Consumer Federation of America
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A CONSUMER POCKETBOOK AND NATIONAL COST-BENEFIT ANALYSIS OF "10 in 10"

INCREASING CAFE STANDARDS 10 MILES PER GALLON OVER TEN YEARS WILL SAVE CONSUMERS MONEY AND HELP CURE THE NATIONAL OIL ADDICTION

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CONSUMER COSTS OF MANDATING 35 MPG IN 10 YEARS ARE COMPLETELY OFFSET BY FUEL SAVINGS

FLAWED NHTSA ASSUMPTIONS PREVENT CAFE INCREASES

CONGRESSIONAL ACTION ON STRONG FUEL ECONOMY STANDARDS WILL SAVE CONSUMERS $1000-$1500

Washington, D.C. June 4, 2007 -- A new analysis by the Consumer Federation of America (CFA) shows that a ten mile-per-gallon improvement in the fuel economy of new vehicles achieved over ten years would pay for itself – not just over the vehicle lifetime but on a monthly basis for the majority of consumers who borrow to buy. It further concludes that the National Highway Transportation Safety Administration (NHTSA) has slowed increases in fuel efficiency standards because of flawed analyses and calls on Congress to mandate a 35 mile-per-gallon goal for Corporate Average Fuel Economy (CAFÉ).

"Our analysis proves a mandatory increase to 35 mpg in ten years passes both a consumer pocketbook test and a national cost-benefit test with flying colors," says Dr. Mark Cooper, CFA Director of Research. "NHTSA's flawed assumptions have prevented fuel economy improvements to date. If Congress continues to allow NHTSA to determine when and whether automakers need to improve fuel economy, we will get the same weak results."

As the summer driving season begins with record gasoline prices and the Senate prepares to debate CAFE legislation, the report, entitled "A Consumer Pocketbook and National Cost-Benefit Analysis of Ten-in-Ten" analyzes the impact of moving from the current average of 25 mpg to 35 mpg in ten years on both the consumer's pocketbook and the Nation's "oil addiction."

According to the CFA report findings, achieving 35 mpg fleet-wide benefits consumers.

- The fuel savings of more efficient cars offset any increase in the cost of the auto loan.
- Consumers can save up to $1500 with gasoline at $3 a gallon and nearly $1000 with gasoline at $2.50 a gallon.

Going to 35 mpg in ten years also eases the nation's oil addiction. It would:

- Save over 100 billion gallons of oil over the next ten years.
- Reduce oil imports by more than 15 percent when 35 mpg is reached.

- Cut emissions of global warming, green house gases by over a half-billion tons per year.

"With gasoline bills up by more than $1,000 per year since 2002, consumers are feeling the pain at the pump, but they also recognize the broader implications of our national oil addiction," Cooper added. "With oil at $60 a barrel, a half-million dollars is flowing out of our country every minute, increasing our trade deficit, creating huge opportunity costs, and most significantly, putting money into the hands of regimes that are hostile to our interests."

"In the past, the bureaucrats who set the standard have failed to reflect reality in their analyses, and that has cost us dearly," Cooper said. "It's time for our elected representatives to take leadership in setting fuel economy standards."

CFA's analysis finds that past analyses by NHTSA have failed to recommend increases in fuel efficiency because of unrealistic and irresponsible assumptions.

- The 2005 EIA Annual Energy Outlook, on which the National Highway Safety Administration (NHTSA) model relies, appears to be based on gasoline prices that are less than $1.50 per gallon in the next decade.

- NHTSA uses an estimate of social costs (externalities like economic burden, national security, and environmental harm) that is irresponsibly low – about at 10 to 20 cents a gallon – when the real social cost of these externalities should be ten times as high, such as $1- $2 per gallon.

"The current legislation is headed for another train wreck because it leaves NHTSA in charge of setting the goals," Cooper concluded. "If Congress wants to seriously address the nation's oil addiction, it must close the loopholes. Congress needs to take responsibility, set a mandatory goal of 35 mpg, and specify the assumptions that should be used in future cost-benefit analyses."

INTRODUCTION

Last year, the Consumer Federation of America published an analysis of the economic impact of a large, long-term increase in the fuel efficiency of the vehicle fleet on consumers. In a report entitled *50 by 2030*,[1] we concluded a doubling of the fuel efficiency of the vehicle fleet was essentially self-financing from the consumer point of view. Assuming a gasoline price of $3.00 per gallon, we concluded that the reduction in consumers' monthly gasoline bill would be equal to or greater than the increased monthly cost to consumers of buying even these extremely fuel efficient vehicles.

Congress and the administration are now engaged in a debate over a much shorter-term policy change, which would essentially be *35 by 2018.* The leading legislation in the House and Senate seeks to require an increase in the light duty vehicle fleet (cars and light trucks) of ten miles per gallon (mpg) in ten years (frequently referred to as *10 in 10*). Because the vehicle fleet today averages just under 25 miles per gallon, this works out to a fleet average for new vehicles of about 35 miles per gallon by 2018 (assuming a year for passage and start-up). In the Senate version reported out of the Commerce Committee, improvements in efficiency are targeted to continue, potentially reaching the goal of 50 mpg by 2030, along the path we outlined last year.

Updating the previous report, this paper applies the consumer economic analysis to the interim goal of "*10 in 10*."

While the pending legislation sets aggressive targets, it also allows federal agencies to adjust the improvements based on technical and economic considerations. It is important that these analyses be based on assumptions that reflect realistic and responsible estimates of the costs and benefits of increased fuel efficiency. Previous analyses by the agencies involved have been seriously deficient in this regard. As a result, they have failed to require increases in fuel economy that would benefit consumers and the nation.

For example, in the most recent setting of the mileage standards for light trucks, the National Highway Transportation Safety Administation (NHTSA) initially required only a 1.5 mpg increase by 2012,[2] based on a gasoline price of $1.50 per gallon.[3] It then raised the price to $2.27, but concluded that only 1.5 miles per gallon is justified. It is remarkable that a 50 percent increase in the cost of gasoline resulted in no increase in the recommended level of fuel economy. Even more remarkable is the fact that in recently launching another analysis of Corporate Average Fuel Economy (CAFE) standards, NHTSA, went back to $1.50 per gallon for gasoline, which is less than half the price consumers are currently paying.[4] Ironically,

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[1] Mark Cooper, *50 by 2030* (Washington, D.C.: Consumer Federation of America, May 2006) available at http://www.consumerfed.org/pdfs/50_by_2030.pdf

[2] Department of Transportation, National Highway Traffic Safety Administration, *Average Fuel Efficiency Standards for Light Trucks: Model Years 2008-2011,* 49 CFR 523, 533 and 557 Hereafter, NHTSA, Truck Rule).

