Consumer Federation of America

ON THE ROAD TO 54 MPG:

A PROGRESS REPORT ON ACHIEVABILITY

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APRIL 2013

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EXECUTIVE SUMMARY

This report shows that consumer demand for more fuel-efficient vehicles is high and the nation is well on its way to adopting a more fuel-efficient vehicle fleet under the federal 54.5 mile-per-gallon (mpg) standard. The report reveals:

- A large majority of Americans support higher fuel economy standards approved by Congress in 2007 and strengthened by the Obama Administration last summer. The survey also reveals that consumers plan to purchase vehicles with significantly higher mileage when compared to their current vehicles.
- Analysis of vehicle mileage over the past four years shows that automakers have been increasing the average mileage of vehicles while making a wide range of options available, and consumers have been increasing their purchase of more efficient vehicles.
- Current adoption curves of electric vehicles show purchase rates exceeding those of the early hybrid vehicles.

Looking at current market offerings and our surveys of consumer demand, there is no doubt that the federal effort to significantly raise fuel economy standards will benefit consumers, car companies, autoworkers and the environment. The extremely broad support for the new standards reflects the nation's need for greater energy independence and the ability to achieve this independence through improved automotive efficiency without increasing consumer costs or denying consumers choice.

Consumers Strongly Support Higher Mileage Standards

A national survey was undertaken for CFA by ORC International, which interviewed 1001 representative American adults on April 11-14 by landline or cell phone. A large majority of Americans support federal government requirements to increase the fuel economy of new cars to an average of 35 mpg by 2017 and to an average of 54.5 mpg by 2025 (using CAFE ratings). Eighty-five percent of respondents said they support the requirements, with more than half (54%) saying they strongly support the standards. This support extends across the political spectrum, with 77% of Republicans, 87% of Independents and 92% of Democrats saying they support the higher standards.

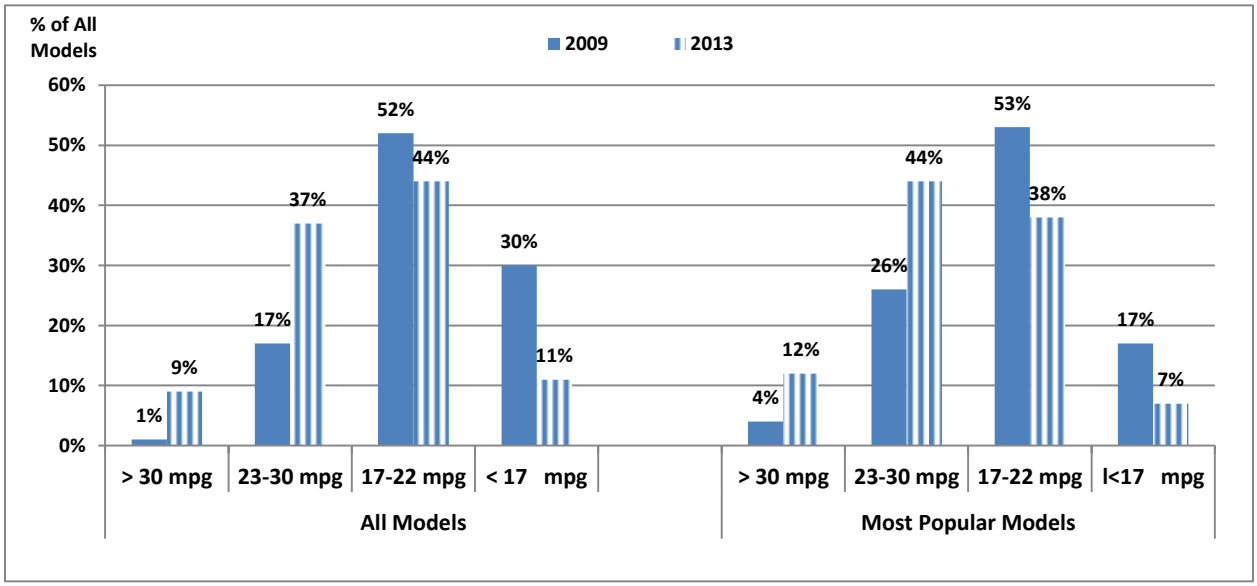
Other data from the survey suggest the reasons behind this strong consumer support for mileage standards. On a five-point scale of concern (with five representing great concern), 69% of respondents expressed great concern about future gasoline prices, and another 14% rated their concern at a level four. Using the same scale, 55% of respondents said they had great concern when asked how they feel about future U.S. dependency on Mid-Eastern oil; 17% rated their concern at four. These concerns translate into purchasing patterns – 88% of the respondents say fuel economy will be an important factor in their next vehicle purchase, (59% say very important).

Consumers Have Increased Purchases of Higher-Mileage Vehicles and Expect to Increase the Mileage of the Next Vehicle they Purchase.

Spurred by higher government standards and greater consumer demand, automakers are increasing the mileage of the vehicles they produce, as shown in Exhibit ES-1. Between 2009 and 2013, the total available models getting at least 30 mpg rose from 1% to 9%; the percentage getting between 23 mpg and 30 mpg from 17% to 37%; and the percentage getting less than 17

mpg fell from 30% to 11%. A new CFA analysis shows that the most popular cars, pick-ups, and vans purchased by consumers did even better on gas mileage over the past several years. Comparing purchases of 2009 models with 2013 models, the percentage of vehicles rated at least 30 mpg rose from 4% to 12%; the percentage getting between 23 and 30 mpg rose from 26% to 44%, and the percentage getting under 17 mpg fell from 17% to 7%.

EXHIBIT ES-1: INCREASING MILEAGE OF VEHICLE MODELS AVAILABLE



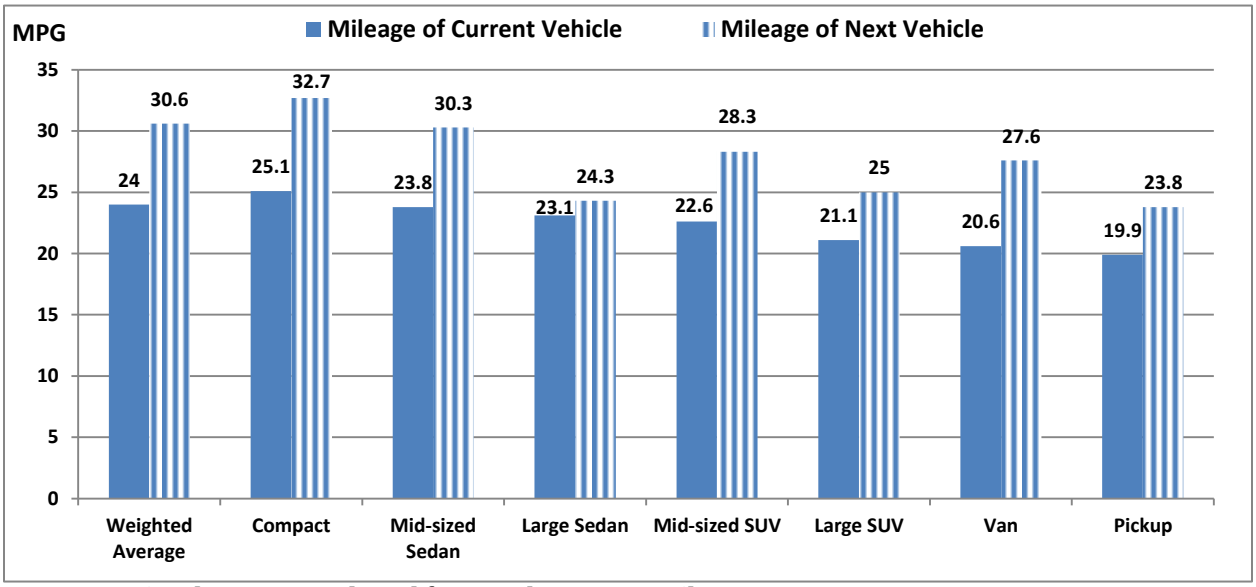
Source: EPA Fuel Economy Estimates for all models. *The Car Book*—an analysis with the makes, models and engine sizes expected to be most popular.

The increasing mileage of vehicles purchased reflects the dynamic development of the auto market. In part, this increasing mileage reflects the growing popularity of four-cylinder vehicles. In 2005, less than 30% of the vehicles purchased had four-cylinder engines, and in 2012, nearly half of those purchased had four cylinders. These four cylinder engines not only increased their mileage dramatically, they also increased their horsepower.

Moreover, over 5% of vehicles purchased in 2012 were hybrids and all electric vehicles, which doubled their sales in the past four years. While hybrids are well established in the market, with many of the automakers offering hybrid models across the vehicle types that consumers are most likely to buy, consumer acceptance of all electric vehicles is actually higher today than consumer acceptance of hybrids at a comparable stage of their introduction into the market.

According to CFA's national consumer survey, consumers intend to purchase even higher mileage vehicles going forward (see Exhibit ES-2). While the average mileage that respondents say their current vehicles get is 24 mpg ("weighted average"), those who intend to purchase a vehicle in the future expect an increase of nearly seven miles per gallon to almost 31mpg in their next vehicle. They expect increased mileage across the full range of vehicle types, with the smallest improvements expected in large vehicles and pickups.

EXHIBIT ES-2: WHAT CONSUMERS WANT FOR FUEL ECONOMY IN THEIR NEXT VEHICLE



Source: National Survey, conducted for CFA by ORC, April 11-14.

Automakers Increase the Gas Mileage of the Vehicles They Manufacture

This increasing gas mileage reflects the decision of automakers to improve the fuel economy of "new series" vehicles – those with significant design changes. Each year from 2010 to 2013, the average fuel economy for these "new series" vehicles increased – by an average of 2.2 mpg over their previous series (see Exhibit ES-3).

EXHIBIT ES-3: NUMBER OF NEW SERIES EACH YEAR WITH FUEL ECONOMY IMPROVEMENTS

Year	Number of New Model Series Introduced	How Many Had Better Fuel Economy	Avg. Increase in Fuel Efficiency over Previous Series
2010	11	9	2.45 mpg
2011	15	13	2.13 mpg
2012	16	13	2.50 mpg
2013	14	10	1.79 mpg
Average	14	11	2.22 mpg

Sources: The Car Book: Model series changes with EPA ratings for vehicles expected to be most popular.

In addition, many car companies have cars on the market now that are already meeting the new standards. We examined the 2013 vehicles on a model by model basis. Looking at the 134 different car models available in 2013, 64 (49%) already have a trim that meets the 2014 standards. Thirty-two (24%) already meet the 2017 standards, and 12 (9%) models already meet the 2025 standards.

While the adoption of standards has shifted the market to higher fuel economy, there is still a range of choices of fuel economy available, as shown in Exhibit ES-4. Three of the more

popular size classes, compacts, midsize, and SUVs, actually offer the largest ranges in fuel economy.

EXHIBIT ES-4: FUEL ECONOMY CHOICES WITHIN SIZE CLASSES: NUMBER OF 2013 MODELS

Fuel Economy (mpg)		Available Range	38 +	31-37	27-30	23-26	22	19-21	17-18	15-16	13-14	0-12
EPA Rating			10	9	8	7	6	5	4	3	2	1
Size Class	Subcompact Cars*	8-5	2	10	18	44	22	41	9	12	0	0
	Compact Cars	9-5	8	26	35	67	6	21	4	3	3	0
	Midsize Cars	9-5	11	21	32	45	16	37	10	2	1	0
	Large Cars	5-4	3	0	3	14	6	41	12	2	2	0
	Minivan	5	0	0	0	2	1	10	0	0	0	0
	SUV	7-2	1	0	9	67	19	92	37	30	15	4
	Pick-up Trucks	5-3	0	0	0	1	0	14	22	19	9	0
	Totals		***25***	***57***	***97***	***240***	***70***	***256***	***94***	***68***	***30***	***4***

Source: EPA Fuel Economy Estimates. *Subcompact includes Two Seater cars.

The rating of vehicles on a ten point scale for gas mileage on the new EPA labels for 2013 models are another reason to expect progress on fuel efficiency to accelerate. Not only will consumers be able to vote with their dollars for more fuel-efficient vehicles, but the labels will provide a powerful market incentive for car companies to improve the efficiency of their offerings as they competitively strive to achieve a higher rating on the label. Car companies that offer vehicles with 9 and 10 ratings will gain an advantage, and manufacturers will have a difficult time trying to sell a vehicle with a lower rating as gas prices continue to rise and consumers can readily see the alternatives.

