

# An Analysis of Feebate Programs and Increased Fuel Taxes as an Alternative to CAFE Standards

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## **Abstract**

This report addresses the reduction of crude oil consumption and green-house gas (GHG) emissions through the passage of government policies in the transportation sector. The transportation sector is an important factor that contributes heavily to the national total of oil consumed and GHGs emitted at increasing rates; highway fuel consumption has increased 62% between 1973 and 2005 and highway GHG emissions increased nearly 40% between 1990 and 2005 (Policy Options).

In the United States, CAFE standards currently act as the mechanism which regulates oil consumption. This report focuses on the inadequacies of CAFE in addressing the level of oil consumption, the lack of GHG emission regulation, and solutions to both of these issues.

Feebate programs that use markets as the mechanism to increase fuel efficiency are discussed as a partial replacement of CAFE standards along with an increased fuel tax. The result is a policy program that reduces oil consumption and GHG emissions by providing consumers and automotive manufacturers with incentives to buy and make more fuel efficient cars and regulates the number of miles driven by the average American.

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## **Background**

The recent and ongoing energy crisis reminds us of how dependent the United States is on crude oil. Although crude oil prices have dropped recently, the finite nature of this resource limits supply and price increases are only inevitable in the long run. Large increases in domestic oil production could help relieve some of the pressure of high crude prices, but the Energy Information Association (EIA) only estimates a 4% increase in domestic production by 2030; alternative methods must be found. Beside the fact that the price of oil affects our everyday lives, the greenhouse-gas emissions produced by the combustion of crude products are becoming an increasingly urgent problem.

When greenhouse-gasses (GHG) such as carbon dioxide (CO<sub>2</sub>) are emitted into the atmosphere, they produce a warming effect by trapping energy from the sun in the earth's atmosphere (IPCC 2007). The Intergovernmental Panel on Climate Change (IPCC) has stated that the effects of increased greenhouse-gas emissions will result in catastrophic weather related events (IPCC 2007). Since global warming is a global issue, efforts to reduce GHG emissions should happen worldwide, and the United States has the opportunity to act as an example of what other countries should do about the issue of global warming.

Oil is consumed and GHGs are emitted by many sectors of the U.S., and all of these cannot be addressed the same way. The U.S. transportation sector consumes 20% of imported and domestic oil and emits 33% of the total U.S. CO<sub>2</sub> emissions, and reducing these numbers will substantially help to relieve some of the negative effects of crude oil use and GHG emissions. Currently, the Corporate Average Fuel Efficiency (CAFE) standards enforce regulations on the U.S. automotive industries to increase the fuel efficiency of the automobiles driven in the U.S., but there is no program that addresses the regulation of CO<sub>2</sub> as a pollutant (Policy Options).

## CAFE Standards

The CAFE standards were enacted in 1975 as a way to increase the efficiency of automobiles driven in the U.S. and decrease the dependence on foreign oil. The CAFE program increases vehicle fuel efficiency through by the mechanism of a mandate for automotive manufacturers. Under CAFE the Department of Transportation establishes standards for fuel consumption per mile applicable to two classes of vehicles: passenger automobiles and non-passenger automobiles, or light trucks (Policy Options). The program was only effective in reducing oil consumption initially due to problems with the program's structure.

