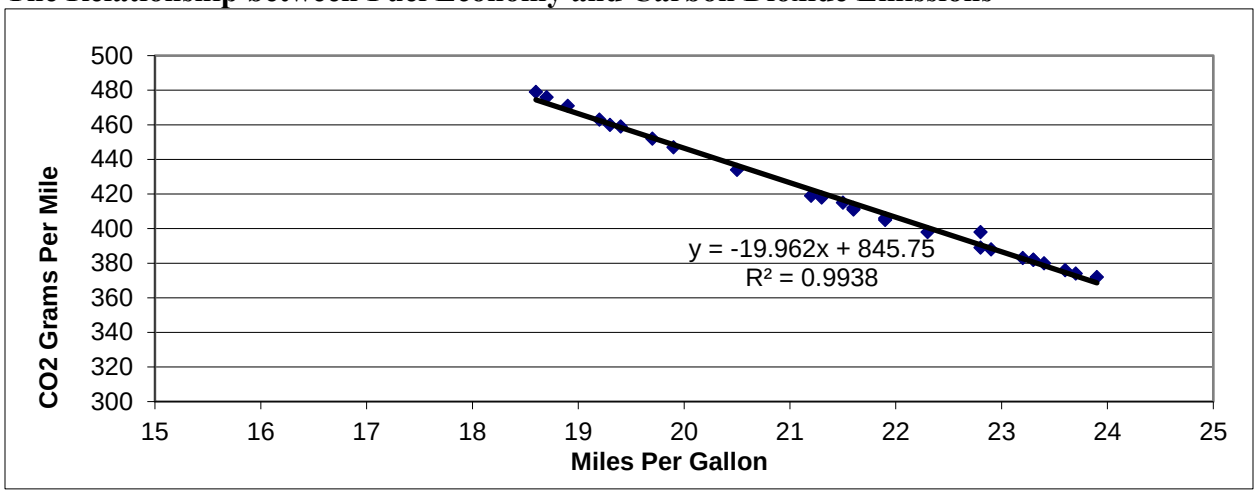
As we noted in our 2009 comments,[20] EPA's goals are expressed in terms of maximum reduction in emissions to protect the public health and welfare. The other considerations that EPA must take into account in terms of technology and economic analysis are less constraining than NHTSA. Nevertheless, the goals are very similar, particularly given the environmental and economic convergence (virtual identicality) of the physical relationship between fuel use and emissions. The California Air Resources Board, which joined in the cooperative effort, is charged with maximum feasible reduction in emissions that are cost-effective.[21] The National Program effectively harmonized the different goals into a consensus within the legal constraints, a harmonization that enjoyed widespread support.

[20] Comments of the Consumer Federation of America, *Proposed Rulemaking to Establish Emission Standards and Corporate Average Fuel Economy Standards Environmental Protection Agency Light-Duty Vehicle Greenhouse Gas) 40 CFR Parts 86 and 600; Department of Transportation 49 CFR Parts 531,633, 537, et al.*, November 27, 2009, pp. 2-3. (hereafter CFA National Program, 2009)

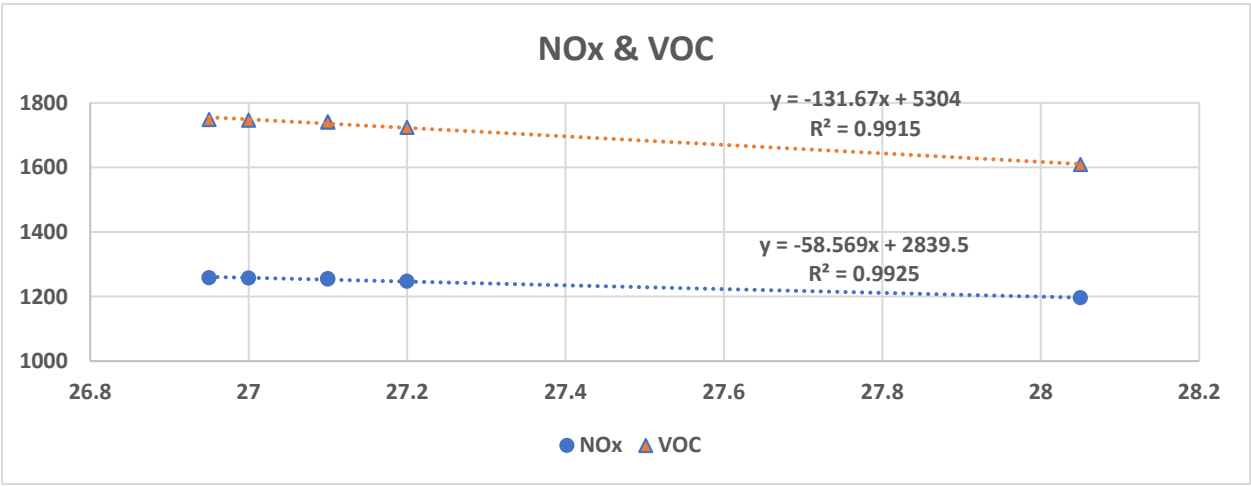
[21] Environmental Protection Agency, California Air Resources Board, National Highway Traffic Safety Administration, *Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025,* July 2016, p. 1-3, (hereafter, TAR).

FIGURE 2: REDUCING ENERGY CONSUMPTION AND POLLUTION ARE INEXTRICABLY LINKED

The Relationship between Fuel Economy and Carbon Dioxide Emissions



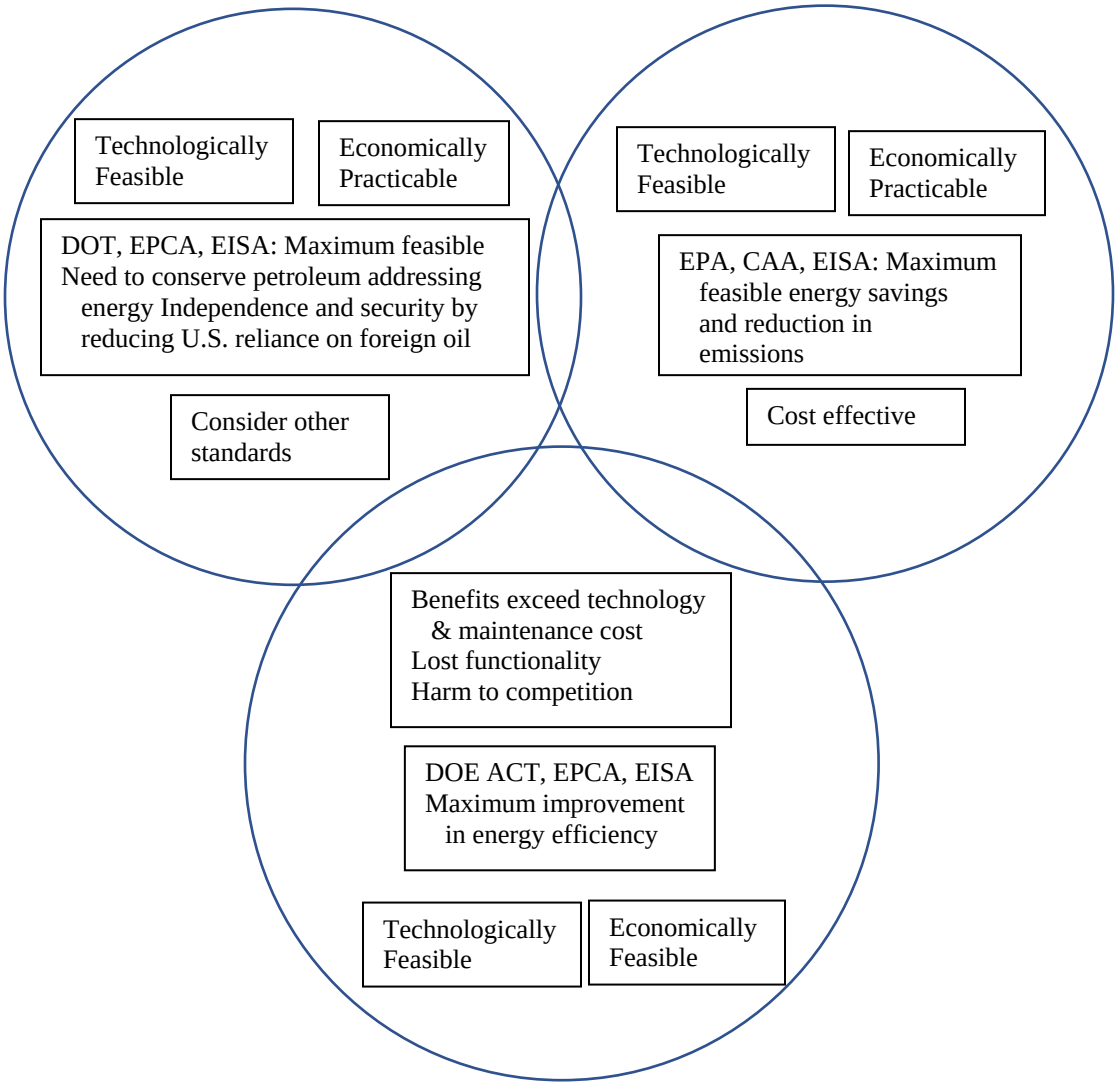
The Near Perfect Correlation between Mileage and Emission of Non-Carbon Pollutant.



Sources: Environmental Protection Agency, *Light Duty Automotive Technology: Carbon Dioxide Emission, and Fuel Economy Trends: 1975 Through 2009* November 2009, p. vii. National Highway Safety Transportation Administration, Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011, Table 1 and Table VII-12.

As shown in Figure 3, Congress enacted parallel and complementary goals and considerations for energy efficiency/environmental protection. Vehicle and appliance efficiency are included in the foundational Energy Policy Conservation Act (1975) and the critically important Energy Independence and Security Act (2007). The Department of Energy Act (1997) also establishes broad goals for the Agency, as the Clean Air Act and its amendments (1970, 1977) do for the Environmental Protection Agency. There are strong similarities and overlaps between these goals and considerations and there are cross references in the statutes. There are also tensions between them with different phases applied in each of the three areas. The National Program effectively reconciled these tensions.

FIGURE 3: PARALLEL AND COMPLEMENTARY GOALS AND DECISION MAKING CRITERIA FOR STANDARD SETTING IN ENERGY EFFICIENCY AND ENVIRONMENTAL REGULATION



THE DOT FRAMING OF THE ISSUE IS ILLEGAL AND IRRATIONAL.

The Department of Transportation's goal for (de)regulation stated in the Notice is incorrect. The goal in the underlying statutes and executive branch guidance is not to "minimize burdens;" it is to maximize energy conservation, or minimize pollution, by adopting rules that maximize net benefits to the nation.[22] Overemphasizing costs and underemphasizing benefits distorts the analysis and undermines the ability of the responsible agencies to accomplish the goals of the statutes.[23] This distortion is not simply illegal, it is bad policy – robbing consumers and the economy of valuable resources and imposing unnecessary harm on the environment and public health

[22] OMB Circular A-94.

[23] OMB Guidance on E.O. 13777, makes the same mistake counting deregulatory actions initially focused only on costs, without mentioning benefits. Overall, the guidance mentions costs 50% more often than benefits. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2017/M-17-23.pdf

- Failing to adopt a standard whose benefits outweigh it costs because of the "two-out, one-in" rule (O.E. 13777, February 24, 2017) violates the underlying statutes.[24]
- Wasting public and private resources by favoring expensive production over lower cost conservation and efficiency (O.E. 13783, March 28, 2017) is both illegal and irrational.

A freeze and roll back of current standards that have strong positive cost benefit ratios constitutes a direct contradiction of the statute and executive guidance (OMB Circular A-94).

THE IMPORTANCE OF RIGOROUS BENEFIT-COST ANALYSIS TO CORRECT MARKET FAILURES (ATTACHMENT SECTION III)

The principles that the laws and executive orders teach should be familiar to anyone who has taken Economics 101. Proper cost benefit analysis must include careful consideration of costs and benefits. The recent OMB advice letter calls for careful cost-benefit analysis.[25] The challenge as always will be to ensure that agencies do not engage in "fuzzy math." The threat of "fuzzy math" is nothing new and the Administrative Procedure Act (APA) takes a pragmatic approach to evaluating whether the agency decision is consistent with the record before it.

The cornerstone of the cost benefit justification for standards is the potential to produce a benefit. If the marketplace is performing well, it is difficult to justify policy intervention. If it is not performing well for any of a variety of reasons, policy interventions in the market can improve market performance.

We have documented and discussed these market imperfections at great length in comments, as well as papers and reports. While a number of conceptual approaches have been taken to analyze the market imperfection and failure issue, they all deliver the same message. Market imperfections affect energy consumption choices significantly and pervasively. In the attached document we briefly review conceptualizations that emphasize the diverse schools of thought that have added many different perspectives and a great deal of depth to the understanding of market imperfections over the past quarter century.

As Table 1 shows, EPA/NHTSA/CARB have identified a number of potential market imperfections that the standards address. One can argue about which imperfections are most important or most prominent, but there is no doubt that there are many that affect the energy efficiency market.

PERFORMANCE STANDARDS: AN EFFECTIVE "COMMAND-BUT-NOT-CONTROL" APPROACH (ATTACHMENT PART II)

Even with well-documented market imperfections, there is no guarantee that the standards will deliver the benefits they claim. The design of standards is important. The literature points out that performance standards have positive effects if they are well-designed, enforced and updated. Of utmost importance in our framework we find that, "command but not control" performance standards work best when they embody six principles, which are clearly at the core of the National Program. The extensive and intensive analysis of the current standards

[24] Id., repeatedly acknowledges that action must comport with applicable law and E.O. guidance in force.
[25] Id.

demonstrates that in the National Program, the agencies have designed an effective performance standard embodying the key characteristics of performance standards below.