An econometric analysis shows that the decision to reform and restart the fuel economy program has played a much larger part in triggering the increase in fuel economy than gasoline prices, although gas prices matter too. Public support for fuel economy standards and rising gasoline prices were a fertile environment for a well-designed standard to trigger a dynamic response by the industry. This analysis shows that the standards possess several characteristics that helped to ensure their success. They are:

- economically beneficial;
- gradual and long-term;
- attribute based,
- procompetitive, especially when combined with the new EPA levels, and
- technology neutral.

The fact that car companies, consumers, auto workers and environmental groups all supported the standard has set the stage for one of the most important energy policies in a quarter century. Current progress makes it clear that meeting the 54.5 mpg by 2025 standard is well within the reach of automakers consumers and the U.S. auto market.

INTRODUCTION

Six months after the federal government finalized the 54.5 miles-per gallon (mpg) requirements by 2025, and six years after Congress passed legislation to reform and restart fuel economy standards for light duty vehicles (cars, light pickup trucks, SUVs and vans), the Consumer Federation of America (CFA) has taken a look at how automakers and consumers are progressing toward that goal and the potential impact of the standards on consumers. Not only did the automakers initially agree that the standard is achievable, but they are already making progress towards full compliance with current vehicles meeting future standards. Consumers supported the standards, too, and, as this paper shows, they have reacted positively to the more fuel efficient vehicles that automakers are bringing to market.

The stakes are huge for both automakers and consumers. Coming out of the recession and bankruptcy, U.S. automakers have made fuel economy goal #1 due to strong consumer demand for efficient vehicles. Consumer motivations to seek and buy more fuel-efficient vehicles are equally strong.

In 2012, households with a vehicle spent almost $3,000 on gasoline.[1] Household gasoline expenditures last year were almost 50% higher than expenditures on home energy (electricity, natural gas and heating oil); ten years ago, they were 13% **lower**. In a time when consumers are feeling the pressure of higher fuel costs, the 2017 to 2025 fuel economy standard significantly reduces the economic hardships associated with volatile gas prices.

This report provides an update on the new 54.5 mpg standard from three perspectives:

- Current consumer attitudes towards fuel economy and fuel economy standards;
- The specific progress being made by the manufacturers in delivering more fuel efficient vehicles to the market, and
- A look at consumer adoption of the most fuel efficient vehicles.

This analysis shows that the strong support for higher fuel economy standards reflects broad consumer concern about gasoline consumption and the performance of the auto market in delivering higher fuel economy while meeting consumer needs and wants for vehicles.

I. CONSUMER ATTITUDES ABOUT FUEL ECONOMY

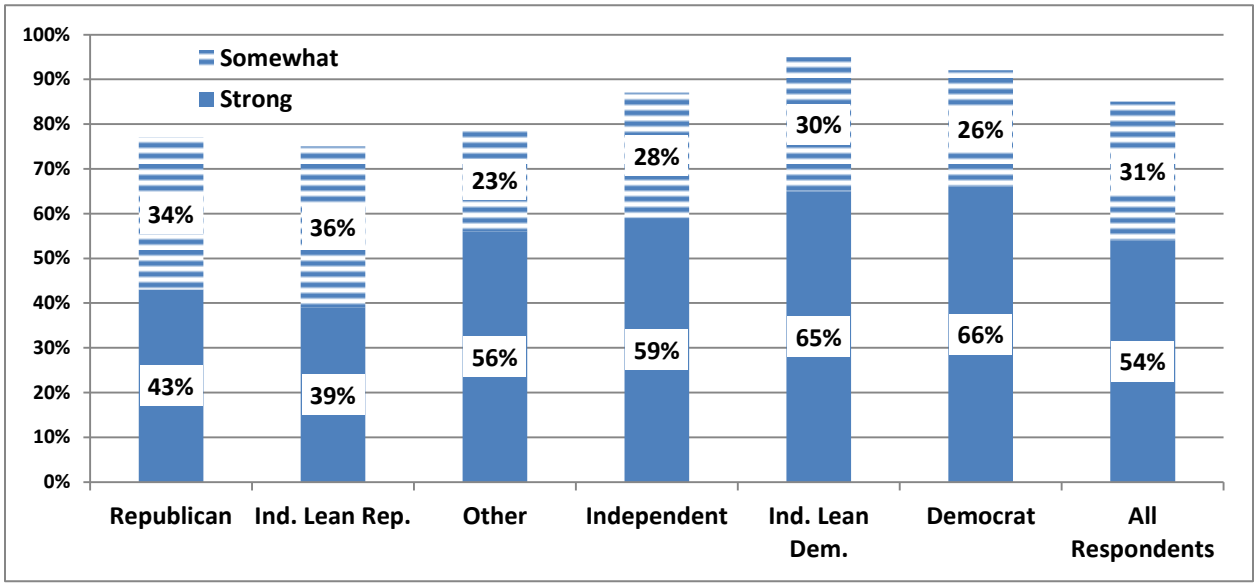
This is the 10th survey the Consumer Federation of America (CFA) has conducted in the past eight years directly addressing consumer attitudes about fuel use, fuel economy and fuel economy standards. Over the years, strong consumer concern about fuel prices and a desire for greater fuel economy in vehicles have translated into support for higher fuel economy standards. The most recent survey results continue that trend. Moreover, they show that consumers are eager to accept the more fuel-efficient vehicles that automakers are bringing to market.

SUPPORT FOR STANDARDS

Throughout CFA's eight years of polling on fuel economy, our surveys have shown strong support for fuel economy standards. That trend continues with this survey, even with the high targets set by the recent rulemaking.

As shown in Exhibit 1, overall support for fuel economy standards remains quite high, with 85% support, (54% strongly). Across the political spectrum, at least three quarters of the respondents express support no matter their party affiliation.

EXHIBIT 1: SUPPORT FOR FUEL ECONOMY STANDARDS



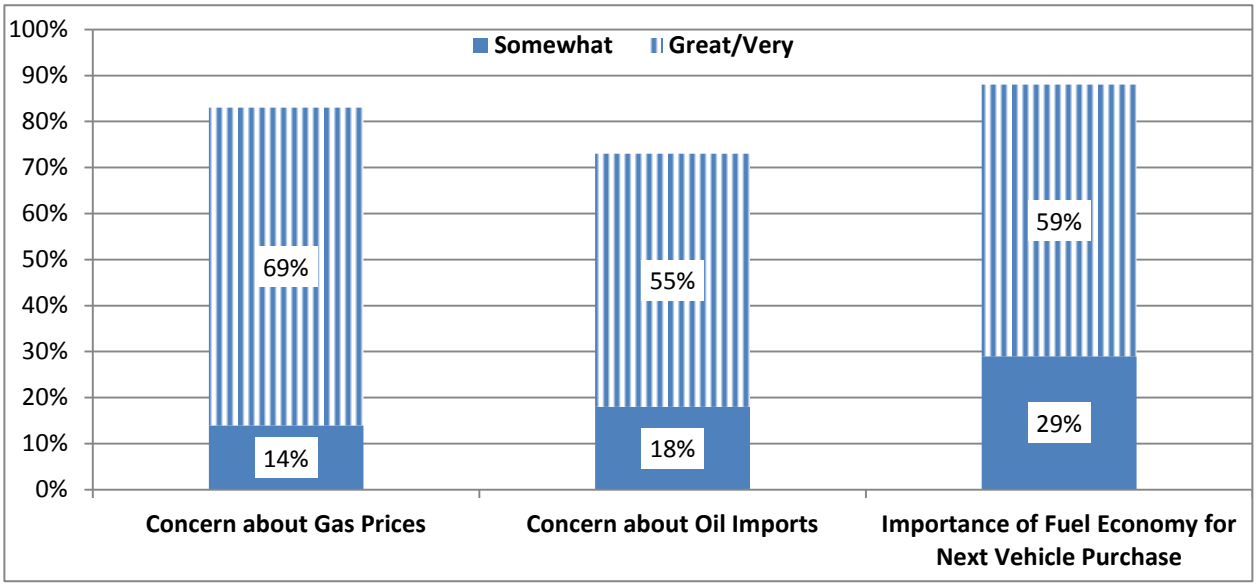
Source: National Survey, conducted for CFA by ORC, April 11-14: Question as follows:
The federal government recently required automobile manufacturers to increase the fuel economy of the new cars they sell from an average of 25 miles per gallon today to an average of 35 miles per gallon by 2017 and to an average of 55 miles per gallon by 2025. What is your view of these increases in fuel economy standards? Would you say you… Strongly support (1), Somewhat support, Somewhat oppose, strongly oppose (5), DON'T KNOW.

BASIC CONSUMER ATTITUDES ON AUTOMOBILE FUEL ECONOMY

Exhibit 2 summarizes the basic attitudes that shape consumer behavior in the auto market. Approximately 83% of respondents express concern about gasoline prices in the next five years, (69% expressing great concern). Predictably, low and moderate income respondents

(less than $50,000) expressed the greatest concern, 74% said great concern compared to upper income households (above $100,000) where 56% expressed great concern.

EXHIBIT 2: WHY CONSUMERS ARE CONCERNED ABOUT FUEL ECONOMY



Source: National Survey, conducted for CFA by ORC, April 11-14: Questions as follows:
Thinking about the NEXT FIVE YEARS, how concerned, personally, are you about the following issues? Please use a scale of 1 to 5, where 1 means 'no concern' and 5 means 'great concern'.
Thinking about the next motor vehicle you will purchase, how important will gas mileage—that is, how many miles to the gallon it will get—be in your decision about the type of vehicle you will purchase? Would you say … Very important (5), Somewhat important, Not very important, Or, not at all important (1); WON'T PURCHASE ANOTHER VEHICLE, DON'T KNOW.

Concerns about Mid-East oil imports remains high, with 73% expressing concern, (55% great concern). Respondents older than 45 years old are more likely to express great concern, (above 60% express great concern); younger respondents are less likely, (less than 50% express great concern).

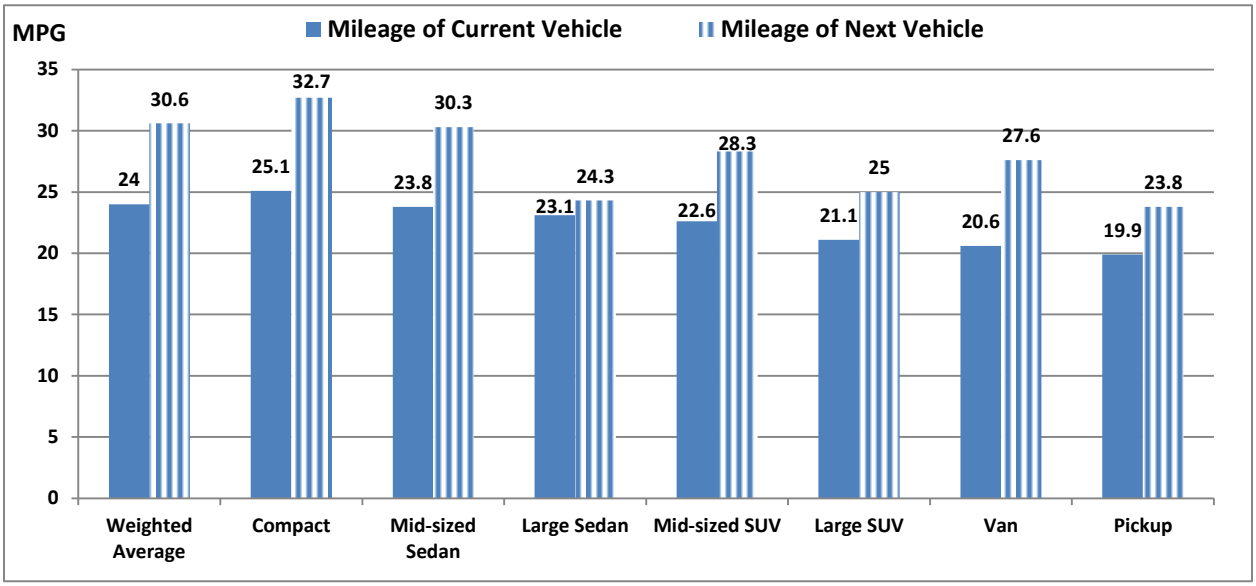
Approximately 88% of respondents say that gas mileage will be important in the purchase of their next vehicle, with 59% saying it will be very important. This finding is consistent with past surveys conducted by CFA[2] as well as research conducted by Consumers Union, publisher of Consumer Reports.[3] Respondents with low and moderate income (less than $50,000) are more likely to say mileage is very important, at 64%, than upper income households, (incomes above $100,000), at 46%.