[3] Id., pp. 33-35.

[4] National Highway Safety Administration, *CAFÉ Compliance and Effects Modeling System (Documentation Draft, 5/26/06).*

even with that low price, the model shows that an increase of more than twice the 1.5 mpg it recommended just last year is justified for light trucks.

If federal agencies continue to use these unrealistic assumptions and distorted analyses, the nation will never achieve the targets Congress has set out to reduce the nation's "oil addiction."[5] This paper also updates our previous research by examining several of the key assumptions underlying the NHTSA analysis. The update and examination of assumptions make it clear that *10-in-10* and *35 by 2018* are both in the consumer and national interest. *35 by 2018* is a step toward *50 by 2030.*

METHODOLOGY

Consumer Pocketbook Analysis

The cornerstone of our analysis is a consumer pocketbook calculation of the increase in efficiency. Our approach is as follows:

We recognize that increasing gasoline mileage requires increased cost that the consumer pays. Although some opponents of increasing CAFE act as if the auto companies bear the burden, ultimately it is the consumer who will be required to cover the cost. The fundamental question is, will the consumer be better off for having done so? To answer this question, we take a strict consumer view. Since most consumers finance their auto purchases, we ask, "What impact does the increase in initial cost to achieve higher fuel efficiency have on the total out of pocket monthly cost the consumer pays, when the fuel savings are factored in?"

As we pointed out in detail in our analysis last year, public policy analysts can quickly complicate this simple question beyond recognition. They frequently (and incorrectly) impose a high "discount" rate on the calculation, which essentially assumes that consumers have alternative uses of their money which earn them fabulous rates of return. In reality, the typical consumer neither has these fabulous alternatives available nor does the consumer use his or her own money to purchase the vehicle. Consumers borrow someone else's money and pay off an auto loan at a fixed, short-term rate. For the consumer, it is straightforward to calculate the monthly payment the consumer would incur when buying the car and the monthly gasoline bill the consumer would pay to drive it.

Unfortunately, policy analysts further misrepresent the issue by assuming an extremely short period for recovery of the costs of increased fuel efficiency. In other words, they assume that the entire cost of fuel efficiency must be recovered in a few years, even though most vehicles stay on the road for a decade or more. This ignores the fact that when consumers sell or trade their new autos, they might be able to recover the cost of fuel efficiency in that sale price. They will retire the remainder of the auto loan when they retire (sell) the car, using the sale to pay-off the loan. Higher gasoline mileage can fetch higher

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[5] President Delivers State of the Union, January 2006, available at: http://www.whitehouse.gov/news/releases/2006/01/20060131-10.html

resale or trade in values. With fuel efficiency becoming more important, this is becoming more likely. Thus, we remain convinced that from a consumer point-of-view, the relevant analysis involves a period at least as long as the length of the loan.

Thus, we calculate two consumer pocketbook tests:1) The out-of-pocket test compares the increase in loan payments to the amount saved due to reduced gasoline consumption over the life of the loan; 2) The life of the vehicle test includes the gasoline savings over a ten year period, which is assumed to be the life of the vehicle.

To conduct the analysis we use a 7 percent auto loan rate, which is available today[6] with a five year loan life. Well over half of all new auto loans are five years or longer.[7] Because consumers tend to drive their newer cars more, the gasoline savings are estimated based on 15,000 miles per year driven in the first year (which is the basis for Environmental Protection Agency (EPA) and NHTSA calculations), declining by 1000 miles per year. As fuel efficiency becomes a greater concern, the use of more efficient vehicles is likely to grow, making this a conservative assumption.

Social Cost Benefit Analysis

The simple consumer economic point of view remains the cornerstone of any consumer analysis. However, we cannot ignore broader policy issues. Public opinion polls show that the American people are well aware of the broader policy implications of what President Bush has called our national “oil addiction.” The public is concerned about importation of oil from unstable regions of the world.[8] They are concerned about global warming, to which auto tailpipe emissions are a major contributor. Increasing the fuel efficiency of the vehicle fleet provides benefits by reducing the impact of gasoline consumption in each of these areas.

From the societal point of view, the least we can do is to calculate the fuel savings over the full life of the car. Society will certainly see the benefits, valued at least at the price at the pump. In today’s market, consumers might reap that benefit in the resale price of the car. It is possible that consumers who make the initial sound decision to purchase a more fuel efficient car will be able to capture the future value of the fuel savings. If they drive the car after they have paid off the loan, they get a large benefit.

When the social costs and benefits are considered, we also examine two different discount rates. NHTSA uses a standard 7 percent rate. We use the 7 percent rate and a 3 percent rate, as recommended by many public interest advocates.[9] A 3 percent real discount rate is much closer to what the consumer can earn in the market.

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[6] Payments are calculated using the loan rate calculator at bankrate.com

[7] Consumer Bankers Association, *2006 Automobile Finance Study: Highlights of the2005 Year-End Data,*

[8] Consumer Federation of America, *Americans Alarmed About Dependence on Oil Imports and Resulting High Gas Prices and Funding of Terrorism,* May 21, 2007, available at http://www.consumerfed.org/pdfs/CFA_For_Immediate_Release052107.pdf

