

*Stricter fuel standards would increase air pollution and hurt U.S. automakers and consumers, but would save little gasoline.*

# CAFE Changes, By the Numbers

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**L**AST MARCH, THE U.S. SENATE CONSIDERED a proposal by Sen. John Kerry (D-Mass.) to raise the Corporate Average Fuel Economy (CAFE) standards for cars and light trucks by 50 percent. Kerry and other proponents of stricter standards had the support of a July 2001 report by the National Research Council (NRC) that called for significantly higher standards, as well as the backing of many major newspapers. The events of September 11 and the subsequent resurgence of violence and political uncertainty in the Mideast added to the momentum in favor of new fuel efficiency standards. But a coalition of Republicans and auto-state Democrats defeated the Kerry measure by a decisive and surprising 62-38 vote.

To the casual observer, the decision may have seemed a defeat of the public interest by special interests. In fact, it was a victory for economic common sense. As many economists and other policy experts have argued, the CAFE standards save very little gasoline, increase car buyers' costs and lower their benefits, increase pollution and auto fatalities, and shift revenue away from U.S. automakers to foreign firms. Instead of raising the fuel efficiency standards, policymakers would better address any externalities associated with gasoline by raising the gas tax.

## A BRIEF HISTORY

The CAFE program, enacted in 1975, required all manufacturers selling more than 10,000 autos per year in the United States to have sales-weighted fuel economy of 19.0 miles per gallon in 1978. That meant that all of the new cars that an automaker sold had to average 19 mpg, though individual models could have gas mileages below that level. Under the law, the mileage standard increased to 27.5 mpg in 1985, and it currently remains at that level.

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The CAFE law divides an automaker's cars into foreign and domestic fleets. It also offered a different standard for light trucks (pickup trucks, sport-utility vehicles, and minivans) — a concession that seemed insignificant in 1975 because those vehicles comprised only a small percentage of the total number of vehicles on the road. However, that concession has become increasingly significant in recent years as light truck sales — buoyed by the wildly popular sport-utility vehicle — now comprise nearly half of all U.S. auto sales. The National Highway Transportation Safety Administration, using authority granted it through CAFE, currently requires a 20.7-mpg fleet-efficiency standard for light trucks, but the agency is considering raising that standard.

**Compliance** If a manufacturer does not comply with the CAFE standards, it is subject to a civil fine of \$55 per car/mpg. For example, if a manufacturer produces one million cars with a sales-weighted mpg of 26.5 mpg, that firm could be subject to a fine of \$55 per car/mpg × 1 million cars × 1 mpg, or \$55 million.

Foreign automakers view the fine as a tax. Thus, BMW and Mercedes-Benz, for example, have routinely paid CAFE fines. In contrast, American firms view the standards as binding because their lawyers have advised them that, if they violate CAFE, they would be liable for civil damages in stockholder suits. The fear of civil suit is so strong that even Chrysler, which is owned by the German firm Daimler-Benz, will not violate the limits. Because the "shadow tax" of the CAFE constraint (the cost of complying with the standards rather than paying the fine) can be much more than \$55 per car/mpg, the effects of CAFE standards are much larger on U.S. automakers than foreign firms.

## GASOLINE EXTERNALITIES

In a free market, consumers equate the price of a commodity (the "internal" cost) with the marginal value of its consumption. In the absence of any external costs like air pollution or traffic



congestion, the marginal value of a gallon of gas to consumers equals its price. No public benefit would arise from reducing the consumption of gasoline, under that scenario. However, if external costs do exist, economic theory recommends that the appropriate policy response is to increase the price to consumers to equal the marginal cost of production plus the cost of the externality. That way, the consumer must consider the full cost of the commodity when he purchases and uses it.

That leads to an important question: Does gasoline con-

sumption create external effects that consumers do not currently pay for? As part of its research on CAFE, the NRC estimated that the external costs associated with the consumption of a gallon of gasoline are approximately 26¢ per gallon. The NRC reached that figure by estimating that the combustion of the gas produces 12¢ worth of adverse global climate effects, 12¢ worth of detrimental oil-import effects, and 2¢ worth of undesirable changes from pollution emissions from refineries.

The cost estimates are subject to several criticisms. With respect to climate change, there is a wide range of uncertainty about measuring the relevant externality. Previous estimates have placed it between 1¢ and 4¢ a gallon, implying the NRC may have overestimated the cost by a factor of at least three. The oil-import effects estimate can be criticized for ignoring the theory of comparative advantage, which holds that those who can produce a certain good at the lowest cost should be the ones to produce it. Thus, it makes far more sense for oil to be produced in Saudi Arabia at \$2 a barrel rather than Alaska at \$20 a barrel. Granted, some argue that reducing U.S. consumption of imported oil would make the United States economically more secure, but that assertion ignores the fact that the market for oil is worldwide and we cannot isolate ourselves from any price shock.