Six percent of the respondents say they do not own a vehicle. Households, with incomes less than $25,000, are much more likely to not own a vehicle (15%), than households with incomes above $25,000 (2%). All subsequent analysis of the survey data is based on respondents who own a vehicle.

CONSUMER ATTITUDES AND THE DYNAMIC IMPROVEMENT IN FUEL ECONOMY

Exhibit 3 shows that the importance placed on higher fuel economy is also consistent with the expectation of respondents about changes in fuel economy. Respondents expect the gas mileage of their next vehicle to be considerably higher, an average of almost 31 mpg, than their current vehicle. They expect increased mileage across the full range of vehicle types, with the smallest improvements expected in large vehicles and pickup trucks.

EXHIBIT 3: WHAT CONSUMERS WANT FOR FUEL ECONOMY IN THEIR NEXT VEHICLE



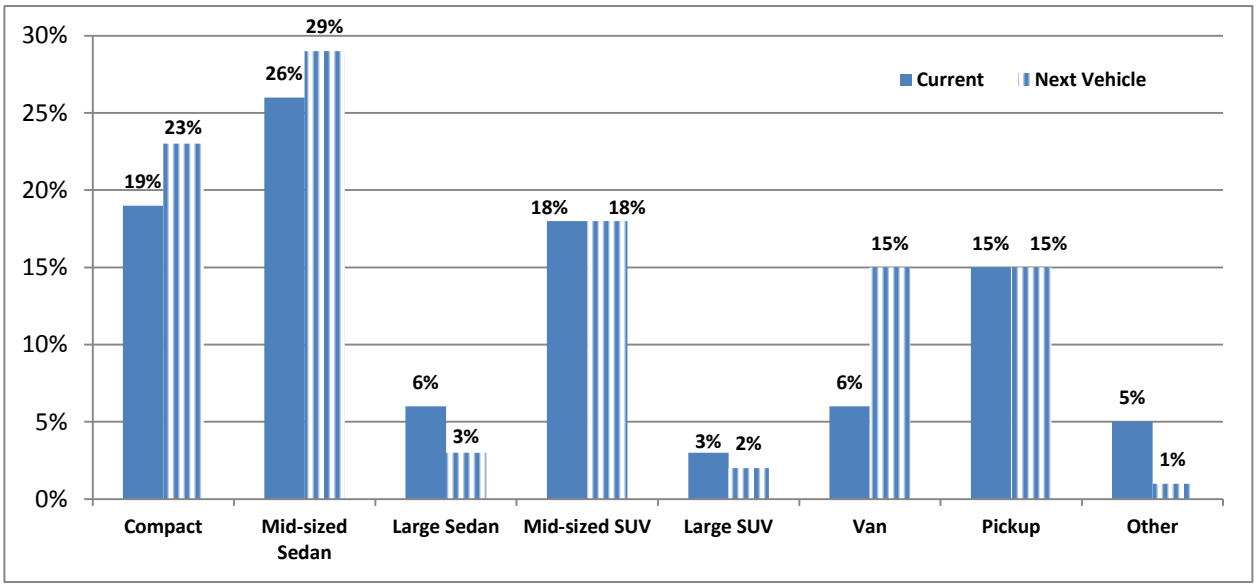
Source: National Survey, conducted for CFA by ORC, April 11-14: Questions as follows:
What is the gas mileage of the motor vehicle you are currently driving? That is, about how many miles to the gallon does this vehicle get?
What type of motor vehicle are you currently driving the most miles? Would you say... Subcompact or compact sedan, Mid-sized sedan, Large sedan, Medium-sized SUV, Large SUV, Minivan, Pick-up truck, OTHER, DON'T KNOW
What is your best guess about the type of motor vehicle this will be? Would you say it will be a… Subcompact or compact sedan, Mid-sized sedan, Large sedan, Medium-sized SUV, Large SUV, Minivan, Pick-up truck, OTHER, DON'T KNOW.
What is your best guess as to its gas mileage, that is, how many miles to the gallon will it get?

As Exhibit 4 shows, responses also indicate a shift in consumer purchasing patterns toward more fuel-efficient types of vehicles, which is consistent with the longer term trends, discussed throughout this report. The market share of smaller vehicles (subcompacts and compacts) and mid-sized cars is expected to increase while the share of large sedans, large SUVs and other vehicles is expected to decline.[4] Given the higher current mileage of these types of vehicles and the larger increase expected in their mileage, this shift would have a significant impact on the average fuel economy of the future vehicle fleet.[5]

Exhibit 5 shows that there is a clear relationship between the importance that respondents place on fuel economy in their purchase decision and the level of fuel economy they expect to get. Those who say fuel economy is very important in their purchase decision expect to get 32 mpg, about 10 mpg more than those who say it is not important.[6]

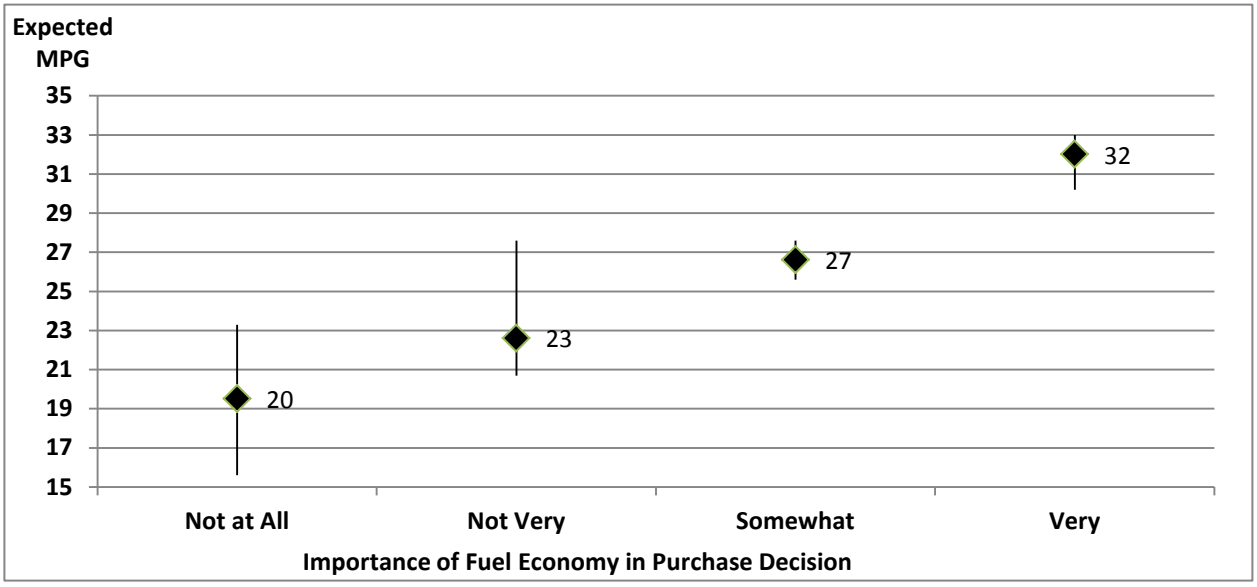
In looking at the respondents' answers, we were able to determine how various factors influenced the importance of fuel economy in their next purchase. The most important factor was how fuel efficient their current vehicle was.[7] The higher their current fuel economy, the more important higher fuel economy would be with their next purchase and the higher the fuel economy they want in their next vehicle. Respondents who intend to purchase compacts expect higher mileage, while those who expect to purchase pickups and large sedans expect to get lower mileage.

EXHIBIT 4: THE TYPE OF VEHICLES CONSUMERS EXPECT TO PURCHASE NEXT



Source: National Survey, conducted for CFA by ORC, April 11-14: Questions, see Exhibit 2.

EXHIBIT 5: IMPORTANCE OF MILEAGE AND EXPECTED FUTURE MILEAGE
(Mean and 95% Confidence Interval)



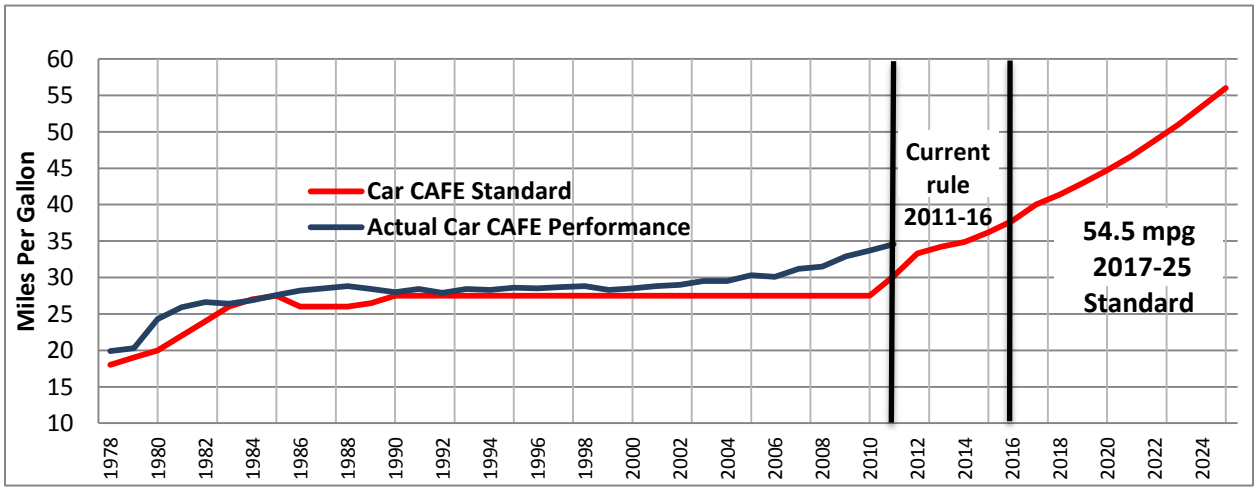
Source: National Survey, conducted for CFA by ORC, April 11-14: Questions, see Exhibit 2.

II. Regulating Fuel Economy Makes a Difference

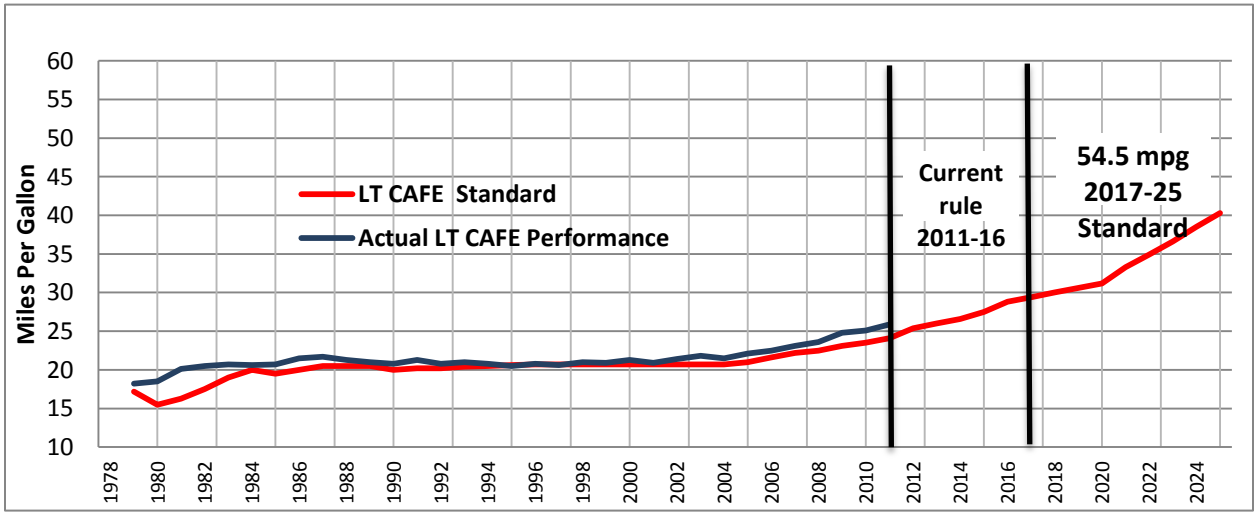
Although consumer demand for fuel-efficient vehicles is high, historically, that demand has not sufficiently moved automakers to deliver the vehicles consumers desire. For 25 years[8], there were no required improvements in fuel efficiency. The result—automakers didn't focus on fuel-efficiency, and there was little to no improvement in fuel economy (see Exhibit 6).