TABLE 1: IMPERFECTIONS POTENTIALLY ADDRESSED BY STANDARDS

Societal Failures[2]	Structural Problems[3]	Endemic Flaws	Transaction Costs	Behavioral[4]
Externalities[5]	Scale[6]	Agency[7]	Sunk Costs, Risk[8]	Motivation[9]
Information[10]	Bundling[11]	Asymmetric Information	Risk & Uncertainty[12]	Perception[13]
	Cost Structure[14]	Moral Hazard	Imperfect Information[15]	Calculation[16]
	Product Cycle Availability[18]			Execution[17]
	Produce differentiation[19]			
	Incrementalism[20]			

Source: Framework developed in Comments of the Consumer Federation of America, Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Environmental Protection Agency 40 CFR Parts 86 and 600, Department of Transportation 49 CFR Parts 531,633, 537, et al., November 28, 2009. Italicized references are additional factors added by the Technical Assessment Review. Page references are to the TAR

1 The efficiency gap persists, P. 6-5, despite these developments and uptake of energy efficiency technologies, lags behind adoption that might be expected under these circumstances." Quoting the National Academy of Sciences, P. 6-7, [T]here is a good deal of evidence that the market appears to undervalue fuel economy relative to its expected present value.".
2 P. 6-7, The nature of technological invention and innovation.
3 P. 6-7, Consumers cannot buy technologies that are not produced; some of the gap in energy efficiency may be explained from the producers' side.
4 P. 6-5, Behaviors on the part of consumers and/or firms that appear not to be in their own best interest (behavioral anomalies).
5 P. 6-8, Dynamic increasing returns. network effects; p.4-35, the potential existence of ancillary benefits of GHG-reducing technologies… These can arise due to major innovation enabling new features and systems that can provide greater comfort, utility, or safety.
6 P. 6-8, The structure of the automobile industry may inefficiently allocate car attributes.
7 P. 6-7, Product differentiation carves out corners of the market for different automobile brands.
8 P. 6-6, Consumers may be accounting for uncertainty in future fuel savings.
9 P. 6-6, Consumers may... not optimize (instead satisficing).
10 P. 6-5 Lack of perfect information.
11 P. 6-6 Fuel-saving technologies may impose hidden costs.
12 P. 6-6, Consumers might be especially averse to short-term loses…. relative to long term gains.
13 P. 6-5, Consumers might be "myopic" and hence undervalue future fuel savings; p. 6.6 Consumers may focus on visible attributes... and pay less attention to attributes such as fuel economy that typically do not visibly convey status.
14 P. 6-8, First mover disadvantages, p. 4-33, Thus, instead of the first-mover disadvantage, there is a regulation-driven disincentive to "wait and see.".
15 P. 6-6, Consumers might lack the information necessary.
16 P. 6-6, Consumers might... not have a full understanding of this information.
17 P. 6-6, Selecting a vehicle is a complex undertaking... consumers may use simplified decision rules.
18 P. 6-7, The role of business strategies.
19 P. 6-7, Separating product into different market segment… may reduce competition.
20 P. 6-8, Automakers are likely to invest in small improvements upon existing technologies.

Long-Term: Setting a high standard for fifteen years fosters and supports a long-term perspective for automakers and the public, by reducing marketplace risk of investing in new technologies. The long-term view gives the automakers time to re-orient their thinking, retool their plants and help re-educate the consumer. Auto makers will have ample time to expend efforts toward explaining why higher fuel economy is in the consumer interests and consumers will have time to become comfortable with the new technologies.

Product Neutral: The new approach to standards accommodates consumer preferences; it does not try to negate them. The new approach to standards is based on the footprint (size) of the vehicles and recognizes that SUVs cannot get the same mileage as compacts.

Technology-neutral: Taking a technology neutral approach to the long-term standard unleashes competition around the standard that ensures that consumers get a wide range of choice at that lowest cost possible, given the level of the standard. Auto makers can choose the technology that best suits them to meeting the standard.

Responsive to industry needs: Establishing a long-term performance standard recognizes the need to keep the standards in touch with reality. The standards have been set at a moderately aggressive level that is clearly beneficial and achievable. With thoughtful cost estimates, consistent with the results of independent analyses of technology costs, a long-term performance standard will contribute to the significant reduction of cost. The setting of a coordinated national standard that lays out a steady rate of increase over a long-time period gives the market and the industry certainty and time to adapt to change.

Responsive to consumer needs: The approach to standards should be consumer-friendly and facilitate compliance. An attribute-based approach ensures that the standards do not require radical changes in the available products or the product features that consumers want.

Procompetitive: All of the above characteristics make the standards pro-competitive. Producers have strong incentives to compete around the standard to achieve them in the least cost manner, while targeting the market segments they prefer to serve using the technologies that exploit their corporate competence.

THE INDUSTRY RESPONSE TO WELL-CRAFTED STANDARDS IS CONTRADICTED BY REALITY

The positive results under the National Program and the fact that automakers are not only complying with the early standards, but over complying at lower costs than anticipated, is driven by the careful design of the standards and the rational response of the automakers. The standards were responsible and did not seek to push fuel economy/pollution reduction to the limit of technology. The goals were "inframarginal" with respect to the capabilities of the industry and the standards remain inframarginal, with many combinations of technologies available for compliance. While the biggest potential game changer in terms of compliance – electric vehicles – is not needed to meet the standards, the evidence continues to grow that they could play a much larger part in the vehicle fleet.

As our historical analysis showed, the industry has responded as market theory and past experience predicts, a process that is observable at both the macro and micro levels. The industry has found lower cost ways of complying with the standards than originally thought. The mix of technologies likely to be chosen has shifted due to different speeds of development in knowledge and cost. There is no evidence that the costs of compliance are disrupting the auto market in any way, and consumers are having no difficulty in finding the vehicles that they prefer at prices that are affordable.

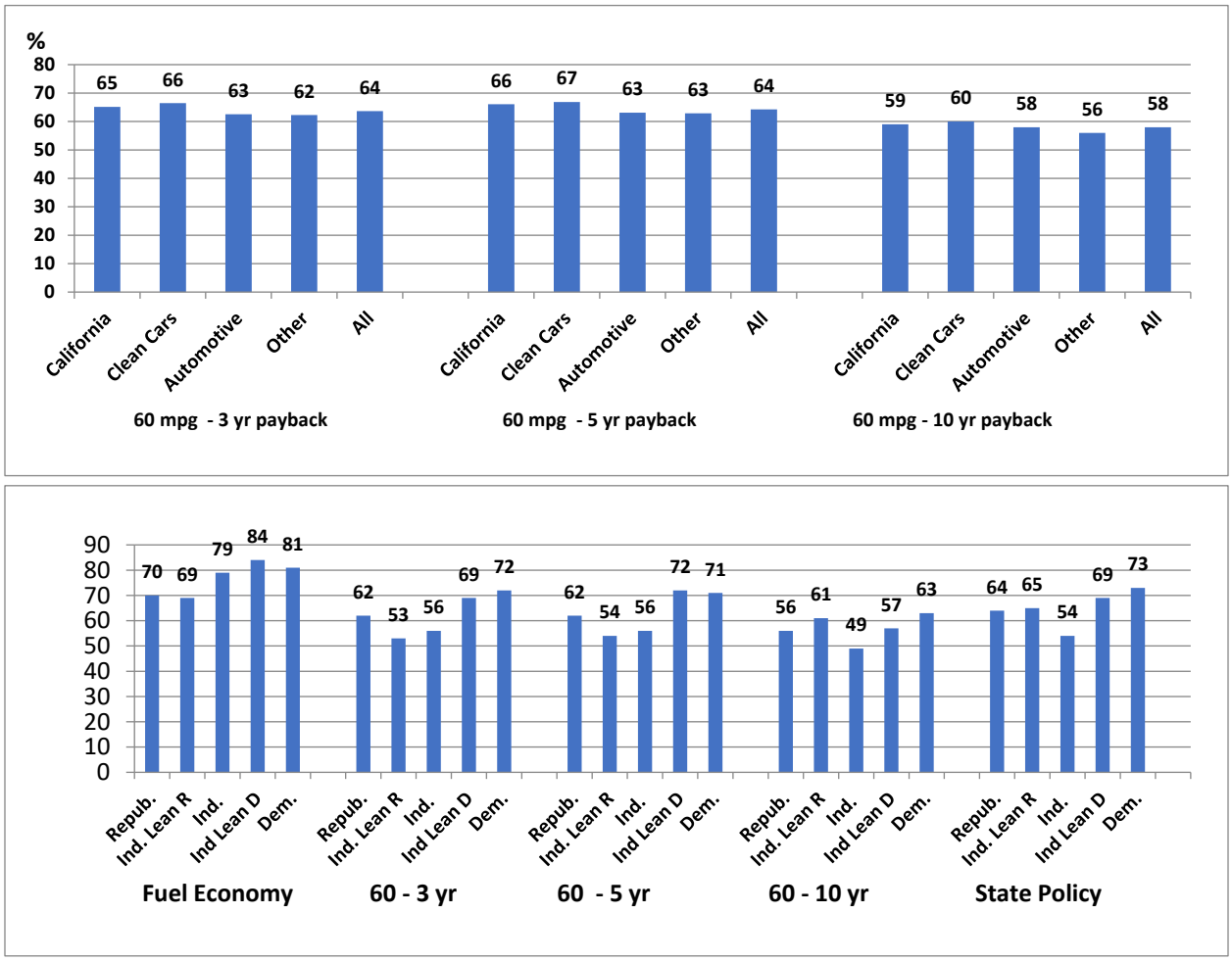
PUBLIC SUPPORT FOR FUEL ECONOMY STANDARDS (ATTACHMENT PART III)

Having examined the extensive conceptual and empirical literature that support energy performance standards as uniquely effective tools of public policy to lower consumer costs, promote economic growth and achieve other national and environmental/public health goals, it is not surprising to find that these policies enjoy broad public and bipartisan support. Over the course of the last decade we have polled public opinion on the levels of standards being considered or adopted. Between three quarters and four fifths of the respondents support the standards.

The very high percentage in support for standards suggests that even subgroups of the respondents are quite supportive of the policy. We have explored the breadth of support along

two dimensions – across different types of states and political orientations (see Figure 4). California has the authority to set its own standards, due to its unique air pollution problems. States can choose to follow either California or the federal standards and 12 states followed California, which came to known as the Clean Cars States. Automotive states (Michigan, Illinois, Indiana) have twice the national average employment in the automotive sector. All other states are "other."

FIGURE-4: SUPPORT FOR A 60-MPG STANDARD & STATE ROLE IN EMISSION STANDARDS



Source: National Survey Shows that Most Consumers Support 60 MPG Fuel Economy Standards by 2025, 09/28/10.

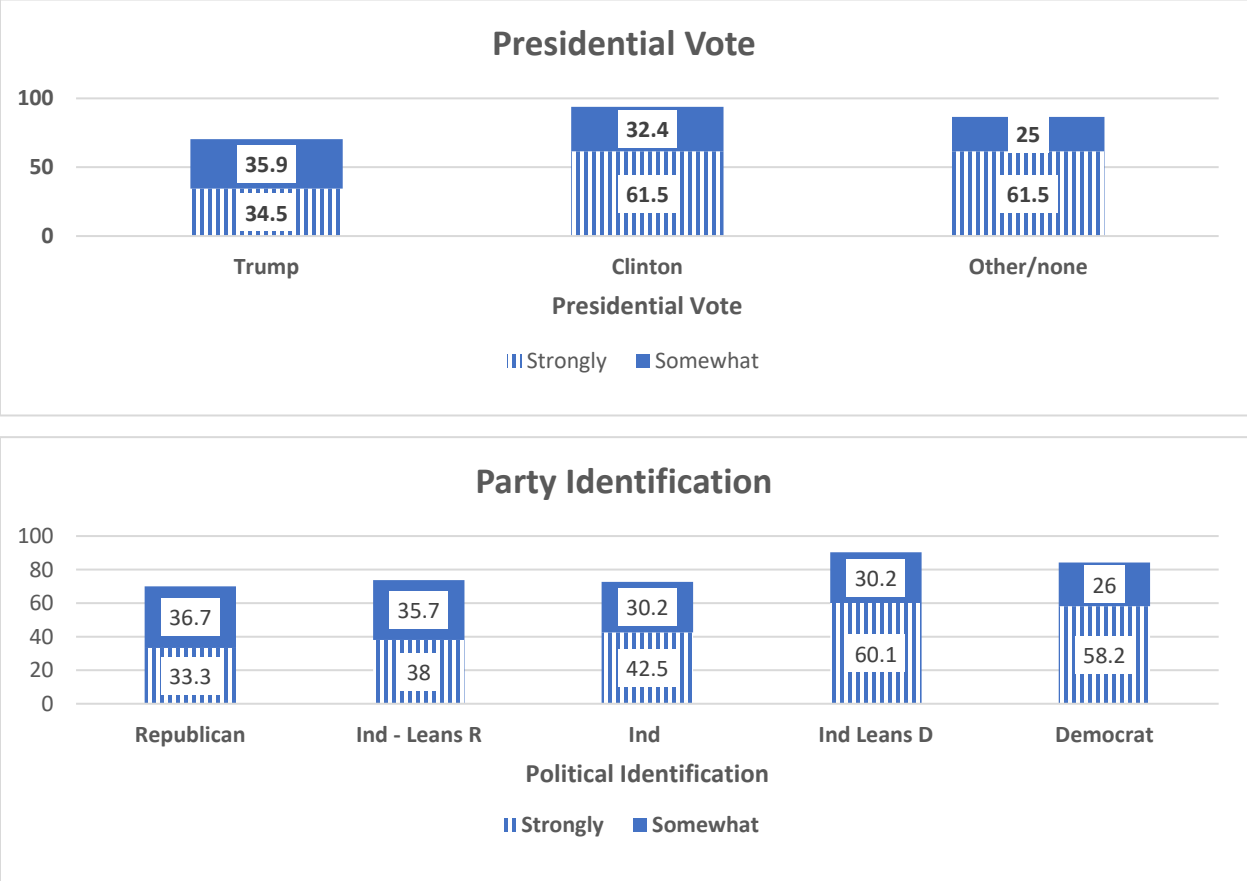
We found very little difference in concern about gasoline prices or Mid-East imports across the states. There are no statistically significant differences between the four groups of states. We found high levels of support (around 80%) for the proposition that it is important to reduce oil consumption through increased fuel economy.