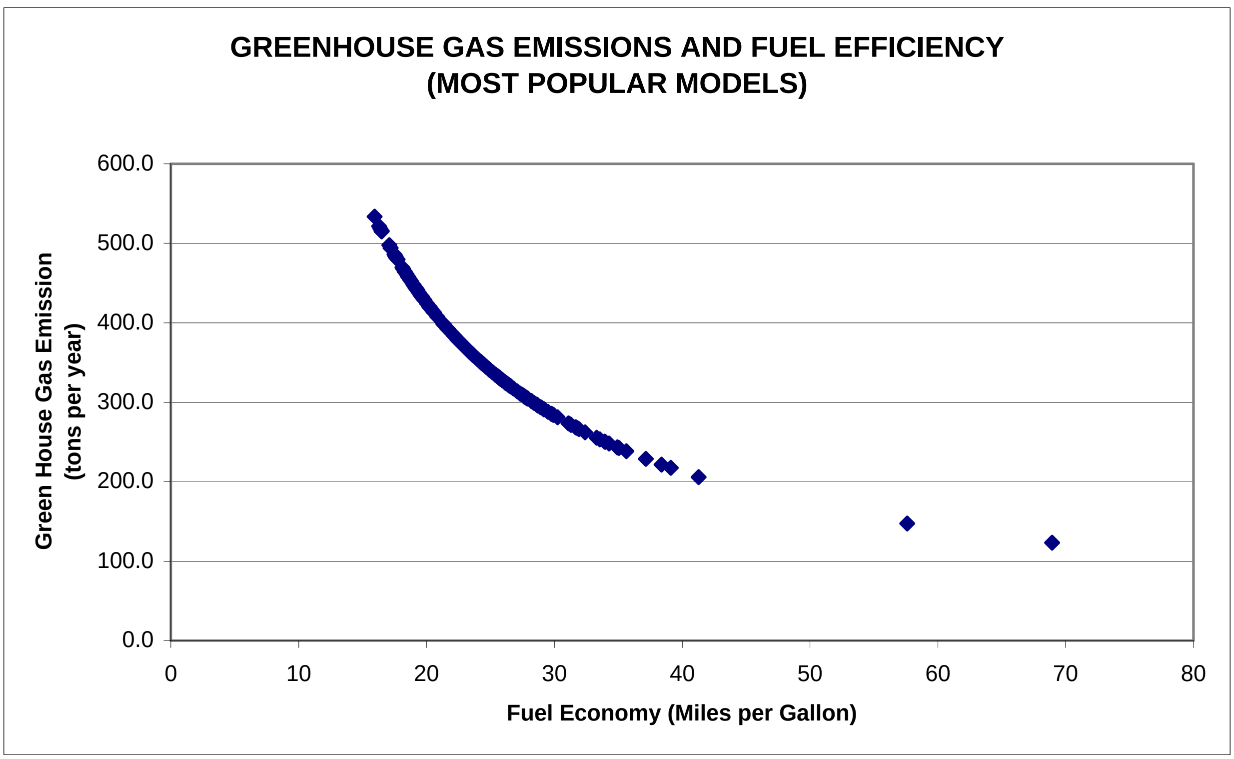
[9] NHTSA, Truck Rule, pp. 213-219.

Quantifying the external benefits of reduced gasoline consumption is challenging, since these are not priced in market transactions. One area that has received a great deal of attention recently is the issue of greenhouse gas emissions, which are associated with global warming. Indeed, for years the energy efficiency debate was driven by environmental concerns.

The impact of gasoline consumption on emissions can be defined with some precision. Resources for the Future estimates the emission of approximately 20 pounds of carbon dioxide (a greenhouse gas) per gallon of gasoline consumed. CFA merged its database on fuel consumption of new autos (derived from the EPA fuel mileage tests) with the Union of Concerned Scientists' analysis of carbon emissions from new vehicles (see Exhibit 1). We discover a near perfect correlation. Fuel efficiency and clean cars go hand-in-hand.

Measuring the amount of emissions is one thing. Translating that value into a cost to society is quite another. A number of estimates of a variety of environmental impacts have been made. These include, in addition to global warming, impact on agriculture, visibility, buildings, and water pollution. However, we should not include in this analysis many of the environmental costs associated with vehicles – like noise, land use or congestion – which are not associated with oil consumption as such.

Exhibit 1:



Source: Merger of Consumer Federation of America Mileage Rating Scale database and Union of Concerned Scientists, Clean Car Discount database.

External economic impacts present a similar complexity. For example, in a series of studies, David Greene has calculated "the economic costs of oil dependence" for three precisely defined economic costs – wealth transfers, loss of potential gross domestic product and macroeconomic adjustment costs.[10] Others include a much broader range of costs including subsidies for vehicle transportation and oil production.[11]

Geopolitical vulnerability is extremely difficult to measure. One obvious possibility to which some have turned is to calculate the cost of deploying military power to protect oil production. The argument about what would have been done in terms of military deployment absent a dependence on oil is extremely difficult to unravel, however.

As a result of the uncertainties in how external costs are defined, the range of estimates is extremely wide. Since these costs are not central to our analysis and the benefits of reducing them are "gravy" atop the consumer analysis, we need not spend a great deal of time trying to sort out the complexities. An order of magnitude estimate is helpful to put the consumer economic analysis at $3.00 per gallon in perspective.

Exhibit 2 presents the estimates for a very narrow range of externalities. All the external costs are attributable to the broader consumption of oil and have been converted to a per gallon basis using total oil consumption. This does not include any of the subsidies for vehicle transportation or oil production.

Exhibit 2: Estimates of Narrowly Defined Oil Consumption Externalities
(in dollars per gallon)

EXTERNALITY	LOW	HIGH
Environment	$.13	$.72
Economic	$.52	$.70
Military	$.20	$.40
Total	$.85	$1.82

International Center for Technology Assessment, *The Real Price of Gasoline,* 1997, *Gasoline Cost Externalities Associated with Global Climate Change,* September 29, 2004; *Gasoline Cost Externalities: Security and Protection Services,* January 25, 2005; Lovins, Amory, et al., *Winning the Oil Endgame* (Rocky Mountain Institute, 2004); Greene, David L., and Sanjana Ahmad, *Costs of U.S. Oil Dependence: 2005 Update* (Oak Ridge National Laboratory: Tennessee, February 2005)..

[10] Greene, David L., and Sanjana Ahmad, *Costs of U.S. Oil Dependence: 2005 Update* (Oak Ridge National Laboratory: Tennessee, February 2005).
[11] International Center for Technology Assessment, The Real Price of Gasoline, 1997, Gasoline Cost Externalities Associated with Global Climate Change, September 29, 2004; Gasoline Cost Externalities: Security and Protection Services, January 25, 2005; Lovins, Amory, et al., Winning the Oil Endgame (Rocky Mountain Institute, 2004).

