Testimony to the U.S. Senate Committee on Energy
and Natural Resources

NEAR TERM OPTIONS TO INCREASE FUEL ECONOMY AND DECREASE PETROLEUM DEMAND

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by

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Good morning Mr. Chairman, distinguished committee members and guests. Thank you for the opportunity to comment on what can be done in the near term to reduce our demand for petroleum by increasing motor vehicle fuel economy. Before I do that, I would first like to note the important actions Congress has already taken to promote fuel economy. The Energy Independence and Security Act (EISA) of 2007 requires a 40% increase in the fuel economy of passenger cars and light trucks by 2020. I estimate that this law alone will save consumers about 60 billion gallons of gasoline a year by 2030. The Act also calls for a study of fuel economy standards for heavy trucks, a policy that has been successfully implemented in Japan. Just as important, you are allowing energy markets to work. Market responses to higher oil prices, though painful, are an essential part of both the long and short-run solution. I believe these measures have already sent a signal to world oil markets that the United States is serious about reducing its oil consumption in the longer term.

There are many things consumers can do themselves to improve the fuel economy of their vehicles, and there are also things the Congress can do to help. By combining a number of individually small improvements consumers' gasoline bills can be reduced significantly. Some actions can be taken immediately, others will require a few years.

Improving fuel economy, by itself, will not bring oil prices back to $30 a barrel. That will require a comprehensive, long-term strategy, one that addresses both climate change and energy security simultaneously, and one that sets measurable goals for both reductions in greenhouse gases and oil dependence (Greene and Leiby, 2008).

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IMMEDIATE ACTIONS TO INCREASE MILES PER GALLON

Many consumers are already aware of actions they can take to get more miles per gallon. The Department of Energy (DOE) and Environmental Protection Agency (EPA) website, www.fueleconomy.gov, itemizes and explains a number of proven driving and maintenance tips. These tips have been publicized on television, in newspapers and magazines, and on the internet through programs such as the Alliance to Save Energy's Drive $marter Challenge at http://drivesmarterchallenge.org/ . However, as a provider of this information, I am well aware of its deficiencies. Often, the best information available is out of date and may not be accurate for today's automotive technology. Some of it is based on studies of a very limited number of vehicles and there are questions about how confidently it can be applied to all vehicles. Just this year, the DOE's Vehicle Technologies Program began an effort to update and validate the fuel economy information it provides to the public. I believe it is appropriate for the DOE to take on this responsibility and that the Congress should encourage it to expand and continue the effort.

Driver Behavior

After a vehicle has been designed, engineered and manufactured the driver can have the greatest influence on its fuel economy. Different driving styles are a major reason why the fuel economy label says, "your mileage will vary". What little research there is on the subject indicates that typical drivers can increase their miles per gallon by about 10% by diligently adopting the driving tips provided on fueleconomy.gov.

- ***Curb aggressive driving*** - 5% improvement in city driving and even more on the highway
- ***Observe speed limits*** - 7-8% fuel economy benefit for every 5 mph slower at highway speeds
- ***Car "housecleaning"*** - remove unnecessary weight from the cargo compartment, as well as cartop carriers when not in use (2% improvement for each 100 lbs. unloaded).
- ***Plan ahead*** - to combine trips to avoid cold-starts (especially in cold weather), and use your most efficient vehicle as much as possible.
- ***Avoid unnecessary idling*** – idling for more than a few seconds wastes fuel versus shutting down the engine and restarting.

Vehicle Maintenance

Proper vehicle maintenance can also improve fuel economy. Keeping tires inflated to the manufacturer's recommended pressure, keeping wheels properly aligned and balanced, oil changes on manufacturers' recommended intervals with the recommended grade of fuel saving oil, replacing dirty air filters and keeping you engine in proper tune can all help maximize miles per gallon.

Speed Limits

Reducing speed limits can save fuel, but at a cost of increased travel time. For each 5 mph above 55 mph, fuel economy decreases by about 7%. For most Americans the value of their time would exceed the value of the fuel saved. A retrospective study of the 55 mph speed limit by the National Academy of Sciences (NAS) found that it saved 1-3% of highway fuel use and also improved highway safety (NAS, 1984). Because many drivers now routinely exceed the speed limit by 5 mph or more, an alternative to lowering speed limits would be to more strictly enforce those we have now.