Exhibit 6: CAFE Standards vs. Actual Performance

Passenger Cars



Light Trucks



Source: NPRM for 2017 and Later MY Corporate Average Fuel Economy Standards; EPA NHTSA 2012-16 Corporate Average Fuel Economy Standards Final Rule. Actual CAFE performance is based on sales weighted data.

In 2007, Congress passed legislation that reformed and restarted the fuel economy standards program[9]. The National Highway Traffic Safety Administration (NHTSA) that administers the program moved quickly in 2008 to propose new standards for 2011-2016 and in 2010, the Obama administration issued an order for federal fuel economy and environmental regulators to cooperate with the Environmental Protection Agency and California Air Resources

Board on a long term strategy to coordinate policies to increase fuel economy and reduce the emission of pollutants from light duty vehicles.[10]

Automakers reacted swiftly to these strong signals that fuel economy standards would be increasing over the long term. As Exhibit 6 shows, automakers began to offer more fuel-efficient vehicles even prior to the imposition of the new requirements. Consumers responded by buying those vehicles, and the actual fleet average began exceeding the requirements.

THE AUTO MANUFACTURERS ARE ALREADY ON THE ROAD TO 54.5

Using the new EPA fuel economy label rating scale,[11] CFA analyzed the fuel economy of 2013 models compared to the performance of previous years. Exhibit 7 tracks the changes in fuel economy performance from 2002 to 2013, according to the EPA ratings. Responding to the new standards, the number of vehicles getting over 30 mpg (a 9 or 10 EPA rating) has more than quadrupled in the last 5 years from 21 to 124 (from 1.3% to 9.3% of all models). In addition, the number of vehicles getting less than 23 mpg decreased from 991 in 2009 to 559 in 2013 (82% to54%). Just in the past year alone, the percentage of available models getting 30 mpg jumped by 3.5% while the percentage of models getting less than 14 mpg dropped by 6.2%. If (similar to academic grading) a 70 or above is considered to be acceptable, then 45 percent of the 2013 models would be "acceptable" under the new fuel economy labeling requirement. That number is over twice as many as were "acceptable" in 2009.

EXHIBIT 7: THE IMPACT OF REGULATORY ACTION ON FUEL ECONOMY:
Of The Total Available Models In A Given Year, What Percent Were In Each Of The EPA Ratings Categories?

Grade	Fuel Economy (mpg)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
10	38+	0.7%	0.9%	0.6%	0.6%	0.4%	0.2%	0.2%	0.2%	0.6%	1.0%	1.1%	2.9%
9	31-37	1.1%	0.8%	1.0%	1.0%	0.7%	0.4%	0.8%	1.1%	2.1%	3.2%	4.7%	6.4%
OVER 30MPG		**1.8%**	**1.6%**	**1.7%**	**1.7%**	**1.0%**	**0.6%**	**1.0%**	**1.3%**	**2.7%**	**4.2%**	**5.8%**	**9.3%**
8	27-30	2.8%	1.6%	2.4%	2.4%	2.4%	3.0%	3.5%	4.4%	7.3%	7.8%	9.2%	12%
7	23-26	11.2%	10.8%	10.3%	10.3%	10.3%	10.2%	12.8%	12.4%	18.9%	18.3%	20.4%	25%
Acceptable		**14.0%**	**12.5%**	**12.8%**	**12.8%**	**12.7%**	**14.4%**	**18.3%**	**19.3%**	**31.6%**	**34.5%**	**41.2%**	**45.3%**
6	22	9.3%	9.7%	8.5%	8.5%	10.4%	10.4%	7.2%	11.7%	8.4%	8.0%	7.0%	7.7%
5	19-21	29.0%	27.2%	28.9%	28.9%	28.2%	26.5%	28.5%	27.6%	29.2%	30.4%	26.9%	26.5%
4	17-18	15.0%	13.4%	15.5%	15.5%	14.7%	13.7%	14.9%	12.5%	13.8%	12.5%	11.3%	9.4%
3	15-16	20.8%	22.8%	23.7%	23.7%	24.4%	24.6%	16.6%	15.6%	11.4%	10.3%	9.8%	6.7%
2	13-14	7.6%	8.0%	4.9%	4.9%	5.0%	5.9%	9.9%	8.2%	6.7%	6.8%	7.8%	3%
1	0-12	2.4%	4.9%	4.1%	4.1%	3.5%	5.2%	5.7%	6.4%	1.7%	1.7%	1.8%	0.4%
Poor		**84.2%**	**85.9%**	**85.6%**	**85.6%**	**86.2%**	**86.2%**	**82.7%**	**81.9%**	**71.1%**	**69.7%**	**64.6%**	**53.7%**
# of Models		**944**	**1044**	**1145**	**1121**	**1076**	**1184**	**1198**	**1182**	**1101**	**1053**	**901**	**1041**

Source: EPA Fuel Economy Estimates for all models with EPA rating and categorizing the models using the new EPA rating grades.

Exhibit 7looks at all models available. Exhibit 8 looks at how the most popular vehicles[12] have changed over time. While not a true sales weighted review, sales are considered. Clearly, among the most popular models, fuel economy is consistently and significantly improving. The most popular vehicles getting more than 30 mpg tripled their share of the total models available in the past four years. Those getting less than 23 mpg declined from 70% to about 46%.

EXHIBIT 8: THE CAR BOOK'S MOST POPULAR VEHICLE PERFORMANCE

Grade	Fuel Economy (mpg)	2009 Car Book Cars	2010 Car Book Cars	2011 Car Book Cars	2012 Car Book Cars	2013 Car Book Cars
10	38+	0.9%	0.9%	2%	2.5%	4%
9	31-37	2.9%	2.5%	5%	9.5%	7.9%
OVER 30MPG		**3.8%**	**3.4%**	**7%**	**12%**	**11.9%**
8	27-30	6.7%	9.4%	13%	13.4%	18.8%
7	23-26	19.5%	23.6%	21.5%	25.4%	24.8%
Acceptable		**30%**	**36.4%**	**41.5%**	**50.8%**	**55.5%**
6	22	10.5%	11.3%	10%	8.9%	9.4%
5	19-21	26.6%	24.1%	25.5%	22.4%	17.8%
4	17-18	15.7%	17.7%	16%	12.4%	10.4%
3	15-16	15.2%	7.4%	6%	4.5%	4.5%
2	13-14	1.4%	2.5%	0.5%	1.5%	2.0%
1	0-12	0%	0%	0%	0%	0%
Poor		**70%**	**63.6%**	**58.5%**	**49.2%**	**44.5%**

Source: The Car Book—an analysis with the makes, models and engine sizes expected to be most popular.

REGULATION BY INFORMATION: HOW THE NEW EPA LABELS WILL STIMULATE CHANGE

Exhibits 7 and 8 include the EPA scale that ranks vehicles from 1 to 10 based on their mileage. Given the shift in the number of higher efficiency models and the increase in sales, in addition to the upcoming 54.5 mpg standard, the new EPA labels on 2013 models are one of the reasons we expect progress on fuel efficiency to accelerate. Not only will consumers be able to vote with their dollars for more fuel-efficient vehicles, but the labels will provide a powerful market incentive for car companies to improve the efficiency of their offerings as they competitively strive to achieve a higher rating on the label. Car companies that offer vehicles with 9 and 10 ratings will have an advantage as these labels become familiar to consumers. Manufacturers will have a difficult time trying to sell a vehicle with a low rating as gas prices continue to rise and consumers can readily see the alternatives.

CHOOSING FUEL EFFICIENCY DOESN'T MEAN CHANGING VEHICLES TYPES

While automakers are on the road to 54.5 mpg by 2025, neither consumers nor car dealers need to fear being forced to buy (or sell) vehicles that don't meet consumer needs. In our analysis of EPA mileage ratings, there was a great variation in the fuel economy of vehicles in each size class and type. This means that consumers seeking more fuel efficient vehicles don't have to consider vehicles that may not meet family transportation needs or personal desires.

Exhibit 9 gives specific examples of the significant range in fuel economy ratings among the 2013 vehicle choices. If consumers are in the market for an SUV, for example, they could choose a Chevrolet Equinox that gets 26 mpg or a Toyota FJ Cruiser 4WD that gets 18 mpg. Choosing the Equinox will save them $897 over the course of a year, assuming they drive 15,000 miles and purchase gas at $3.52 per gallon.[13] Exhibit 9 provides a sampling of the range of choices available in each size class. These large savings are indicative of the fact, as we demonstrated in the rulemaking,[14] that the standards have been set in a manner that makes them extremely economically beneficial for consumers.

EXHIBIT 9: BUYING FOR FUEL EFFICIENCY IN 2013 DOESN'T HAVE TO MEAN CHANGING VEHICLE TYPES

Size Class	Fuel Economy Ranges within Size Class Comparative Consumer Choices[15] – 2013 Models		Annual Gas Savings[16]
Subcompact Cars	Ford Fiesta 33mpg	Suzuki SX4 26mpg	$431
Compact Cars	Hyundai Accent 32mpg	Subaru Impreza AWD 19mpg	$1129
Midsize Cars	Volkswagen Passat 34mpg	Cadillac CTS 21mpg	$961
Large Cars	Hyundai Sonata 28mpg	Chrysler 300 AWD 18mpg	$1047
Minivan	Mazda 5 24mpg	Toyota Sienna 19mpg	$579
SUV	Chevrolet Equinox 26mpg	Toyota FJ Cruiser 4WD 18mpg	$902
Pick-up Trucks	Ram 1500 19mpg	Nissan Titan 14mpg	$992

Source: EPA Fuel Economy Estimates.

Exhibit 10 shows the full range of mileage available within each size class/vehicle type. Three of the more popular size classes, compacts, midsize, and SUVs, actually offer the largest ranges in fuel economy.

EXHIBIT 10: FUEL ECONOMY CHOICES WITHIN SIZE CLASSES: 2013 MODELS

Fuel Economy (mpg)		Available Range	38 +	31-37	27-30	23-26	22	19-21	17-18	15-16	13-14	0-12
EPA Rating			10	9	8	7	6	5	4	3	2	1
Size Class	Subcompact Cars*	8-5	2	10	18	44	22	41	9	12	0	0
	Compact Cars	9-5	8	26	35	67	6	21	4	3	3	0
	Midsize Cars	9-5	11	21	32	45	16	37	10	2	1	0
	Large Cars	5-4	3	0	3	14	6	41	12	2	2	0
	Minivan	5	0	0	0	2	1	10	0	0	0	0
	SUV	7-2	1	0	9	67	19	92	37	30	15	4
	Pick-up Trucks	5-3	0	0	0	1	0	14	22	19	9	0
	Totals		***25***	***57***	***97***	***240***	***70***	***256***	***94***	***68***	***30***	***4***

Source: EPA Fuel Economy Estimates *Subcompact includes Two Seater cars.

GOING FORWARD MANUFACTURERS ARE DEMONSTRATING THAT THE NEW STANDARD IS ACHIEVABLE

As we move forward to the 2017-2025 requirements, the very carmakers who supported the standards are demonstrating that they are, indeed, achievable. In order to evaluate the progress already made, we looked at the status of the 2013 vehicles from two perspectives: the total fleet and on a model by model basis.