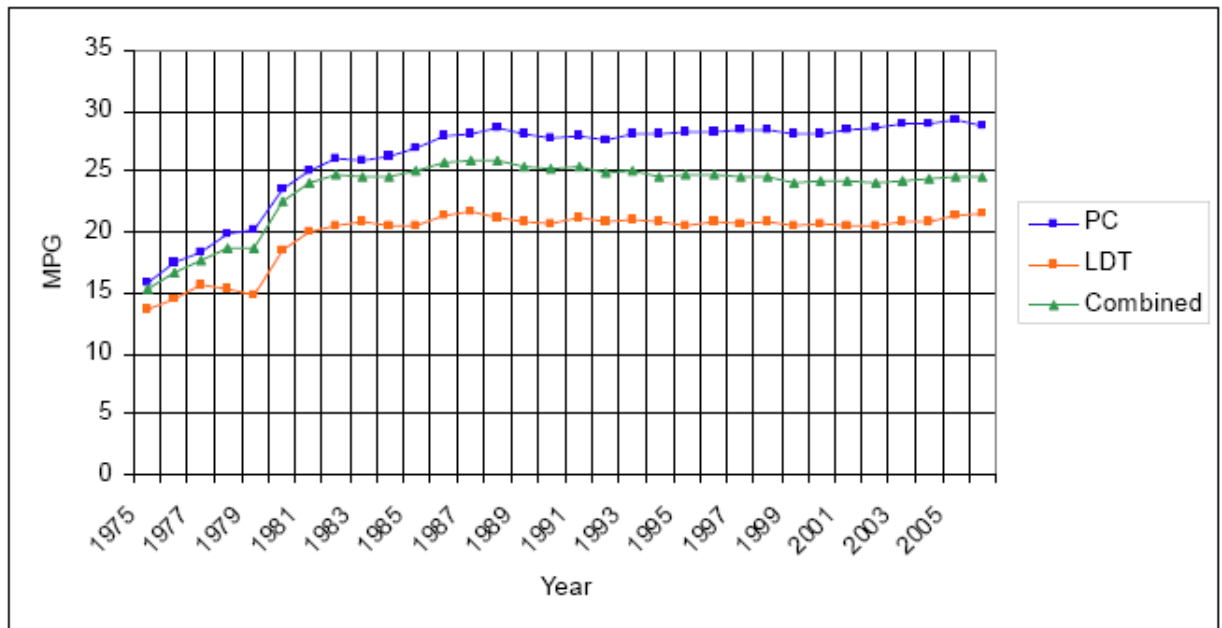
## The Successes of CAFE

When the CAFE standards were first implemented, U.S. oil use dropped 7%, oil imports dropped 23%, and increased the average fuel efficiency of American vehicles (Winning the Oil Endgame). Although the CAFE program produced significant increases in fuel efficiency, it eventually failed to reduce oil consumption and acted only as a way to keep vehicle efficiencies from backsliding

## Problems with CAFE

Although the CAFE standards were initially effective in reducing the consumption of oil and increasing automobile efficiency, they did not continue to produce the same results. Figure 1 shows the fuel efficiency of different classes of automobiles in the U.S. for the years 1975-2007.

**Fuel Efficiency (MPG) vs. Time (years)**



*Figure 1:* Plot showing the average automobile fuel efficiency in the U.S. for the years 1975-2007 (Policy Options).

The combined trend in Figure 1 shows that the overall fuel efficiency leveled out to approximately 25 miles per gallon (mpg) in the early 1980s and has remained close to this value since. The average fuel efficiency leveled off at 27.5 around 1985, because the standard became mandatory at that point (Policy Options). Since then, there has been no increase in the fuel efficiency standard because the CAFE program lacks a mechanism that continuously raises standard. Since the price of fuel from the period of 1985-2005 remained low, there was no incentive to raise the standards (World Petroleum Consumption).

The increase in fuel efficiency coupled with low fuel prices made it more convenient for Americans to drive larger distances so that from the period of 1995 to 2005 the average number of miles driven per car annually in the U.S., or VMT, rose 1.6% for cars and 3.0% for SUVs and trucks. The rise in VMT and the absence of CO<sub>2</sub> emission regulation under the CAFE program has resulted in nearly a 40% increase in the amount of CO<sub>2</sub> emitted by the transportation sector (Policy Options).

Since the CAFE program requires automotive manufacturers to raise the efficiency of their vehicles, the program is taking the burdens created by American's driving habits and putting most of it on the automotive manufacturers (Winning the Oil Endgame). Focusing part of the burden on the automotive sector is necessary to increase fuel standards, but drivers should also receive part of the burden since they contribute to the overall problem.

### **Feebate Programs**

Feebate programs utilize a market mechanism that rewards certain consumers with a rebate for buying a fuel efficient vehicle and penalizes other consumers with a fee for a less fuel efficient vehicle (Davis 1995). The pivot point is a variable value of fuel efficiency where neither a rebate nor fee applies. All values of fuel efficiency below the pivot point have fees associated with them and all values of fuel efficiency above the pivot point have rebates associated with them (Davis 1995); a hypothetical situation is displayed graphically in figure 2 below.