We asked about a very aggressive standard, 60-mpg, across states and political party identification with specific payback periods. As shown in the upper graph of Figure 4, although the target has never been set as high as 60 mpg, with payback periods of three and five years, it is supported by over 60% of respondents. This support declines to the high 50% range with a ten-year payback period.

The second aspect of broad support is political. In the survey that addressed 60-MPG and paybacks, we examined support across political lines. Among Democrats or those who lean Democrat, over 80% favor the fuel economy standards, and 70% favor a 60-mpg standard with a 3 or 5-year payback. 70% favor continued state involvement. Among those who are Republican, two-thirds support the general concept of fuel economy standards, and over half support the 60-mpg level. Continuing state involvement in standard setting receives the same level of support as 60 mpg with a 3-year payback.

Increasing federal fuel economy standards for cars and light duty trucks to the real-world level of 42-mpg set by the National Program by 2025 is supported by 79% of respondents; just eighteen percent oppose this increase (see Figure 5). Moreover, 70% of Republicans and Trump voters support the standard.

FIGURE 5: POST-2016 PUBLIC SUPPORT FOR FUEL ECONOMY STANDARDS



Source: CFA commissioned public opinion poll conducted by ORC, December 8-11, 2016.

AUTOMAKER EFFORT TO ROLL BACK THE STANDARDS V. CONSUMER INTEREST IN STANDARD DRIVEN FUEL ECONOMY (SECTION VII)

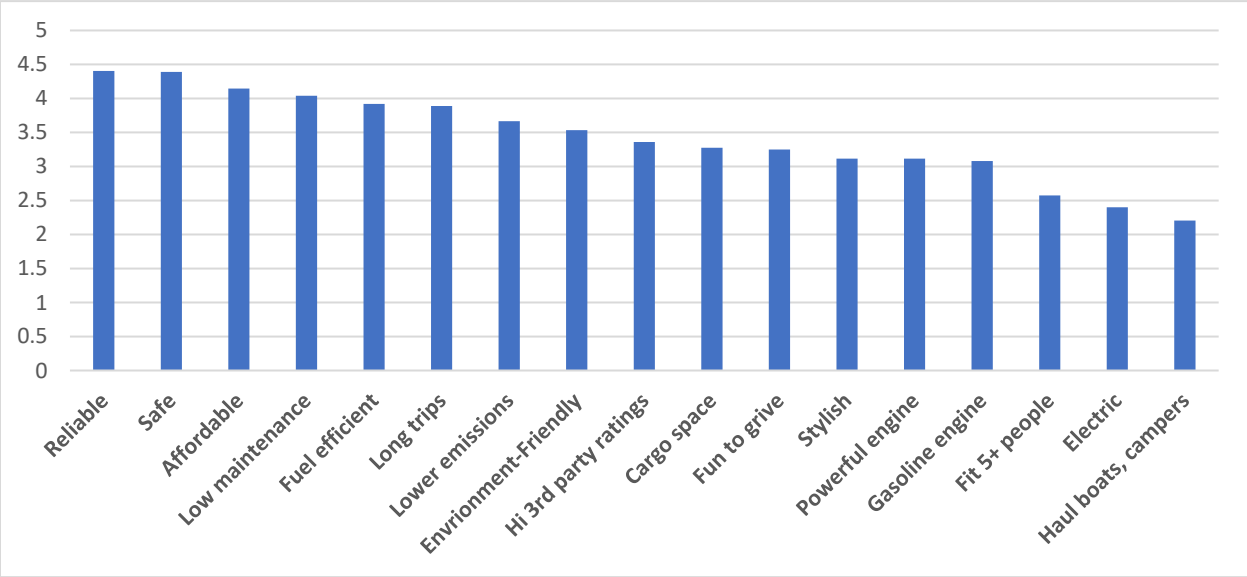
The public is not as enamored of gasoline powered muscle cars and trucks as the automakers claim

The automakers spend a great deal of time complaining about policies to promote electric vehicles (EVs), claiming they will drive up the cost of the National Program. We have shown that the EV program will have little impact on the cost of compliance for three reasons.

First, electric vehicles are projected to make up a very small part of the fleet in the targeted compliance period. Second, the cost of electric vehicles is plummeting, with a number of cost-competitive, consumer-friendly vehicles planned for the market long before the compliance period. Third, as frequently happens in efficiency programs, the cost of compliance declines as producers learn and volumes rise. This is the powerful intersection of "command but not control" regulation and the market forces on which it relies.

The automakers' survey evidence does not support their claim. If an EV and gasoline vehicle were matched on cost and travel length, more would prefer the electric vehicles (48% to 43%) and a clear majority (57%) are willing to pay more for an electric vehicle. The automaker misrepresentation of consumer is not limited to electric vehicles. As Figure 6 shows, the analysis of desirable vehicle attributes shows that consumers want reliable, safe, affordable and low maintenance vehicles, which EVS are increasingly able to deliver.

FIGURE 6: ALLIANCE OF AUTOMOBILE MANUFACTURERS, VEHICLE ATTRIBUTE SURVEY



Source and Notes: Mitch Bainwol, President and CEO, Alliance of Automobile Manufacturers, *Consumers & Fuel Economy*, CAR Management Briefing Seminars, Traverse City, Michigan, August 2016, p. 10. The winter related question, specific to the North East, has been discarded. It would rank 12th of 18, low in California, high in New England).

After the big four attributes, respondents care as much about fuel efficiency as the ability to take long trips and the automakers are working on that too. Beyond these big six attributes, the valuation of other attributes falls off, but even here the message for EVs is positive.

Environmental impacts rank a lot higher (8th and 9th) than powerful engines (13th) or engine type (gasoline power =14th, electricity = 16th). Fitting more than 5 people (15th) or hauling boats and campers don't matter much (ranks dead last).

BENEFIT-COST ANALYSIS, THE DISCOUNT RATE AND POCKETBOOK SAVINGS (ATTACHMENT SECTION IX)

In spite of the emergence of a general approach in the laws, executive branch guidance and litigation, and widespread public and bipartisan support, there remain important areas of debate that we examine before we outline our specific approach to benefit cost analysis. Table 2 identifies the issues we address in the Attachment in terms of their magnitude, measured as a percentage of the average base case benefits we estimate below.

TABLE 2: MAJOR POINTS OF DEBATE IN BENEFIT COST ANALYSIS

Type of Benefit	As % of base case Net Benefits
Pocketbook Savings	60%-80%
Macroeconomic benefits	60%
Value of Environment/Public Health	33% - 50%
Discount Rate	40%
Tendency of costs to decline & feasibility	30%
Rebound effect on pocketbook savings	10%

THE DISCOUNT RATE

No matter how lofty the goal of policy, the use of the public's money (whether for increased costs to lower energy consumption of durables or to administer programs) to achieve a goal must not only deliver a benefit above the cost, it should also deliver a return at least as large as those resources could have if put to other uses. This is the opportunity cost of capital which is operationalized as the discount rate in the benefit-cost analysis. The return must be based on **all** benefits and costs, and is particularly sensitive to the externalities that do not enter into market transactions.

We have frequently argued that the 3% discount rate is the correct discount rate from the consumer point of view as recognized by OMB Circular A-4. It is a good, perhaps somewhat high estimate of the opportunity cost of consumer capital. It is also one of the anchor points ordered by OMB, making it available in all formal agency evaluations. The 3% discount rate is not only a somewhat high estimate of the consumer discount rate, it also serves as a somewhat high estimate of the social discount rate when intergenerational and incommensurable impacts are being analyzed, as recognized in OMB Circular A-4. Emissions from vehicles clearly have intergenerational impacts, most notably in their impact on climate change.

Therefore, for us, 3% is the reasonable compromise for the central analysis of the discount rate. Since it is generally available in agency analyses, we use it. A range would be justified, but the agencies, which routinely report analyses with a 7% discount rate do not report (or conduct) analyses with a 1% discount rate. Rather than bias the picture presented by showing one side of the range, we show only the center point, which is widely available.

CONSUMER POCKETBOOK SAVINGS

Consumer pocketbook savings are a central element of traditional agency analysis, since fuel economy reduces operating costs more than the increase in technology costs. However, some opponents of regulation take the view that since there are choices in the marketplace, there can be no consumer utility gain from imposing standards. Consumers express their preferences and get what they want. In a sense, the very high discount rate implicit in market behavior is the centerpiece of the market fundamentalist objection to performance standards. We believe this is wrong, based on a view that ignores all the market imperfections that inflate the discount rate.

First, the outcome in the market is not simply the result of consumer preferences, it is the result of all the forces that affect the options presented to consumers and that weigh on and constrain their choices. Manufacturers determine a narrow range of choices to present consumers and seek to influence consumers, through advertising and incentives, to purchase the vehicles that manufacturers want to sell. Consumers are imperfect in their calculations and projections about fuel usage and prices. Second, consumers do express a great deal of interest in and concern about energy usage, much more than automakers admit. Third, more importantly, as noted, once a well-crafted standard is adopted and implemented, it improves market performance by lowering the cost of driving. Thus, we interpret the implicit, high market discount rate as a result of the many barriers and imperfections that retard investment in efficiency enhancing technology[26] not simply consumer preferences.

Willingness-to-pay studies reflect the same weaknesses. The willingness-to-pay observed in survey analysis and derived as implicit through econometric analysis reflect opinions and decisions offered or made by individuals in the context of all the imperfections that afflict the market. They reflect the market structure the policy is intended to correct more than the "true" value of correction.

DECLINING COST OF COMPLIANCE AND TECHNOLOGICAL FEASIBILITY (ATTACHMENT SECTION X)

Reflecting the market imperfection addressed by standards and the market forces they unleash; the empirical analysis exhibits a persistent pattern of costs that fall below *ex ante* projections (as shown in the upper graph of Figure 7). We argue that the strong evidence of overestimation of costs should be recognized in the benefit cost analysis. We recognize that the agencies run multiple scenarios to test the sensitivity of the results to assumptions and frequently apply Monte Carlo statistical tests to assess the likelihood of outcomes. But with strong historical evidence and well-documented economic processes that explain a persistent and systematic pattern of declining costs, the pattern demands more than just Monte Carlo sensitivity treatment. The outcome is more likely than a random disturbance.

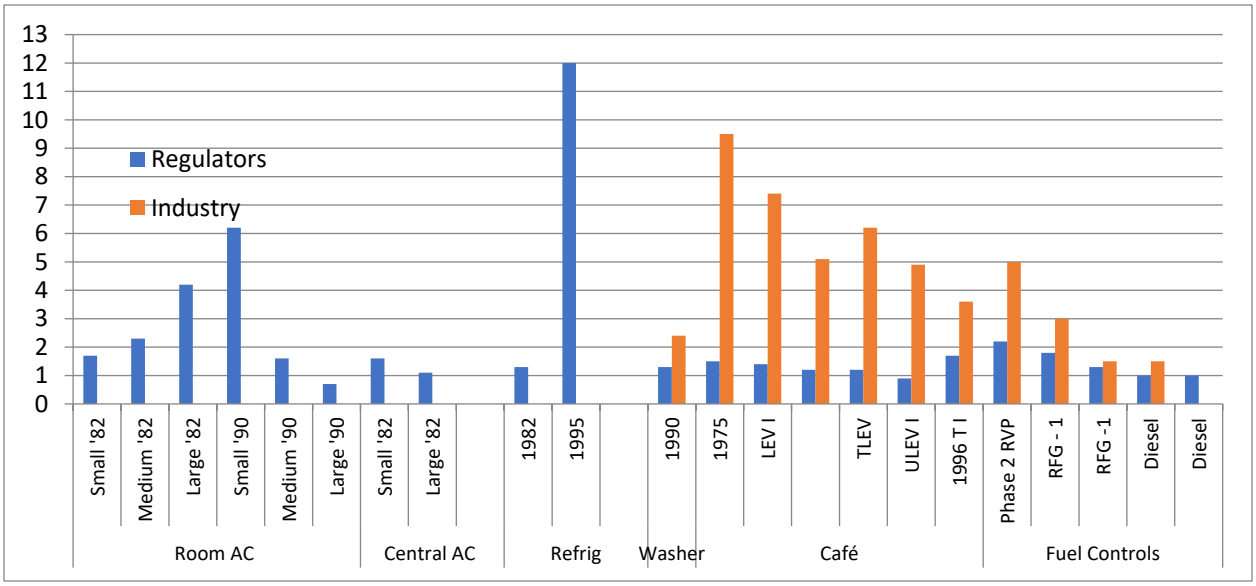
As noted above, policies to reduce the efficiency gap, like performance standards, will systematically improve market performance. By overcoming barriers and imperfections, well-designed performance standards will stimulate investment and innovation in new energy efficient technologies. A natural outcome of this process will be to lower not only the level of energy

[26] See Appendix B for extensive citations for the following discussion.

consumption, but also the cost of doing so. The efficiency gap literature addresses the question of how "learning curves" will affect the costs of new technologies as they are deployed.