Despite those criticisms, let us assume that the NRC estimates are correct. The policy implication is that government should affix a 26¢ externality tax on a gallon of gasoline. Of course, gasoline already is taxed significantly, but under federal law most of the funds from the existing tax are used to build and maintain roadways, and therefore should be viewed as user fees rather than attempts to combat externalities. Those taxes, ironically, work to encourage more driving and gasoline usage. An externality tax should be assessed in addition to the road-

TABLE 1

## Detroit Fallout

The annual effects of proposed increases in the CAFE standards on automakers and U.S. consumers

	Change Under Cheney Proposal: 3MPG Increase in CAFE Standards	Change Under Kerry Proposal: 50% Increase in CAFE Standards
<b>Changes in Producer Surplus (\$ billion)</b>		
<b>General Motors</b>	-0.433	-3.861
<b>Ford</b>	-0.455	-3.469
<b>Chrysler</b>	-0.236	-1.967
<b>Foreign Firms</b>	0.260	4.387
<b>U.S. Firms Total</b>	-1.124	-9.297
<b>Change in Consumer Surplus (\$ billion)</b>	-1.841	-17.573
<b>Change in U.S. Total Surplus (\$ billion)</b>	-2.965	-26.870

way tax, to cover the external costs produced by the gasoline. The revenue generated from the tax should then be spent on projects other than road construction.

CAFE supporters claim that such a tax is politically infeasible. I disagree with that opinion; the federal government, every single state in the union, and all developed foreign countries of which I am aware have gasoline taxes. The average tax (federal and state combined) on gasoline in the United States is currently 41¢ per gallon. Democratically elected European governments have much higher taxes. Hence, it does not seem that an additional tax on gasoline is politically unfeasible.

### PROBLEMS WITH CAFE

Ignoring concerns over feasibility, CAFE proponents claim that increasing the fuel efficiency standards has the added advantage of creating net benefits apart from any reduction in the external cost of gasoline use. The NRC report goes so far as to assert that higher standards would actually pay for themselves, with the increased costs more than offset by reduced fuel consumption — yet another “free lunch” from Washington, D.C.

Contrary to those claims, it appears that stricter standards would save very little gasoline. There are three basic reasons for that:

- CAFE has only a limited effect on the production of “gas-guzzlers.”
- CAFE leads to increased driving.
- CAFE keeps older cars with lower gas mileage on the road.

**Gas-guzzlers** The CAFE standards affect the mix of vehicles produced by a manufacturer, but not the overall production of any particular type of car. That is important to remember because, as explained earlier, domestic firms will feel constrained by the new standards but foreign firms will not. The constrained U.S. firms will be forced to increase their fuel efficiency, leaving an undersupply in the large-car market. In turn, foreign firms will move into that market and begin producing vehicles with lower fuel efficiency. Though the cars will have a slightly higher price because of CAFE fines, they likely will still appeal to consumers, so the overall mix of cars being sold will not change nearly as much as what CAFE proponents expect.

Foreign automakers stand to draw a lot of profits away from U.S. firms if stricter CAFE standards are adopted. Honda and Toyota, for example, have fleet averages now that likely would satisfy any new standards that Congress might pass, hence the automakers would have no disincentive to try for a larger share of the U.S. large-car market. (In fact, they may feel they need to move into that market because U.S. automakers will be moving into the small-car market.) Even if the foreign automakers’ fleet averages would not satisfy the new standards, the automakers likely would pay the relatively small mileage fines in order to have a larger share of the market.

**More driving** CAFE standards may reduce the consumption of fuel per mile, but they also increase the overall amount of driving. Because the standards lower the per-mile cost of operating a car, drivers have less financial incentive to drive less. Vehicle

use is just like any other market in which demand is responsive to price: A decrease in cost results in an increase in aggregate use. The latest estimates are that for every 10 percent increase in fuel efficiency, people increase their driving by two percent. Those trends indicate, again, that the fuel savings from tighter CAFE standards will be less than what proponents believe.

**Old cars** By raising the cost of new cars, CAFE standards provide a disincentive for old-car owners to trade in their lower-gas-mileage vehicles for new, more-efficient ones. That, in turn, increases gasoline consumption by older cars because they will be staying on the road instead of being taken to the scrap yards. So, yet again, stricter CAFE standards will have less of a gas-saving effect than what proponents claim.

**Other problems** CAFE standards not only save very little gasoline, they increase air pollutants such as volatile organic compounds (VOC), oxides of nitrogen (NOx), and carbon monoxide (CO). The increases occur because the standards do not alter a car’s grams/mile of emissions and thus do nothing to alter pollution levels directly. Because the pollution from a car is a direct function of the number of miles it is driven, and people in more fuel-efficient vehicles drive more, the net result from an increase in CAFE standards is an increase in automobile pollutants.

Increased CAFE standards also result in more auto fatalities. As the NRC panel conceded in its report, compliance with stricter standards means that automakers lighten their cars. Lighter, smaller cars, in turn, mean more fatalities from automobile accidents.

