Consumer Federation of America

PAYING THE FREIGHT:

THE CONSUMER BENEFITS OF INCREASING THE FUEL ECONOMY OF MEDIUM AND HEAVY DUTY TRUCKS

VERSION 2.0

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I. INTRODUCTION

PURPOSE

Over the past decade public opinion polling by the Consumer Federation of America and other organizations has revealed strong and widespread support for energy efficiency standards for consumer durables including automobiles and households appliances.[1] Because gasoline and electricity bills are such a large part of household annual expenses – currently about $2,600 for gasoline and over $1400 for electricity[2] — it is not surprising that polls consistently elicit this support. Consumers clearly feel the pain in their pocketbooks and understand the economic impact of energy costs on their households.

Economic analysis has shown that there is a sound basis for consumer support of energy efficiency standards.[3] Although energy saving technologies require an investment, when they lower energy bills by much more than their cost, the result is substantial net savings to consumers.

While direct household expenditures on personal energy consumption are significant, they are only part of the consumer's expenditures on energy. We also pay, indirectly, for the energy consumption in the commercial and industrial sectors, which actually exceeds the energy consumed in the residential sector.[4]

Although the consumer impact of commercial and industrial energy costs will vary across goods, services and markets, these expenditures on energy are substantial and have a significant impact on U.S. households. One of the largest contributors to commercial energy consumption is America's medium and heavy duty trucks. Consumers pay the cost of commercial and industrial transportation energy consumption in the price of the goods and services they buy. **In fact, we conclude that indirect freight truck fuel costs passed on to consumers are about half as large as direct gasoline expenditures and almost equal to household electricity bills.**

Reducing the energy consumption of medium and heavy duty trucks will reduce household expenditures by lowering the cost of all goods and services. As such, the rulemaking currently underway at the U.S. Environmental Protection Agency and the National Highway Transportation Safety Administration regarding medium and heavy duty truck fuel consumption deserves close scrutiny and support.

This paper examines the costs of energy used by medium and heavy duty trucks, the potential for energy savings in this transportation sector, and the positive impact increased truck[5] fuel efficiency will have on America's households. When fuel prices rise, so does the cost of consumer goods due to the cost of transporting those goods. Conversely, because of

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[1] Mark Cooper, 2013, *Energy Efficiency Performance Standards: The Cornerstone of Consumer-Friendly Energy Policy*, Consumer Federation of America, presents an extensive bibliography of survey analysis by the Consumer Federation of America and other consumer groups.

[2] Based on Bureaus of Labor statistics, *Consumer Expenditure Survey,* for 2013 and 2013-2014

[3] Cooper, 2013

[4] Household gasoline consumption accounts for about half of transportation fuels. Households account for about one-third of electricity consumption and one-sixth of natural gas consumption.

[5] For the purposes of simplicity, in this paper, we will refer to medium and heavy duty trucks as 'trucks'.

competition, a reduction in transportation costs will result lowering the cost of goods and services for consumers. The fact that a significant part of the trucking industry is also seeking ways to reduce the enormous impact of fuel expenditures on their costs, reinforces the notion that not passing on these extra costs will make them more competitive.[6]

In evaluating the EPA/NHTSA proposal for increasing truck fuel efficiency, we ask three questions:

First, would consumers benefit from an increase in energy efficiency of the trucks that deliver goods and services? In other words, would the reduction in fuel costs exceed the cost of the technology needed to improve efficiency by a sufficient amount to reduce the cost of goods and services to consumers?[7]

Second, why hasn't competition in the marketplace done more to drive the technology needed to increase truck fuel efficiency? Here we look for market imperfections that inhibit investment in energy saving technologies.

Third, are the performance standards proposed by NHTSA and the EPA a good tool to overcome the market imperfections?

This paper focuses on the first question. We first estimate the potential size of the indirect consumer expenditure, then we discuss the evidence that the costs are passed through to consumers. In addition, we will present survey evidence which shows that the public understands the impact of transport costs on their pocketbooks and the role of truck fuel economy standards in alleviating the burden. We will address the second two questions in our formal comments to the EPA/NHTSA by the September 11, 2015 deadline.

II. CONSUMERS PAY THE FUEL COSTS FOR AMERICA'S TRUCKING AND DELIVERY INDUSTRY

HOUSEHOLD EXPENDITURES FOR MEDIUM AND HEAVY DUTY TRUCK FUEL

Expenditures for transportation fuels, whether direct or indirect, are the result of the amount of energy consumed and the price of that energy.

Consumption

To estimate the potential consumer savings from improvements in the fuel economy of trucks, we first estimated the fuel used by the three main vehicle categories (household light duty, commercial light duty, and medium-heavy duty trucks). We undertake this analysis because different organizations that analyze energy use slightly different categorizations of energy use by types of vehicles and we want to make clear how we arrived at our figures.

[6] Consumer Federation of America (Gillis) interviews with UPS, Navistar, Peterbilt, ATA.

[7] For most of the products that we evaluate, the first question is straightforward because consumers pay the bill for the energy that they use. In the case of freight trucks, this relationship is indirect. Thus, we have to establish why consumers should care about freight truck fuel costs.

Because light duty vehicles, which make up the vast majority of households vehicles, are already covered by CAFE standards, we do not include them in our analysis. We have been careful not to double count energy consumption in our estimate of indirect household expenditures on medium and heavy duty transportation fuel.

Table II-1 (below) shows three different approaches to estimating household gasoline consumption. We used four data sources to build our estimate, the Department of Transportation, *National Household Transportation Survey; the Annual Energy Outlook* of the Energy Information Administration; the Bureau of Labor's Consumer Expenditure Survey; and the U.S. Department of Transportation, *Bureau of Transportation* statistics each which estimates fuel usage by types of vehicles. Because consumption varied on a year-to-year basis, we looked at estimates for three different years in order to ensure that an outlying year didn't bias the estimate.