The fact that not all vehicle travel occurs under free-flowing highway conditions limits the potential benefits of lower speed limits. According to the Federal Highway Administration (FHWA), less than 40% of all vehicle miles are traveled on interstates, freeways and expressways or principal rural roads (U.S. DOT, 2005). A substantial fraction of these miles will occur under congested conditions. Thus, a 5 mph reduction in speed limits, if strictly enforced, would reduce fuel consumption by up to 7% on the roads where it applied, and 2-3% nationwide.

Heavy Trucks

Strategies available to improve heavy truck fuel consumption include idle reduction (up to 1,000 gallons per truck per year), improved aerodynamics (up to 600 gallons per truck per year), wide base tires, automatic tire inflation systems, and hybrid powertrains (EPA $martway, www.epa.gov/smartway/smartway_fleets_strategies.htm).

NEAR-TERM (1-5 YEARS) OPTIONS

Low Rolling Resistance Tires

Americans spend about $20 billion purchasing 200 million replacement tires each year. A recent study by the NAS concluded that it was technically and economically feasible to reduce the rolling resistance of replacement tires by 10% (NRC, 2006), saving 1-2% or 1-2 billion gallons in fuel consumption. To encourage more widespread use of low rolling resistance tires, Congress has required the National Highway Traffic Safety Administration (NHTSA) to develop and implement an energy efficiency labeling system for replacement tires, as recommended by the NAS panel. This is yet another accomplishment of the EISA of 2007. The effectiveness of this system remains to be seen. Congress might also consider establishing rolling resistance standards (relative to original equipment tires) for replacement tires.

Driver Training

Fuel efficient driving behavior, correctly done, should also contribute to safe driving. Observing posted speed limits, avoiding aggressive driving behaviors, anticipating traffic situations and avoiding tailgating all improve fuel economy and traffic safety. A well-maintained vehicle is a more fuel efficient and safer vehicle. Unfortunately, higher fuel prices have encouraged what has been called “hypermiling” which includes some extreme and unsafe driving practices such as

drafting behind other vehicles to reduce aerodynamic drag or coasting with the engine off (in a vehicle not equipped for engine-off-at-idle). Congress might seek ways to encourage the inclusion of safe, fuel efficient driving practices in standard driver training curricula.

Updating Fuel Economy Test Procedures

The time has come to update the test procedures for determining compliance with Corporate Average Fuel Economy (CAFE) Standards. Beginning with model year 2008, the Environmental Protection Agency fundamentally changed the fuel economy estimates it provides to the public on window stickers, in the Fuel Economy Guide and via www.fueleconomy.gov. These changes incorporate several important real-world factors that affect in-use fuel economy but are not included in the city and highway test cycles used to determine compliance with CAFE Standards. These factors include use of air conditioning, cold starts and aggressive high speed driving. As a result, the standards provide no incentive for the adoption of certain technologies that can improve real-world fuel economy but are of little or no benefit on the city and highway test cycles. Because most accessories, such as air conditioners, power steering pumps, and alternators, are operated little or not at all on the CAFE test cycles, there is no incentive for manufacturers to improve their efficiency in order to meet fuel economy standards. The standards also offer no incentive to reduce cooling loads by improved insulation or specially tinted glass. It has been estimated that adoption of such "off-cycle" fuel economy technologies could raise real-world fuel economy by 10% or more (Duleep, Fulton and Perkins, 2005).

Voluntary Labeling of Used Cars

While every new car bears a fuel economy label, used cars, which comprise the vast majority of sales transactions, do not. New car fuel economy ratings should be useful for used cars, since research indicates that fuel economy deteriorates very little with age for a reasonably maintained vehicle (Greene et al., 2006). The National Automobile Dealers Association is currently considering a voluntary labeling program for used cars and there may be ways in which Congress could facilitate such a program.

