STATEMENT OF:
THE UNION OF CONCERNED SCIENTISTS

BEFORE THE:
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

PRESENTED BY
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Thank you Mr. Chairman and members of the committee for the opportunity to testify before you today. My name is David Friedman and I am a Senior Analyst in the Clean Vehicles Program at the Union of Concerned Scientists. UCS is a nonprofit partnership of scientists and citizens that has been working at the intersection of science and policy for over 30 years.

I am the lead author of the report "Drilling in Detroit: Tapping Automaker Ingenuity to Build Safe and Efficient Automobiles," in which we provide a comprehensive assessment of both the technical and economic potential of achieving a safe and fuel-efficient fleet of passenger vehicles. Prior to my time at UCS I have been involved in several projects related to fuel economy, including modification of a Ford Taurus to reach 65 mpg and various analysis and support in assessing fuel economy potential in the early stages of the Partnership for a New Generation of Vehicles.

Today I would like to summarize some of the results from our fuel economy study as well as comment on several parts of the recent National Research Council (National Academy of Sciences) report on the "Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards."

The Importance of Fuel Economy

US drivers consumed 121 billion gallons of gasoline in 2000 at a total cost of $186 billion. This level of consumption represents 40 percent of the oil products that the nation consumes. This number places these vehicles at the heart of the growing debate over oil supplies.

Today, US oil dependence is greater than it has ever been as we import a record 10 million barrels of oil and petroleum products each day. These imports represent over half of US oil product consumption, and as demand increases the proportion of imports will rise. About 25% of this imported oil comes form the politically unstable Middle East[1] – for example in the year 2000 we imported 1.7 million barrels of oil per day from Saudi Arabia and another 0.6 million barrels per day from Iraq. The cost of imported oil exacts a toll on our international balance of trade, as the United States currently sends about $200,000 overseas each minute to buy oil products and is estimated to spend $20 to $40 billion per year to defend oil resources in the Middle East.[2]

In recent years, the Organization of Petroleum Exporting Countries (OPEC) has regained its ability to substantially influence the price of oil throughout the world.[3] OPEC's market power can be expected to grow as its production approaches half of all world oil output in the next two decades. In the United States, our dependence on imported oil from OPEC and other foreign sources is expected to grow to 64%, making us even more susceptible to supply shortages and rapid rises in world oil prices. Historically oil price shocks and periods of inflation have coincided, resulting in significant harm to the US economy and our balance of trade.

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[1] based on EIA 2000a import values.

[2] Overseas payments is a UCS estimate is based on the EIA 2000a import cost figure of $106 billion in 2000. Oil defense expenditures from Delucchi and Murphy 1996.

[3] OPEC is composed of the following countries: Algeria, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

Transportation is also the source of roughly one-third of all the heat-trapping gases (greenhouse gases) linked to global warming that are released in the United States every year (EIA 2000a). Greenhouse-gas emissions from the US transportation sector amount to more than most countries release from all sources combined.[4] The production, transportation, and use of gasoline for cars and light trucks resulted in the emission of 1,450 tons of greenhouse gases by the United States in 2000—over one-fifth of US global warming emissions that year.[5]

Cars and trucks are the second largest single source of air pollution in the country, second only to electricity generation. As tailpipe standards are tightened, pollutants from passenger vehicles are falling to near the level of those produced in refining and distributing gasoline. As a result, transportation's impact on air pollution will soon approach an equal split between the tailpipe and the amount of fuel a vehicle uses. In the case of toxic emissions, pollutants that may be linked to cancer, the upstream emissions from fuel refining and distribution are the dominant source. The production and distribution of gasoline is also linked to many other negative environmental impacts including oil spills and groundwater pollution

Assuming current fuel use, the production and distribution of gasoline alone results in the emission of 848,000 tons of smog-forming pollution and 392,000 tons of benzene-equivalent toxic emissions in the United States each year.[6] Reducing these numbers significantly through improvements in fuel economy can mean great strides in protecting human health.

The effect our cars and light trucks have on our economy, our oil use, and our environment is only expected to get worse due to rising vehicle travel, a changing vehicle fleet, the impacts of vehicle emissions and fuel use under actual driving conditions, and stagnant fuel economy standards. Together these factors have led to a 24 mpg fleet average fuel economy in 2000, the lowest level in over twenty years[7]:

- Rising Travel. There are now more vehicles in the United States than people licensed to drive them. Combined with increasing travel rates per vehicle, the number of miles that Americans are driving

[4] Only China, Russia, and Japan have higher total emissions (based on Marland et al. 1996).

[5] This UCS estimate is based on EIA 2000a. Each gallon of gasoline burned emits nearly 19 pounds of carbon dioxide, the primary pollutant responsible for global warming. The production and delivery of gasoline are responsible for another five pounds per gallon of global warming pollutants for a total of 24 pounds of carbon dioxide per gallon of gasoline used (Wang 1999).

[6] The production, refining, and delivery of each gallon of gasoline in the United States emit an estimated 6.4 grams (0.014 pounds) of smog-forming pollution (Wang 1999). Upstream activities also release harmful toxic pollution into the air that poses a major health hazard near refineries, along distribution routes, and at gasoline stations. For every gallon of gasoline delivered, 2.9 grams (0.0065 pounds) of benzene-equivalent toxic emissions are produced (Winebrake, He, and Wang et al. 2000; Wang 1999).

[7] Heavenrich and Hellman. *Light-Duty Automotive Technology and Fuel Economy Trends 1975 Through 2000*. An Arbor, MI. US Environmental Protection Agency. 2000

[8] Energy Information Administration. *Annual Energy Outlook 2001*. Washington, DC: US Department of Energy.

continues to rise. Vehicle travel is expected to increase nearly 50% over the next 20 years,[8] a trend that will help drive up passenger vehicle fuel use.