TABLE II-1: THREE METHODOLOGIES FOR ESTIMATING THE INDIRECT, ANNUAL HOUSEHOLD CONSUMPTION OF TRANSPORTATION ENERGY

		Billion Gallons		
		BLS/CE, EIA	**NHTS/ EIA BTS**	
2009				
Household Gasoline		**100**	**96**	
2010				
Household Gasoline	**Light Duty Short Axle**	**91**		**88**
Commercial Light Duty	**Light Duty Long Axle**	**36**		**36**
Medium & Heavy Duty	**2Axle-Six Wheel & Combination**	**43**		**45**

Method – BLS/EIA: ($per HH / $ per gallon) X No. HH; NHTS/EIA: (VMT/MPG)

Source: Consumptions: Bureau of Labor Statistics (BLS), *Consumer Expenditure Survey 2010,* Energy Information Administration (EIA), *Annual Energy Outlook, 2013,* Appendix A*;* Department of Transportation (DOT), *Bureau of Traffic Statistics (BTS) Data Base,* Tables 4-11 to 4-14. Department of Transportation, *National Household Transportation Survey, 2009* Price: Energy Information Administration, *Petroleum Database;* Households, Bureau of the Census, *Statistical Abstract of the United States: 2012,* Table 59, 118 million households. *EIA, Monthly Energy Review,* miles per gallon, total gasoline and diesel on-highway supplies.

The 2009 estimate compares an estimate based on the Bureau of Labor Consumer Expenditure Survey to an estimate based on the National Household Transportation Survey, both for 2009. Using each of the estimates, we divided the household expenditure by the average price per gallon to arrive at the number of gallons per household. We then multiplied the household consumption by the total number of households. The National Household Transportation Survey estimates the total number of vehicle miles traveled by households. We divided this by the average miles per gallon of the light duty vehicle fleet to arrive at the amount of gasoline consumed. These two estimates are quite close.

The 2010 estimate is based on EIA data that identifies the amount of energy consumed by automobiles and light duty vehicles, medium duty vehicles and heavy duty trucks. The EIA data does not separate out household and commercial use of light duty vehicles, so we used the *Consumer Expenditure Survey* from the Bureau of Labor Statistics to estimate the gasoline consumed by households. We subtracted this from the total for light duty vehicles, as reported in the *Annual Energy Outlook*, to determine the amount of energy consumed by light duty vehicles

that is not consumed by households. We call this commercial light duty. As shown in Table II-1, this approach provides an estimate that is consistent with the Department of Transportation data, Transportation data, which categorizes vehicles by axle length and the number of tires. Again, the estimates are quite close, although they are lower than the estimate for 2009. There was a decrease in consumption between 2009 and 2010 in the aggregate consumption. The consistency of this data provides us with a substantial level of confidence in the amount of medium and heavy duty truck fuel we use for our calculations. We compared the 2013 BLS/EIA numbers with previous year numbers from other sources and discovered that all of the estimates were within 10% of each other.

Table II-2 (below) applies the BLS/EIA approach from Table II-1 to the data for 2013 and 2014. [1] We prefer this approach since it can be updated easily. As a result, for 2013, we estimate 92 billion gallons of household gasoline consumption and 43 billion in medium and heavy duty truck consumption. We reduce the freight truck consumption by 11% to account for exports, since the cost burden would not fall on consumers.

TABLE II-2: HOUSEHOLD EXPENDITURES (BLS/EIA Method)

	Fuel	Consumptions		$/gal.	Annual cost
		Total Bil. Gal.	Per HH Gal.		
2013					
Household Gasoline	**Gasoline**	**92**	**730**	**$3.58**	**$2,613**
Medium & Heavy Duty	**Diesel**	**43**	**300**	**$3.92**	**$1,176**
2014					
Household Gasoline	**Gasoline**	**93**	**730**	**$3.54**	**$2,511**
Medium & Heavy Duty	**Diesel**	**45**	**310**	**$3.82**	**$1,184**

Source: See Table II-1.

This confirms the conclusion we reached in our earlier analysis. We estimate 730 direct gallons per household and 300 indirect gallons of diesel fuel consumption. For every dollar that consumers spend on household gasoline, they spend about $0.50 on freight transport fuel consumption. At an annual cost of nearly $1,200, households spend almost as much on freight truck fuel as they do on electricity.

Price

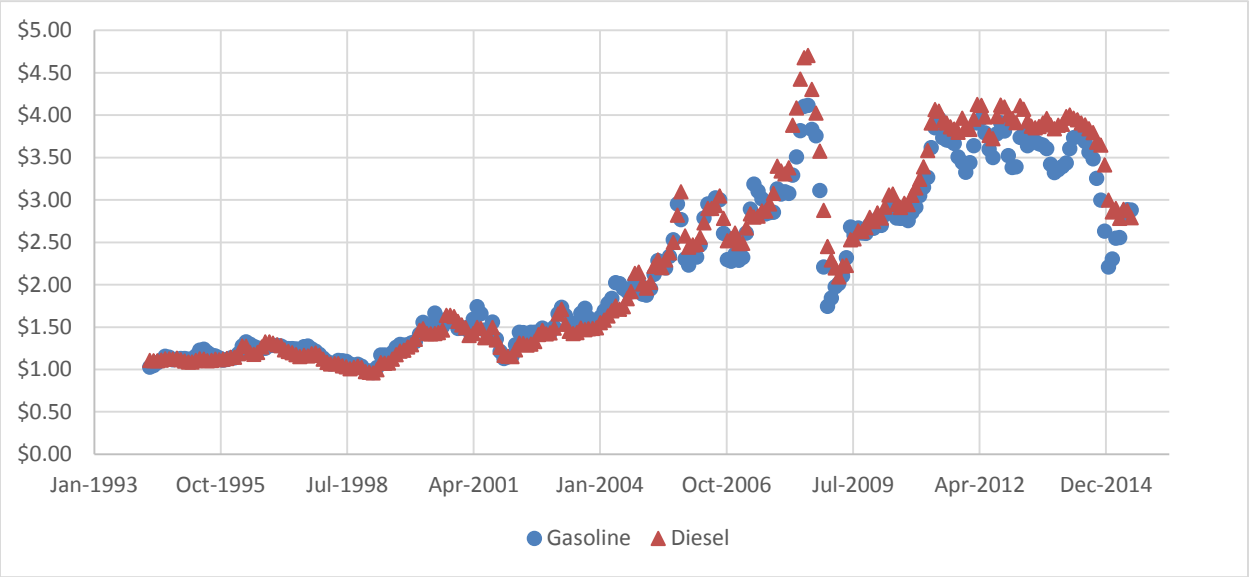
As shown in Figure II-3, the prices of transportation fuels in recent years have been volatile while clearly trending upward. For a little over a decade, diesel fuel has cost more than gasoline.