Individualized Fuel Economy Estimates

In the belief that it's previous fuel economy numbers were biased, the EPA recently revised its procedures for calculating the fuel economy estimates it provides to the public. Despite this, most car buyers will remain highly uncertain about the fuel economy they will actually achieve in real-world driving. This is because the EPA's estimates are intended to be an average for all American drivers and not an individualized estimate for any particular driver. Many factors affect real-world fuel economy, especially traffic conditions, driving style, trip lengths, and climate. The result is tremendous variance in real world experience around the mean estimate (Figure 1). For the data shown in Figure 1, a confidence interval that includes 95% of motorists is a band 16 mpg wide around the mean estimate. To improve the usefulness of MPG estimates to consumers we need more *accurate* predictions for individuals not less biased estimates for the average driver. This means finding ways to take account of driving style, traffic conditions, climate and possibly other factors to produce an individualized estimate. I believe the internet provides a means for creating such individual fuel economy estimates. With some research

effort, I believe much better (but still not perfect) fuel economy information can be provided to consumers.

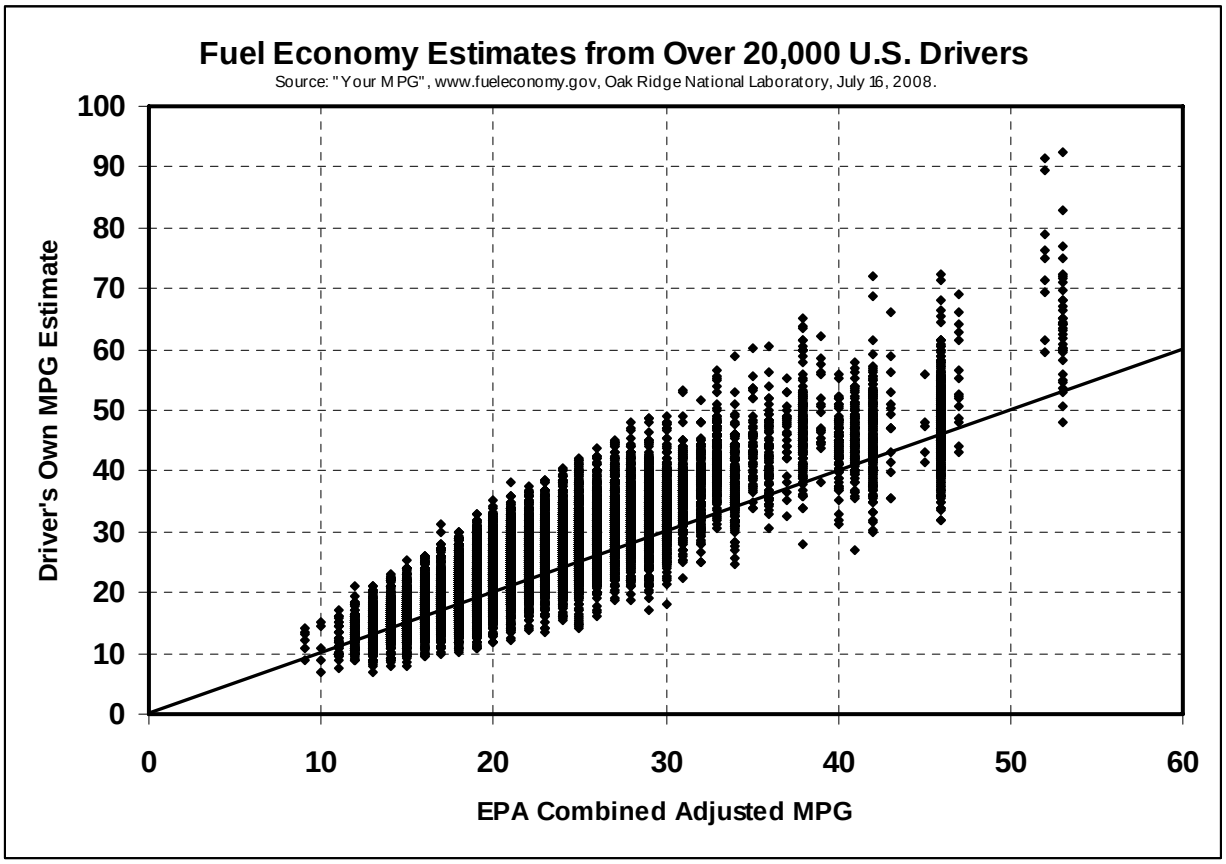

Figure 1. Real World Fuel Economy Estimates from Over 20,000 U.S. Drivers

Strong consideration should be given to reporting fuel economy to consumers in terms of fuel consumption per distance, rather than distance per fuel consumed. There is evidence that consumers misinterpret miles per gallon estimates, assuming that the 5 mile per gallon difference between 15 MPG and 20 MPG is the same as the 5 mile per gallon difference between 45 and 50 MPG (Larrick and Soll, 2008). Thus, fuel economy improvements tend to be undervalued for low MPG vehicles relative to higher MPG vehicles. Most of the rest of the world now reports fuel economy in terms of fuel use per distance traveled. This makes it easier for consumers to compare fuel economy among vehicles and to do such calculations as average city and highway estimates.

Fuel Economy Gauges to Provide Feedback to Drivers

Drivers of most vehicles cannot see how their driving behavior affects their vehicle's fuel economy. Some cars now provide digital displays of instantaneous fuel economy so that drivers can see how speeding or aggressive driving behaviors waste fuel. While it is virtually certain that such devices will improve in-use fuel economy, current test procedures give no credit for them. Research is now ongoing at the University of California at Davis to better understand how fuel economy feedback devices can improve in-use fuel economy. Congress may wish to