- Shifting Markets. SUVs and other light trucks are allowed to use one third more fuel than cars under current CAFE requirements. This "Light Truck Loophole" caused consumers to use about 20 billion more gallons of gasoline in 2000 and cost consumers about $30 billion dollars more than if the fuel economy standards of light trucks was set to the same as that of cars. The light truck market has risen from 19% to 46% since 1975 and is expected to grow to at least 50% of the passenger vehicle market, driving fuel economy lower in the coming years.

- Real World Fuel Economy. Testing for CAFE standards is based on a pair of simulated driving cycles established in 1975. At the time it was unclear if these cycles represented real world driving conditions, but today it is quite clear that they do not. Estimates show that real world fuel economy is about 17% below tested values and this shortfall is expected to increase over the next two decades.[9]

- Stagnant Fuel Economy Standards: CAFE standards for cars and light trucks have not changed in more than a decade. The original schedule called for an increase in car fuel economy to 27.5 mpg by 1985. While this goal was delayed for a few years, the standard has been at that level since 1990. The light truck standard reached approximately today's level in the late 1980s while separate standards existed for 2 and 4-wheel drive vehicles, and, like passenger cars, was stalled for a short period until reaching today's 20.7 mpg requirement.

We estimate that these factors, along with continued stagnant fuel economy standards, would lead to an increase in passenger vehicle fuel use over the next two decades of 56 percent, to 189 billion gallons per year, by 2020. The result would be fuel costs to consumers of $260 billion dollars at a gasoline price of $1.40. Total oil demand would rise from today's 20 million barrels per day to over 27 million barrels per day by 2020, 64% of which would be imported form outside the US. In addition, annual greenhouse gas emissions from the passenger vehicle sector would rise to 2,260 million tons of carbon dioxide equivalent while emission of 1,320,000 tons of smog-forming pollutants and 612,000 tons of benzene-equivalent toxic emissions would be produced in the United States each year.

Reforming Regulations to Reduce the Impacts of Driving

The US is not locked into the predictions noted above. A systematic approach to reducing fuel use would address all of the key factors noted above: stagnant fuel economy standards, shifting markets, real world fuel economy, and rising travel. Within this systematic approach, increasing fuel economy standards to 40 mpg by 2012 is the single most effective, fastest and least expensive path to reducing our future dependence on oil.

Fuel Economy Standards

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[9] *Ibid.*

The 2001 National Research Council study has identified the CAFE standards enacted in 1975 as a key factor in the near doubling of new passenger car fuel economy (15.8 mpg in 1975 rising to a peak of 28.5 in 1998) and the 50% increase in the fuel economy of new light trucks (from 13.7 mpg in 1975 to toady's 20.7 mpg). In addition, this study notes that CAFE standards have played a leading role in preventing fuel economy levels from dropping as fuel prices declined in the 1990s. UCS estimates that current fuel economy levels maintained by CAFE saved consumers over $90 billion in 2000. The NAS report estimates that in the year 2000 alone, increased fuel economy reduced gasoline use by 43 billion gallons, or about 2.8 million barrels of oil per day (UCS estimates the figure to be about 60 billion gallons of gasoline, or 3.9 million barrels of oil per day).

These savings put to rest concerns over the effectiveness of improved fuel economy. While fuel use has risen by 30% since the CAFE law was passed, this is primarily due to an increase in the amount of travel by Americans each year – which would have resulted in an even large increase in fuel use had vehicle fuel economy not improved.

Savings of same magnitude as seen in the past can be achieved in the future if fuel economy standards are again increased. UCS analysis has shown that cost-effective technologies for near-term and longer-term improvements in vehicle efficiency exist today. If these technologies are used to increase fuel economy over the next 20 years, our passenger vehicle oil use could be turned around (i.e. we could stop the growth in fuel use and even turn back the clock to 1990 levels if standards are raised sufficiently), the amount of money consumers spend on gasoline could be substantially reduced, and the impact our driving has on the environment could be cut in half. Below is a short list of conventional technologies that have already been developed by automakers that could significantly increase the fuel economy of today's cars and light trucks, many of which are already in some cars today.

Existing Conventional Technology Options for Fuel Economy Improvement.

Vehicle Load Reduction	**Integrated Starter Generators**
• Aerodynamic Improvements	
• Rolling Resistance Improvements	**Improved Transmissions**
• Safety Enhancing Mass Reduction	• 5- and 6-speed automatic transmissions
• Accessory Load Reduction	• 5-speed motorized gear sh transmissions
Efficient Engines	• Optimized shift schedules
• Variable Valve Control Engines	• Continuously Variable Transmissions
• Stoichiometric Burn Gasoline Direct Injection Engines	

Estimates from a study released by the American Council for an Energy Efficient Economy, by DeCicco et. al., indicate that a combination of these technologies, along with mass reductions targeted at the heaviest vehicles, can produce a fleet of cars and trucks that averages over 40 miles per gallon. The table below shows the costs and net savings associated with these improvements in fuel economy. The result is an increase in fuel economy of over 70% and a net saving to the average consumer of over $2,000. Increasing fuel economy standards results in a win-win situation where consumers and the environment are both better off. In this case, fuel economy standards result in a net cost of carbon dioxide reduction of -$49/ton of carbon dioxide avoided, in other words, consumers are paid to reduce their impacts on the environment while at the same time we are reducing our oil dependence.