FUTURE HOUSEHOLD EXPENDITURE TRENDS

Any cost/benefit analysis of a proposed standard must be forward looking and factor in expected costs at the time of implementation. As shown in Figure II-4, the EIA projects lower prices for both gasoline and diesel in 2020, followed by a steady increase in prices to 2030. The table shows both "real" prices, which are adjusted to compensate for inflation and actual expected prices. The EIA, which is the primary source that government agencies use for future pricing, projects diesel prices to rise slightly faster than gasoline prices, which has been the trend

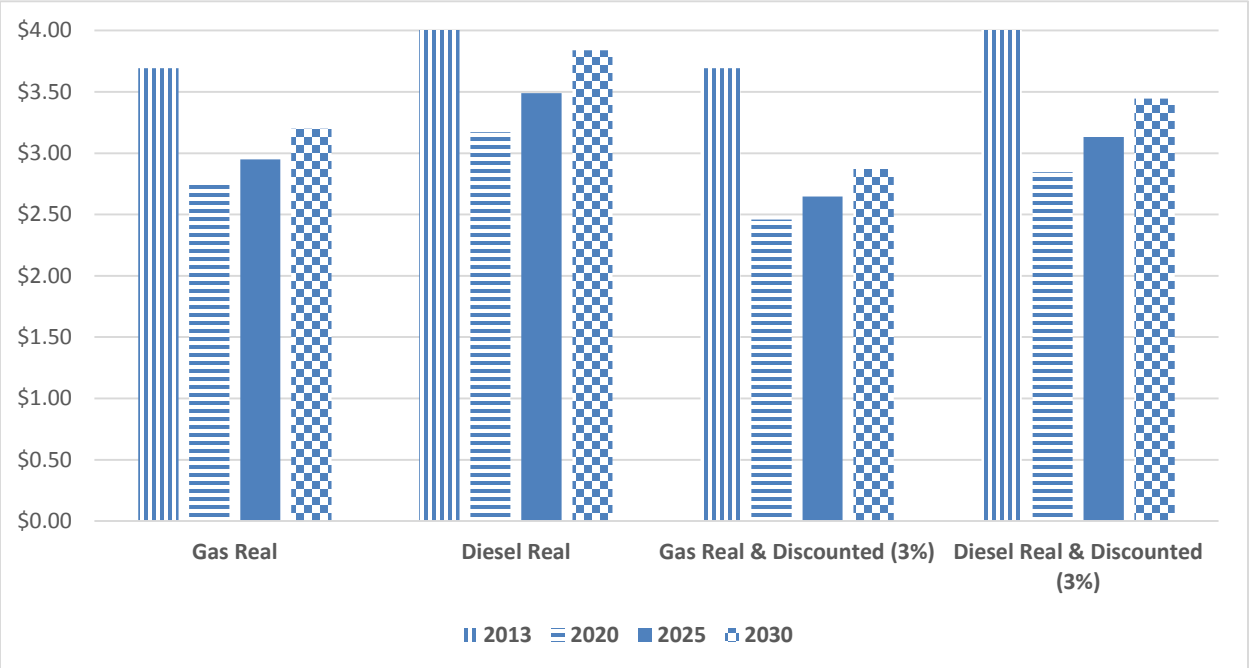
for the past decade. Because actual prices have recently fallen, in analyzing the proposed rule, we will reduce the projection of future benefit by 10% to reflect the difference between the 2014 EIA projection (on which the agency analysis was based) and the 2015 projection.

FIGURE II--3: FUEL PRICE (NOMINAL $/GALLON)



Source: EIA, Petroleum Price Database.

FIGURE II-4: FUTURE PRICES, REAL AND DISCOUNTED



Source: Annual Energy Outlook, 2015, Appendix A.

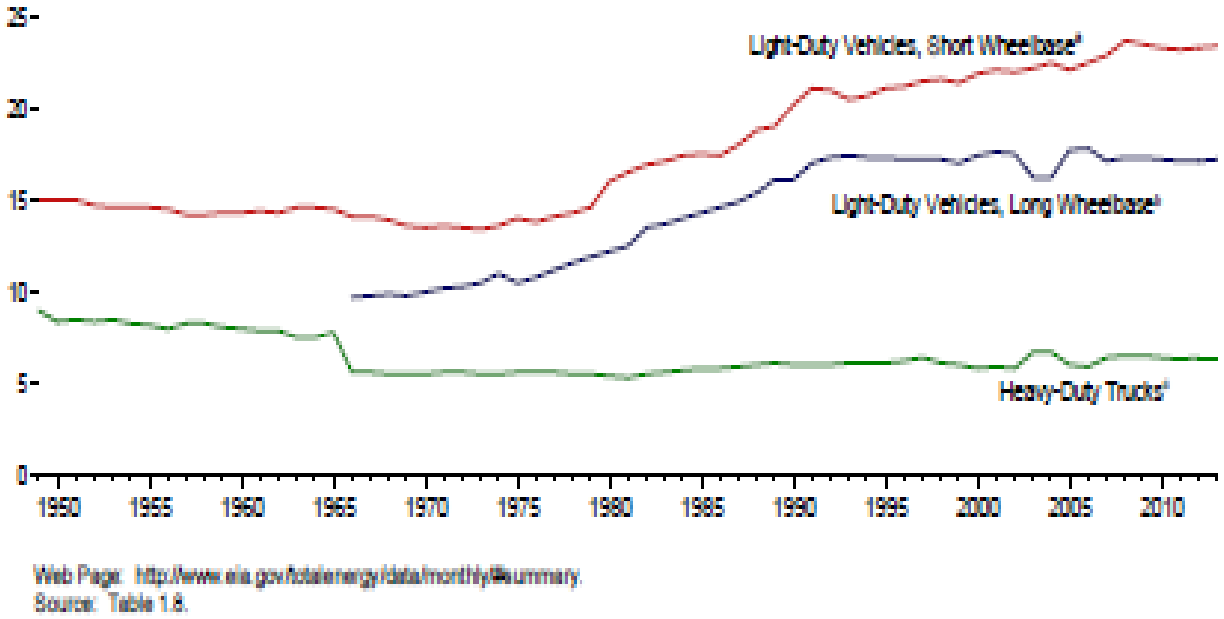
Figure II-4 also shows the effect of "discounting" future prices. The reason to discount is that the use of money has value. It could have been put to other uses and earned a return. The

standard discount rates established by the OMB for regulatory analysis are 3% for the consumer discount rate and 7% for the producer discount rate. In our analysis of the proposed rule, we use the consumer discount rate of 3%.