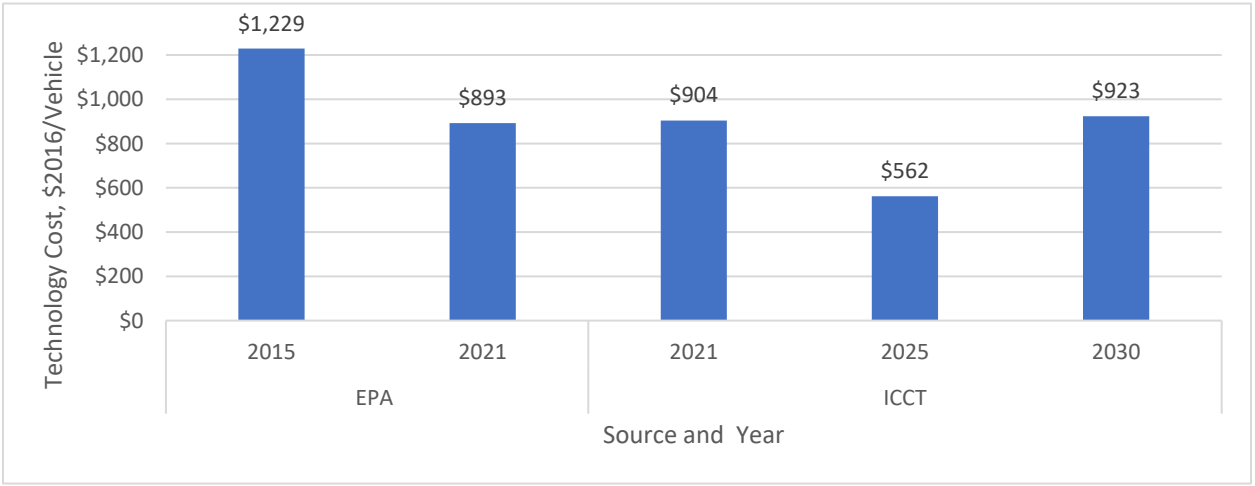
FIGURE 7: THE PROJECTED COSTS OF REGULATION EXCEED THE ACTUAL COSTS:

Historical Ratio of Estimated Cost to Actual Cost by Source



Sources: Winston Harrington, Richard Morgenstern and Peter Nelson, "On the Accuracy of Regulatory Cost Estimates," *Journal of Policy Analysis and Management* 19(2) 2000, *How Accurate Are Regulatory Costs Estimates?*, Resources for the Future, March 5, 2010; ; Winston Harrington, *Grading Estimates of the Benefits and Costs of Federal Regulation: A Review of Reviews*, Resources for the Future, 2006; Roland Hwang and Matt Peak, *Innovation and Regulation in the Automobile Sector: Lessons Learned and Implications for California's CO_2 Standard*, Natural Resources Defense Council, April 2006; Larry Dale, et al., "Retrospective Evaluation of Appliance Price Trends," *Energy Policy* 37, 2009.

NHTSA AND ICCT NATIONAL PROGRAM COST ESTIMATES



Sources: Environmental Protection Agency and National Highway Traffic Safety Administration, *2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule*, Federal Register, 77: 199, October 15, 2012, Table I-128. Environmental Protection Agency, *Final Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Emission Standards under the Midterm Evaluation*, January 2017, Table ES-1. International Council on Clean Transportation, *Efficiency Technology and Cost Assessment for U.S. 2025-2030 Light-Duty Vehicles*, March 2017, Table 2.

EPA's analysis of the National Program demonstrates that this process is continuing to operate with respect to fuel economy standards, as shown in the lower graph of Figure 7. EPA found that a technology that had not even been considered is likely to have a substantial penetration, driving costs down by over 25%. Looking forward, a recent study from the International Council on Clean Transportation projects an additional 25% decline in the cost of compliance. This is consistent with the broad pattern of earlier research.

TECHNICAL FEASIBILITY OF THE STANDARDS (ATTACHMENT SECTIONS X, XIII, PART VIII)

The clear pattern of declining costs links directly to a central issue in the writing of standards – the technical feasibility of achieving them. The ability of automakers to comply with the standards at lower costs than anticipated suggests that technologies were readily available. There is direct evidence that supports this conclusion, especially when the level of standards chosen is taken into account.

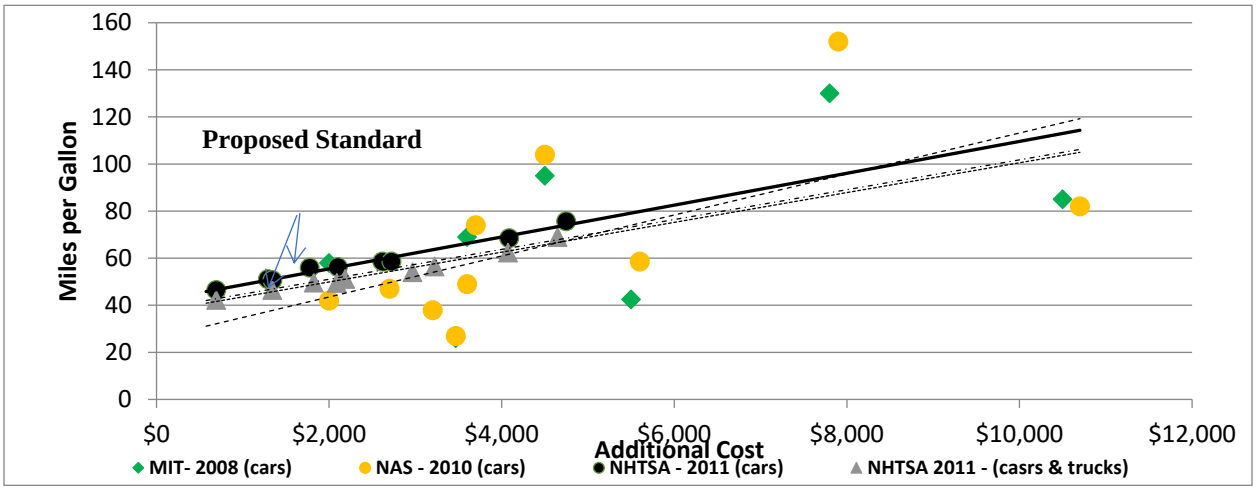
The agencies do independent analysis of technology availability and cost, frequently engaging in engineering (tear down) studies and reviewing the technical literature, as well as numerous reports from the National Research Council of the National Academy of Sciences and other independent sources (a shown in Figure 8).

Having identified cost curves, the agencies set standards at moderate levels making the achieving the standard quite feasible. Figure 8 presents the full range of cases and scenarios considered by the agencies in setting the standards for light duty vehicles under the National Program. It shows each target level evaluated at a discount rates of 3%. It plots the costs (on the x-axis) and the benefits (on the y-axis) for the eight different target levels and the results of the sensitivity analyses. If a case/scenario falls above the line, the benefits exceed the costs. The upper Figure makes it clear that the benefits are likely to exceed the costs by a wide margin for light duty vehicles. Even under the most extreme assumptions the benefits are almost twice as large as the costs at the 3% discount rate. The standards are well below the maximum net benefit level.

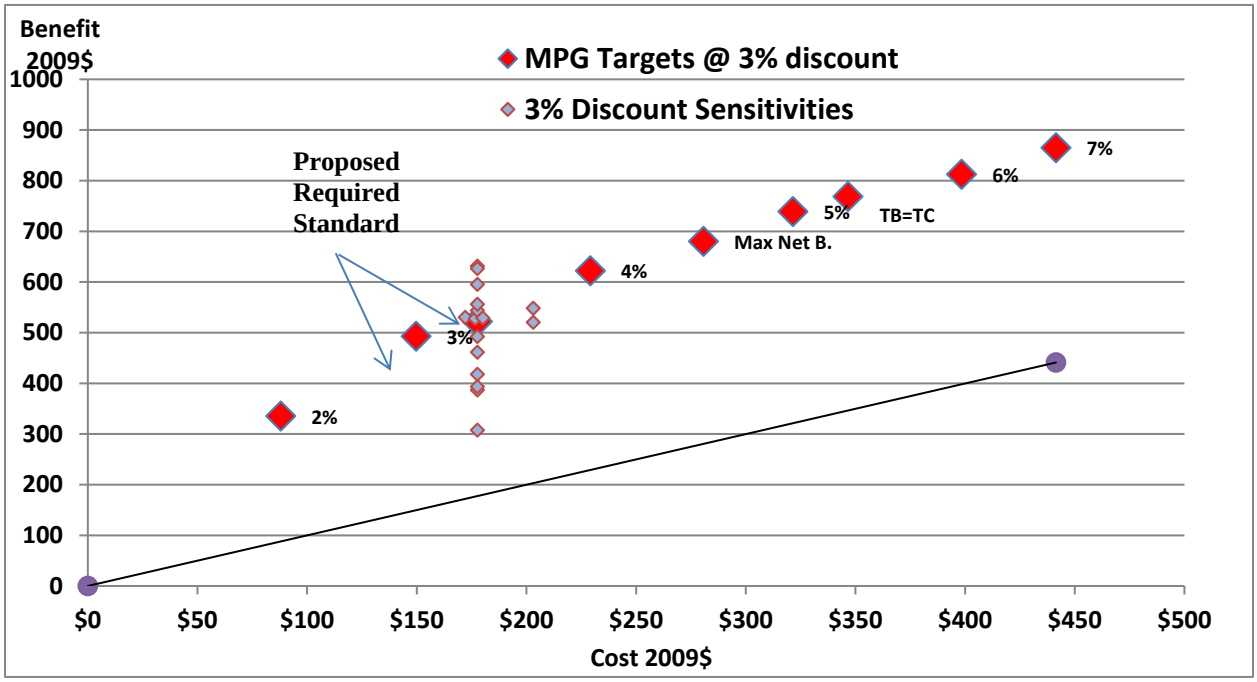
The upper graph in Figure 9 shows the cost curves for tractor trailer technology. Tractor trailers are the single largest category of work trucks by far. It plots the Phase I and Phase II standards energy savings and costs in the same axes as the third-party studies. The graph highlights the anomaly. To make the cost curves comparable, we have included both Phase I and Phase II and have stated all costs in 2009$, which would be equivalent to the third-party analyses. Again, it is clear that the agencies have used cost estimates that are consistent with the broader literature. This Figure also puts a recent analysis by the ICCT in perspective. Responding to some claims by members of the industry that the proposed standards exceed even the super truck projects, the ICCT analysis shows that the super combining all the elements of the super truck program (engine, aerodynamics and tires), the improvement in fuel economy would be 2.4 times larger. They do not give costs, however. Moreover, that includes every truck maxing out on each technology, not something regulatory agencies generally require.

FIGURE 8: AGENCY AND INDEPENDENT ESTIMATES OF LIGHT DUTY VEHICLE COSTS ESTIMATES

The 2025 Light Duty Standard is Well Within the Technology Frontier



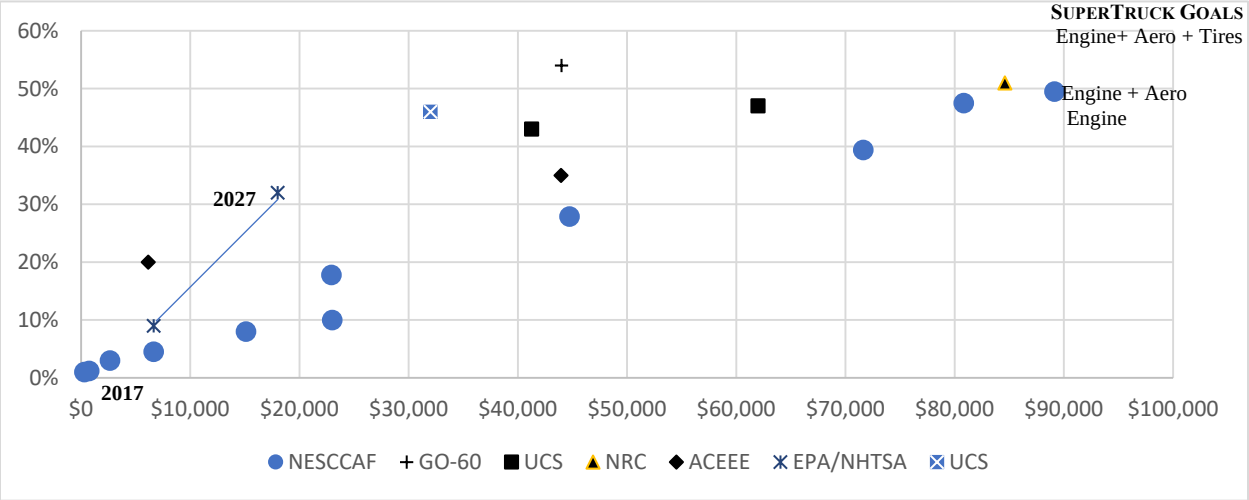
The 2025 Light Duty Standard is a Moderate, Mid-Range Target