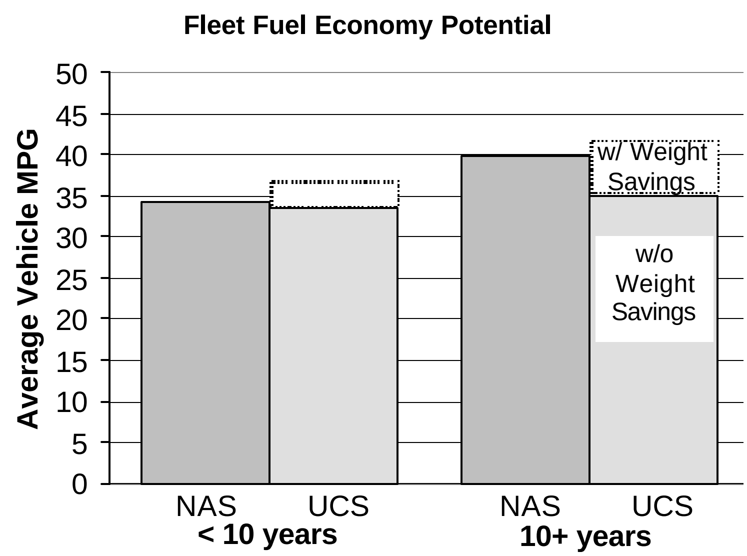
Fuel Economy and Lifetime Savings from Existing Conventional Technologies.

	CAFE Rated Fuel Economy[a] (mpg)	*Real World Fuel Economy[b] (mpg)*	*Fuel Economy Improvement vs. baseline*	*Cost of Fuel Economy Improvement[a]*	*Lifetime Fuel Cost Savings[d]*	*Net Savings*	*Greenhouse Gas Savings (tons)*	*Avoided Toxic Emissions (lb.)*	*Smog Precursor Savings (lb.)*
Small car	48.4	38.7	57 %	$1,125	$2,595	$ 1,470	30	16	35
Family Car	45.8	36.6	75 %	$1,292	$3,590	$ 2,298	42	23	49
Pickup	33.8	27.0	61 %	$2,291	$3,964	$ 1,673	46	25	54
Minivan	41.3	33.0	85 %	$2,134	$4,534	$ 2,400	53	28	61
SUV	40.1	32.1	98 %	$2,087	$5,346	$ 3,259	62	34	72
Fleet Average	**41.8**	**33.4**	**74 %**	**$1,693**	**$3,900**	**$ 2,207**	**45**	**24**	**53**

a. Source: DeCicco, An, and Ross. *Technical Options for Improving the Fuel Economy of U.S. Cars and Light Trucks by 2010-2015*. Washington, DC. American Council for an Energy Efficient Economy. 2001.

b. CAFE fuel economy reduced by 20 percent.

c. Assumes a 15-year, 170,000-mile vehicle lifetime and a 5% discount rate. Average life based on scrappage rates from Davis 2000. Vehicle mileage based on 1995 National Personal Transportation Survey (NPTS) data.



Notes:
a. NAS values based on sales-weighted average of individual class fuel economy estimates from NRC, *Effectiveness and Impact of CAFE Standards*. July 2001.
b. UCS estimates from Friedman, et al., *Drilling in Detroit*. June 2001.

We have compared the UCS/ACEEE fuel economy results with those from the recent National Research Council report and we find that the costs and improvements in fuel economy are very similar. Using the results from NRC Path

3 technologies (NRC 2001, page 3-24) we estimate that a fleet fuel economy of 33 to 47 mpg could be reached at a retail price increase of about $1,700 to $3,800 per vehicle. This compares favorably to UCS/ACEEE estimates of a fleet fuel economy of 36-49 mpg at retail price increase of about $1,200 to $3,900. (Friedman et. al, pages 84-87) In both cases, consumers would be saving thousands of dollars at the gas pump. In most cases, this would be more than enough to pay for the cost of the fuel economy improvements, resulting in a net savings to consumers.

The figure to the right shows the results of the NAS work for Path 2 and Path 3 technologies as well as comparable UCS and ACEEE analyses. The combination of both the UCS and the NRC results indicate that it is clearly feasible to reach a fleet average fuel economy of 40 mpg. We feel that such a standard could be phased in over 10 years, while the NRC analysis shows that similar fuel economy levels could be achieved within 10-15 years if weight reduction is not prominently used to reach improved fuel economy. In less than 10 years, both the NAS and UCS results agree that a fleet average of close to 35 mpg is technically feasible and cost effective.

The benefits to reaching a 40-mpg fleet by 2012 are quite significant. By 2012, we would have accumulated savings of 125 billion gallons of gasoline, this is about one full year's worth of gasoline and is 25 times the savings sought though the House energy bill, H.R. 4. In that same year, we would be saving about 1.9 million barrels of oil per day. This is more than the 1.7 million barrels per day we imported form Saudi Arabia last year and over three times the amount of oil we imported from Iraq. Consumers would also see significant benefits, with the US economy seeing net savings of 12.6 billion dollars in 2012 alone. On top of these financial benefits, over 40,000 new jobs would be created in the auto industry and close to 70,000 would be created in the US economy as a whole. In the end, increasing the average fuel economy of cars and trucks would both aid us in reducing our dependence on oil and help stimulate the economy.

Before the 40-mpg standards are phased in, UCS analysis indicates that average light truck fuel economy could be raised well above today's 20.7 mpg standard to that of cars (28.1 mpg) for about $670 in mass production. This increase in fuel economy could be achieved within 5 years using technologies available in cars today. By 2010, this increase in fuel economy would save 35 to 40 billion gallons of gasoline, more than seven times the meager savings offered in the existing House Energy Bill, H.R. 4. The overall benefit to consumers would be $7 billion dollars per year in 2010 alone and would be accompanied by significant reductions in greenhouse gas, toxic, and smog forming pollutants.

Shifting Markets

The NRC report (page 5-11) identifies "economic incentives for manufacturers to assure that their vehicles are classified as trucks…." These are the "light truck loophole" and the "gas-guzzler tax". The fact that the fuel economy standard for light trucks is set at 20.7 mpg, lower than the 27.5 mpg for cars, means that automakers have to spend less money on the fuel economy of trucks. The resulting lower price combined with the current strong demand for light trucks means that automakers can make more money from light trucks and therefore have an incentive to classify more vehicles as light trucks. In addition, the gas-guzzler tax, which applies to cars below 22.5 mpg, does not apply to light trucks, creating yet a further incentive to make sure vehicles are classified as light trucks.