In 2007 dollars, a range of $1.00 to $2.00 per gallon is a cautious estimate of the external costs associated with gasoline consumption.

Gasoline Prices

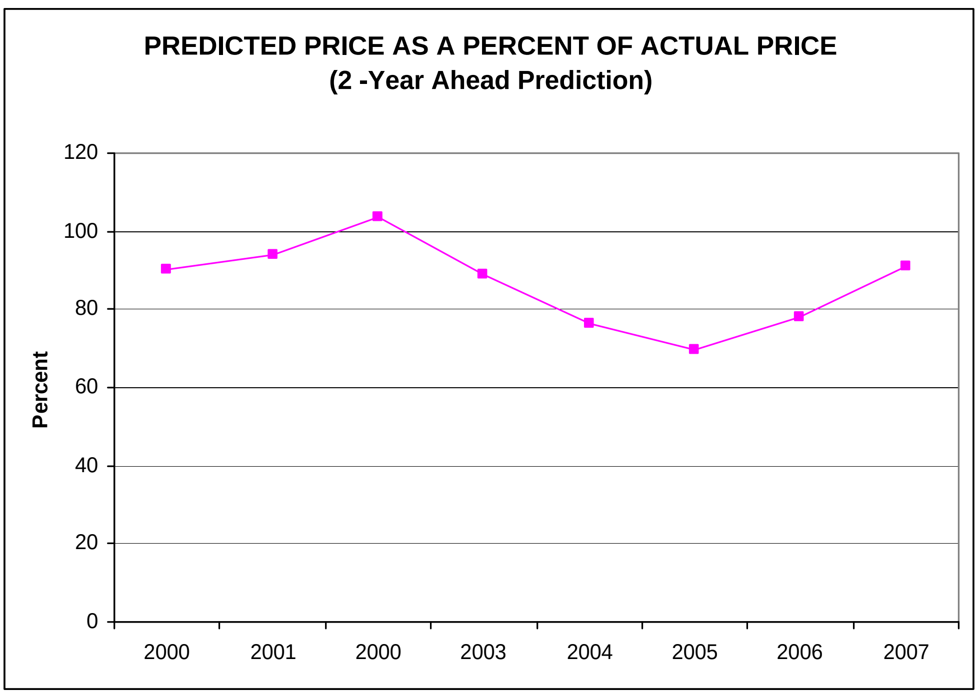
One of the most important elements of both the consumer and societal cost benefit analyses is the price of gasoline. We use $2.50 and $3.00. NHTSA's recent analyses have been based on much lower prices.

The Notice of Proposed rulemaking for light trucks began with a price of $1.50 per gallon, obviously too low. The final rule switched to $2.27, but then made no change in the recommended level of efficiency. The CAFE model, reverts to the $1.50 gasoline price, although it was not fully updated.

NHTSA relies on Energy Information Administration (EIA) projections of prices, but that provides little solace. The current (2007) EIA projection for prices over the next decade and a half predict dramatic reductions in the real price of gasoline. Compared to today's price, EIA projects a 2010 price that is 18 percent lower in real terms, a 2015 price that is 22 percent lower and a 2020 price that is 19 percent lower.

To analyze the impact of EIA's price projections on the NHTSA cost benefit analysis we examined short term (see Exhibit 3). We chose a two year lag for the short term, since that tends to be the lag in the EIA annual Energy Outlook.

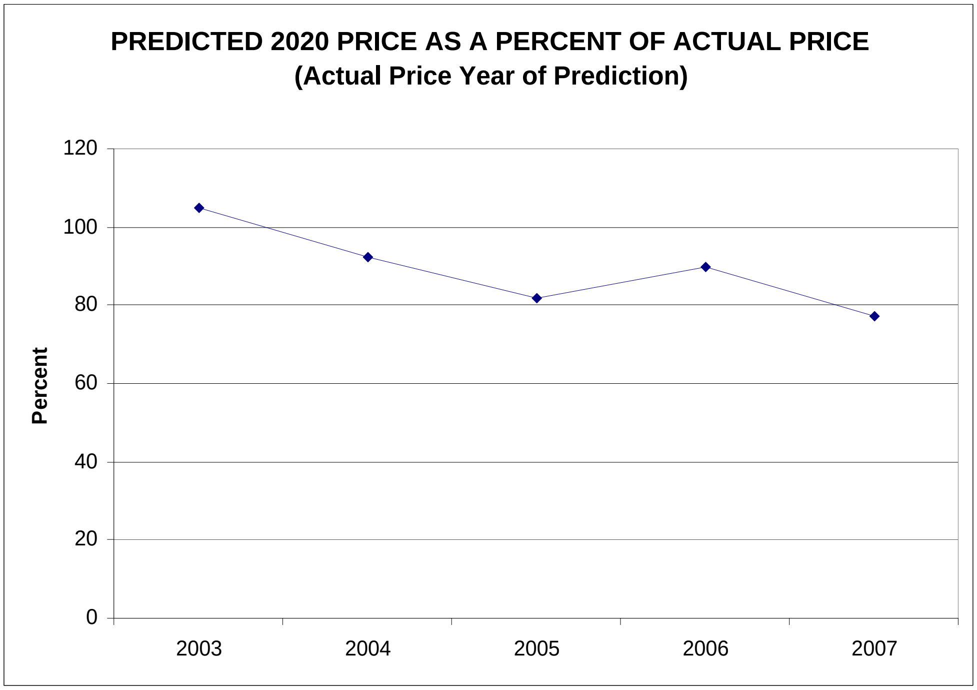
Exhibit 3: Short-Term Prediction



Source: Short-Term various years compared to actual prices.

We also looked at long-term price projections (see Exhibit 4**).** We chose the longer term price projections for 2020, since that is approximately the year in which 35 miles per gallon will be achieved and the year in which the 10 in 10 period ends. Exhibit 4 compared the real price assumed for 2020 to the then current price of gasoline.

Exhibit 4: Long-Term Predictions



Source: Short-Term and Annual Energy Outlook, various years compared to actual prices.