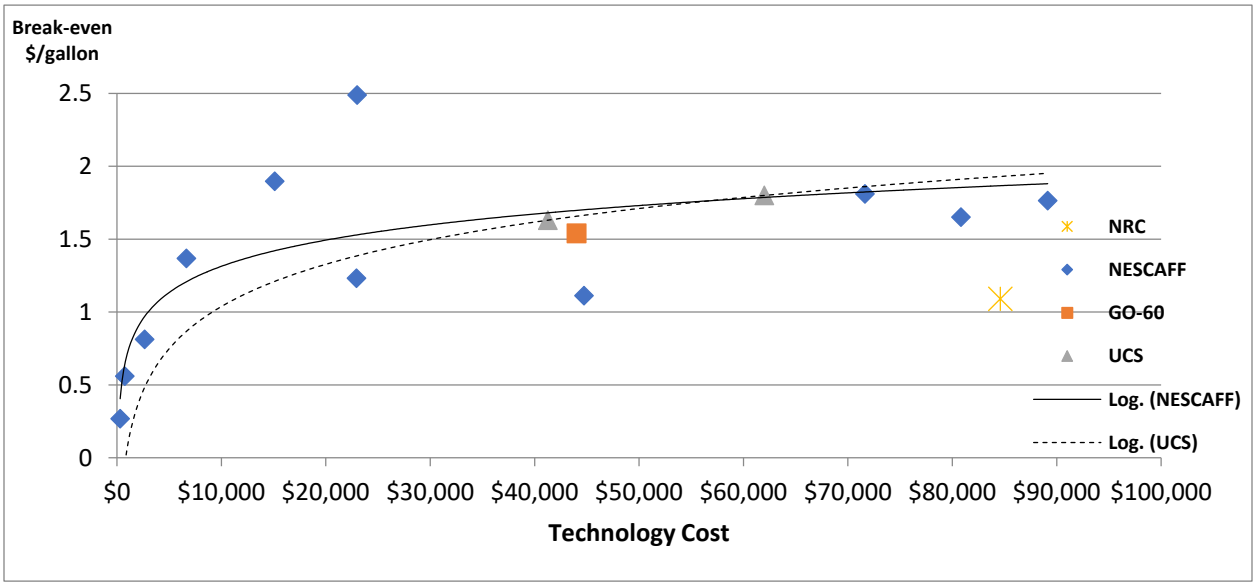
Sources: MIT, 2008; Laboratory of Energy and the Environment, *On the Road in 2035: Reducing Transportation's Petroleum Consumption and GHG Emissions*, Cambridge: July, 2008), Tables 7 and 8; NAS -2010, National Research Council of the National Academy of Science, America's Energy Future (Washington, D.C.: 2009), Tables 4.3, 4.4; NHTSA-EPA 2011;Office of Regulatory Analysis and Evaluation National Center for Statistics and Analysis, *Preliminary Regulatory Impact Analysis, Corporate Average Fuel Economy for MY 2017-MY 2025 , Passenger Cars and Light Trucks,* November 2011, Table 2 and Tables 3, 5; Source: Office of Regulatory Analysis and Evaluation National Center for Statistics and Analysis, *Preliminary Regulatory Impact Analysis Corporate Average Fuel Economy for MY 2017-MY 2025, Passenger Cars and Light Trucks,* November 2011, Table 2 and Table X-12c

FIGURE 9: EPA/NHTSA TECHNOLOGY TARGETS FOR WORK TRUCKS

Agency Tractor Trailer Technology Cost are Well Within the Technological Frontier



Heavy Duty Cost Per Gallon Break-Even Analysis for Class 8 Trucks



Sources: Northeast States Center for a Clear Air Future, International Council on Clean Transportation and Southwest Research Institute, *Reducing Heavy Duty Long Haul Combination Truck Fuel Consumption and CO_2 Emissions*, October *2009;* Don Air, *Delivering Jobs: The Economic Costs and Benefits of Improving the Fuel Economy of Heavy-Duty Vehicles*, Union of Concerned Scientists, May 2010; Committee to Assess Fuel Economy for Medium and Heavy Duty Vehicles, *Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles*, National Research Council, 2010; Go 60 MPG, *Delivering the Goods: Saving Oil and Cutting Pollution from Heavy Duty Trucks.* A. Siddiq Khan and Therese Langer, 2011, *Heavy Duty Vehicle Fuel Efficiency and Greenhouse Gas Emissions: The 2014-2019 Standards and a Pathway to the Next Phase*, American Council for an Energy Efficient Economy, December. EPA/NHTSA, PHASE II, NOPR, Tables X-1 and X-8. EPA/NHTSA, PHASE II NOPR, Table X-1; EPA/NHTSA, PHASE I NOPR, Tables I-10, III-6; SuperTruck Goals from Nic Lutsey, "Will the U.S. Truck Standards Bring "SuperTrucks" to the Market?", ICCT.org, blog; Dave Cooke, Engines for Change: From Cell Phones to Sodas, How New Truck Standards Can Improve the Way America Ships Good, Union of Concerned Scientists, March 2015.

The lower graph makes it clear that the Phase II work truck rules re very cost effective. With estimates of the technology costs and fuel savings in hand, the National Research Council report on medium and heavy-duty trucks simplifies the cost benefit analysis by focusing on the cost side and not making assumptions about fuel prices. Instead of engaging in the uncertain and sometimes contentious exercise of projecting fuel costs over long periods, the National Research Council estimates the price per gallon that would be necessary to break even on an investment that incorporates technologies to reduce fuel consumption in medium and heavy-duty trucks, as noted in the discussion of OMB Circular-4.

NRC includes a discount rate, representing the time value of money, set at 7% to compare the estimated costs of saved fuel to projections for the future cost of fuel.[27] As shown in lower graph of Figure 9, the NRC estimated that fuel prices would have to be just $1.09 per gallon for a very large investment in new technology to earn a 7% real rate of return. As actual fuel prices are currently over two and a half times this amount and expected to rise over time, the payout from these technologies would far exceed their cost.

We have also converted the results of several other recent studies to this break-even approach. While there are some differences among these studies, there is a clear consensus that large investments in increasing the fuel economy of medium and heavy-duty trucks are very attractive. All but one of the analyses show that investments in technology to improve fuel economy would earn more than the 7% discount rate at diesel prices of $2 and substantially more at higher gas prices. At a 3% discount rate, the breakeven price would be considerably lower. The analysis suggests it could be as low as $0.70/gal.

MACROECONOMIC GROWTH AS A POSITIVE EXTERNALITY OF STANDARDS (ATTACHMENT SECTION XI)

To the dismay of anti-standard, free market ideologues, and the surprise of consumers who end up with a more fuel-efficient car than they thought they could get, fuel economy standards puts more money in the consumer's pocket. The inevitable result is to increase disposable income and, under any reasonable assumption, trigger a macroeconomic multiplier effect. The macroeconomic stimulus that results from efficiency standards is a true externality.

Assessing the macroeconomic impact of policy choice generally relies on complex models of the economy. First, the inclusion of energy efficient technologies in energy using durables increases the output of the firms that produce the technology. Second, economically beneficial energy efficiency investments yield net savings when the reduction in energy costs exceeds the increase in technology costs.

In 2010, EPA reviewed the literature on the macroeconomic impact of reduced energy consumption.[28] It ran econometric models driven by the pocketbook savings. It found a very substantial multiplier effect increasing the GDP by just under 1%, or $340 billion, by 2050. Discounting the incremental growth of the economy at 3%, which is the discount rate used as the

[27] The discount rate also refers to the interest rate used in discounted cash flow (DCF) analysis to determine the present value of future cash flows… takes into account not just the time value of money, but also the risk or uncertainty of future cash flows; in*vestopedia.com/terms/d/**discountrate**.asp*

[28] Memorandum To: Docket EPA-HQ-OAR-2009-0472, Subject: Economy-Wide Impacts of Greenhouse Gas Tailpipe Standards, March 4, 2010.

base case in this paper, the total is just under $100 billion and it is largely realized by 2030. This is slightly larger than the total consumer pocketbook savings.

Table 3 shows examples of the multiplier, with the GDP impact expressed as a multiplier of the value of net pocketbook savings. That is, we subtract costs from the estimated value of energy savings. This ensures we do not double count benefits. In the analysis we use the extremely conservative assumption that the macroeconomic benefits equal the net pocketbook benefits.

TABLE 3: ESTIMATES OF MACROECONOMIC MULTIPLIERS AS A MULTIPLE OF NET POCKETBOOK SAVINGS

Modeler	Model	Date	Policy Assessed	Region	GDP/$ of Net Savings
Roland-Holst	DEAR		Computer Standard	California	1.8
ENE	REMI		Utility Efficiency	Northeast	2.2
Cadmus	REMI		Utility Efficiency	Wisconsin	2.5
Arcadia	REMI		Utility Efficiency	Canada	2.7

Sources: David Roland-Holst, 2016, *Revised Standardized Regulatory Impact Assessment: Computers, Computer Monitors, and Signage Displays,* prepared for the California Energy Commission, June. ENE, *Energy Efficiency: Engine of Economic Growth: A Macroeconomic Modeling Assessment,* October 2008. Cadmus, 2015, *Focus on Energy, Economic Impacts 2011–2014,* December. Arcadia Center, 2014, *Energy Efficiency: Engine of Economic Growth in Canada: A Macroeconomic Modeling & Tax Revenue Impact Assessment,* October 30,

THE CONSUMER STAKE IN THE FUEL USE OF HEAVY DUTY TRUCKS (SECTION XII)

Consumers recognize that when fuel prices rise, so does the cost of consumer goods due to the cost of transporting those goods. Conversely, because of competition, a reduction in transportation costs will result in lowering the cost of goods and services for consumers. Reducing the energy consumption of medium and heavy duty (work) trucks will reduce household expenditures by lowering the cost of all goods and services.

The economic reality of the flow-through to consumers of transportation fuel costs is reflected in the way econometric models describe the growth of the economy. Such models are built on input/output tables, and transportation costs are a significant input in the models. In building these models, the pass-through of transportation costs is assumed, since transportation plays a fundamental role in the overall cost of production as an intermediate good. Two Consumer Federation of America surveys found that the vast majority of consumers (over 90%) understand that "some, most, or all" of the fuel costs of heavy-duty trucks, which transport virtually every consumer good, are passed on to consumer. In fact, over 55 percent believe that "all or most" of these costs are passed on to the consumer.

Our analysis shows that, at present, for every dollar that consumers spend on household gasoline, they spend about $0.47 on work truck transport fuel consumption. Because fuel economy standards for trucks are weaker than light duty vehicles and diesel prices are projected to rise faster than gasoline, work truck fuel expenditures are projected to grow from 47% of household gasoline consumption to 67%. This indirect burden on households will grow, absent stronger standards, offsetting a significant part of the savings in direct fuel expenditures.

POTENTIAL FUEL SAVINGS AND MARKET IMPERFECTIONS FOR MEDIUM AND HEAVY-DUTY TRUCKS (ATTACHMENT SECTION XIII)

Above we showed that there was a broad consensus among the federal and state agencies and academic institutions that available technology could be added to light duty vehicles and work trucks at an economic cost that makes them an attractive investment. The analysis of the work truck market by the agencies and a number of other independent institutions shows clearly that there are substantial market failures, as shown in Table 4.

In the Phase I analysis, EPA identified six broad categories of factors that have been offered as explanations for the failure of the truck market to pursue investment opportunities in fuel saving technologies that appear to be cost effective. The other major analyses identify these obstacles and several more, adding a great deal of detail. The findings from the medium and heavy-duty truck sector reinforce several of the key aspects of our earlier analysis.

- The analysis involves commercial enterprises, which affirms the fact that economic motivation alone does not ensure optimum investment in efficiency.
- Many of the same factors are confirmed as important obstacles to energy saving investment on both the supply and the demand sides of the market.
- The supply and the demand sides interact and reinforce each other in a vicious circle. Policies that can break the circle are extremely attractive.
- The diffusion of innovation unfolds as a process in which the early challenge is to provide reliable, verifiable information to trigger the diffusion process. Experience allows the sharing of information later in the process, which creates different challenges.

THE WORK TRUCK RULES ARE EFFECTIVE PERFORMANCE STANDARDS (ATTACHMENT SECTION XIV)

The agencies have done yeoman's in crafting effective "command-but-not-control" standards in the complex work truck space.

Long-Term: In designing performance standards, the key issue is the cycle on which the design of consumer durables is refreshed or entirely redone. In the heavy-duty truck sector, EPA/NHTSA point out that the cycle can take as long as ten years. EPA/NHTSA see this as a fundamental constraint on the ability to set standards to require technologies to be included in vehicles. The agencies go through potential technologies one-by-one to assess the time frame in which they could be implemented and find several that have rather long periods. While the long redesign cycle presents a challenge for standard setting, the 10-year time frame chosen by EPA/NHTSA represents a reasonable balance.

Technology Neutral: Given the legislative mandates to maximize efficiency and reduce environmental harms to the extent feasible, the long cycle demands that the agencies actively monitor developments within the industry to see whether technologies have become feasible for the purpose of setting future standards. The Phase II represents exactly this approach.

TABLE 4: PERFORMANCE STANDARDS AND MARKET BARRIERS TO EFFICIENCY, WORK TRUCKS

Nature of the Barrier	Effect on the Market	Impact of the Standard
Information Issues in the first sale market* Unavailable due to public good nature Complexity due to geography, driving styles, uses* Cost of gathering Cost of "redundant" production of Information	Inadequate or unreliable information about fuel saving technologies	Better information more readily available Public provision of information
Information Issues in the Secondary Market Compounded information problem Complexity due to geography, driving styles, uses* Different uses may affect mileage	Resale value inadequately rewards fuel saving technology Lack of incentive to invest in fuel economy in 1st sale market	Better information more readily available
*Split Incentives** Owner-Operator* Owner-Renter Tractor-Trailer Contract structure*	Owners emphasize different attributes Information does not overcome Coordination Problem	Alters the incentives Investment embedded in market Fosters coordination
Shrouded Attribute Lack of availability in bundles* Positional, "status" good	Bundles of attributes maximize other characteristics --durability, maintenance costs	Increased emphasis on shrouded attribute
Market power	Ability to choose operators, dulls market signals	Investment embedded in market, lower risk
Uncertainty Future savings, level and variance* Fuel price, performance, life, use, geography* Risk aversion, Option value Reliability	Savings are future, technology costs are current	Some market uncertainties removed Investment embedded in market, lower risk Hidden costs*
Adjustment & Transaction Costs Conservative approach to change, need to learn *& evaluate technology* Accelerated fleet turnover Training costs	Slows innovation Resistance to capital expenditure Resistance to increased cost	Experience with technology accelerates innovation Levels the playing field for investment
Endemic *Financial** Limited Access to Capital* Short payback, First Cost Bias* Time lag for retrofit*	Crowds out investment in efficiency Short payback period due to under-compensation of initial investment	Levels the playing field for investment Investment embedded in market, lower risk

PRIMARY SOURCES:

Bold = EPA-NHTSA, *Greenhouse Gas Emissions Standards and Fuel Economy Standards for Medium and Heavy-Duty Engines and Vehicles,* Federal Register 76(179), September 15, 2011, pp. 57315-57319.