Together with lower tailpipe emissions and safety standards, these loopholes have and will continue to enable the sales of more vehicles with lower fuel economy, increasing fuel use and air pollution. The tailpipe air pollution loophole for light trucks will be phased out by 2009 under EPA's Tier 2 regulations. The vast majority of these "light trucks" are no longer used for commercial purposes and are instead used as passenger vehicles. The NRC report (page 5-10 and page 5-11) indicates that "The car/truck distinction has been stretched well beyond the original purpose." and that redefining the car/truck classification or reducing economic incentives for manufacturers to define their vehicles as trucks could alleviate the problems.

Since the existing loophole no longer serves its intended purpose and is enabling increased fuel use and increased costs to consumers, the light truck loophole in CAFE should be closed by 2007 as a first step in fleet-wide increases to fuel economy standards. Once this is done, all cars and light trucks can be classified as passenger vehicles and the gas-guzzler tax can be applied to all such passenger vehicles.

Real World Fuel Economy

Given that current data shows real world fuel economy to be 17% lower than CAFE certified fuel economy, CAFE reform should also include a shift in fuel economy measurement towards more realistic driving cycles. This has been pursued for emissions through the incorporation of the SC03 and US06 driving cycles. The SC03 cycle includes the use of air conditioning, which is not included in standard CAFE testing. The US06 driving cycle is more akin to modern urban driving with harder accelerations and higher speeds. Incorporating these driving cycles or some other measure to ensure "truth in testing" could serve to provide a more certain increase in fuel economy.[10]

Rising Travel

The increase in total vehicle miles traveled in the US, due partly to increases in individual travel, cannot be addressed by increased fuel economy standards.[11] One determinant of the amount of individual travel is the cost of gasoline. Increasing gasoline taxes or instituting a tax on the amount of carbon in a fuel (to account for global warming effects associated with the emissions of carbon from burning the fuel) would likely result in some decrease in daily travel. Estimates are that a 100 percent increase in the cost of gasoline would result in about a 10 to 20 percent reduction in the amount each vehicle travels (Greene et. al., 1999), though estimates of this value vary widely. Significant increases in the price of gasoline alone, or smaller increases along with increases in the CAFE standards, would result in a reduction in gasoline use – however, a reform option that relies on large increases in gasoline costs would face substantial political obstacles.

To put this into perspective, if we consider an increase in fleet fuel economy to 40 mpg, accounting for a

[10] While it will improve the certainty of the fuel economy achieved, "truth in testing" will not, by its self, lead to an increase in fuel economy.

[11] In fact, increased fuel economy standards without increased gasoline or carbon taxes would reduce the cost of driving. This could lead to an increase in driving on the order of 1 to 2 percent per 10 percent increase in fuel economy.

rebound effect, fuel use would be reduced by about 40% compared to today. Long term elasticity fuel use price elasticity estimates range from -0.5 to -0.9[12], indicating that a gasoline price increase of 44% to 80% would be required above today's values. Assuming last year's average of $1.54 per gallon, this translates into a $0.68 to a$1.23 per gallon tax. However, this assumes a baseline fuel economy at today's level, which is influenced by existing CAFE standards. If we add in the tax that would be required today if CAFE did not exist, estimated at $1.12 per gallon[13], the total increase could be as much as $1.80 to $2.35 per gallon. **That would have required bringing 2000 gasoline prices up to as much as $3.89 per gallon.**

<u>Safety</u>

I will discuss the topic of safety and fuel economy further in a moment, however, I would like to address some key reforms that can take place under CAFE to improve vehicle safety. The key issue that can be addressed through CAFE is the danger that the "not-so-light" light truck class imposes on other drivers. Because these trucks are heavy, stiff and have high bumpers, they represent a greater risk to car drivers, pedestrians, bicycle and motorcyclists.

This is a fact that seems to be agreed upon by the entire NRC/NAS panel in their recent report (both the majority opinion and the dissent opinion point to reductions in fatalities from decreasing the size of light trucks). While we do not agree with the magnitude of the life savings in the report, we believe the direction is correct – we feel the magnitude is actually larger – and therefore can accept them for demonstrative purposes. The clear message is that any policy that creates an incentive for light trucks to get lighter will save lives. Closing the light truck loophole would create such an incentive and would therefore provide an increase in safety.

An additional measure to achieve similar ends is the addition of means for controlling the "Crash Aggressivity (CRAGG) index" as introduced in the House Energy Committee. This is an index that evaluates the stiffness, structure height, and mass of a striking vehicle. Use of the CRAGG index would highlight the safety hazards of light trucks which are very stiff, high and heavy. Regulated reductions in the fleet-wide CRAGG index could produce an opportunity for the Senate to save lives.

Commentary on the National Academy of Science/National Research Council Report

The following are brief comments on some of the key sections of the NAS/NRC fuel economy panel report. This is not intended to be an exhaustive analysis and critique of the report, but instead highlights issues of key concern to UCS.

<u>Rational for Regulation of Fuel Economy</u>

The NAS/NRC panel report provides clear justification of the value of regulating fuel economy. In their

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[12] The -0.5 high end value from Patterson, *Transportation's Contribution to Global Climate Change*. US Department of Energy presentation. 1999. The –0.2 value from Agras and Chapman, 1999, and falls near the high end of elasticities from Niovella and Crandall, 1995.