Since the severe run up in gasoline prices that began after the turn of the century, the EIA has had difficulty predicting prices in the short term (2-years) and its projection of longer term prices does not closely reflect the current prices being paid by consumers. It severely under-predicted short term prices in the 2003-2005 period, but has improved those short term prices in the last couple of years. At the same time, EIA has dramatically lowered its prediction of long term prices in recent years.

EIA has been erratic in its predictions about the real price changes in the long term (see Exhibit 5). It swings from predicting real price increases to real price declines. While the differences in Exhibit 5 may seem small, compounded over a ten year period, they become substantial. The difference between a ten year projection at 1.005 percent and a ten year projection at .997 percent results in a difference in the final year projection of more than 12 percent.

The impact of these price prediction differences can be substantial. Thus, the truck rule was written on the basis of prices that have proven to be far too low, but the error was predictable (and correctible). The 2015 price used in the 2005 projection was about $1.56 per gallon (in 2005 dollars). The actual price paid in 2004 (in 2005 dollars) was about $1.96. EIA and NHTSA scrambled to adjust, shifting to an early 2006 price projection which was higher, but the range of prices projected for the 2008-2012 time frame were in the range with a mid-point of $2.27, while the actual price in 2006-2007 are above $2.60.

Exhibit 5: Projected Real Price Changes in Gasoline

Year	Real Price Change
2003	+.2
2004	+.3
2005	-.1
2006	+.5
2007	-.3

Source: Short-Term and Annual Energy Outlook, various years.

These years were particularly difficult for EIA, but there is a way to build in protections against this problem. The analysis should use as a starting price either EIA's projection or the actual price paid in the most recent 12 months. The 2006 average price was $2.63 and the previous 12 month price for May 2007 is $2.63. The average price for the week ending April 30, 2007, was $2.97. For our analysis we have used a range of $2.50 to $3.00 range, which seems reasonable. These are real prices, held constant by assuming the increase in gasoline prices equals the rate of inflation over the ten year period. This is a conservative assumption.

The Cost of Fuel Efficiency

We assume an increase in fuel efficiency of 10 mpg at a cost of $1600 per vehicle. These are the most expensive increases in fuel efficiency that are likely to be implemented over the life of the plan.[12] These are based on the same National Research Council (NRC) study that NHTSA relied on in its analysis of increases in CAFE standards (see Exhibit 6). The NRC and the NHTSA analyses were constrained by economics, not technology. The NRC scenarios were modeled at an assumed price of gasoline of $1.50 per gallon (in 1999 dollars). Under that constraint, in none of its scenarios did it invest more than $1500. More than half the technologies that were identified as available off the shelf were left on the shelf. Also, the NRC did not consider hybrids.

[12] NHTSA models trucks as an average fuel savings of 8 miles per gallon at an average cost of $800. Cars achieve a fuel savings of 10 miles per gallon at an average cost of $400. In both cases, later year savings are more expensive.

Exhibit 6: Increasing Gasoline Cost Dramatically Raise Justified Investment in Fuel Efficiency

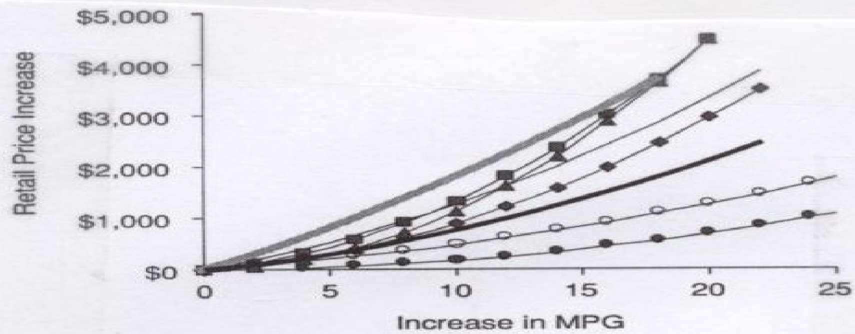


FIGURE 4-5 Passenger car fuel economy cost curves from selected studies.

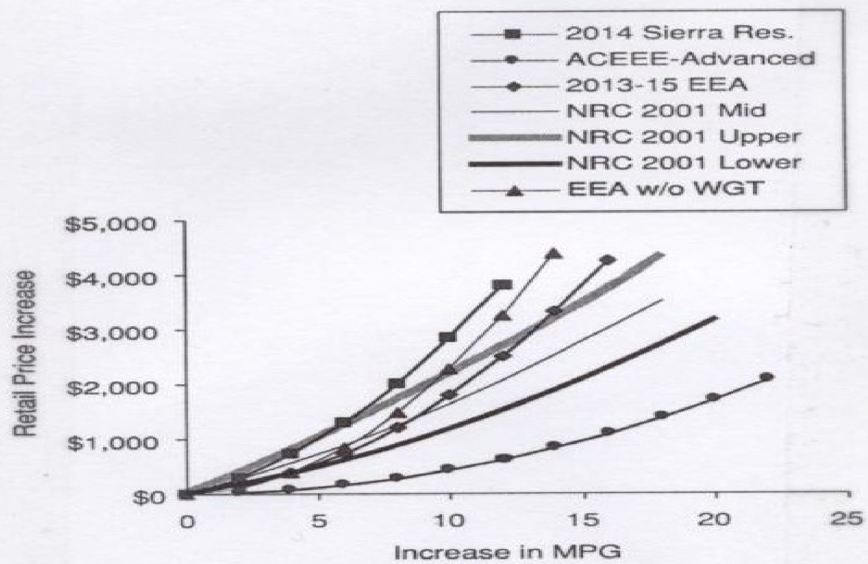


FIGURE 4-6 Light-truck fuel economy cost curves from selected studies.

Source: National Research Council

Relying on dated studies, NHTSA includes a large rebound effect, which assumes that consumers drive more because their monthly fuel bill is reduced. This conclusion does not fully reflect the fact that the income effect would be offset in significant part by the increase in the cost of the vehicle, as well as the increasing disproportionate attention to rising gasoline prices.[13] Without the rebound effect, the fuel savings could be closer to 2.5 million barrels per day.