***Italic* = Committee to Assess Fuel Economy for Medium and Heavy-Duty Vehicles, *Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles,* National Research Council, 2010.**

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David Vernon and Alan Meier, "Identification and Quantification of Principal---Agent Problem Affect Energy Efficiency Investments and Use Decisions in the Trucking Industry." *Energy Policy, 2012,* 49.

Haifeng Wang, et al., *Marginal Abatement Costs and Cost Effectiveness of Energy-Efficiency Measures,* London: International Maritime Organization (IMO), 2010.

The agencies achieve technological neutrality and feasibility in two ways. They do not mandate any specific technology and they do not assume a very high level of penetration of many technologies. By relying on a variety of technologies that affect several of the key attributes of the vehicle that affect energy consumption, they create a rich palate of alternatives from which the manufacturers can choose to meet the standard.

Product Neutral: The large amount of head room that EPA/NHTSA have left for manufacturers applies to alternative technologies across the board. Thus, entirely new approaches to meeting the standards are welcome and a small penetration of alternative engine types (Rankin and hybrid engines) factors into the level of the standards.

Responsive to industry needs: Given the amount of capital, the life of the product and its uses, the speed of adoption can vary substantially. Again, EPA/NHTSA evaluate specific technologies with respect to adoption cycles. The challenge of the adoption cycle reinforces the

challenge of the product design cycle. Monitoring the development and adoption of technologies and using other policies to accelerate both are important activities to undertake. The agencies have outlined a list of key technologies that are already feasible or candidates for future inclusion in standards.

Responsive to consumer needs: Whether or not the statute explicitly requires or defines specific attributes that should be considered, the agencies can and should take attribute based approaches under their general obligation to ensure standards are feasible and practicable. EPA/NHTSA have certainly made that effort here. The target levels and development paths for the fuel consumption of tractor trailers taking their class, cab height and use into account. There is a 30% difference in targets across the nine categories and a 3% difference in the rate of improvement.

Procompetitive: Given the above description of the Phase II proposal, we conclude that it would be procompetitive. It would induce competition around the standard in which manufacturers would install those technologies in which they have an advantage, given the nature of their expertise and the customers they serve.

BENEFIT COST ANALYSIS OF FUEL ECONOMY/EMISSIONS STANDARDS (ATTACHMENT SECTION XVII)

Method

In this analysis we rely primarily on agency economic analysis presented in final regulatory impact/or environmental impact analyses. We accept the agencies' estimate of costs at a 3% discount rate, which even the critics seem to accept for purposes of estimating regulatory costs. We accept the agencies' estimates of energy savings and the resulting reduction in emissions. For present and near future values, the Technical Support Documents and Federal Register notices provide the basic analysis so only a slight adjustment for the based year is necessary. We show three metrics of performance, the benefit/cost ratio (b/c), the Internal Rate of Return (IRR), and the cost per gallon saved.

In light of the debate over pocketbook savings, the analysis that follows includes a "pure externalities" view of the benefit of the rules. This consists of two components (macroeconomic effects and environmental, public health and other externalities) that are very unlikely to be internalized in the private transaction of the manufacturer's sale of an energy using consumer durable. As noted above, one can argue that consumer pocketbook savings are an externality of environmental regulation. In this analysis, we treat it as a direct benefit in of the rule, which is the traditional agency practice.

We also offer an "adjusted" scenario in which costs are projected to be 70% of the base case assumptions as a separate scenario. That scenario includes the rebound effect as a pocketbook benefit, but does not include the rebound effect in the estimate of the macroeconomic benefits, which are based on the net pocketbook benefits as estimated by the agencies. We do not include a macroeconomic benefit for public health/environmental benefits.

TABLE 5: EVALUATION OF ENERGY EFFICIENCY/EMISSION STANDARDS

Consumer Durable	Period (Source)	Cost & Benefit	2016$ Billion at 3% discount	b/c Ratio	IRR	Cost of Saved Energy $/Gal.	Enviromental Billion at 3%	b/c	Traditional Pocket + Enviro b/c	IRR	Pure Extern. Macro + Enviro b/c	IRR	Total Pocket+Extern b/c	IRR	Adjuste *Total b/c @ 70% of Cost*
Light Duty															
Past	1980-2014	TechCost	$499			$0.58									
	(Greene & Walsh)	Pocketbook	$2,121	4.25	13.88%		$697	1.40	5.65	18.72%					
	at 6% discount	Macroconomic	$1,622	3.25							4.65	15.28%			
		Total Economic	$3,743	7.50	24.97%								8.90	29.66%	
Present	2008-2011	TechCost	$9			$1.11									
	(NHTSA, TSD)	Pocketbook	$27	3.00	9.31%		$6	0.67	3.67	11.80%					
		Macroconomic	$18	2.00							2.67	8.10%			
		Total Economic	$45	5.00	16.50%								5.67	18.78%	*8.81*
	2012-2016	TechCost	62												
	(EPA/NHTSA, TSD)	Pocketbook	$182	2.94	9.06%		$41	0.66	3.60	11.55%					
		Macroconomic	$120	1.94							2.60	7.07%			
		Total Economic	$302	4.87	16.05%								5.53	18.32%	*8.60*
Near Future	2017-2021	TechCost	$47			$0.88									
	(National	Pocketbook	$192	4.09	13.30%		$48	1.02	5.11	16.87%					
	Program)	Macroconomic	$131	2.78							3.80	12.27%			
		Total Economic	$323	6.86	22.82%								7.88	26.25%	*12.24*
	2022-2025	TechCost	$36			$0.75									
	(EPA	Pocketbook	$92	2.56	7.56%		$41	1.14	3.69	11.88%					
	Determination,)	Macroconomic	$56	1.56							2.69	8.12%			
		Total Economic	$148	4.11	13.39%								5.25	17.36%	*8.09*
Far Future	2025-2030	TechCost	$39												
	(ICCT Adapted)	Pocketbook	$117	3.00	9.31%		$52	1.33	4.33	14.05%					
		Macroconomic	$78	2.00							3.33	9.01%			
Heavy Duty		Total Economic	$195	5.00	15.07%								4.59	15.07%	*7.27*
Trucks															
Present	Phase I	TechCost	$9			$1.07									
	(EPA, NHTSA)	Pocketbook	$56	6.22	19.35%		$6	0.67	6.89	22.94%					
		Macroconomic	$47	5.22							5.89	18.28%			
		Total Economic	$103	11.44	35.76%								12.11	37.84%	*18.94*
Near Future	Phase II	TechCost	$29												
	(EPA, NHTSA	Pocketbook	$163	5.62	17.42%	$0.33	$66	2.28	7.90	24.67%					
	CFA Supporting)	Macroconomic	$134	4.62							6.90	21.49%			
		Total Economic	$297	10.24	32.00%								12.52	39.13%	*19.34*
Far Future	Alt. 5 Increment	TechCost	$24												
	(EPA, NHTSA)	Pocketbook	$66	2.75	5.82%	$0.33	$27	1.13	3.88	11.71%					
		Macroconomic	$42	1.75							2.88	6.95%			
		Total Economic	$108	4.50	11.74%								5.63	17.40%	*8.68*
Appliance						Billion $/ Quad									
Past	1988-2007	TechCost	$179			$2.29									
	(Meyers, et al.)	Pocketbook	$488	2.73	16.28		156	0.87	3.60	16.08%					
	3% to 2007	Macroconomic	$309	1.73							2.60	15.26%			
	7% to 2040	Total Economic	$797	1.60	29.03								5.32	33.83%	*7.83*
Present	2007-2040	TechCost	$23												
	Light Bulbs	Pocketbook	$212	9.22	61.40		42	1.84	11.06	73.71%					
	\ ACEEE	Macroconomic	$189	8.22							10.06	54.70%			
	\	Total Economic	$401	17.43	116.23								17.4	110.67%	*27.40*
	2007-2040	TechCost	$39												
	ACEEE assorted	Pocketbook	$166	4.26	27.65		33	0.85	5.11	33.63%					
		Macroconomic	$127	3.26							4.11	20.36%			
		Total Economic	$293	7.51	49.97								7.51	47.76%	*11.81*
	2014-2044	TechCost	$26			$1.29									
	DOE TSD	Pocketbook	$62	2.38	13.53		11	0.42	2.81	19.69%					
	Refrigerator	Macroconomic	$36	1.38							1.81	8.51%			
		Total Economic	$98	3.77	24.15								4.19	26.65%	*6.53*
Near Future	CFA Supported	TechCost	$56												
		Pocketbook	$370	6.61	20.15		18	0.32	6.93	23.94%					
		Macroconomic	$314	5.61							5.93	16.42%			
		Total Economic	$684	12.21	49.97								12.54	79.76%	*19.65*
Far Future	ACEEE	TechCost	$202												
Appliances	(assume b/c=3,	Pocketbook	$607	3.00	18.42		121	0.60	3.60	22.29%					
	no water savings)	Macroconomic	$405	2.00							2.60	15.28%	5.60	35.62%	*8.29*
		Total Economic	$1,012	5.00	32.86										

Sources and Notes

Light Duty

Past: This estimate is based on David Greene and Jilleah G. Welch, The Impact of Increased Fuel Economy for Light-Duty Vehicles on the Distribution of Income in the United States, Howard Baker Center for Public Policy, January 2017. A slight period of overlap between past and present is subtracted based on the NHTSA estimate of 208-2012.

Present: These are from the Technical Support Documents. Here we use the Federal Register Notice with the EPA economic analysis, since EPA separated out pocketbook (fuel) and other benefits. The inflator to bring the estimates to 2016 is 1.1.

2008-2011: https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/2006_friapublic.pdf
2012-2016: https://nepis.epa.gov/Exe/ZyPDF.cgi/P1006V2V.PDF?Dockey=P1006V2V.PDF
2017-2025: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100F1E5.PDF?Dockey=P100F1E5.PDF

Near Future: These are from the Technical Support Documents in the mid-term review. TAR: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100OXEO.PDF?Dockey=P100OXEO.PDF Final Determination:

Far Future: Light Duty Vehicles: This is based on a comparison of the ICCT projections for the five years between 2025-2030 to the analysis of the 2022-2025 period in the mid-term review. We use a 4.5% improvement scenario (the average of the ICCT 4% and 5% scenarios) because EPA discusses a 4.5% scenario for going forward in the mid-term review. The ICCT cost numbers are 10% higher and the savings rate 10% lower, compared to the EPA analysis, which seems reasonable given the movement up the supply curve for efficiency technology and the short period of time covered. ICCT: Nic Lutsey, et al., *Efficiency Technology and Cost Assessment of U.S. 2025-2030 Light Duty Vehicles*, March 2017.

Heavy Duty Trucks:

Present: The first standard for heavy duty trucks adopted as a result of the Energy Independence and Security Act. Taken from the Technical Support Document: Phase I: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EG9C.PDF?Dockey=P100EG9C.PDF, In the Technical Assessment Report (TAR) and the Final Determination, EPA projects substantial cost reductions from the original Technical Support Document for the National Program. The current incremental cost estimate is almost 20% lower than the original incremental cost for 2022-2025. Taking a cautious approach for this analysis, we assume that the cost decline represents a 10% decline in the 2025 costs (assuming no cost overestimation in the 2017-2021).

Near Future These are from the Technical Support Documents: Phase II: https://www.gpo.gov/fdsys/pkg/FR-2016-10-25/pdf/2016-21203.pdf

Far Future: This is based on the Regulatory Impact Assessment of the Phase II Heavy Duty Truck Rule. We use the difference between the most stringent alternative considered and the final rule.

Appliances

Past: Stephen Meyers, James McMahon and Barbara Atkinson, *Realized and Projected Impact of U.S. Energy Efficiency Standards for Residential and Commercial Appliances*, LBNL, March, 2008. Converted from $2006 and a benefit cost ratio of 2.7-to-1 (p. 2). The study used a split discount rate, 3% for backward looking estimates and 7% for forward looking.

Present: (2008- 2014) is subtracted from the past. All adjustments to quantities are made to preserve the benefit cost ratios in the original.

Lowell Unger, et al., *Bending the Curve: Implementation of the Energy Independence and Security Act of 2007*, ACEEE, October 2015. Dollars inflated from 2013 to 2016. Discount rate adjusted from 5% to 3%. Costs are derived from net benefits and benefit cost ratio after adjustment to preserve the original benefit cost ratio.

Near Future: These are based on a small number of rules that were on the cusp of being adopted and have been delayed, for which CFA has taken action to secure the consumer benefits. , these estimates are for the 50% holdout scenario analyzed by Lawrence Berkeley National Laboratory (LBNL Report Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps (see Table 3: Representative Lamp Options and Properties), which was cited in our letter to DOE (Appliance Standards Awareness Project, et al., Docket No. EERE-2017-BT-NOA-0052, October 16, 2016). Small rules include portable air conditioners, uninterruptible power supplies, air compressors, commercial packaged boilers, ceiling fans and walk-in coolers and freezers.