explore ways to encourage the installation of fuel economy feedback devices in all motor vehicles.

Pay-at-the-Pump Minimum Liability Insurance

At a time of record high gasoline prices, it may seem strange to propose a policy that would increase the price of gasoline at the pump. However, pay-at-the-pump insurance would have no impact on the overall cost of driving. It would simply transfer the incidence of a fraction (perhaps one fourth) of the total cost of auto insurance to the cost of motor fuel. This would increase the cost of gasoline by $0.25 to $0.50 per gallon but reduce the cost of auto insurance by an equal amount. Motorists would still be required to enroll with an insurance carrier to establish coverage and to purchase any additional insurance needed. The increased cost of gasoline would encourage manufacturers to adopt more fuel efficient technologies and consumers to choose more fuel efficient vehicles and operate their vehicles more efficiently. It would also reduce the problem of uninsured motorists since everyone would be purchasing a minimal amount of liability insurance on a pay-as-you-go basis. It would also improve the economic efficiency of the insurance system by making at least a fraction of insurance payments proportionate to the amount of transportation done.

Incentives for Energy Efficient Vehicles

Gasoline at $4/gallon provides a strong economic incentive to increase fuel economy for both car makers and car buyers. Still, there are good reasons to believe that the market for automotive fuel economy is not itself efficient and that market outcomes could be improved by means of economic incentives to vehicle purchasers (Greene, German and Delucchi, 2008).

Extending and simplifying incentives for hybrid vehicles would raise new vehicle fuel economy and encourage the transition to more efficient electric drive systems (Kromer and Heywood, 2007). Incentives could be based on fuel consumption (on the quantity of fuel saved) rather than on a technical measure of degree of hybridization. For example, a hybrid pickup truck that got 18 miles per gallon instead of 12 would benefit from a larger incentive than a hybrid passenger car getting 45 mpg instead of 30 because it would save 200 gallons more in a typical year of driving (333 gallons in driving 12,000 miles instead of 133). Of course, incentives for higher fuel economy have two drawbacks. First, some car buyers would have bought a hybrid vehicle anyway, especially at today's high fuel prices. Second, the incentives will be a drain on the treasury unless they are offset by comparable increases in revenue. The first problem can be mitigated but not eliminated by announcing incentives at least two years in advance to give manufacturers time to expand production. The second problem can be eliminated by implementing disincentives for inefficient vehicles.