### Value of Fee/Rebate vs. Fuel efficiency

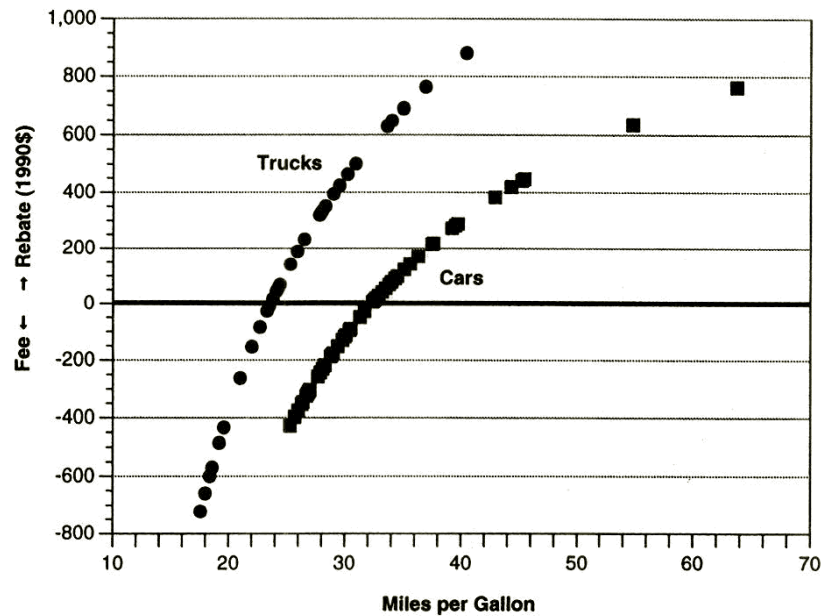


Figure 2: Hypothetical scenario of Fee/Rebate values for specific fuel efficiencies (Davis 1995).

In this scenario, different feebate prices are used for cars and trucks, so two curves exist. The pivot points are where the curves cross the 0 value on the y-axis. For a given fuel efficiency, the associated fee or rebate is determined by the applicable curve. The slopes of the curves are their associated feebate rates.

#### The Advantages of Feebate Programs

Feebate programs have the ability to fix many of the problems with the CAFE program by taking advantage of markets, which achieve the goals of reduced fuel consumption and GHG emissions more efficiently than mandates (Winning the World Oil game).

One of the problems with the CAFE program is that it lacks a mechanism that promotes continuous increases in fuel efficiency. Feebate programs provide monetary incentives that encourage consumers to buy more fuel efficient automobiles, and this promotes automotive manufacturers to produce more fuel efficient vehicles. Consumers will want to save more money and manufacturers will want to stay competitive, so both parties will want increases in fuel efficiency.

Feebate programs would also put money into the U.S. economy, because the consumers who buy more fuel efficient vehicles will save an additional amount of money since they are spending less to fuel their vehicles. A set of six different feebate program scenarios were analyzed by the U.S. Department of Energy in 1995; data regarding the amount of money saved by the consumers over a 15 year period (1995-2010) is displayed in table 1 below.

Table 1: Maximum Annual Increase in Consumer Surplus per Household (Davis 1995).

<b>Maximum Annual Increase in Consumer Surplus per Household, 2010 (1990\$)</b>	
GPM LOW	82
GPM HIGH	91
ONE ZERO POINT	75
MPG LOW	87
NONLINEAR LOW	90
SIZE-BASED	70

The scenarios differ based on the values of variables that effect feebate programs such as feebate rate and pivot point settings were altered. For this study, an average of \$10 billion would enter the U.S. economy (Davis 1995).

The DOE study also showed that feebate programs would reduce CO<sub>2</sub> emissions by a significant amount. The results are displayed in table 2 below.

Table 2: Measurement of the Decrease in CO<sub>2</sub> Emissions

	<b>2010</b>		<b>Cumulative Total, 1995–2010 million tons</b>
	<b>million tons</b>	<b>% savings</b>	
GPM LOW	69	7.0	750
GPM HIGH	83	8.4	890
ONE ZERO POINT	71	7.2	770
MPG LOW	77	7.8	800
NONLINEAR LOW	77	7.8	830
SIZE-BASED	63	6.4	660

An additional bonus is that feebate programs have the ability to be revenue neutral or in other words would not act as a tax because the program's variables could be adjusted so that the amount of money received from fees by the government would equal the amount of money the government pays out as rebates.

### **The Problem with Feebate Programs**

Although Feebate programs offer solutions to many of the problems associated with the CAFE program, they are not fully sufficient. Feebate programs, just as the CAFE program, do not provide a

way to limit the average VMT per capita. Any policy that aims to decrease oil consumption and GHG emissions by increasing vehicle efficiency must also limit the average VMT per capita. An effective way to regulate the average VMT per capita is a fuel tax, which is described in the next section.