Far Future: This is based on the ACEEE estimate that identifies opportunities for further increases in appliance efficiency consistent with the statutory mandates for updating standards (Appliances in general: http://aceee.org/research-report/a1604). They project dollar value savings. We inflate to 2016$ and discount the total. We assume the benefit cost ratio will be slightly lower than the near future ratio of 3-to-1 to estimate costs.

We do not show this scenario for studies that evaluate past performance, since these are intended to reflect the actual cost of the technology, which would include any progress.

Periods

The history of performance standards can be conveniently divided into four periods,

The first, past period, stretches from their beginning in the late 1970s as a response to the oil price shocks of that decade. It runs approximately three decades until the passage of the Energy Independence and Security Act of 2007 (EISA).

The second, recent period begins with the passage of EISA, which aggressively reformed and rebooted both fuel economy and appliance efficiency standards setting. This period includes the launch of the National Program. It ends with the beginning of the Trump administration.

The third, present period includes the attack on standards launched by the Trump Administration. This includes the executive anti-regulatory orders as well as decisions by the EPA to reopen standards that had been formally concluded. The reconsideration of the final determination with regards to the National Program is included in this period.

The fourth, future period includes estimates of potential savings in all three areas on which we have focused – light duty vehicles, heavy duty vehicles and appliances.

Past Benefits

As shown in Table 5, there can be no doubt that energy efficiency performance standards are remarkably beneficial to consumers, the national economy and the public health/ environment. Every present and near future standard has a positive of effect on every measure or outcome by a wide margin. Fuel economy/public health standard pass the benefit cost test based on the consumer pocketbook savings alone and the pure externalities savings standing alone. The standards are justified on the basis of pocketbook savings alone (with benefit cost ratio around 4 to 1) or pure externalities alone (with benefit cost ratios around 3 to 1).

The Harm of Freeze and Rollback

We have estimated that the roll back of the 2021 CAFE standard would account for about one-quarter of the near future benefits and a little more than one-quarter of the costs. Combining MY 2021 with 2022-2025, adding in work trucks and recognizing that the structure of Trump executive orders would impale future standards, we conclude that for the standards that have been put under review by the Trump administration, the benefit cost ratios are extremely positive. Economic benefits are about $800 billon. Public health/environmental benefits are another $200 billion, for a total of $1 trillion. Costs with historical and engineering based reduction going forward, would be about $100. The net benefits of $900 billon.

Table 5 includes the analysis of appliance efficiency standards. The results are similar to the vehicle analysis. Two differences are notable.

First, the present standards have very positive ratios because of the technological revolution in lighting. This underscores the importance of not picking technologies and the potential benefits of encouraging the development of new, transformative technologies. Needless to say, electric vehicles could play a similar role in the transportation sector. Second, far future benefits appear to be quite large relative to the transportation savings. This is not because they are overestimated, but reflects a wide ranging, long term look at the future. For vehicles we have included two much nearer term (albeit future) standards

Therefore, this estimate of future savings for vehicles is likely to be very low. These include future benefits that do not extend far into the future. The projection of future benefits for appliances, which takes a long-term view, is significantly larger than vehicles (25%). Thus, a longer-term projection for vehicles would likely be at least $1 trillion and could be much larger.

LOW INCOME CONSUMERS ENJOY DISPROPORTIONATELY LARGER BENEFITS FROM EFFICIENCY STANDARDS (ATTACHMENT SECTION XVIII)

Contrary to the claims frequently made by industry opponents of efficiency standards, a careful look at the data show that low income households enjoy disproportionately large benefits from well-crafted standards. Repeating an analysis that is unrebutted and fully supports in the evidentiary record, we show that since low income households are generally not in the new car market and operating costs are a much larger share of their cost of driving, the standards do not harm them. In fact, low income households actually benefit more than the overall population.

The Greene and Welch study, put in the record of EPA's Final Determination strongly supports our view, as shown in Figure 9. The upper graph shows the much larger benefits for low income households as a percentage of income. In fact, the analysis shows that middle income households (the second and third quartiles) also benefit disproportionately from fuel economy standards.

The lower graph shows that the percentage of income spent on both gasoline and household energy used by appliances is much larger. by lower income households is much larger, six times the national average for the lowest income group, but twice the national average through households with $35,000

The same is true for public health impacts. Low income households suffer disproportionately from environmental pollution.[29] They tend to live in areas that are most affected by pollution and have less resources to prevent, adapt or recover from the harms of pollution. They live closer to facilities that emit pollutants,[30] making them more vulnerable to the harmful effects of pollutant that have local and regional impacts,[31] live in housing that is less

[29] Miranda, Maie Lynn, 2011, "Making the Environmental Justice Grade: The Relative Burden of Air Pollution in the United States," Int. J. Environ. Res. Public Health,8(6).

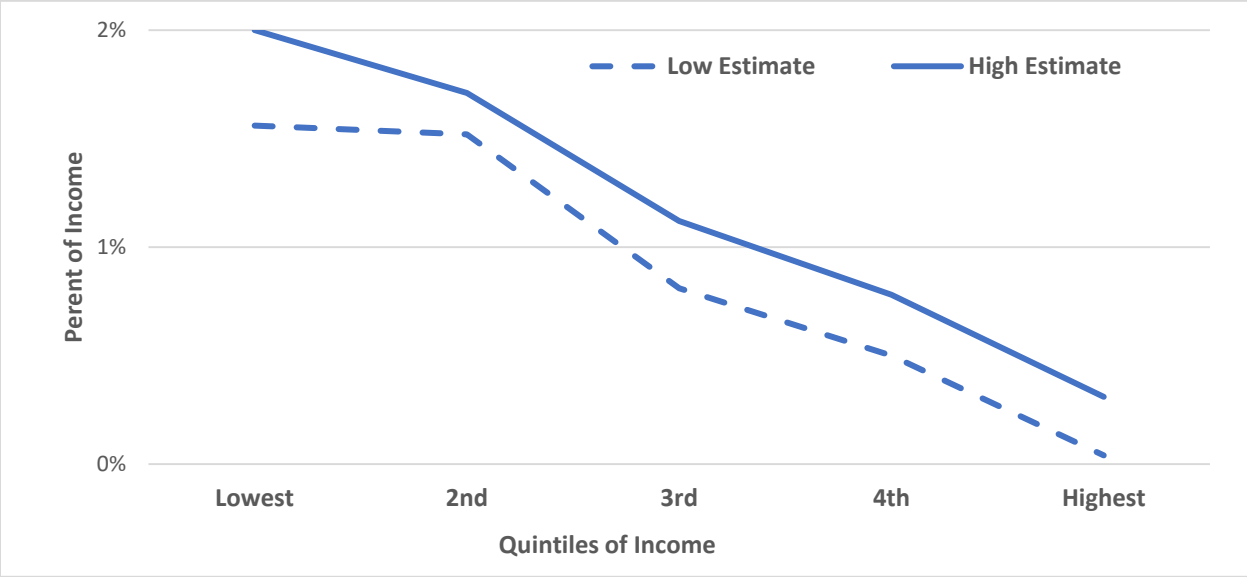
[30] Morello-Frosch, R. and B.M. Jesdale, 2006, "Separate and unequal: residential segregation and estimated cancer risks associated with ambient air toxics in U.S. Metropolitan areas," Environ. *Health Perspect.* 114(3); Fleischman, Lesley and Marcus Franklin, 2017, *Fume Across the Fence Line,* Clean Air, November.

[31] Deguen, S. and D. Zmirou- Navier, 2010, "Social inequalities resulting from health risks related to ambient air quality – a European review," *Eur J Public Health* (1); Katz, Cheryl, 2012, "People in Poor Neighborhoods Breathe More Hazardous Particles," *Scientific American,* November 1.

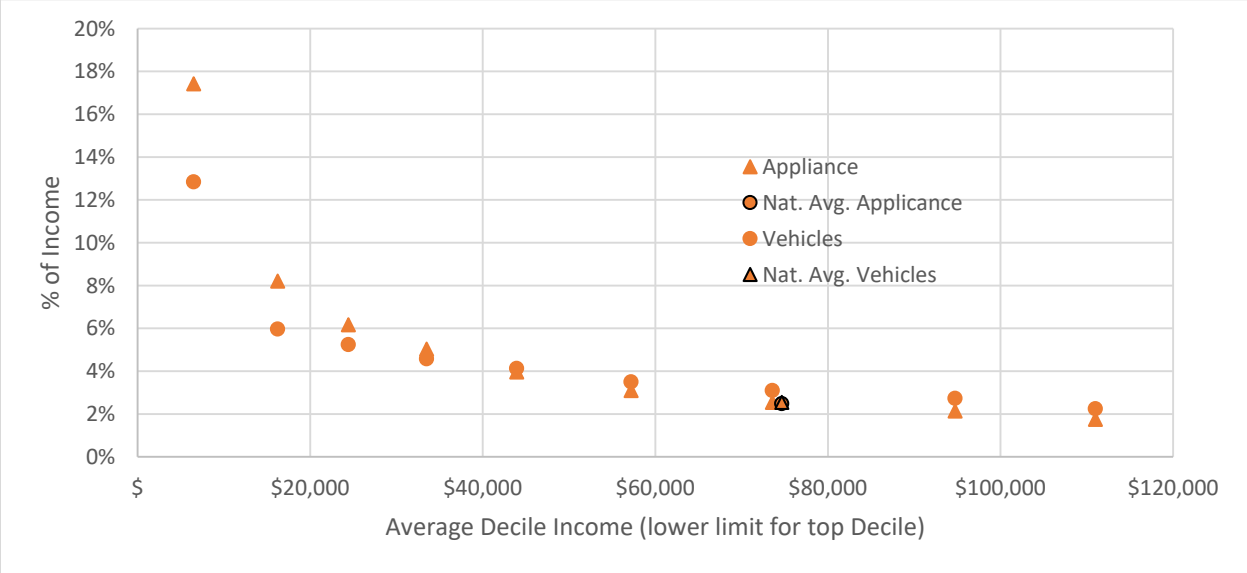
resistant to pollution.[32] They are more exposed and are more susceptible to suffer from pollution. This issue has been recognized for decades.[33]

FIGURE 10: LOW INCOME CONSUMERS AND ENERGY SAVINGS/EXPENDITURES

Percentage of Income Saved Due to Fuel Economy Improvements 1980-2014



Energy Expenditures as a % of Income, 2016



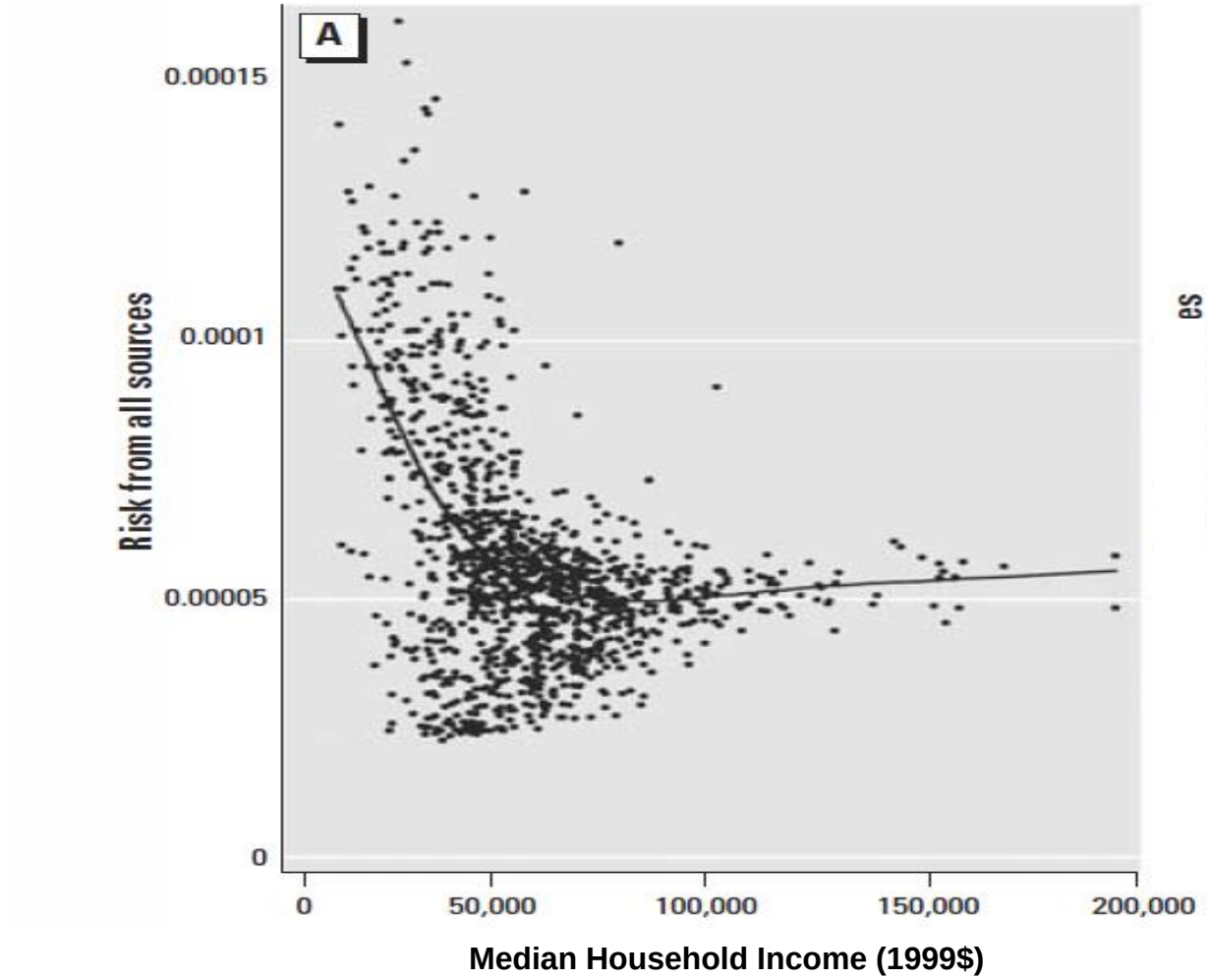
Source: David Greene and Jilleah G. Welch, *The Impact of Increased Fuel Economy for Light-Duty Vehicles on the Distribution of Income in the United States*, Oak Ridge National Laboratory and the Energy Foundation, September 2016, p. 56. Bureau of Labor Statistics, Consumer Expenditure Survey, 2015.