Consumption

As large as current household spending is on transportation fuel used by medium and heavy duty trucks, it will become even larger in the future. Going forward, the new CAFE requirements will lower the household impact of fuel costs associated with consumer and commercial light duty vehicles. On the other hand, without some controls, the burden on households due to medium and heavy duty truck fuel costs will only increase both absolutely and related to their direct expenditures on gasoline. Figure II-5 shows that, historically, the fuel economy of heavy-duty trucks has not increased.

FIGURE II-5: MOTOR ECONOMY 1949-2011 (MILES PER GALLON)



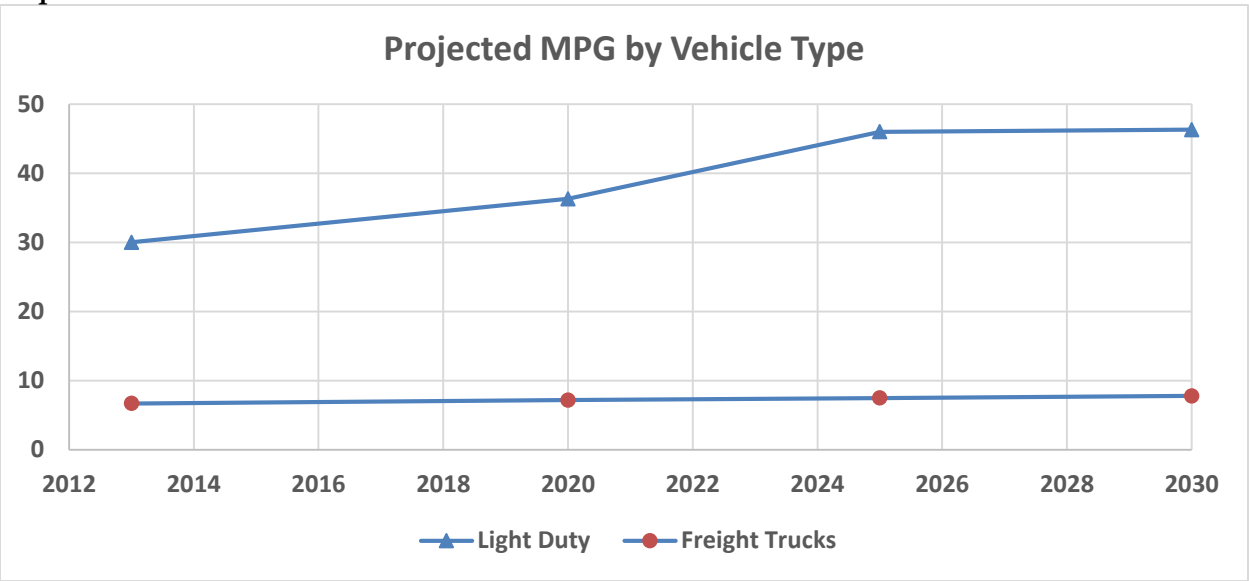
Source: U.S. Energy Information Administration, Monthly Energy Review, July 2015, page 17.

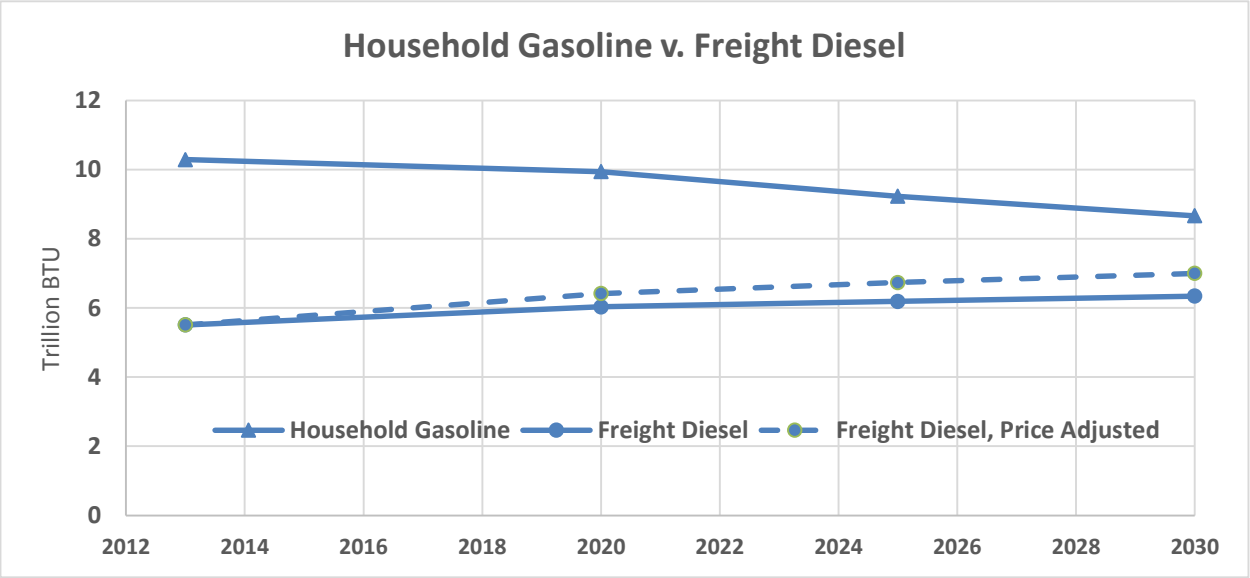
The most recent *Annual Energy Outlook* from the EIA, incorporating the new fuel economy standard for light duty vehicles, projects a substantial decline in fuel consumption as a result of increasing fuel economy standards, as shown in the top graph of Figure II-6. As shown in the bottom graph of Figure II-4, fuel consumption of light duty vehicles (and therefore household gasoline) is projected to decline because the increase in fuel economy is larger than the expected increase in miles driven[8]. On the other hand, in spite of the recently adopted truck standard (2014), the EIA projected MPG for these vehicles to remain flat. As the use of these vehicles increases, the lack of MPG improvement and rising fuel prices will significantly increase fuel costs.