### **Fuel Taxes to Regulate VMT**

A fuel tax is a tax on certain types of fuel. The U.S. and many other countries use fuel taxes at least as a source of revenue and, in some cases, as a way to reduce fuel use and the average VMT per capita (Fuel Taxes). Reducing the average VMT per capita in the U.S. would also reduce the per capita amount of oil consumption and GHG emissions.

The U.S. fuel tax, which is 20 cents per gallon, does not act as an effective way to regulate average VMT per capita, but this would change if the tax was increased. In 2008, the average price of fuel in the U.S. reached over \$ 4; as a result, the average VMT per capita dropped 4.3% from March 2007 to March 2008 (Fuel Taxes). Figure 3 shows how the average VMT per capita decreases with increases in fuel price. Using the fuel tax as a VMT regulator indirectly limits CO<sub>2</sub> emissions for vehicles.

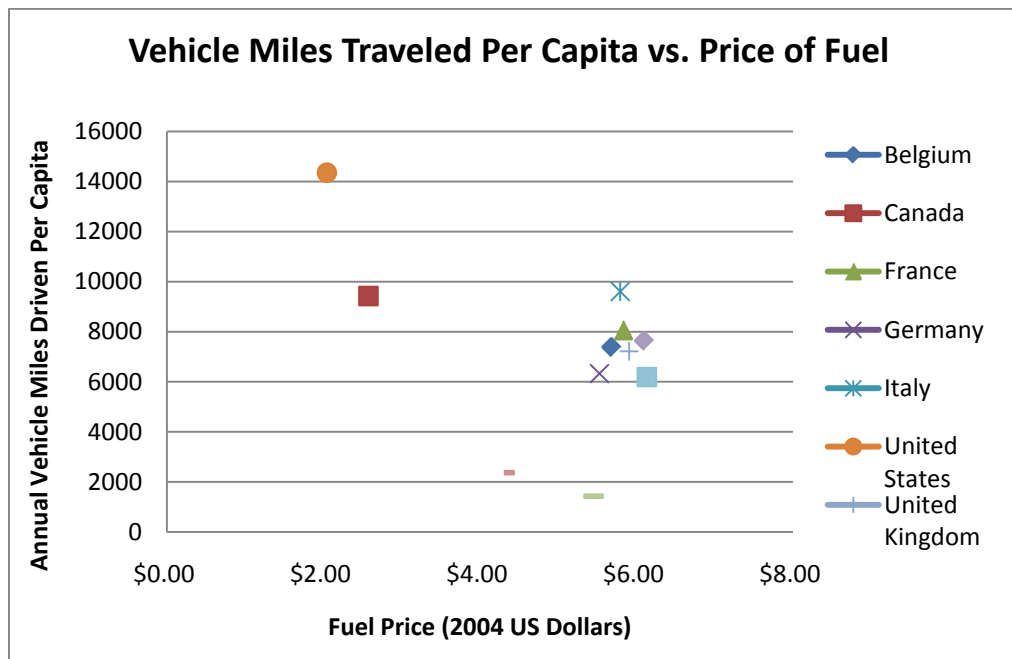


Figure 3: Plot of Vehicle Miles Traveled Per Capita vs. Price of Fuel (2004 U.S. Dollars).

### **Opposition to Fuel Taxes**

Opponents of fuel taxes mention that taxes are not a politically feasible way to perform regulations, because most citizens do not approve of tax increases (Fuel Tax). This obstacle is easily

avoidable by using the revenue of the tax to perform an action in the citizen's favor, such as a decrease in the income tax.

## **Conclusion**

The U.S. is at a point where the passage of smart and effective policies that aim to reduce oil consumption and GHG emissions should be a primary concern to the government. The failures and limited nature of the CAFE program should be replaced by programs that don't require law makers to revisit them every time fuel efficiency needs to be increased or put too much of a burden on one group.

A revenue neutral feebate program provides a smart alternative that addresses many of the problems with CAFE standards. Feebate programs would benefit both consumers and automotive manufacturers and put money back into the U.S. economy by rewarding certain consumers. Although, feebate programs solve many of the problems with CAFE standards, they fail to regulate the average VMT per capita, so an increase in the U.S. fuel tax should work together with the feebate program.

Increasing the U.S. fuel tax will act as a mechanism to regulate average VMT per capita by penalizing American citizens who drive more often than others. The fuel tax will act as even further incentive to buy a fuel efficient vehicle, and the tax's revenue could recycle back to citizens through other government programs or reductions in taxes such as the income tax.

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