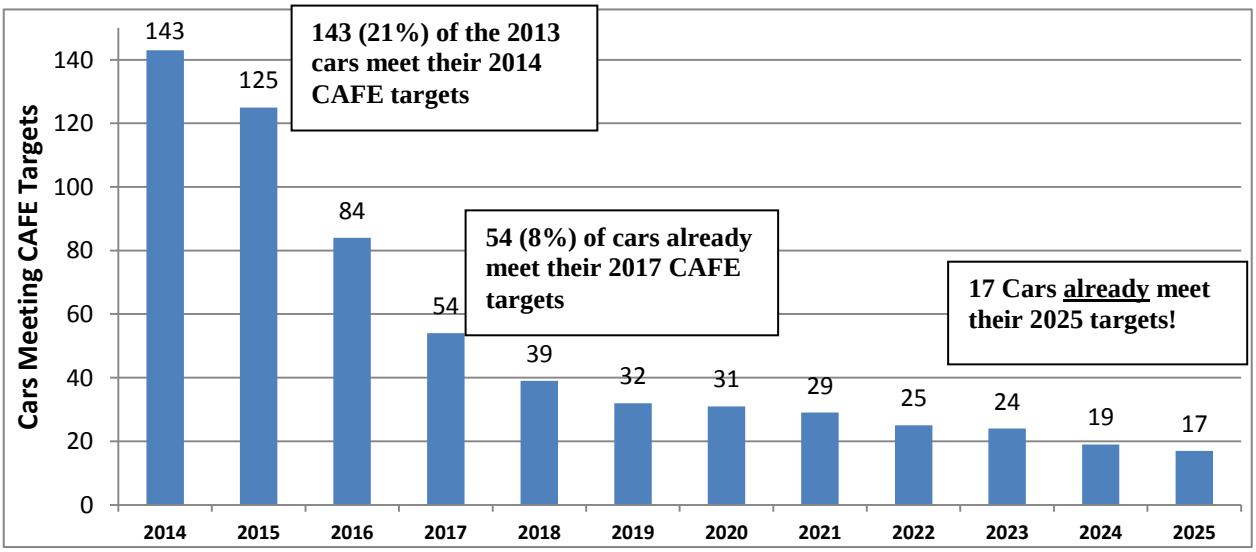
Exhibit 11 takes a look at all 1,057 of the 2013 passenger vehicles with EPA fuel economy ratings. Looking at the 696 cars being offered, we see that 143 (21%) of the 2013 cars

already *meet or exceed* the 2014 requirements. Eight percent actually meet the 2017 requirements. In fact, 17 of the 2013 cars already meet the 2025 standard.

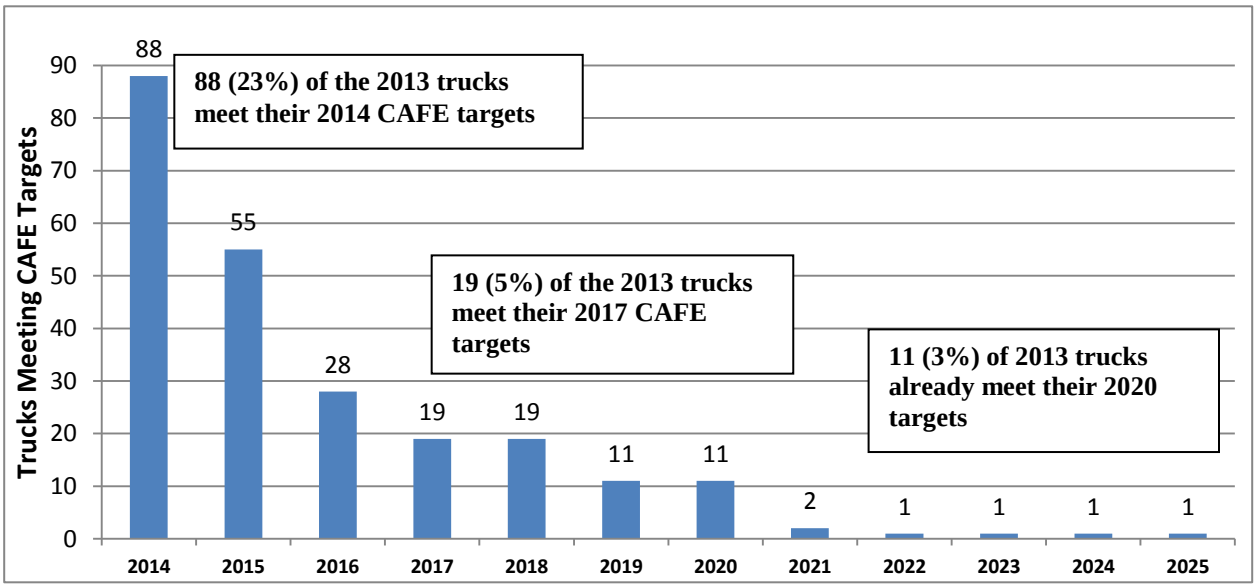
Of the 361 light duty trucks, 88 (23%) already meet or exceed the standard for 2014. Seven percent of this year's trucks have achieved the 2016 standards, and 5% meet various levels of the 2017-2025 standards.

EXHIBIT 11: HOW MANY OF THE 2013 VEHICLES ALREADY MEET FUTURE CAFE TARGETS?

2013 Cars Already Meeting Future CAFE STANDARDS



2013 Trucks Already Meeting Future CAFE Standards



Sources: EPA 2013 fuel economy, CAFE standards, CAFE fuel economy standards.

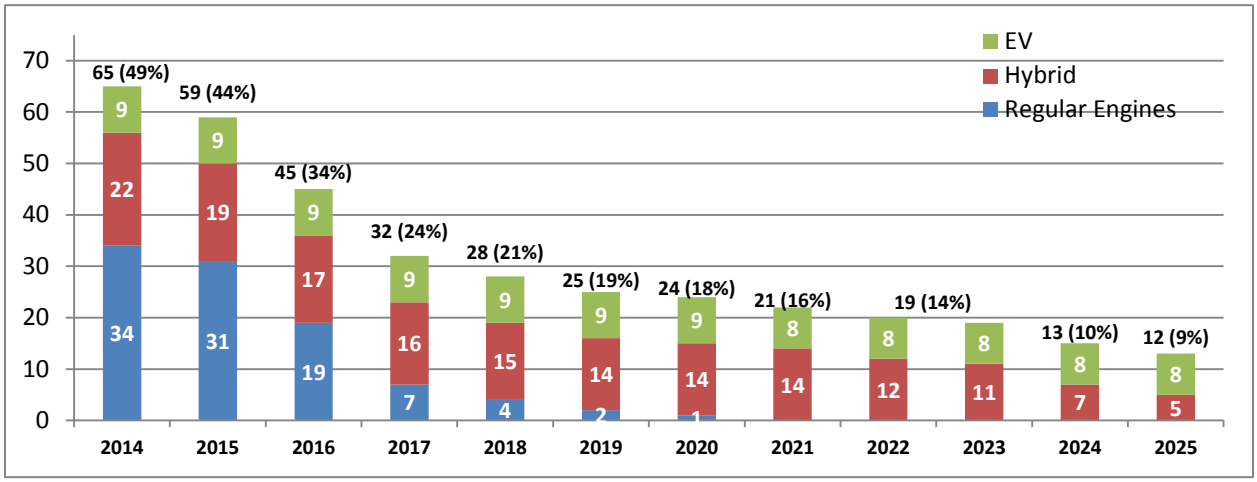
As most consumers buy cars on a model-by-model basis, we also looked at the 236 (134 car; 102 truck) models that make up 2013 vehicles. Each model comes in a variety of versions or "trims" (e.g. engine size, transmission type).[17] In looking at the 236 models available, we

determined how many of those models have a trim that meets or exceed future fuel economy standards. The results, again, indicate that the manufacturers are fully capable of meeting the new requirements. Exhibit 12 looks at how many *models* have a trim that meets or exceeds the future standards.

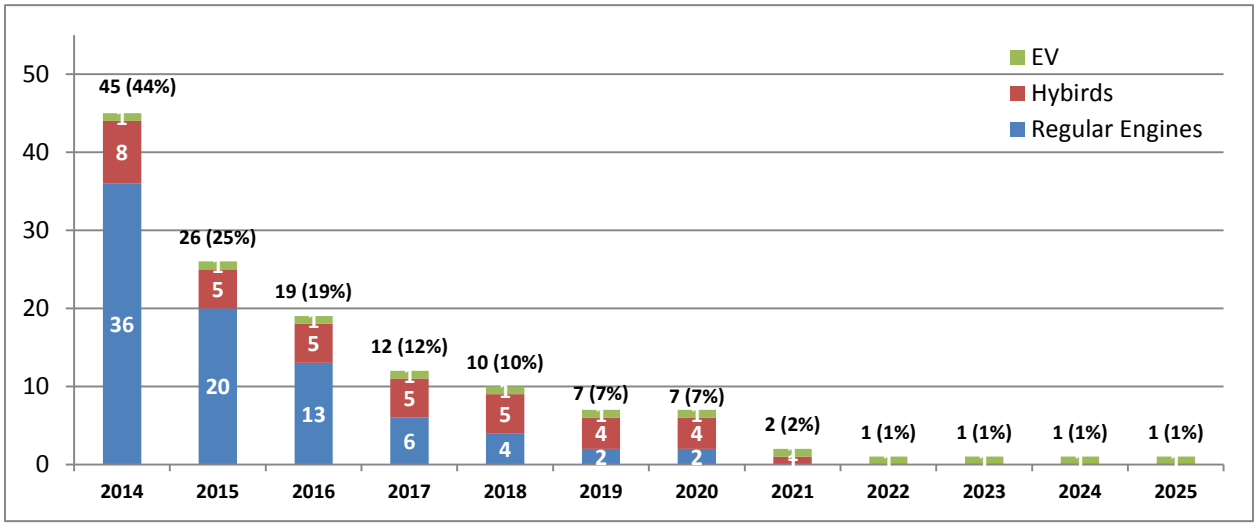
As shown in Exhibit 12, of the 134 different 2013 car models, 65 (49%) have a version (trim) that meets its 2014 target. Nearly a quarter (24%) of the 2013 models have a version that meets the 2017 requirements, and 12 models already have at least one version that meets its 2025 target.

EXHIBIT 12: HOW MANY 2013 MODELS HAVE A TRIM THAT ALREADY MEETS FUTURE STANDARDS?

Sixty-Five 2013 Car Models Have a Trim that Already Meets Future CAFE Standards



Forty-Five 2013 Truck Models Have a Trim that Already Meets Future CAFE Standards



Sources: EPA 2013 fuel economy, CAFE fuel economy standards; CAFE targets rounded down to EPA equivalent.

We have also taken a look at the past 4 years when new models were introduced to see how much the carmakers improved their offerings. Exhibit 13 provides the details. Of the truly

new models (new series) offered each year, typically 80% had significantly better fuel economy than the previous series of the same model. Proposing standards that ramp up slowly over the long term, as the combined 2010-2025 standards do, enables automakers to better plan and manage the process of introducing new and innovative fuel economy technologies into the vehicle fleet.

EXHIBIT 13: NUMBER OF NEW SERIES EACH YEAR WITH FUEL ECONOMY IMPROVEMENTS

Year	Number of New Model Series Introduced	How Many Had Better Fuel Economy	Avg. Increase in Fuel Efficiency over Previous Series
2010	11	9	2.45 mpg
2011	15	13	2.13 mpg
2012	16	13	2.50 mpg
2013	14	10	1.79 mpg
Average	14	11	2.22 mpg

Sources: The Car Book: Model series changes with EPA ratings for vehicles expected to be most popular.

In addition, we looked at what was happening with the fuel efficiency of the most popular models (see Exhibit 14). Looking at the top 25 sellers over the past 5 years, we see a 17% improvement in fuel economy. Considering that these 18 annually top selling vehicles represent, on average, 36% of the new cars sold over the last 5 years, consumers are buying vehicles with better fuel efficiency ratings.[18] A look at the 18 cars that have stayed among the top 25 in sales, over the past 5, years reveals an average gain in fuel economy of 3 mpg with some popular models gaining up to 9 mpg in their most popular trim.

EXHIBIT 14: INCREASE IN FUEL ECONOMY OF CARS CONSISTENTLY IN THE TOP 25 SELLERS

Cars In the Top 25 5 years Running	MPG Gain	2008	2009	2010	2011	2012	2013
Honda Accord	6 mpg	24	24	25	27	27	30
Nissan Altima	5 mpg	26	26	27	27	27	31
Toyota Camry	3 mpg	25	25	26	26	28	28
Honda Civic	4 mpg	28	28	28	28	32	32
Toyota Corolla	0 mpg	29	30	29	29	29	29
Honda CR-V	4 mpg	22	22	23	23	26	26
Ford Escape	6 mpg	19	20	23	20	23	25
Ford Focus	3 mpg	28	27	28	28	31	30
Ford F-Series	2 mpg	14	16	17	17	16	16
Ford Fusion	5 mpg	21	23	25	26	26	26
Chevrolet Impala	0 mpg	22	22	22	23	22	22
Chevrolet Malibu	9 mpg	20	26	25	26	26	29
Toyota Prius	4 mpg	46	46	50	50	50	50
Ram 1500	1 mpg	14	15	15	15	15	15
Toyota Rav 4	2 mpg	21	24	24	24	24	23
GMC Sierra	1 mpg	16	16	17	17	17	17
Chevrolet Silverado	1 mpg	16	17	17	17	17	17
Hyundai Sonata	6 mpg	22	25	25	26	28	28
Average Fuel Economy	3 mpg avg. gain	23	24	25	25	26	26

Sources: EPA Fuel Economy Data (mpg is combined rating for trim expected to be most popular); 2008-2013; Auto News Sales Figures 2008-2013.