[8] Population growth will increase vehicles on the road and overall miles driven.

FIGURE II-6: TRENDS IN FUEL ECONOMY AND CONSUMPTION MILEAGE BY VEHICLE TYPE

Expected MPG





Source: Energy Information Administration, *Annual Energy Outlook, 2015.*

Without long-term standards for freight trucks, fuel consumption of trucks is projected to increase because fuel economy improvements will not keep up with increasing demand for freight services. Within 20 years, taking the price difference between gasoline and diesel into effect, the gap between direct and indirect household expenditures on transportation energy will narrow considerably.

III. COMMERCIAL FUEL COSTS ARE PASSED THROUGH TO HOUSEHOLDS

While we have calculated the size of fuel expenditures on a per household basis, we must ask, "do households actually pay these costs?" The answer is "Yes." These costs are just like any other commercial costs in the economy. When a farmer pays for fertilizer or the delivery driver gets his paycheck, these business costs are recovered in the price of the related goods and services. The same is true with fuel costs. In fact, the Mid-Atlantic Freight Coalition confirms the pass through of transportation costs in a recent report on how transportation and logistics consume a significant portion of household budgets. According to the report,

> "the freight logistics system costs nearly $4,500 per person, which is spent moving and warehousing goods. This $4,500 factors into the cost of every product we buy. Anything that industry or government can do to make the logistics system more efficient will return benefits in terms of lower cost and greater global competitiveness."[9]

Although this estimate of the size of the expenditure on freight logistics includes all transportation modes and all costs, (equipment, maintenance, salaries, etc.), it acknowledges the importance of transportation costs to the economy which includes truck fuel costs. In addition to the pass through of these costs to consumers, there is the significant dependence on foreign sources for this fuel.

While the recognition that transportation costs are paid by consumers is obvious, the concept is reinforced by two observations: First, although transportation costs are a small part of the total economy (just under 3%), they are as large or larger, than several other sectors, including agriculture, mining, utilities and construction (see Figure III-1).

Second, fuel costs are the single largest component of transportation costs, representing over one-third of the total transportation costs. Fuel costs are slightly larger than driver pay and three times as large as the cost of owning and insuring the truck.[10] As transportation costs are passed through to consumers, fuel is the largest component of that pass-through (see Figure III-2).

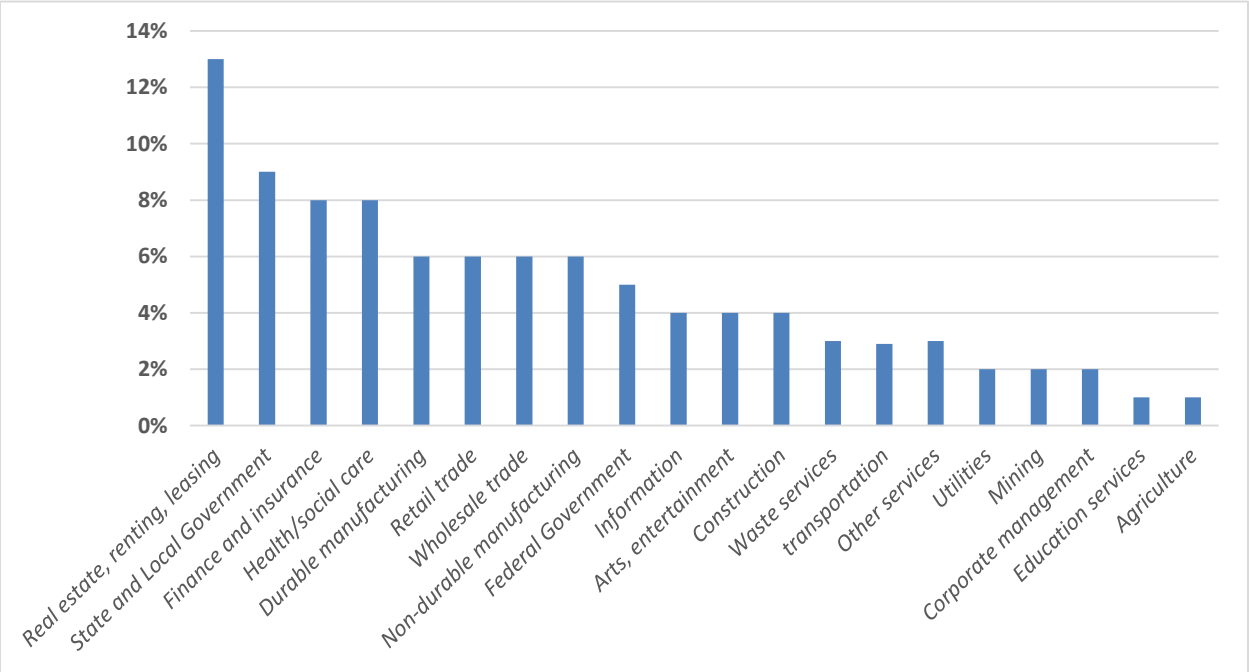
ECONOMETRIC MODELS DEMONSTRATE THE PASS-THROUGH NATURE OF TRANSPORTATION FUEL COSTS

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.