The current price of $3.00 per gallon is about $2.50 in 1999 dollars. With the benefits of fuel efficiency increased by two-thirds, the economic analysis pulls those technologies off the shelf and into the fleet. For the near term scenarios we assume $1600 per vehicle to get *35 by 2018*.[14]

RESULTS

Consumer Pocketbook Analysis

Under these logical assumptions, increases in fuel efficiency pay for themselves (see Exhibit 7). The savings in the monthly gasoline bill are larger than the increase in the cost of vehicle. If the consumer keeps the vehicle past the period of the loan, or captures the value of future fuel savings when the car is sold or traded in, the payoff would be quite large.

Exhibit 7: Consumer Analysis of Reformed Café: All Households

	GASOLINE PRICE	
	$2.50	**$3.00**
Loan Payment increase	$1909	$1909
Life of Loan		
Fuel Cost Savings	$2073	$2487
Net savings	$ 164	$578
Life of vehicle		
Fuel Cost Savings	$2900	$3480
Net Savings	$991	$1571

Source and Assumption: see text

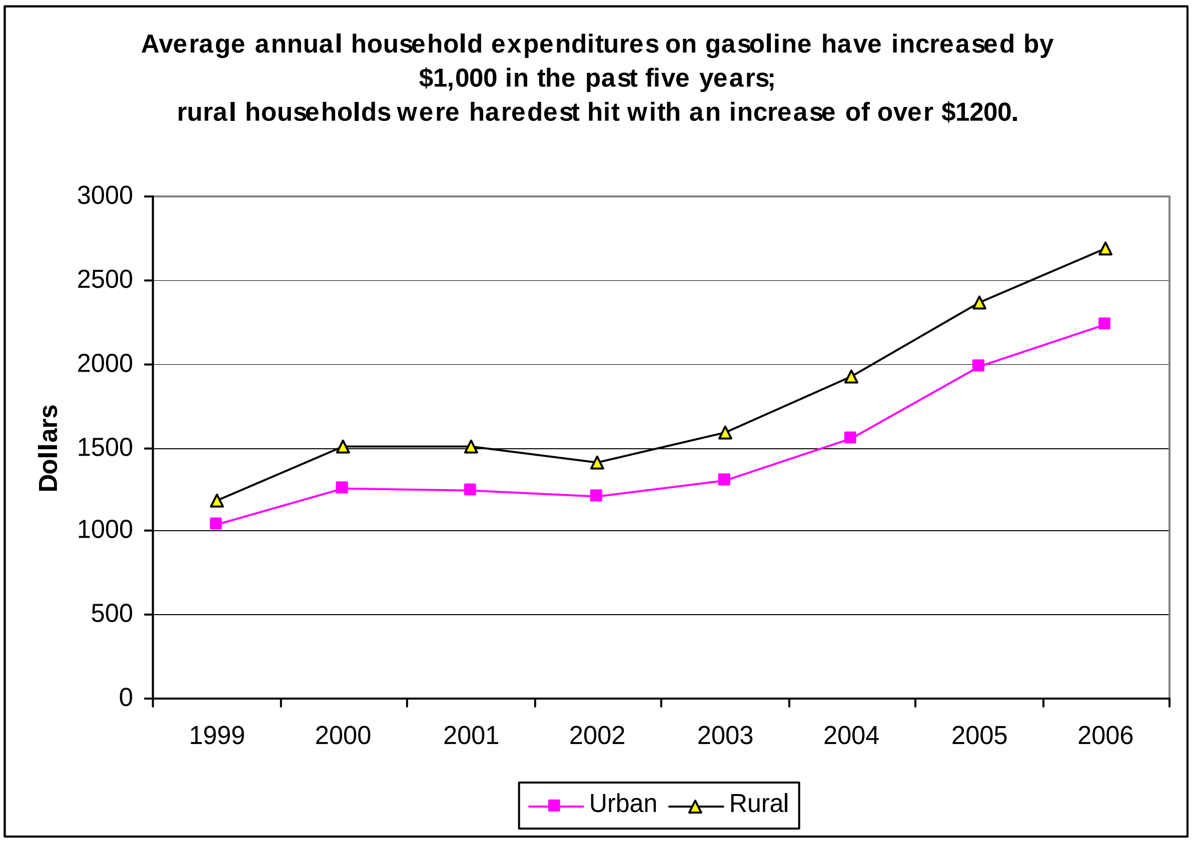
The increase in the cost of the car to improve efficiency adds just under $32 per month to the cost of the car. Over the course of the full 60 months of the loan, the total increase in payments is $1909. However, in the first year, when the car is assumed to be driven 15,000 miles, the consumer would use an average of almost 14 gallons per month less gasoline. The consumer would save about $34.50 per month if the price is $2.50 per gallon and $41 per month, if the price is $3.00 per gallon. Over the life of the loan, consumers save more in

[13] Taking into account the increase in costs, the net income effect of reduced energy consumption is a savings of about $125 per year. Given that the assumed rebound effect is far too large. For example, under assumed rebound effect, consumers would spend about 80% of their gains on “joy riding.”
[14] The NRC also used a more severe economic criterion – three year payback – than our five year cash flow criterion. The three year payback vastly exceeds the investment opportunities available to most consumers. The implicit or revealed preference on which the 3 year payback period rests does not suggest rational behavior on the part of consumers. We suspect that the “revealed” preference is being misinterpreted. It may involve many factors, like imperfect information, an inability to project prices and do life cycle cost calculations, marketing by auto manufacturers, etc.

gasoline expenditures than they pay in increased loan payments. Looking to the life of the vehicle, we observe substantial consumer savings in the range of $1000 to $1500. Consumers who keep their cars for ten years or capture the value of these efficiency investments will enjoy a big pay-off. Whether it is the initial owner or the second purchaser of the vehicle, society will enjoy the benefits of reduced gasoline consumption over the life of the vehicle.

These national average figures obscure a great deal of variation. While consumers have seen their household expenditures increase by more than $1000 in the past half decade, some groups in society incur much higher expenditures than others (see Exhibit 8). One such group is households in rural America. They have consistently spent about 20 percent more on gasoline and would benefit disproportionately from increasing fuel efficiency.