[13] Present value of $0.80 estimate for 1989 from, Kaoujianou. *The effects of Corporate Average Fuel Efficiency Standards in the US*. Journal of Industrial Economics, 1998.

first recommendation it is stated that, "Because of concerns about greenhouse gas emissions and the level of oil imports, it is appropriate for the federal government to ensure fuel economy levels beyond those expected to result from market forces alone." (page 6-6)[14]. UCS firmly agrees with this statement. Based on our assessment of the available technologies and the impacts of their use, we believe that a near term goal of closing the light truck loophole by making light truck fuel economy standards the same as cars by 2007 provides significant net benefits to society. In the longer term, we believe that a goal of 40 mpg by the middle of the next decade is both technically achievable and also provides significant net benefits to society through consumer savings at the gas pump, reduced oil use, reduced global warming and other pollutant emissions, and reductions in highway fatalities.

<u>Fuel Economy Assessment</u>

Overall, UCS analyses agree with the general results for potential fuel economy improvements and associated costs using what the NAS/NRC terms existing and emerging technologies. Under some specific comparisons, UCS estimates of fuel economy are somewhat higher than those of the NAS/NRC. One key reason for this is that our estimates are based on detailed vehicle modeling that ensures inclusion of the synergistic effects between technologies that the NAS/NRC menu approach can miss. Another key reason for the difference is that in our analysis we rely more heavily on safety enhancing weight reductions for the light truck class, which enables higher levels of fuel economy to be reached at lower costs.

One significant exclusion from the NAS/NRC analysis is an evaluation of the consumer savings of improved fuel economy. The panel chose a potentially misleading name for their summary analysis. This analysis was termed a "break-even fuel economy analysis for 14-year payback". This might seem to imply that the savings on gasoline costs is just equal to the added cost of the fuel economy improvements, resulting in no net savings. In fact, as described in their report on page 4-4, this analysis looks at the point where the marginal savings on gasoline is equal to the marginal cost of fuel economy improvements. In other words, the analysis sought to find the point where the last dollar spent on improving fuel economy saved exactly one more dollar on gasoline cost over the vehicle lifetime. This is a classic economic analysis that is more appropriately termed an "economically efficient analysis" and actually finds the point where the net savings over the life of the vehicle is at its maximum. **Thus, the analysis performed by the NAS/NRC panel theoretically identifies the fuel economy levels where consumers save the most money.** In public testimony, the NAS panel has noted that this is the case and has attempted to clarify the issue (I believe the NAS has submitted such a clarification to this committee). I have included an attachment to this testimony, which shows the NAS/NRC report Table 4-2 but also includes the savings that would accrue from these vehicles.

I have performed an additional analysis using the results for the Path 3 technologies as identified in the NAS/NRC report on page 3-24. The results for the average cost/average fuel economy level in Path 3 are presented below assuming a discount rate of 5% (this discount rate corresponds to an 8% new car

[14] Alternatively, the report also states that, "Regulations such as the CAFE standards are intended to direct some of industry's efforts toward satisfying social goals that transcend individual car buyers' interests." (page 2-16)

loan, corrected for inflation).

	Base mpg	Base Adj mpg	FE (mpg)	Average Incremental Cost	Net Savings
Cars					
Subcompact	31.2	30.1	46.13	$ 2,055	$ 358
Compact	27.9	27.0	41.94	$ 2,125	$ 635
Mid Size	24.9	24.1	41.05	$ 3,252	$ 354
Large	21.2	20.5	37.59	$ 3,655	$ 1,034
Light Trucks					
Small SUVs	26.0	25.1	43.7	$ 2,762	$ 812
Mid SUVs	21.1	20.4	36.22	$ 3,515	$ 1,003
Large SUVs	17.7	17.1	32.71	$ 3,417	$ 2,497
Small Pick-ups	22.6	21.8	39.98	$ 3,480	$ 930
Large Pick-ups	18.1	17.5	32.33	$ 3,137	$ 2,407
Mini Van	22.1	21.4	39.41	$ 3,137	$ 1,379
Average Car			43.6	$ 2,308	$ 454
Average Light Truck			36.1	$ 3,299	$ 1,453
All			39.8	$ 2,765	$ 915

Here we see that consumers are saving between $360 and $2,500 above the cost of the fuel economy improvements for different vehicles. The average fleet fuel economy is 39.8 mpg with an average cost of $2,765. UCS estimates predict a higher fuel economy at this cost, however, the NAS/NRC results still demonstrate the ability to save money while achieving a fleet-wide average fuel economy of 40 mpg. **Thus, when using a discount rate of 5%, NAS/NRC numbers show that the cost of a 40 mpg fleet will pay for itself over a vehicle's life, even saving consumers nearly $1,000.**

One final issue related to the fuel economy assessments in the NAS/NRC report is the inclusion of their calculated externality values. The panel identifies the externalities associated with the oil market and the environmental impacts of gasoline use valued at $0.26 per gallon of gasoline. While we feel that this value is low, even this amount would show a net increase in savings to society from improved fuel economy standards. For example, in the average Path 3 example above, the societal savings of a 40-mpg fleet fuel economy would be $1,573 per vehicle and would vary between $775 and $3500, depending on the vehicle.