> Transportation is an economic factor of production of goods and services, implying that relatively small changes can have substantial impacts on costs, locations and performance…

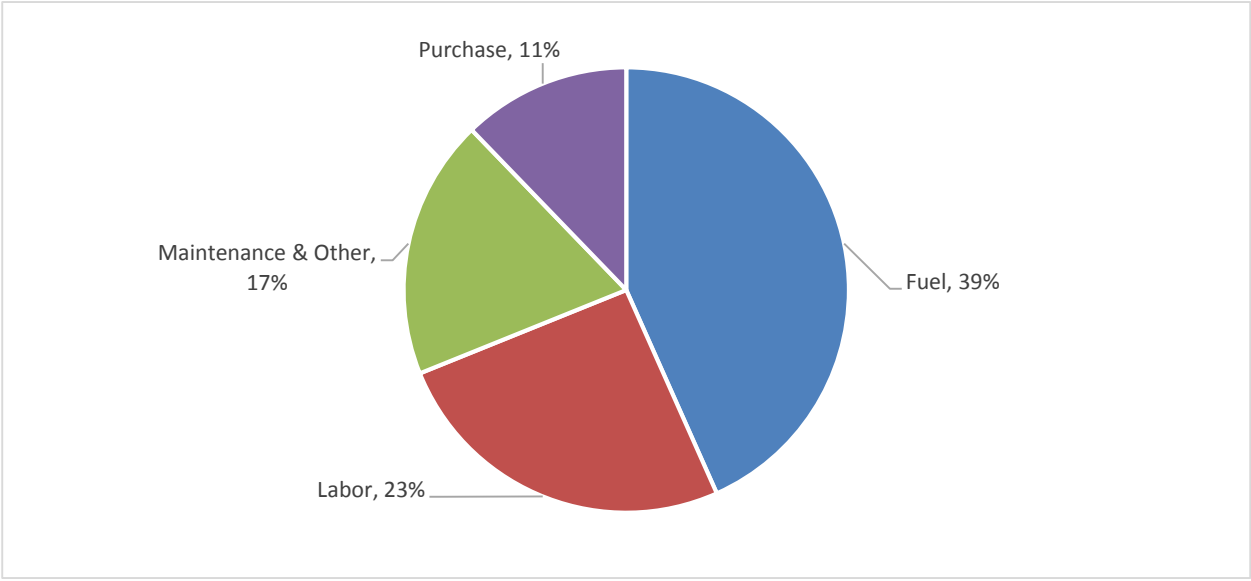
[9] Mid-America Freight Coalition "The Economic Importance of Freight," p. 2.
[10] NRC, 2010, Table 6.1

FIGURE III-1: GROSS DOMESTIC PRODUCT BY SECTORS



Source: ***GDP by Industry*****, http://en.wikipedia.org/wiki/Economy_of_the_United_States**

FIGURE III-2: AVERAGE TRUCK OPERATION COSTS



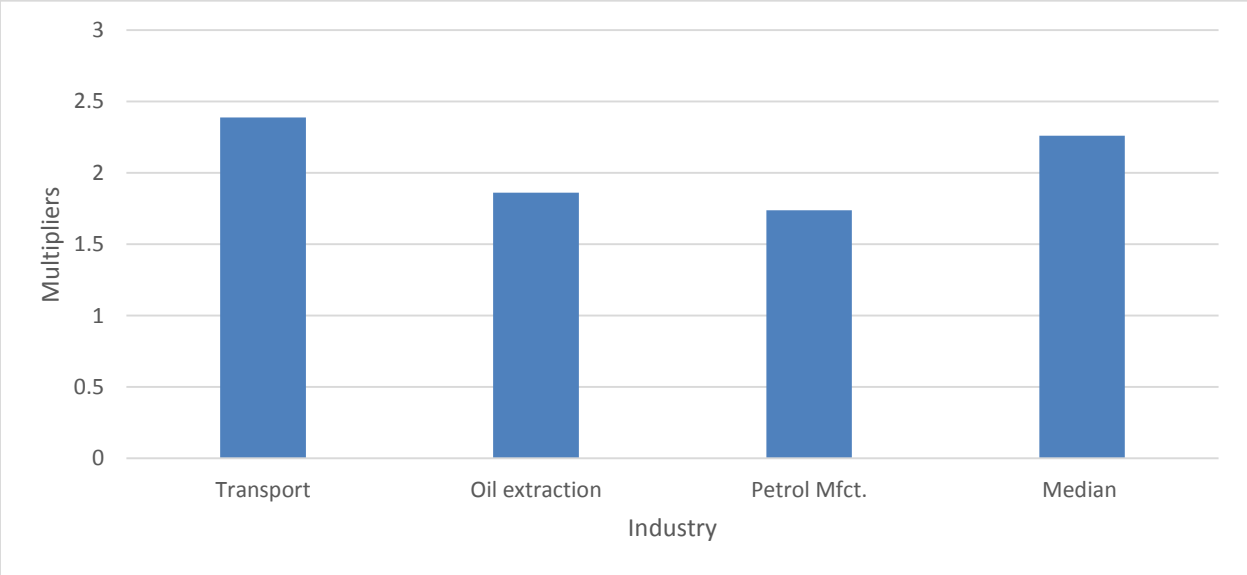
Source: EPA/NHTSA, Regulatory Impact Analysis, Medium and Heavy Duty Truck Rule, p. 8-1

Transport also contributes to economic development through job creation and its derived economic activities. Accordingly, a large number of direct (freighters, managers, shippers) and indirect (insurance, finance, packaging, handling, travel agencies, transit operators) employment are associated with transport. Producers and consumers make economic decisions on products, markets, costs, location, prices

which are themselves based on transport services, their availability, costs and capacity.[11]

The importance of transportation in these economic models is reflected in the high multiplier it is given. In order to build a model of the economy, analysts study the places where a sector purchases inputs and sells output. Typically, the more places that are touched by a sector, the larger its multiplier. Because most economic models are built on the flow of goods and services through the economy, they depend on the geographic scope and nature of activity within the economy being modeled. Transportation is generally seen as a central input to measuring broader economic activity. To further reinforce the impact of transportation costs on consumer pocketbooks, Figure III-3 presents the sector multipliers for the state of California. Transportation has the 20th largest multiplier, in a study of 60 California sectors. Not only is the transportation cost multiplier above average, but it is substantially larger than the multipliers on related to the petroleum production.