Exhibit 8: Household expenditures on Gasoline



Source: U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Expenditure*, 1999-2005. 2006 expenditures estimated based on 2005-2006 price increase from Energy Information Administration, *U.S. All Grades All Formulations Retail Gasoline Prices.*

Since there is no reason to believe that the cost of fuel efficiency would be higher in rural America, the net benefits would be much higher (see Exhibit 9).

Exhibit 9: Consumer Analysis of Reformed Café: Rural Households

	GASOLINE PRICE	
	$2.50	**$3.00**
Loan Payment increase	$1909	$1909
Life of Loan		
Fuel Cost Savings	$2488	$2984
Net savings	$ 579	$1075
Life of vehicle		
Fuel Cost Savings	$3480	$4176
Net Savings	$1571	$2267

Social Cost-Benefit Analysis

The conclusion that the *10 in 10* or the *35 by 2018* policies are in the consumers' interest should not be surprising since NHTSA recently conducted a policy analysis that reached this very conclusion. Even though the NHTSA model used extremely cautious assumptions – fuel prices that are too low, national security costs and environmental costs that are irresponsibly low and a rebound effect (i.e. an assumption that increased fuel efficiency leads to increased driving) that is too high – its model showed that from the national policy point of view, a substantial increase in CAFE has a positive benefit cost ratio.

NHTSA modeled increases in CAFE standards on a percentage basis – i.e. 3 percent per year, 4 percent per year, and 5 per cent per year. The *10 in 10* approach falls between a 4 percent and a 3 percent increase. It starts as a 4 percent increase, but because it is one mpg per year, as the fuel efficiency of the base builds up, a one mpg increase is a smaller percentage. In the last few years, *10 in 10* becomes a 3 percent increase. Thus, the NHTSA 4 percent and 3 percent scenarios provide extremely cautious upper and lower bounds for the cost benefit ratio of a *10 in 10* approach.

In Exhibit 10, we interpolate the cost benefit ratio for *10 in 10* based on the average fuel efficiency achieved on a percentage basis over ten years. It is clear that the *10 in 10* policy yields a net benefit, even though the benefits are heavily discounted by NHTSA. Keeping in mind that the benefits are discounted at a substantial rate (7 percent), when the ratios exceed 1, they indicate that the investment is better than the alternatives available, not just better than doing nothing.

The NHTSA model also shows that benefit cost ratios exceed 1 under both the 4 and 3 percent scenarios for both cars and trucks on a year-by-year in 31 of the 32 combinations of vehicles, efficiency improvements and years.

Exhibit 10: Cumulative, National Benefit-Cost Ratios

	VEHICLE TYPE	
	CARS	TRUCKS
CAFE IMPROVEMENT		
NHTSA 4 percent	1.04	1.06
10-IN 10 Interpolated	1.10	1.08
NHTSA 3%	1.22	1.13

Source: National Highway Transportation Safety Administration, Scenario Summaries for cars and trucks.

The NHTSA analyses are very much affected by the economic assumptions. While this helps policymakers choose between alternatives, there is a sense in which the modeling assumptions obscure the reality of the policy. Therefore, we have built an alternative model to evaluate the national benefit cost of *10 in 10.* The two basic elements of the analysis are the cost of increasing fuel economy and the amount of gasoline consumption saved. The NHTSA analysis estimates that society will have to spend about $114 billion to save about 110 billion gallons of gasoline.[15]

The modeling assumptions introduced by the policy framework (discount rates externalities) essentially ask the question, are there other uses to which this $114 billion can be put that are better investments taking into account the costs of gasoline consumption not reflected its price. To take the alternative uses into account, the analysis includes a discount rate, which is what might be earned if the money were put to other uses. In order for fuel efficiency to be a better use, it has to earn more than the alternatives. To conduct this financial analysis, one must put a price tag on the value of gasoline and on the time value of money.

We build scenarios based on two prices of gasoline ($2.50 and $3.00 per gallon), which reflects prices paid in the past couple of years, two estimates of the cost of externalities ($1 and $2), which we concluded was a reasonable range in our previous analysis, and two different discount rates – 3 percent and 7 percent. Arguably, 7 percent is relevant, since that is the cost of money to the consumer who wants to buy a car. At the same time, consumers can earn a relatively risk free real rate of return on investments of only about 3 percent. To the extent that they increase their down payment to finance the more efficient vehicle, this is their opportunity cost of capital.

[15] This figure is net of the "rebound" effect, which assumes that drivers of more efficient cars drive approximately 20 percent more as a result of owning a more efficient car. The claim is that the income effect increases the willingness to pay for gasoline consumption. With cars that are financed through increasingly long term loans, there is no such income effect, however. Evidence suggests that the rebound effect has been declining and the growing reliance on finance may explain why.

We have taken a different position from the NHTSA model on each of these sets of assumptions. The 2005 EIA Annual Energy Outlook, on which the NHTSA model relied, is outrageously low. The analysis appears to be based on gasoline prices that are less than $1.40 per gallon in the next decade. NHTSA used an estimate of externalities of 10 to 20 cents. In other words, the total social cost of gasoline in the NHTSA calculation appears to be less than $1.50. NHTSA only uses a discount rate of 7 percent.

Exhibit 11 presents the results of these scenarios. The conclusion is clear. Increasing the fuel efficiency of the vehicle fleet is a darn good investment, especially when reasonable estimates of the external casts are included in the analysis. To conclude otherwise, one would have to assume a value of gasoline below $2.50 with a discount rate of 10 percent or more. Even then, the policy analysis would have to ignore the security, economic and environmental benefits of reduced gasoline consumption. Under reasonable assumptions that reflect consumer reality and the national energy, security and environmental situation, the investment necessary to achieve *10 in 10*, which consumers will ultimately pay, is well worth it.