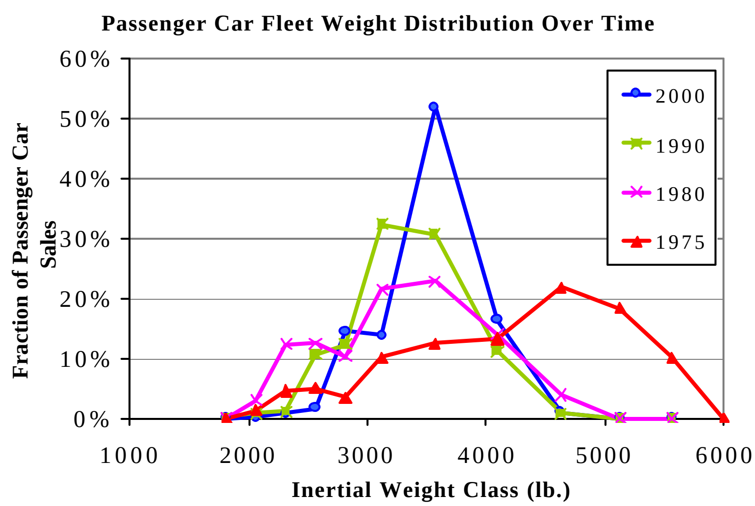
<u>Safety</u>

We disagree strongly with the majority of the assertions made by the majority panel regarding vehicle safety and fuel economy improvements. The key to making a vehicle safe is in its design. Proper design techniques, use of powerful computing resources and high strength materials enable designers to reduce the weight of vehicles while simultaneously including efficient crush space to absorb the impact in a crash and therefore reduce the forces experienced by the vehicle occupants. Existing crash data does not provide the ability to differentiate between vehicle weight, physical dimensions, and vehicle design and therefore statistical analysis based on this data **cannot** evaluate the direct relationship between changes and weight and changes in vehicle safety.

On the other hand, we agree generally with the findings of the panel minority in the dissent chapter on safety and note that significantly more analysis would need to be done before adequate quantification of the impacts on fuel economy changes on safety could be produced.

In addition to the key problems raised in the dissent chapter, I would like to point out at least one conspicuous assertion that was made in the safety analysis. One of the key reasons why we reject the use of past data to assess current and future safety impacts of weight reduction is that vehicle technology is changing over time. On page 2-27 of the NAS/NRC report, an assertion is made that “the ratio of fatality risk in the smallest vehicles of a given type compared to the largest remained relatively similar.” However, this ratio is never presented to the reader. Calculating this ratio for the data in the NAS/NRC Table 2-2 produced the following results:

vehicle type	vehicle size	occupant deaths per million registered vehicles one to three years old			Ratio of occupant deaths in a class relative to those in the heaviest vehicles of that class			% change in ratio over time	
		1979	1989	1999					
car	mini	379	269	249	2.37	1.95	1.87	-18%	-4%
	small	313	207	161	1.96	1.50	1.21	-23%	-19%
	midzise	213	157	127	1.33	1.14	0.95	-15%	-16%
	large	191	151	112	1.19	1.09	0.84	-8%	-23%
	very large	160	138	133	1.00	1.00	1.00	0%	0%
	all	244	200	138	1.53	1.45	1.04	-5%	-28%
pickup	< 3000	384	306	223	NA	3.26	1.94	NA	-40%
	3-3.9k	314	231	180	NA	2.46	1.57	NA	-36%
	4-4.9k	256	153	139	NA	1.63	1.21	NA	-26%
	5k +	0	94	115	NA	1.00	1.00	NA	0%
	all	350	258	162	NA	2.74	1.41	NA	-49%
SUVs	< 3000	1064	192	195	NA	1.29	2.12	NA	64%
	3-3.9k	261	193	152	NA	1.30	1.65	NA	28%
	4-4.9k	204	111	128	NA	0.74	1.39	NA	87%
	5k +	0	149	92	NA	1.00	1.00	NA	0%
	all	425	174	140	NA	1.17	1.52	NA	30%



All of the data above, other than the last columns labeled “% change in ratio over time” are the original data from the NAS/NRC report. The added columns above indicate that the ratio of fatalities in the smallest vehicles to the largest ones in each class changed during each 10 year period, with these changes being as high as a 64% increase for SUVs and a 40% decrease for pickups. Clearly the ratios did not remain either relatively similar over time, or among the classes. Even without the existing disagreements relative to the past safety data, this seriously threatens the validity of using the data to predict current or future safety impacts.

Further eroding their analysis is the fact that the type of vehicles in the fleet have changed drastically over time. The figure below shows how the weight distribution of cars has changed since CAFE was first passed. The key feature that stands out is that we used to have a lot of cars of many different weights with an overall high average weight. Now we have a lower overall average weight and the weight distribution is less spread out. **This means that changing the weight of today's vehicles has a much different effect than it would have in 1975 or even 1990 and therefore past data simply cannot be used to predict current safety performance.**

This issue of changing safety relationships over time brings to the fore another important issue, that of improved safety technology. Some of the differences above are likely attributable to improvements in the design of the vehicles as well as incorporation of improved safety technologies and/or better use of existing technologies. In our report, we have estimated the potential reductions in fatalities from simply increasing seat belt use from today's 70% up to 90% and found that 6,000 to 10,000 lives could be saved through increased seatbelt use. Improved safety belt design could save an additional 3,000 to 5,000 lives, for a total of 15,000 lives saved by safety belts alone. These potential life saving methods completely outweigh any negative safety impacts associated with weight/size reduction even if the majority analysis is accepted.

As noted above, however, we do not agree with the majority analysis. In our report, we demonstrate that it is the disparity in weight that is the key influence on safety and that influence is a negative one – the more you mix heavy and light vehicles, the less safe the highways will be. This fact is accentuated by the presence of light trucks that are heavy, stiff and have high bumpers. These three factors combine to make these vehicles very aggressive in crashes.

Analysis by Joksch et. al. indicates that in a front end collision, light trucks produce an increase in fatality risk by a factor of 3 to 5.6 when striking a car compared to a car striking a car.[15] In front-driver-side collisions light trucks pose risk factor 2 to 4.5 times that of a car when striking another car on the driver-side.[16] Further demonstrating the risks imposed by light trucks, recent analyses done by Ross and Wenzel shows that the top four selling cars in 1995-98[17] impose less of a risk in 2-vehicle crashes on other vehicles on the road than do SUVs and pickup trucks. For vehicles 2 to 5-years old, there were 79% more deaths per vehicle caused by the SUVs than by cars and more than four times as many deaths caused by pickups than by cars[18]. Correcting for the influence of age does not significantly alter

[15] Joksch, Massie, Pichler. *Vehicle Aggressivity: Fleet Characterization Using Traffic Collision Data"*. NHTSA. 1998. No vehicles had airbags. Data used was for 1991-1994.