FIGURE III-3: SECTOR MULTIPLIERS FOR THE CALIFORNIA ECONOMY



Source: California Economic Strategy Panel, *Using Multipliers to Measure Economic Impacts,* 2009, Table 1

In modeling the impact of higher fuel economy with these econometric models, it is important to understand certain market factors. As the cost of transportation declines, demand for transportation increases because the demand for goods and services increases due to their lower costs. In addition, as the population and economy grows, the need for commercial transportation increases as well. Nevertheless, the fuel savings from greater efficiency are much larger than the increase in consumption. The net effect is to reduce expenditures on fuel as a

[11] Transportation and Economic Development Authors: Dr. Jean-Paul Rodriguez and Dr. Theo Notteboom, http://people.hofstra.edu/geotrans/eng/ch7en/conc7en/ch7c1en.html , A regional analysis reinforces this observation, Oregon, Transportation, Plan Update, Transportation and the Economy Manufacturing is dependent on transportation to receive raw materials and to deliver its products. Manufacturing is usually a highly competitive activity. Unless an area has other low cost attributes, high transportation costs will cause manufacturers to leave or avoid that area

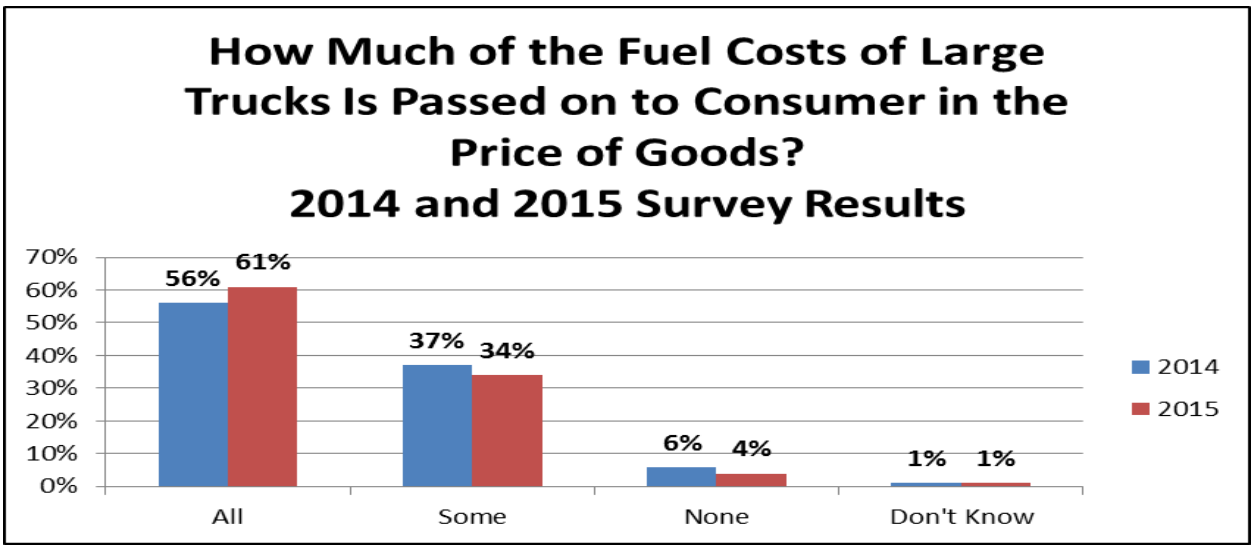
percent of total output. In fact, the reduction in energy consumption may be so large that the absolute level of consumption is lowered. This has a positive effect on the economy. We consume less petroleum products and more of other goods and services. Because those other goods and services have bigger multipliers, the economy expands. So it is clear that the pass through to consumers of truck fuel costs is important for both energy policy and economic policy.

IV. PUBLIC OPINION

While we have been able to demonstrate that these fuel cost are considerable and, in fact, passed on as indirect costs to households, consumers as well, understand that fact.

Two recent 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 consumers (See Figure IV-1). In fact, over 55 percent) believe that "all or most" of these costs are passed on to the consumer.

Figure IV-1 Do Consumers Understand that Truck Fuel Cost Are Passed on to Them?

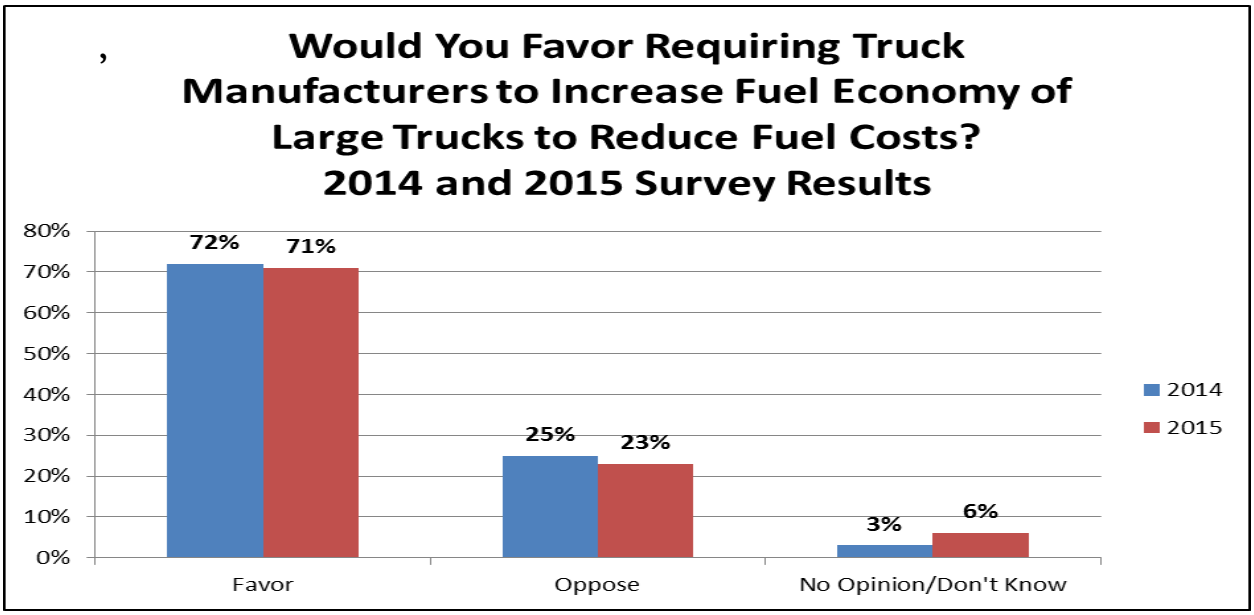


With the average American household spending nearly $1,200 extra on consumer goods and services to cover the costs of fueling up inefficient trucks, improving their fuel efficiency will save households hundreds of dollars.