Exhibit 11: National Benefit Cost Ratios Under Various Assumptions about Gasoline Prices and Discount Rates

Investment Cost = $114 billion
Gasoline Savings = 110 billion Gallons

	Cost of Gasoline			
Price of gasoline	$2.50	$3.00	$2.50	$3.00
Value of Externalities	0	0	$1.00	$2.00
Total Social Cost of Gasoline	$2.50	$3.00	$3.50	$5.00
Value of Gasoline Savings				
Discount Rate				
3%	173	208	243	347
7%	145	161	203	290
Benefit Cost Ratios				
Discount Rate				
3%	1.52	1.82	2.13	3.04
7%	1.29	1.41	1.78	2.54

REDUCING OIL CONSUMPTION, IMPORTS AND EMISSIONS

The positive consumer economic and social cost benefit findings are driven by substantial reductions in gasoline and oil consumption. To assess the impact on the nation's "oil addiction" we modeled the change in the overall vehicle fleet and compared those results to other analyses.[16] The reality behind the cost benefit ratios are 110 billion gallons of

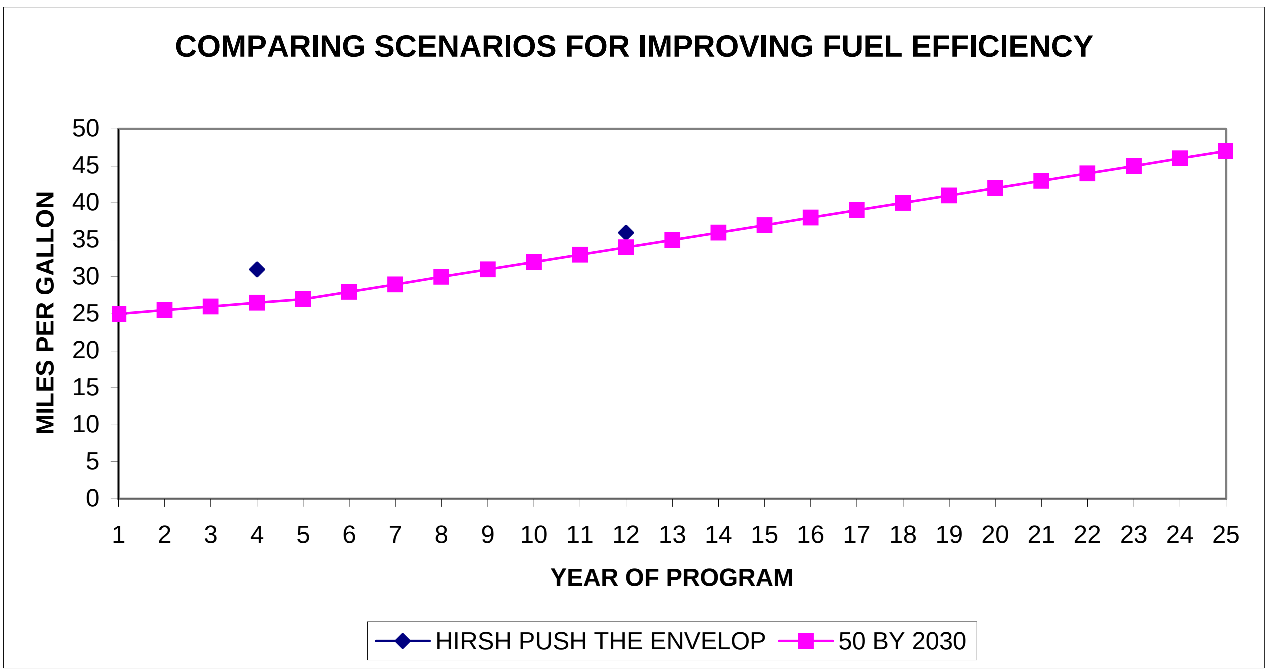
[16] Hirsh, Robert L., Roger Bezdek and Robert Wendling, *Peaking of World Oil Production: Impact, Mitigation & Risk Management*, February 2005, p. 77, allow three years for an aggressive program. Hirsh allows three years.

gasoline saved, oil import reductions of more than 2 million barrels per day, when 35 mpg is achieved, which equals more than 15 percent of projected imports, and reduction of over half a billion tons of global warming causing green house gas emissions.

NHTSA estimates that increasing fuel economy by 4 percent per year would result in fuel savings of about 2.1 million barrels per day. Without the large assumed rebound effect, the reduction in gasoline consumption would be closer to 2.5 million barrels per day. Continuing the improvement over a second decade would push the vehicle fleet well above 40 mpg by 2030. Fuel economy doubles and consumption declines by over five million barrels a day. This is a reduction of just under 20 percent of total consumption and over 30 percent of imports.

These goals are technologically achievable and economically justified. For example, NRC's most aggressive case has been rendered as a "Push the Envelope" proposal by Hirsh, Bezdek and Wendling in their study of peak oil production.[17] It increases fuel efficiency by 45 percent. Hirsh puts short time frames on the scenario see (Exhibit 12). Thus, the consumer pocketbook and national benefits of reaching 35 mpg in 10 years can be achieved with off the shelf technologies.

Exhibit 12:



Source: ***50 by 2030*** **calculated by author. Hirsh, Robert L., Roger Bezdek and Robert Wendling,** ***Peaking of World Oil Production: Impact, Mitigation & Risk Management,*** **February 2005, p. 77.**

[17] Hirsh, Robert L., Roger Bezdek and Robert Wendling, *Peaking of World Oil Production: Impact, Mitigation & Risk Management*, February 2005.

CONCLUSION

The examples and analyses presented in this paper involve many simplifying assumptions, but we believe they demonstrate a fundamentally correct point. The current gasoline situation, with prices at $3.00 per gallon and growing recognition of severe societal costs, requires a shift in thinking about the public policy challenges the nation faces in dealing with its "oil addiction."

All analyses such as this are plagued by the question "what happens if gasoline prices fall?" Given that consumers have been up and down this roller coaster so many times,[18] we think the smart thing to do is remind ourselves of the huge external benefits, applaud the temporary relief, but not be fooled into thinking the problem is solved, and redouble our efforts to reduce our dependence on oil.

[18] Consumer Federation of America, *Ending the Oil Price Spiral: Market Fundamental for Consumer-Friendly Policies to Stop the Wild Ride* (Washington, D.C.: July 2001); *Record Prices, Record Prices, Record Oil Company Profits: The Failure of Antitrust Enforcement to Protect American Energy Consumers* (Washington, D.C.: September 2004); *Debunking Oil Industry Myths and Deception: The $100 Billion Consumer Rip-Off: A Report on Rising Gas Prices and Industry Profits* (Washington, D.C.: May 3, 2006).