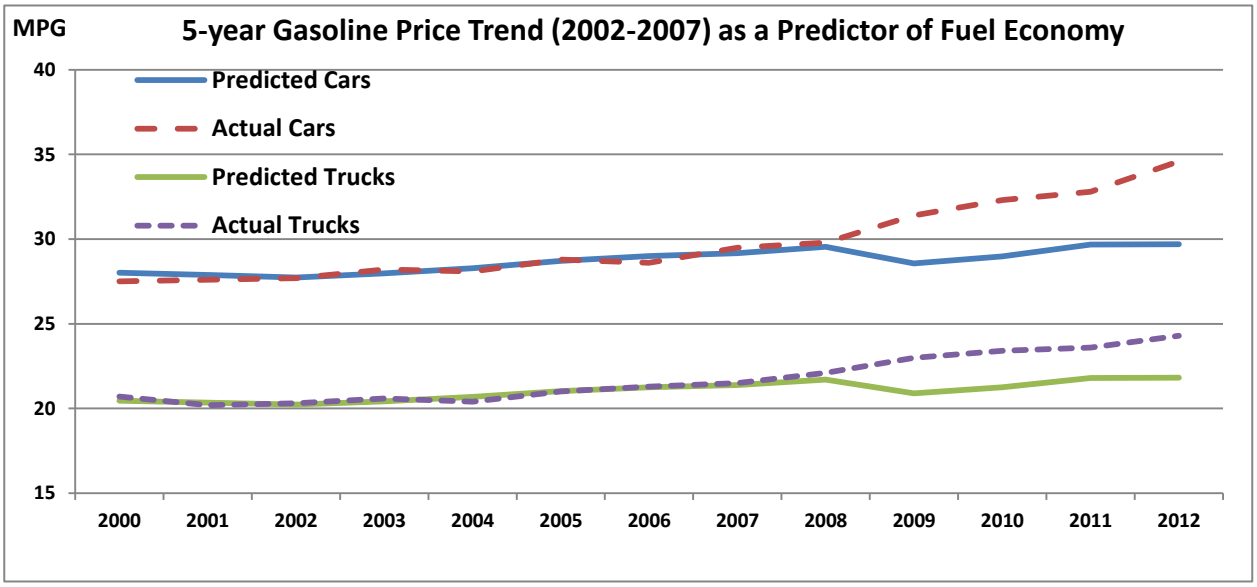
III. A Deeper Dive Into The New Fuel Economy Standards And the Auto Market Response

It is already clear that the market is dynamically adapting to the new standards on both the supply and the demand side. 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 examines several issues that inevitably arise with the acceptance and demand for more fuel efficient vehicles. The following is an in-depth look at 3 key factors on the road to increased fuel efficiency: the role of gasoline prices, electric vehicles and four-cylinder engines.

Gasoline Prices

It is strikingly clear that the shift in fuel economy behavior coincided with the Congressional decision to reform and reinvigorate the fuel economy standards discussed in the previous section, as shown in Exhibit 6 above. However, there is an obvious question that will inevitably be raised: "Are not gasoline prices the actual cause of the change in behavior?" Comparing Exhibit 15 to Exhibit 6 shows that while there is a correlation between gas prices and miles per gallon, standards have a strong correlation. Using the price of gasoline as the predictor of fuel economy, we find that prices dramatically under-predict fuel economy in 2008 and later years. Therefore, other factors must be at work.

Exhibit 15: Mileage Predicted by Real Gasoline Prices v. Actual Mileage



Sources: Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2012,* March 2012; Energy Information Administration, Petroleum Price Database.

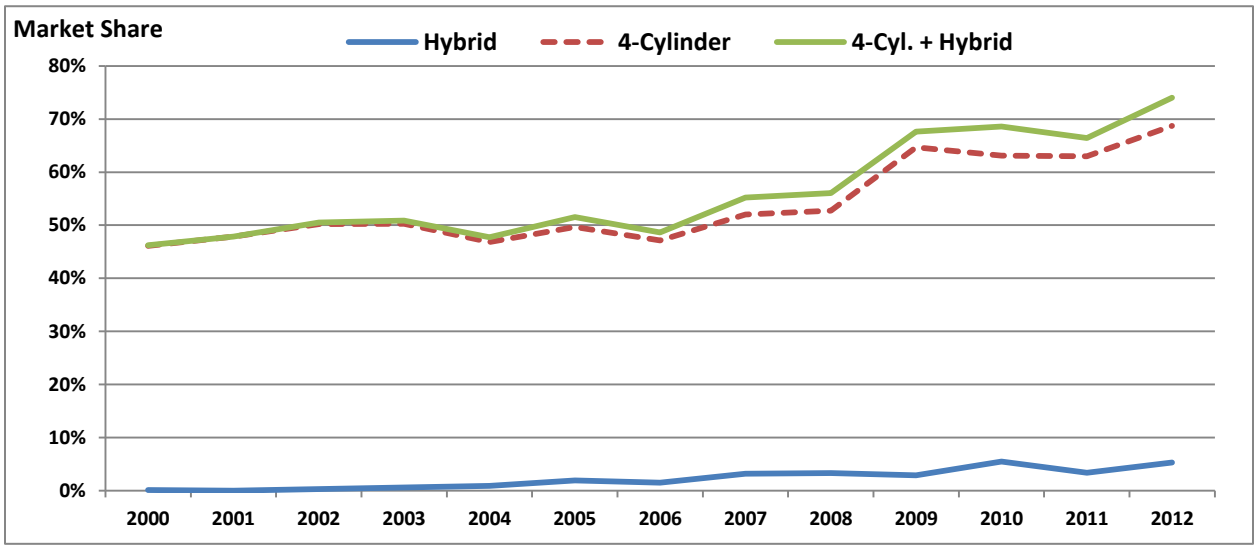
The above analysis supports the hypothesis that the adoption of future standards played a larger role than gas prices. In fact, a statistical model that includes both the announcement of standards and gasoline prices accounts for over four-fifths of the variance in fuel economy and shows that standards have a statistically much larger effect.[19]

FOUR-CYLINDER ENGINES: EFFICIENT, POPULAR

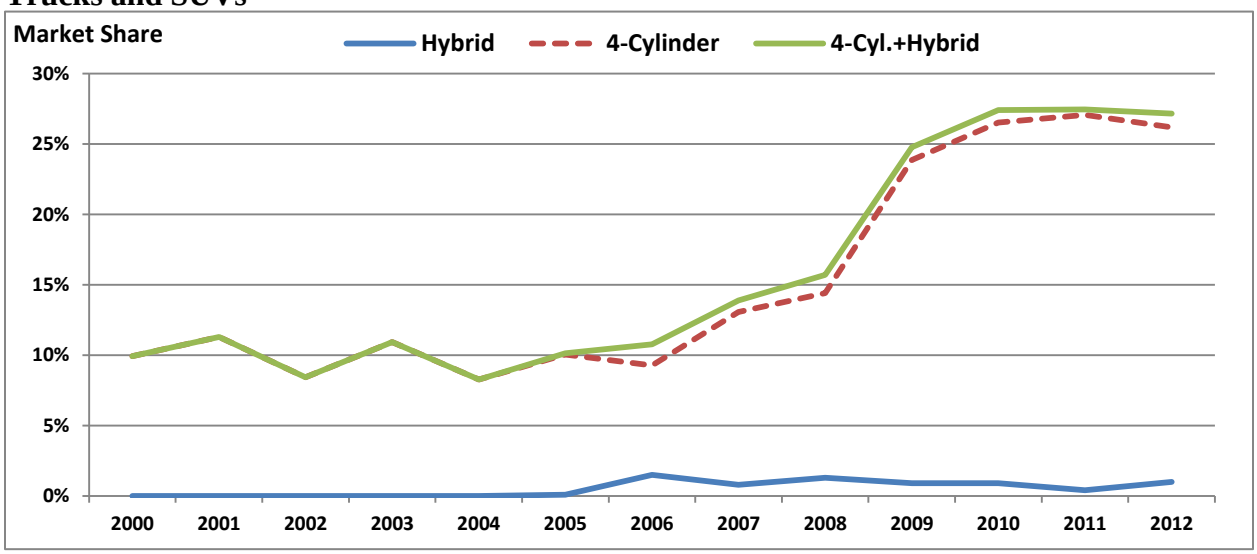
Analyzing sales of vehicles with four-cylinder engines also support this view of the market. As shown in Exhibit 16, the increase began in 2004, but showed a dramatic jump in 2008. One thing that is particularly noteworthy about this chart is that the increase in popularity of four-cylinder engines came after a significant decline in the popularity of 4-cylinder engines from 1987-2004. During that period, manufacturers offered more and more six and eight-cylinder engines focusing on the perceived need for power and speed.

EXHIBIT 16: 4-CYLINDER ENGINES AND HYBRID VEHICLES AS A PERCENT OF CARS SOLD

Cars



Trucks and SUVs

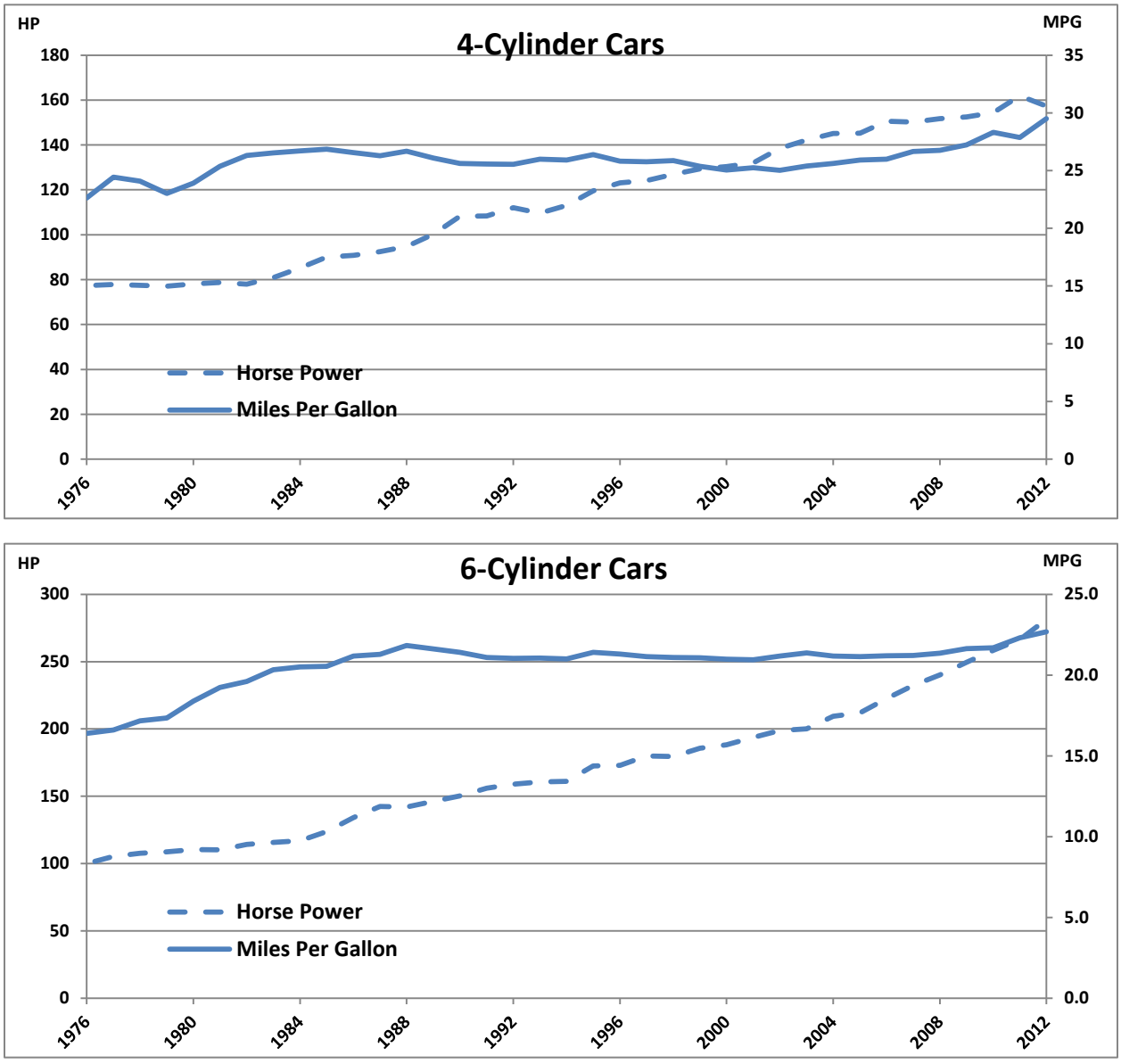


Sources: Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2012,* March 2012.