In both of the CFA surveys, consumers clearly understood the possibility of these savings as nearly three quarters of the respondents favored requiring truck manufacturers to increase the fuel economy of large trucks (see Figure IV-2). Both surveys were conducted by ORC International, and in each poll ORC surveyed over a thousand Americans with an error rate of +/- 3%.

While consumer support for big truck fuel economy is already substantial, as consumers better understand the impact these policies have on their pocketbooks, public support will become even stronger. The proposed truck fuel efficiency standards are a win-win-win as they will benefit consumers' pocketbooks, big truck fleet owners and the economy. Clearly, the vast majority of consumers understand how important these standards are and want them to go into effect.

FIGURE IV-2—Do Consumers Favor Regulations Requiring More Fuel Efficient Trucks?



V. CONCLUSION

This analysis presents the consumer case for the need increased fuel efficiency standards for medium and heavy duty trucks. Not only does truck energy consumption impose a substantial burden on household budgets, but there is strong public understanding that consumers shoulder these costs and support requirements to reduce them.

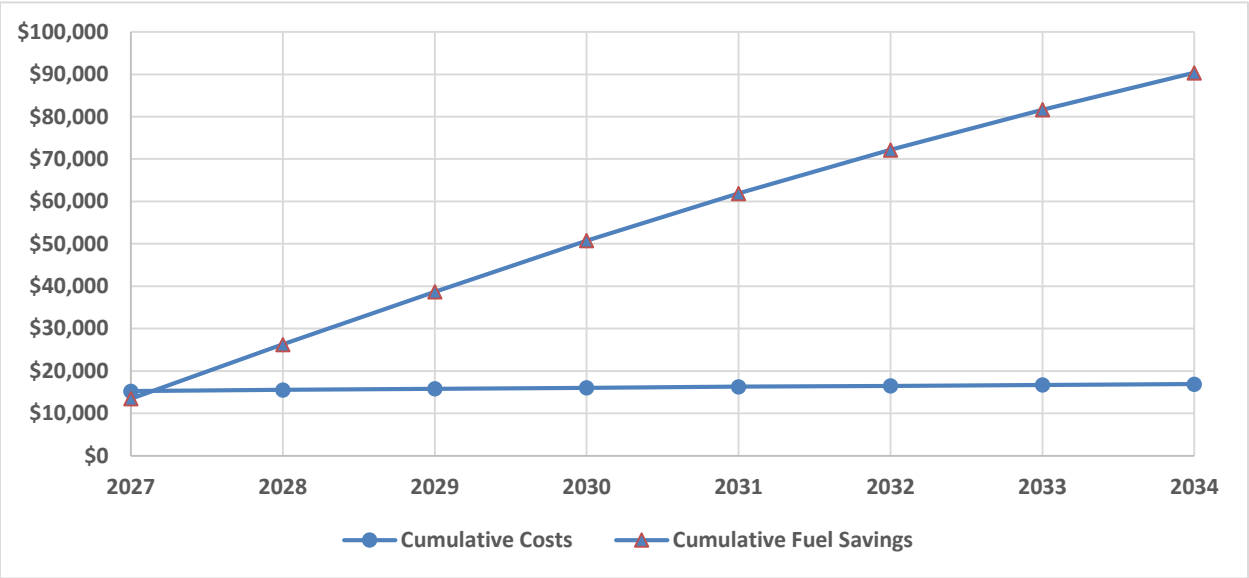
In addition there are other strong arguments which justify a standard. These include:

- The benefits of energy savings technology far outweigh the costs,
- There are market imperfections that cause the underinvestment in energy savings technologies, and
- Performance standards are a good tool to reduce or eliminate these market imperfections.

Now that EPA and NHTSA have proposed new standards and provided lengthy analysis of technologies and regulatory options, we can move from the general to the specific in our

evaluation which we will do in our formal comments to be submitted next month. In the meantime, we can clearly conclude that the standard proposed by EPA and NHTSA will deliver substantial benefits to consumers. As preliminary evidence, based on the price/consumption estimates above, consider the case of a tractor trailer delivered in 2027 that meets the proposed standard (see Figure V-1).

FIGURE V-1: CUMULATIVE COSTS AND SAVINGS



Source: EPA/NHTSA, Regulatory Impact Analysis, Medium and Heavy Duty Truck Rule, p. 7-42.

We choose tractor trailers for this example because they account for the majority of freight truck fuel, especially diesel. Figure V-1 shows the stream of costs and benefits in real, discounted dollars with all technology, maintenance and insurance costs included. We reduced the stream of benefits by 10% to account for the reduction in the projected price of diesel fuel in the *Annual Energy Outlook* between 2014 (which was the year the EPA/NHTSA used) and 2015, which became available after they completed their analysis.

Several key aspects of this analysis are striking.

- First, the investment in technology pays for itself in 14 months, an extremely rapid payback.
- Second, in the first eight years, the cumulative net savings are five times the cost providing a cost/benefit ratio of five-to-one.
- Third, we can use this cost/benefit ratio to estimate the financial benefits to households. While the rule reduces the consumption of tractor trailers by about 18.5%,[12] the technology cost uses one fifth of that, yielding a net cost reduction of just under 15%.

If we apply this to the level of indirect expenditure today, it would equal an annual savings of $200 per household. Projecting forward, however, we would have to adjust for the

[12] EPA/NHTSA, Regulatory Impact Analysis, Medium and Heavy Duty Truck Rule, p. 5-3.

price of energy and the growth of freight truck fuel consumption. If the fuel standards were in place, consumption would not grow as much as suggested by the EIA *Annual Outlook.* Ironically, the projected growth was 15%, which would be offset by the standard

While others have made strong environmental and industry economic arguments regarding the benefits of the proposed rule, CFA believes that consumer benefits will be in the billions and we will further demonstrate those savings in our official comments on the proposed rule.

[1] We estimate 2014 based on total products supplied and average price for the year, assuming a 1% increase in the number of households and constant consumption per household. This is consistent with the difference between the 2013Cconsumer Expenditure Survey and the mid-year 2014 Consumer Expenditure Survey. While price is down 3% between 2014 and 2013, expenditures are down 1.5% in the year July 2013-July 2014. By the end of the year we would expect the increase in consumption stimulated by declining prices to be offset by the decrease in consumption reflecting more fuel efficient vehicles and the underlying trend. For diesel, we divide the total expenditures by the estimated number of households.