[32] Shrubole, C., et al., 2016, "Impacts of energy efficiency retrofitting measures on indoor $PM_{2.5}$ concentrations across different income groups in England: a modelling study," *Advances Building Energy Research*, 10(1).

[33] Faiz, Asif, Christopher S. Weaver and Michael P. Walsh, 1996, Air Pollution from Motor Vehicles: Standards and Technologies for Controlling Emissions, The World Bank.

This is certainly a very complex issue, but the evidence is overwhelming that lower income is associated with greater exposure to pollutants, which is associated with a higher incidence of the health problems associated with pollution (See Figure 10). As one study put it,

FIGURE 11: CANCER RISK FROM AIR TOXICS V. MEDIAN HOUSEHOLD INCOME



Sources: Buckley, Timothy J, Ronald White, 2005, Socioeconomic and Racial Disparities in Cancer Risk from Air Toxics in Maryland," *Environmental Health Perspectives*, July, p. 696.

> Census tracts in the lowest quartile of socioeconomic position, as measured by various indicators, were 10–100 times more likely to be high risk than those in the highest quartile. We observed substantial risk disparities for on-road, area, and non-road sources by socioeconomic measure and on-road and area sources by race. There was considerably less evidence of risk disparities from major source emissions.[34]

[34] Buckley, Timothy J, Ronald White, 2005, Socioeconomic and Racial Disparities in Cancer Risk from Air Toxics in Maryland," *Environmental Health Perspectives*, July, p. 693. While this study was at the census track level in Maryland, other studies reach similar finding in metropolitan areas across the nation. See, for example, "Segregation and Black/White Differences in Exposure to Air Toxics in 1990," Lopez, Russ, 2002, *Environmental Health Perspectives*, 110, April., Three factors, Black/White poverty levels, percent employed in manufacturing, and degree of segregation as measured by the dissimilarity index, collectively explain over half the variation in the net difference score for exposure to air toxics in large U.S. metropolitan areas. Other potential factors,

The graph of the data that underlies this conclusion is crystal clear. Simply put, living close to traffic and facilities that emit pollution raises the exposure to toxics and the risk and incidence of the related health effects.

A DEEP DIVE INTO THE NEW FUEL ECONOMY STANDARDS AND THE AUTO MARKET RESPONSE (ATTACHMENT SECTION XX)

The ability of the automakers to meet the standards reflects two basic factors. There is a wide array of technologies that can meet the standards. The cost of these technologies and their "impact" of the vehicles presents no obstacle to consumer demand. Moreover, the looming expansion of electric vehicles will transform the residential sector, making compliance even more economic. Automakers are delivering products that consumers want, and consumers are purchasing them in increasing numbers. The important role of the standards in triggering this market adaptation is also clear. This section provides an in-depth look at 3 key factors on the road to increased fuel efficiency: the role of gasoline prices, four-cylinder engines and electric vehicles.

Using the price of gasoline as the predictor of fuel economy, we find that prices dramatically under-predicted fuel economy in 2008 and later years. Therefore, other factors must be at work. Analyzing sales of vehicles with four-cylinder engines also support this view of the market. The increase began in 2004, but showed a dramatic jump in 2008. Four-cylinder engines now account for four-fifths of all car and SUV sales. The recent increase in popularity of four-cylinder engines is due to manufacturers building more power into smaller, more efficient engines. The improving performance of four-cylinder engines was an important factor in increasing their market share.

A 2017 ANALYSIS OF CONSUMER SAVINGS AND AUTOMAKER PROGRESS ON THE ROAD TO 2025 CAFE STANDARDS (ATTACHMENT SECTION XXI)

Manufacturers have the greatest opportunity to improve vehicle fuel economy when they introduce a truly new vehicle. For this analysis, we compared the cost and fuel economy of 19 of the 27 "all-new" 2017 models which had a 2011 version, the year before the current standard was put in place. These 19 models included 79 different EPA designated engine/drive train/transmission/MPG configurations (or what are called "trims"). When we compared the cost difference between the "all-new" 2017 models and their 2011 version, after factoring in inflation, 21 or 27% actually went down in price, yet every one of these vehicles saw a 1 to 10 MPG increase.

Fuel savings exceeded fuel economy technology costs for 94% of all-new 2017 models. Overall, fuel economy improvements far exceed their cost, and partially offset the cost of other improvements. When calculating 5 years of fuel costs, nearly half of these 2017 vehicles cost less to buy and fuel than their 2011 counterparts. We find that 58 of the 79 vehicles increased in

including overall income inequality, relative political power, and local variation in environmental regulation (*64*), may also affect net difference scores and should be included in future research…. The results here show that Blacks are more likely than Whites to live in census tracts with higher total modeled air toxics concentrations, partly because they are more likely than Whites to live in poverty, and poverty itself may be a risk factor for living in a poor-quality environment.

price, however; 15% (12 of 79) had fuel savings that offset the entire price increase and 52% (41 of 79) had fuel savings that offset the increased cost of fuel economy technology.

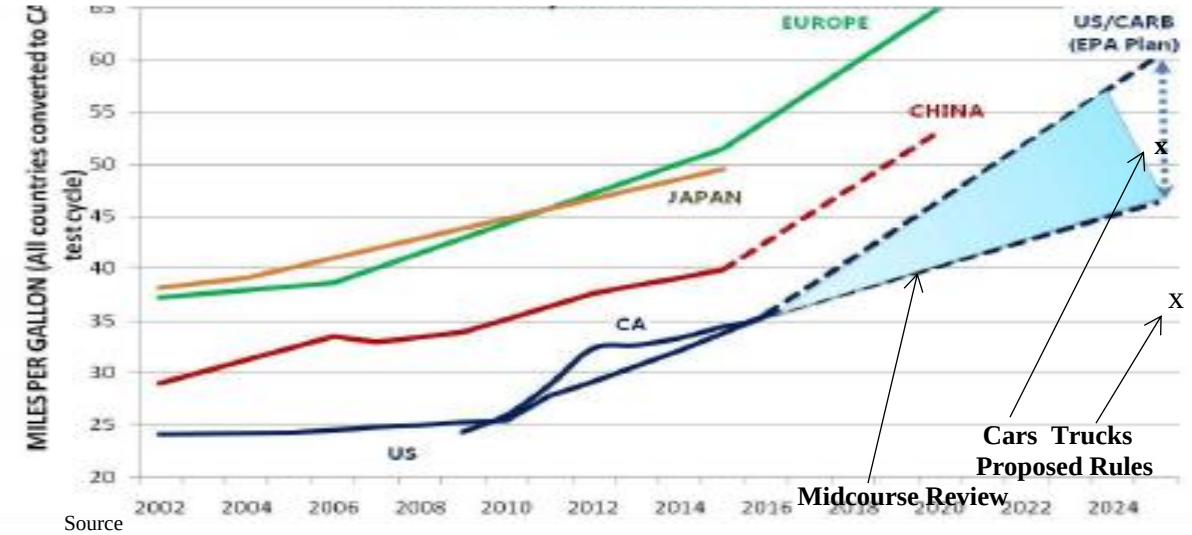
Looking at the cost/benefit average for these 79 all-new models—the added cost of fuel economy averaged $320 per vehicle and will save the buyer an average of $946, thus putting $626 back into consumer pocketbooks. About 70 percent of the "all-new" 2017 vehicles had a CAFE-compliant trim, compared to 41 percent of the "all-new" 2015 vehicles. A record 78% of the "all-new" light duty trucks had a CAFE compliant trim for 2017. Percentage-wise, trucks beat cars for CAFE compliance in 2017.

Comparing the sales figures for 2016 SUVs and light duty trucks with the 2011 models, those that increased the fuel efficiency by over 10% sold nearly 20% more vehicles than those with a less than 10% increase in fuel efficiency. SUVs, crossovers and pickups with higher mpg increases sell better.

The Proposed Standards are Well Within the Reach of the Industry

The standards chosen are quite moderate, given the broad consensus on technology costs, note above. There are two historical perspectives that also suggest the proposed standards are moderate and achievable. The passage of EISA rebooted the fuel economy standards and the National Program put them on a path that is consistent with what was achieved in the early period of the standards. as shown in Figure 11, is the fact that the current standards set the U.S. on a path similar to global standards. Globalization of the auto industry means it is no longer possible to be a successful automaker without being able to compete globally.

FIGURE 12: U.S. STANDARDS IN INTERNATIONAL PERSPECTIVE



Source

Source: Feng An, Robert Early and Lucia Green-Weiskel, Global Overview of Fuel Economy and Motor Vehicle Emission Standards: Policy Options and Perspectives for International Cooperation (The innovations Center for Energy and Transportation, United Nations Commission on Sustainable Development, May 2011, Background Paper No. 3).

CFA'S ELECTRIC VEHICLE ANALYSIS (SECTION XXII)

The Benefit of Technology Neutral, Product Neutral Long-Term Standards

CFA first introduced the analysis of electric vehicles into the hearing record in our 2012 comments on the National Program and we have updated that analysis regularly inside and outside of the record. At the time, we used the innovation diffusion adoption framework to argue that electric vehicles were headed towards sales of millions by the end of the period covered by the mid-term review. Today, automakers offer 30 models of electric vehicles. All of the major, mass market automakers are offering electrics using different approaches to power including hybrid, plug ins, hybrid plug in and extended range plug in, and they sell hundreds of thousands of units in the U.S. They are offering vehicles across the full range of models that consumers drive – compacts, sedans, large cars, SUVs and pickups.

While there is speculation that consumers are not ready for electric vehicles, there has been a sharp increase in sales. Compared to the pattern for hybrids through their first three years, the electrics are doing quite well – number of EV models keeps increasing, EV ranges are matching household driving patterns, EVs are increasingly price competitive

Knowledge Affects Consumer Interest in EVs

While knowledgeable consumers have a more positive attitude towards EVs, there is a general attractiveness of EVs among consumers regardless of their EV knowledge. Thus, 71 percent of those that know about EVs have a "Very Positive" or "Positive" attitude about EVs, it is important to note that there is a remarkably high "Very Positive" or "Positive" attitude (49 percent) among respondents who indicated that they knew little or nothing about EVs.

The more consumers say they know about EVs, the greater their interest in purchasing one. Among survey respondents who consider themselves very knowledgeable about electric vehicles, 55 percent are interested in buying an EV. Among those who say they have no knowledge of EVs, only 22 percent are interested in buying one.

CONCLUSION

Economic theory and analysis provides a clear explanation why a large loss would result from abandoning the current well-crafted, "command-but-not-control," performance standards that address the combination of significant, persistent market imperfections. Reductions in regulatory burdens that result in larger reduction in benefits, resulting in a negative benefit cost ratio, should be presumed to violate the statute and the executive branch guidance. They should bear a heavy burden of proof to prevent their rejection. Specific "balancing" factors that reverse the presumption should be documented. The massive record in this the regulatory proceedings indicates that no such showing can be made.

Various aspects of over a dozen standards are examined in detail throughout this analysis to make and reinforce the general findings and conclusions. The agencies have reviewed mountains of evidence, conducted their own independent research, written extensive evaluations

of the broader research literature, taken the factors identified in the laws into account and reached a conclusion.

With a new administration that is much friendlier to the industry point of view, several industries sought to overturn the balance that the agencies had struck, since the passage of EISA. The administration's bias in favor of industry contradicts the underlying statutes and disturbs the "objective" balance the executive orders sought to achieve. Because the underlying statutes and executive guidance are still in place, the challenge for the agencies will be to build hearing records that support a new direction. Throughout this analysis we show that they are very unlikely to be able to make a convincing case. We directly address the tired old industry arguments, which we are likely to be offered anew. In a sense, much of the analysis in the Attachment can be read as rebuttal of those arguments.

- The cost of compliance is invariably much less than anticipated, Section X on vehicles, Section XV on appliances, Section XVI on computers.
- Cost is closely linked to the feasibility of standards, a topic explicitly addressed in several Sections, including all of Part VIII, covering current fuel economy standards, Section VIII addressing past fuel economy standards, Section XIII on heavy-duty trucks and Section XVI covering computers.
- Consumer desires and abilities, frequently cited as evidence against standards are shown to be the opposite on both counts, they want more efficiency than the manufacturers admit (Sections VII and VIII), and have less ability to implement their desires than the manufacturers claim (Section IX)
- The claim that weakening standards helps low income households is shown to be incorrect on all three measures of the impact of standards in Section XIX, which reviews consumer pocketbook, public health, and macroeconomic stimulation.
- Claims that standards slow the economy, reduce sales and cost jobs are shown to be false (Section XI and XIX).

The document lays the foundation not only for regulatory review comments at DOT, but also the Department of Energy (early next year) and individual rulemakings (e.g. EPA/NHTSA's mid-term review, in the spring), as well as potential court challenges to unjustified changes to other rules, and not only at the federal level, but in state proceedings (e.g. the California Energy Commission and the Air Resources Board). The legal/analytical framework, historical record and contemporary evaluation all demonstrate the clear benefit of hundreds of standards developed under the general approach of "command-but-not-control" regulation that the U.S. implemented for energy efficiency over the past four decades. Abandoning this approach will impose a huge, $1 in the use of vehicles and $2 trillion including appliances.