[16] *Ibid*.

[17] The Taurus, Accord, Civic and Camry. *Wards's Motor Vehicle Facts & Figures 2000 for model years 1997 and 1998*.

[18] The Ford F Series, Chevy C/K pickup/Silverado, Explorer, and Ram Pickup. *Wards's Motor Vehicle Facts & Figures 2000* for model years 1997 and 1998.

these effects.[19]

Even more important are the findings by Ross and Wenzel that the risk of death in all crashes to the person driving one of the four best selling cars is **lower** than the same risk associated with driving one of the four best selling light trucks which are all heavier than the cars.[20] These results indicate that for modern vehicle designs with their associated size and weight, not only are the most popular cars less dangerous to others on the road, they are also safer for the driver compared to the top selling light trucks.

The NAS/NRC panel findings agree that reducing the weight and historically associated characteristics of light trucks could reduce the fatalities on our highways, however, in most of their fuel economy assessments they did not include weight reductions. In Path 3 where they did include some weight reduction, it was only 5% and was only in 3 of the 10 vehicles investigated, thus providing a very small benefit to safety. Our analysis indicates that a 10% weight reduction along with streamlining and an efficient variable valve controlled engine would enable light trucks to have the same fuel economy standard as cars. As indicated by Green and Keller, this would conservatively have saved 176 lives in 1993. Reaching higher fuel economy levels could require a 20-30 percent reduction in weight, implying a fatality reduction of 352 to 528. We feel that if more accurate assessments of the negative impacts of today's aggressive light trucks were developed, these fatality reductions would be further increased, especially since they can be achieved using high strength materials that maintain occupant safety while reducing aggressivity.

Weight Based Standards

The NAS/NRC report presents an altered fuel economy standard system termed E-CAFE, for Enhanced CAFE. A summary of the key impacts of this system is as follows:

- The weight based system creates incentives to add weight to smaller vehicles.
- As a result, this system creates a disincentive to adopt one of the most cost-effective fuel economy strategies (weight reductions) for many vehicles, one which PNGV has been working on for years.
- The weight based system also does not guarantee a specific fuel economy level and market shifts could still keep fuel economy on the decline.
- The NAS/NRC panel only provided an example of how the standards should be set. Evaluating and comparing the different impacts of various forms of the standard would be very complicated and leads to significant difficulty in setting fuel economy levels.

This system is predicated on a fuel economy standard that is based on a vehicle's weight. The heavier the vehicle the lower the required fuel economy, up to a weight cap, above which the fuel economy standard becomes constant (i.e. independent of weight as we have today). The cap creates an incentive for the heaviest vehicles to shed weight, which we agree seems like a positive step as it would improve

[19] Risk by drivers for cars and light trucks provided in personal communication with Marc Ross and Tom Wenzel, September 7, 2001.

[20] Risk to drivers of top four selling SUVs is 26% higher than the risk to drivers in the top four selling cars and the risk to drivers of the top for selling pickups is 68% higher than that in the top four selling cars..

overall vehicle safety, however it is, in essence, not very different from simply modifying the current flat light duty truck standard. The only difference is that some of the lightest trucks would not be included, they would instead be replaced by the heaviest cars.

For the vehicles below a weight cap (4,000 pounds in their example), there is no mathematical advantage to adding or reducing weight. As a result automakers have no incentive to make the vehicles near the cap somewhat lighter and therefore safer for the overall fleet. Further, automakers actually have an incentive to increase the weight of the vehicles below the cap thus creating a very large loophole similar to the current light truck loophole. This incentive is not created by the proposed standard, but instead by the existing market forces. Automakers can make larger profits on heavier vehicles today, therefore, there is an inherent financial incentive to increase sales of the heavier vehicles that are more profitable, as we have seen with SUVs. This shift in sales would increase the overall size and weight of the fleet at no penalty to a company's ability to meet the weight based fuel economy standards because the standards drop as the vehicle becomes heavier. Therefore, economic pressures turn the weight neutral slope into an incentive to increase weight, likely producing a fleet of vehicles that all move towards the 4000 lb. mark set in the NAS/NRC example, with an overall reduction in fleet fuel economy. A fleet that minimizes the variations in weight is good for overall safety, however, the cap set in the standard would effectively become an imposed fleet weight. Lower fleet weights could be just as safe, if not safer and would produce larger oil savings. A flat average 40 mpg standard across all car and light truck classes would instead encourage the heaviest vehicles to get lighter and therefore create a fleet that is both safer and more efficient.

The next concern is that, even if we ignore the first issue, the exact fleet fuel economy under this method is quite uncertain. As we have seen with the rise in light truck sales eroding fuel economy, a potential rise in vehicle weights could produce a net drop in fuel economy, even with the example 4000 pound limit. Further, the uncertainties of the political process create the risk for an even higher limit passing, which could further erode fuel economy levels.

Dual-fuel Vehicle Credits

The NAS/NRC panel, in their fifth recommendation on page 6-6 suggests the elimination of the dual-fuel vehicle credit system. UCS agrees that this system has not functioned as intended and automakers have received credit for their vehicles using alternative fuels they have never consumed. One solution is to eliminate these credits as suggested by the NAS/NRC panel, which we would find acceptable. Another alternative is to tie the amount of credit received by the automakers to the actual amount of each alternative fuel used in the previous year. Such a system would ensure that extra fuel economy credit is only given to the degree that the sales of these vehicles enhances the actual use of alternative fuels and would thus preserve the intent of the credit without the current pitfalls.