The recent increase in popularity of four-cylinder engines is due to manufacturers building more power into smaller, more efficient engines. As shown in Exhibit 17, the improving

performance of four-cylinder engines was an important factor in increasing their market share. Four-cylinder engines get much higher gasoline mileage than engines with more cylinders, but in recent years they have been delivering high fuel economy with more horsepower. In contrast to four cylinder engines, six cylinder engines have been increasing their horsepower, while holding fuel economy steady. These trends reflect the efforts of the auto industry to keep options available for consumers while increasing overall fuel economy. They also reflect the fact that one of the major reforms enacted by Congress was to require future standards be attribute based. NHTSA chose the size (footprint) of the vehicle, which means larger vehicles have lower standards. Therefore, a wider range of vehicles that meet the vehicle-specific standard is available in the market.

EXHIBIT 17: CYLINDERS, HORSE POWER AND MILEAGE FOR CARS



Sources: Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2012*, March 2012.

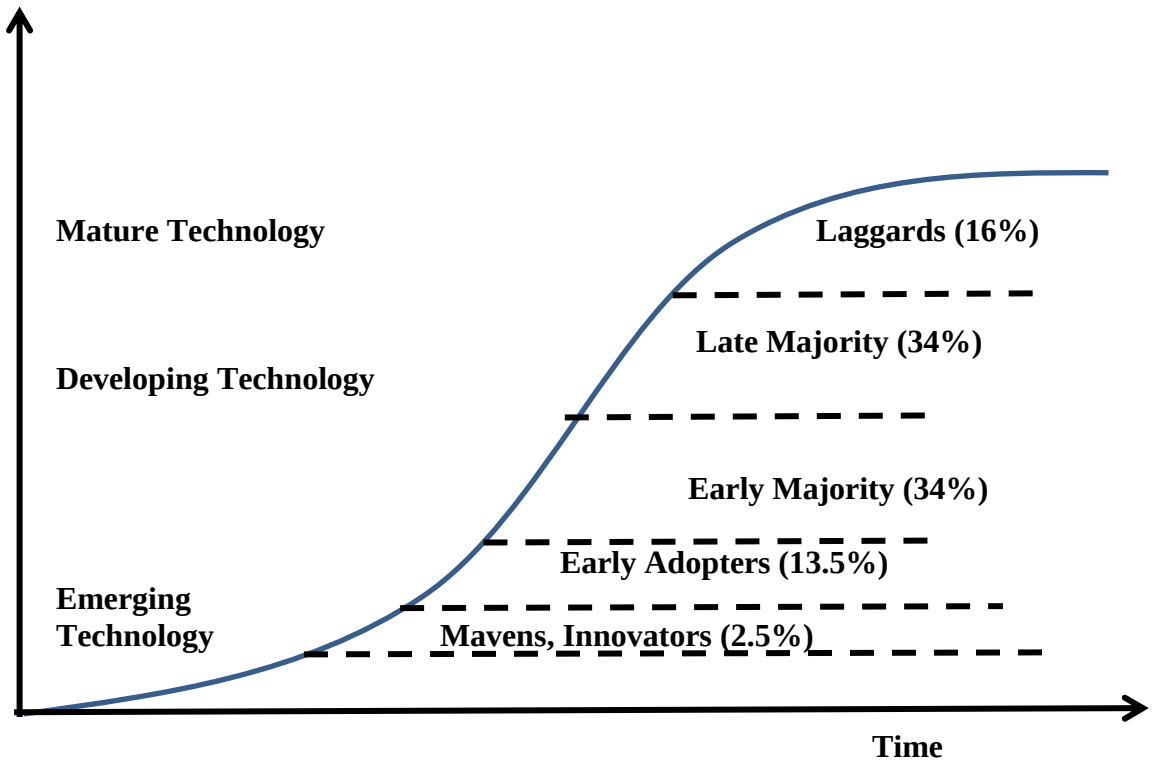
ELECTRIC VEHICLES

Another question that inevitably arises when fuel economy numbers are discussed in the context of the new fuel economy standards is "how are electric vehicle sales doing?" The 54.5 mpg standard is technology neutral--it picks no technology winners or losers. It is widely recognized that the gasoline engine can achieve much higher mileage than it currently does, and the sale of very large numbers of hybrid or other electric vehicles is not necessary to meet the 2025 standard of 54.5 mpg. Nevertheless, electric powered vehicles are seen as the new technology in the market.

The Process of Adopting New Technologies

The electric vehicle likely represents the most profound change currently in the automobile. Its introduction is a function of new technology, and its adoption will be a function of the continuous development of the technology on the supply-side and consumer acceptance of this new technology. Time is a critical variable in analyzing the adoption of new technologies. The adoption of innovative products goes through a series of stages that starts out with small numbers and accelerates before peaking and leveling off. The result is a classic "S curve," as shown in Exhibit 18.

EXHIBIT 18: INTERACTION OF SUPPLY AND DEMAND IN THE DIFFUSION OF INNOVATION[20]



This classical view of innovation adoption highlights several important characteristics in the electric vehicle market. Products do not spring into the market and immediately achieve large market shares. It takes time on both the supply and demand sides. On the supply-side, there is a

significant period of development of a product before it is brought to market. There is continued development of the technology as it is adopted. On the demand side, the small number of very early purchases frequently looks like a "niche" market, comprised of "mavens and innovators," who have unique characteristics. Early adopters are often opinion leaders and are perceived as "ahead of the curve." These opinion leaders serve as resources for the early majority. They tend to be more mainstream than "innovators" and provide legitimacy and broader appeal for the product. This is the product's takeoff period. It is also important to recognize that not all products penetrate 100% of the market, nor is it necessary for them to do so to be profitable.

Adoption of Electric Vehicles

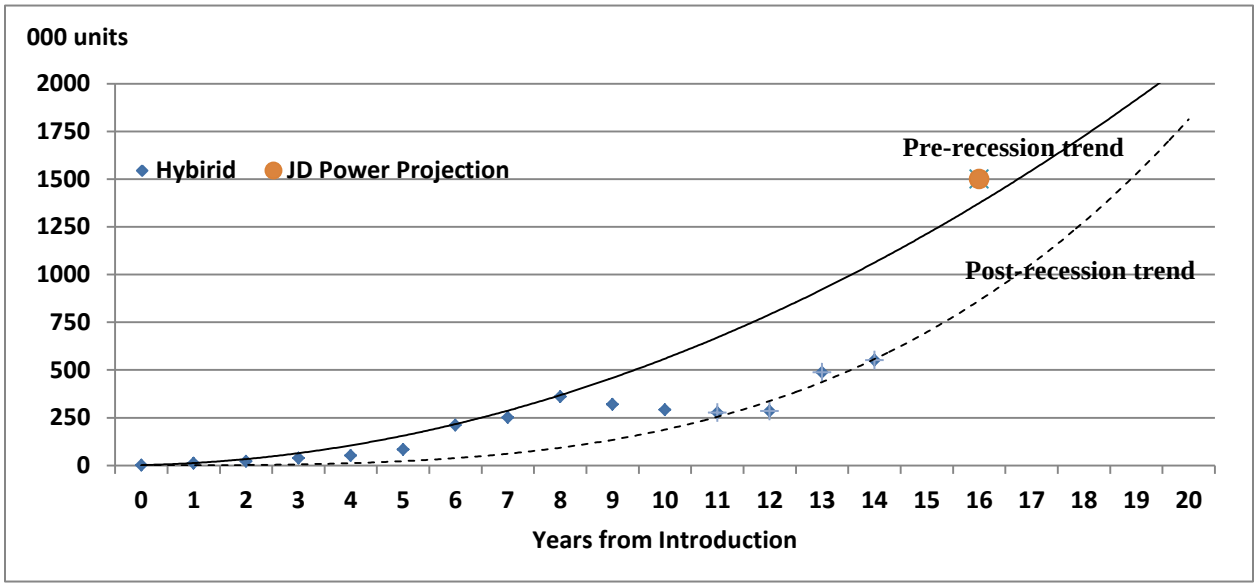
We apply this view of the innovation diffusion process to answer the question "How are electric vehicles doing?",[21] electric vehicles can be divided into two broad categories: hybrids and other electric vehicles (plug in hybrids and battery electrics).[22] The distinction is important, not only because the technologies are different, but also because hybrids were introduced into the market over a decade ago, while other electric vehicles were significantly introduced only about three years ago.

After more than a decade of development and marketing, hybrids are an example of one of the most successful, radically different products introduced in the past two decades. Exhibit 19 shows the sales history and the number of models. Both graphs include a projection from JD Power. The adoption of hybrids appears to have followed a non-linear growth pattern, especially after the initial phase of adoption. The sale of hybrids accelerated after year five, and only the recession slowed them down. Their sales have now recovered. The number of models available has increased along with sales, and JD Power projects a sharp increase in the next few years. Putting models in the showrooms is critically important to driving sales, particularly as hybrid power trains are deployed in more of the various types of vehicles consumers want to purchase. The hybrid car is now well past the developmental phase on the supply side and well into the early adoption phase on the demand side.

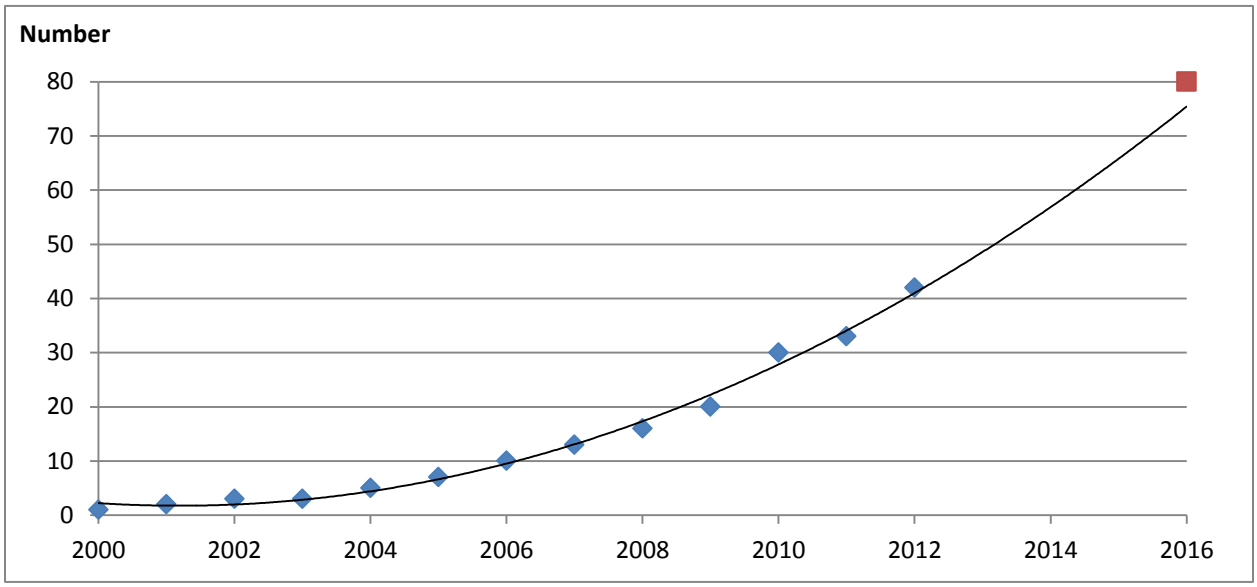
While there is speculation that consumers are not ready for electric vehicles, there has been a sharp increase in sales. Compared to the pattern for hybrids through their first three years, the electrics are doing quite well, as shown in Exhibit 20. In fact, they have reached higher sales than hybrids did in their first three years. If electric vehicles follow a standard and expected nonlinear pattern, there will be large numbers on the road within a decade.