In the longer run, fiscal incentives for more energy efficient vehicles may be the most efficient policy not only for encouraging consumers to choose higher fuel economy but also for encouraging manufacturers to invent and adopt advanced fuel economy technologies. Feebates – fiscal incentives based on fuel consumption per mile – are a flexible market based policy for promoting fuel economy. Feebates can be indexed to vehicle attributes, such as NHTSA's footprint metric, in the same way fuel economy standards can (Greene, 2008). Feebates can be

revenue neutral or can provide a net subsidy for new vehicle purchases. They can be a complement to fuel economy standards, or possibly even a substitute for them.

CONCLUDING OBSERVATIONS

In my remarks I have concentrated on actions individual motorists can take to increase fuel economy and thereby reduce the burden of high gasoline prices, or things Congress can do to promote light duty vehicle fuel economy. Yet we cannot solve our oil dependence problem unless we address all uses of petroleum throughout the transportation sector and throughout our economy. Light-duty vehicles account for less than half of total U.S. petroleum use. Other transportation vehicles account for more than one-fourth of petroleum demand. Industry consumes almost another fourth and we burn up an average of 1 million barrels per day of distillate fuel heating buildings. All of these uses must be addressed. Only through a comprehensive strategy to reduce petroleum use and increase energy supply, directed towards a measurable oil independence goal, can we be confident of achieving energy security.

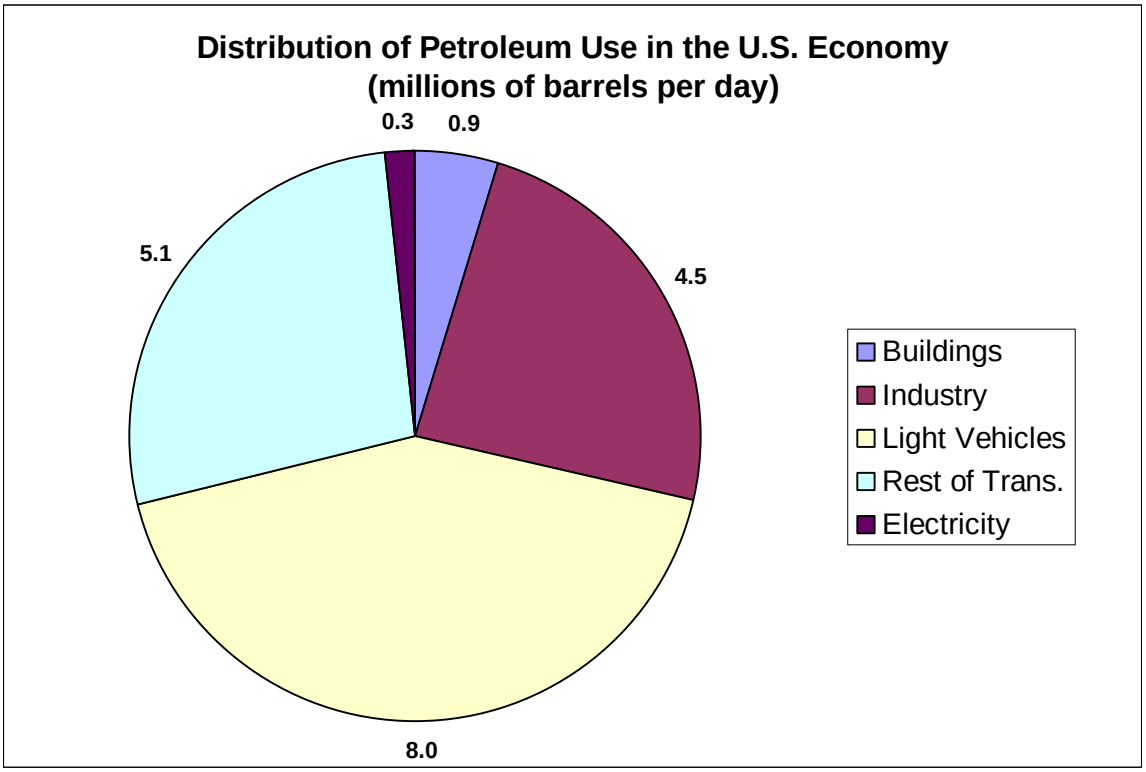

Figure 2. Petroleum Use in the U.S. Economy, 2007

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