Availability of Higher Fuel Economy Vehicles

One assertion made by in the NAS/NRC report that is often put forward by automakers is that, "consumers already have a wide variety of opportunities if they are interested in better gas mileage." (page 1-3) While it is strictly true that there are a number of models on the US market that achieve more than 30 mpg, all of them force the consumer to give up some feature or some amount of performance to obtain the improved fuel economy. They cannot, however, accept in a very few cases, elect to pay more for a vehicle with the same features and performance, but with higher fuel economy. The result is that consumers do not truly have a choice to express a desire for improved fuel economy, all else being equal.

Our analysis and that done by the NAS/NRC panel indicate that the fuel economy of passenger vehicles can be increased while maintaining the size, performance and the various features consumers expect. Our analysis also indicates that consumers can purchase these vehicles without sacrificing and likely increasing overall crash safety. These improvements in fuel economy do come at a cost, but were these vehicles to be offered, consumers would have a true choice of getting all they expect from a car or light truck today, but with higher fuel economy and the associated net savings.

Conclusion

Raising fuel economy standards is the fastest, least expensive and most effective thing Congress can do to reduce our future dependence on oil. The oil savings associated with reaching an average fuel economy of 40 mpg by 2012 for all new cars and light trucks would be 1.9 million barrels per day in that year alone – this is four times the expected peak output from the Arctic Refuge at today's oil prices and over three times the oil we imported from Iraq last year (and more than we imported from Saudi Arabia). The cumulative oil savings would be about 3 billion barrels of oil or 125 billion gallons of gasoline. That means that in 10 years we would save almost as much oil as is recoverable at today's oil prices from the whole Arctic Refuge in its 50-60 year lifetime. That is also 25 times the oil savings called for in the House energy bill, H.R. 4. At the same time we are significantly cutting our oil dependence, consumers are saving 12.6 billion dollars in 2012 and close to 100 billion dollars per year by 2015, while the auto industry will see a growth of over 40,000 jobs in the US.

We feel that between our work, the most recent NAS/NRC fuel economy study as well as a wealth of other literature available today, it is clear that the technology exists to cost effectively increase fuel economy with resulting benefits to oil use, consumers and the environment. These significant improvements in fuel economy can be achieved with existing technology, enabling us to achieve progress in fuel economy in the near term as we watch the market for hybrid electric and fuel cell vehicles grow. We can see both near and longer term increases in fuel economy and these increases can be accompanied by the same safety, comfort and performance consumers expect today and could even improve the overall safety of America's highways if the light truck loophole is closed.

Thank you for the opportunity to testify before the Committee today. I would be happy to answer any questions you may have.

Attachment – Analysis of savings in the NAS 14 year "break-even" study

The assessment performed by the NAS panel in chapter four of their report finds the point where the financial benefits to a consumer are maximized, ignoring the financial impacts of externalities. This is done through a process where the last dollar spent on improving fuel economy is just offset by an additional dollar saved from that same improvement in fuel economy. This identifies an equilibrium point associated with significant savings that were not reported in the NAS/NRC report. Below I have re-created Table 4-2 from the NAS/NRC report and I have included the net savings consumers would experience using the NAS/NRC conservative assumption of a 12% discount rate. I have also included a summation of the vehicles into class and an overall fleet average fuel economy

			Low Cost/High mpg			Average			High Cost/Low mpg		
	Base mpg	Base Adj mpg	new mpg	Incremental Cost	Net Savings	FE (mpg)	Incremental Cost	Net Savings	FE (mpg)	Incremental Cost	Net Savings
Cars											
Subcompact	31.2	30.1	38.9	$ 543	$ 614	36.2	$ 513	$ 343	33.3	$ 379	$ 105
Compact	27.9	27	35.8	$ 657	$ 747	33.3	$ 640	$ 434	30.6	$ 520	$ 143
Mid Size	24.9	24.1	33.8	$ 872	$ 973	30.5	$ 789	$ 549	28.2	$ 668	$ 252
Large	21.2	20.5	30.3	$ 1,087	$ 1,367	28.8	$ 1,178	$ 1,000	27.5	$ 1,286	$ 631
Light Trucks											
Small SUVs	26	25.1	35.1	$ 832	$ 926	32.6	$ 818	$ 593	30.1	$ 729	$ 283
Mid SUVs	21.1	20.4	30.3	$ 1,070	$ 1,422	28.2	$ 1,056	$ 1,042	26.2	$ 1,000	$ 669
Large SUVs	17.7	17.1	26.3	$ 1,308	$ 1,882	25.1	$ 1,348	$ 1,549	23.9	$ 1,367	$ 1,210
Small Pick-ups	22.6	21.8	32.2	$ 1,031	$ 1,273	29.8	$ 1,008	$ 896	27.6	$ 931	$ 550
Large Pick-ups	18.1	17.5	28.6	$ 1,415	$ 2,058	26.7	$ 1,466	$ 1,603	24.9	$ 1,489	$ 1,145
Mini Van	22.1	21.4	32.1	$ 1,092	$ 1,333	29.9	$ 1,101	$ 956	27.7	$ 1,059	$ 577
Average Car			36.7	$ 645	$ 728	34.0	$ 610	$ 414	31.3	$ 483	$ 146
Average Light Truck			30.2	$ 1,161	$ 1,539	28.2	$ 1,168	$ 1,146	26.2	$ 1,131	$ 759
All			33.4	$ 883	$ 1,102	31.0	$ 867	$ 751	28.7	$ 782	$ 429

These results show that, even using the conservative discount rate, consumers would be saving $340 to $1,600 above the cost of fuel economy improvements under the average cost average fuel economy scenario. These results show the maximum net savings for consumers and the associated fleet fuel economy varies between 29 mpg and 33 mpg. If a more reasonable discount rate, based on current automobile loan rates of 7-8%, corrected for inflation to yield 5%, had been used, the average fuel economy levels would be higher and the costs would also be higher. The savings and fuel economy levels would further be higher if the value of externalities was included in the analysis.