EXHIBIT 19: HYBRID SALES AND PROJECTIONS

Sales



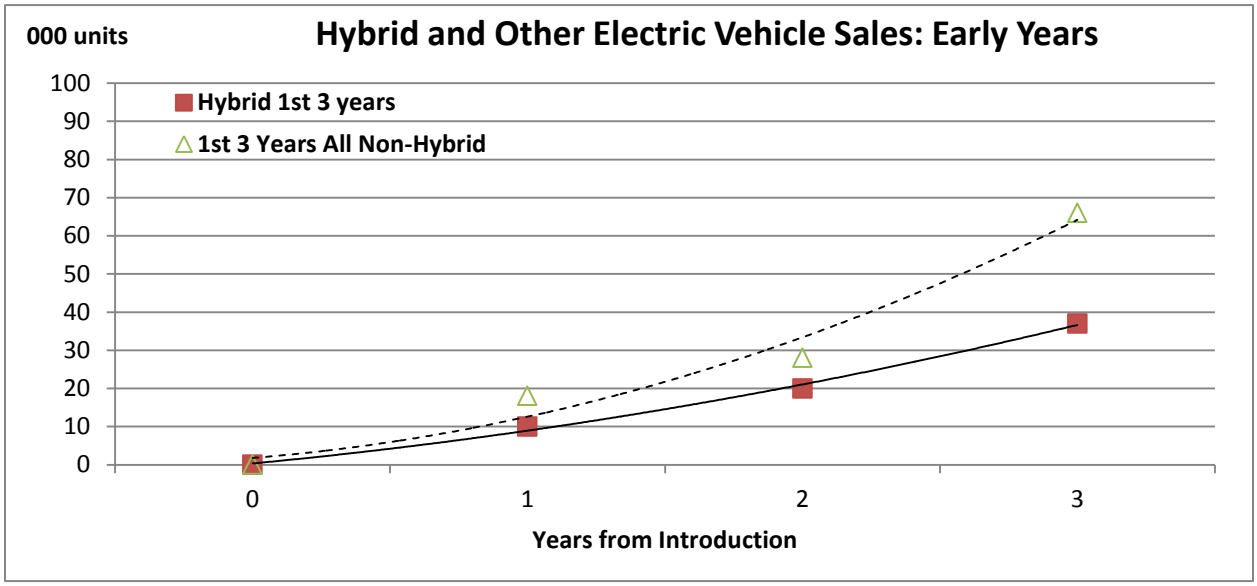
Models



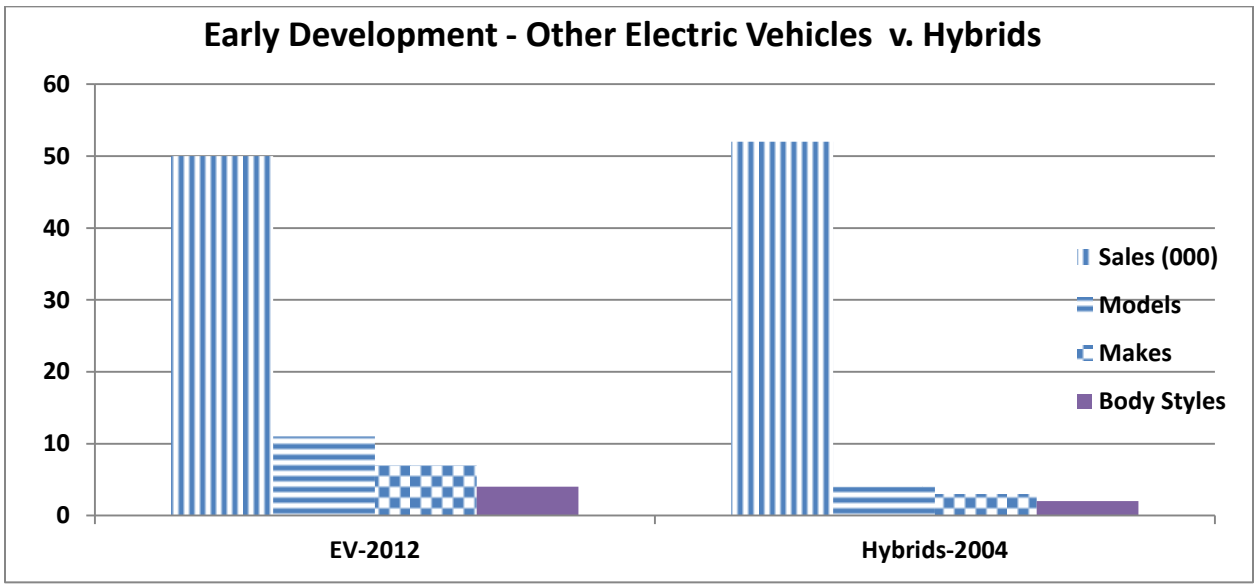
Sources: Rudi Halbirght, Max Dunn, *Case Study: The Toyota Prius, Lessons in Marketing Eco-Friendly Products,* March3, 2010, http://www.hybridcars.com/hybrid-sales-dashboard/... Various years; J.D. Power, ,Mike Omotoso, *Global Alternative Fuel Light Vehicle Sales Forecast,* April 2010; J.D. Power and Associates - 2, *Despite Rising Fuel Prices, the Outlook for "Green" vehicles Remains Limited for the Foreseeable Future,* April 27, 29011, The Boston consulting Group, *The Comeback of the electric Car? How Real, How Soon, and What Must Happen Next?,* June 2011, Exhibit 5, from the "steady pace Scenario;" Electric drive vehicle sales figures (U.S. Market) - EV sales, http://www.electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952.

EXHIBIT 20: HYBRIDS COMPARED TO NON-HYBRID ELECTRIC VEHICLES

Sales



Models, Makes and Body Types



Sources: See Exhibit 19.

CONCLUSION

The fact that car companies, consumers, auto workers and environmental groups all supported the standard has set the stage for one of the most important energy policies in a quarter century. Current progress makes it clear that meeting the 54.5 mpg by 2025 standard is well within the reach of automakers.

Public support for fuel economy standards and rising gasoline prices were a fertile environment for a well-designed performance standard to trigger a dynamic response by the industry. This analysis shows that the standards possess several characteristics that helped to ensure their success. They are:

- economically beneficial;
- gradual and long-term;
- attribute based,
- procompetitive, especially when combined with EPA's new labels, and
- technology neutral.

Fully implementing the standard will pave the way to significant consumer economic benefits and financial protection against rising and volatile gasoline prices, reduced dependence on foreign oil, and both the economic and health benefits of a cleaner environment.

ENDNOTES

[1] U.S. Bureau of Labor Statistics, *Consumer Expenditure Survey, 2012.*

[2] Mark Cooper And Jack Gillis, *Policymakers, Consumers And Automakers Are Shifting New Vehicles to Higher Fuel Economy*, Consumer Federation of America, Consumer Federation of America, July 2012

[3] Consumers Union, Consumer Reports National Research Center, *Auto Pulse #26: Fuel Economy*, April 26, 2012.

[4] The shift is statistically significant (Chi Square $p < .000$).

[5] The shift to types of vehicles that are more fuel efficient accounts for almost one-fifth of the expected increase in fuel economy.

[6] Because there are so few who think fuel economy is not important, the confidence interval around the average is very large, as shown in the Exhibit, but the difference between those who think it is important and those who do not is statistically significant because it is so large. The relationship between importance and expected fuel economy is highly statistically significant ($p < .0000$) and quantitatively meaningful, with the importance of fuel economy explaining 8% of the variance in expected fuel economy

[7] The statistically significant factors explain 37% of the variance in next vehicle fuel economy. The standardized beta coefficients are as follows:

Current mpg	.49***
Importance of fuel economy	.18***
Pickup	-.1**
Subcompact Compact	.08*
Large Sedan	-.07*
Gender (Male=2)	-.07*
Income	-.07*

Sig. Levels: **** <.0001, *** <.001, ** <.01, * <..1

Given that these background and basic attitudes do not take into account many other factors that affect fuel economy, like the number of cylinders, the transmission, etc., the amount of explained variance is substantial.

[8] 1985-2010

[9] *The Energy Independence and Security At of 2007.*

[10] Comments of Consumer Groups, Proposed Rule 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions) and Corporate Average Fuel Economy Standards, Docket Nos. EPA-HQ-OAR-2010-0799; FRL-9495-2, NHTSA–2010–0131, February 13, 2012 analyzes the importance of this sustained commitment to higher standards coordinated at the federal and state levels.

[11] For the 2013 models, EPA requires a new fuel economy label which, among other important elements, rates fuel economy on a 1-10 scale.

[12] Each year *The Car Book* identifies what are typically the most popular vehicle models based on prior year sales and then identifies what is expected to be the most popular version of those models. The fuel economy rating of the popular models was used for this analysis.

[13] National AAA Average Fuel Cost as of April 23, 2013

[14] See not 10.

[15] Vehicles represent typical pairs of vehicles consumer may be considering in each of the size classes.

[16] Annual savings on gas, driving 15,000 miles with gas prices at $3.52 per gallon

[17] In other words, there is an average of 7-8 versions or trims of each model. Some models have many trims; others have one or just a few. Each has their own fuel economy rating.

[18] Automotive News Annual Sales Figures 2008-2013

[19] A two variable regression model explains four-fifths or more of the variance, with all the coefficients significant and no problem of co-linearity. In a multiple regression model, the coefficient on standards is much larger and more highly significant. This is the case whether we use a short period of price history (five years of rising prices from 2002-2007) or a long period (21 years of prices 1986-2007). Regressions were also run with lags on the gasoline price variable of two and three years. There results were similar, with the gasoline price effect weaker.

CARS					TRUCKS				
21-year	β Coff.	Sig.	β Coeff.	Sig.	21-year	β Coff.	Sig.	β Coeff.	Sig.
Standard	.8958	****	.6284	****	Standard	.8932	****	.7017	****
Price	na		.3500	***	Price	na		.2507	***
R^2	.79		.85		R^2	.73		.82	
5-year					5-year				
Standard	.8483	****	.6510	****	Standard	.8985	****	.7001	****
Price	na		.3900	*	Price	na		.3116	**
R^2	.72		.78		R^2	.81		.86	

Sig. Levels: **** <.0001, *** <.001, ** <.01, <.1

[20] Mahajan, Vijay, Eitan Muller and Frank M. Bass, "New Product Diffusion Models in Marketing: A Review and Directions of Research," *Journal of Marketing,* 54 (1990); Rick Brown, "Managing the "S" Curve of Innovation," *Journal of Consumer Marketing,* (:1 (1992); Jackie Fenn, *When to Leap on the Hype Cycle*. Gartner Group (1995); Paul gilder and Gerard J. Tellis, "Will it Ever Fly? Modeling the Takeoff of Really New Consumer Durables," *Marketing Science,* 16: 3 (1997), "Growing, Growing Gone: Cascades, Diffusion, and Turning Points in the Product Life Cycle," *Marketing Science,* 23: 2 (2004); ; Rajeev Kohli, Donald R. Lehman and Jae Pae, "Extent and Impact of Incubation Time in New Product Diffusion, *Journal of Product Innovation Management,* 16 (1999); Yshitaka Osawa and Kumiko Miazaki, "An Empirical Analysis of the Valley of Death: Large Scale R&D Project Performance in a Japanese Diversified Company," *Asian Journal of Technology Innovation,* 14:2 (2006); Ashish Sood, Et al., "Predicting the Path of Technological Innovation: SAW vs. Moore, Bass, Gompertz and Jryder," *Marketing Science,* 31: 6 (20)

[21] Mark Cooper, Will They or Won't They? Consumer Adoption of High Fuel Economy Vehicles, 1999-2012, and the Role of the 2025 Standards in Speeding Diffusion of Advanced Technology, Panel on Consumer Acceptance of Advanced Technology Vehicles Mobile Sources Technical Review Subcommittee, December 13, 2012

[22] There are three types of electric powered vehicles on which the auto market is focused at present that can be distinguished by two characteristics, whether they have gasoline engines and whether the batteries can be recharged by being plugged in. Hybrids, like the Prius, entered the market in significant numbers over a decade ago. Plug-in hybrids and all electric vehicles entered the market in significant numbers about a decade after the hybrids. For the purposes of innovation diffusion analysis, since the time of market entry is important, we group the latter two as other electric vehicles.

		Plug-in Capacity	
		No	Yes
Gasoline	No		All electric vehicle
	Yes	Hybrid	Plug-in Hybrid