Finally, CAFE standards are, in large part, unworkable because demand can shift much more quickly than a manufacturer’s abil-

TABLE 2

## Better Mileage, Worse Air

The annual effects on pollutant emissions from proposed changes in the CAFE standards

	Change Under Cheney Proposal: 3MPG Increase in CAFE Standards	Change Under Kerry Proposal: 50% Increase in CAFE Standards
% Change in VOC Emissions	1.64%	2.30%
% Change in NOx Emissions	1.80%	3.82%
% Change in CO Emissions	1.86%	4.97%
Change in Gasoline Consumption (billion gallons)	-5.091 (-7.15%)	-15.994 (-22.04%)
Average Cost of reducing Gasoline Externality	\$0.58	\$1.68
Marginal Cost of reducing Gasoline Externality	\$1.06	\$3.93

ity to alter the fuel use of its vehicles. For example, it would take a firm three to five years to re-engineer its cars so that, at current demand levels, the fleet would satisfy a new standard. But consumers can change their buying habits in an extremely short period of time and can buy a mix of cars very different than what automakers expected. Automakers, through no fault of their own, could face short-run CAFE problems that they could address only through “mix-shifting” — selling fewer large cars and more small cars by raising prices on the former and lowering them on the latter. Because mix-shifting annoys consumers and reduces industry employment, the government has little choice but to grant the automakers relief, or else the politicians will permit serious unemployment and economic harm.

These considerations further indicate that the benefits of new CAFE standards will be less, and the negative effects more, than what proponents believe.

### EFFECTS ON AUTOMAKERS

On behalf of General Motors, I created a model of the impact of stricter CAFE standards on domestic and foreign automakers. I assumed that the relevant period is the “long-run,” so as to allow for the development of new technologies that would assist firms in meeting the stricter standards. As part of the model, I considered two different proposals for new CAFE standards: the 3-mpg increase proposed by Vice President Dick Cheney’s energy task force and the 50-percent increase proposed by Sen. Kerry. For my cost-benefit analysis, I adopted the NRC assumption that the level of externality associated with a gallon of gasoline is 26¢, despite my reservations about that figure.

The results of the model are presented in Tables 1 and 2. The first column of each table refers to the Cheney proposal, the second to the Kerry proposal.

**Cheney proposal** I found that increasing the CAFE standards by 3 mpg would reduce annual profits at General Motors by \$433 million, at Ford by \$455 million, and at Chrysler by \$236 million. Total losses to U.S. automakers would amount to \$1.124 billion. In contrast, foreign manufacturers would see an increase in profits of \$260 million.

With respect to consumers, losses are measured in terms of the economic concept of “consumer surplus.” For example, assume a consumer values a car for \$20,000, and is able to purchase it for \$18,000. That consumer would gain \$2,000 in consumer surplus. If CAFE standards make that car unavailable and the consumer chooses not to purchase a car, the new standards would have caused a loss of \$2,000 in consumer surplus for that consumer. If the fuel efficiency standards were to be increased 3 mpg, I estimate that U.S. consumer surplus would decline \$1.841 billion.

Emissions of all three “criteria” pollutants would increase relative to emissions if the CAFE standards remained unchanged. Increasing the standards by 3 MPG would increase VOC emissions by 1.64 percent, NOx emissions by 1.80 percent, and CO emissions by 1.86 percent. The new standards would result in a decrease in consumption of 5.091 billion gallons, or about 7.15 percent of fleet consumption. The marginal cost of a gallon of gasoline saved would be \$1.06.

**Kerry proposal** Increasing the CAFE standards by 50 percent would cause far more harm to the economy. I estimate that passage of the Kerry proposal would have reduced annual profits at General Motors by \$3.824 billion, at Ford by \$3.423 billion, and at Chrysler by \$1.959 billion. Total losses to U.S. automakers would amount to \$9.206 billion. In contrast, foreign manufacturers would see an increase in profits of \$4.434 billion. Consumer surplus would decline \$17.603 billion.

Emissions of all three “criteria” pollutants would increase above what would occur if the CAFE standards remained unchanged. Increasing fuel efficiency as proposed would increase VOC emissions by 1.87 percent, NOx emissions by 3.41 percent, and CO emissions by 4.57 percent. The new standards would result in a decrease in consumption of 14.690 billion gallons, or about 20.6 percent of fleet consumption. The marginal cost of a gallon of gasoline saved would be \$3.93.

Given the estimates generated by my model, what are the costs and benefits of the two CAFE proposals? Let us assume, as the NRC indicates, that the external cost of the consumption of a gallon of gasoline is 26¢ per gallon — which would thus be the benefit from a gallon of gasoline not consumed. My model indicates that the average cost of a 3-mpg increase in fuel standards is 2.2 ( $58¢ \div 26¢$ ) times the benefits. The average cost of a 50-percent increase in the standards is about 6.5 ( $\$1.68 \div 26¢$ ) times the benefits. The marginal cost of the Cheney proposal would be 4.1 ( $\$1.06 \div 26¢$ ) times the benefits. And the marginal cost of the Kerry proposal is 15.1 times ( $\$3.93 \div 26¢$ ) times the benefits.

### CONCLUSION

Proponents of stricter CAFE standards, including the authors of the recent NRC report, claim that increasing the CAFE standards is the policy equivalent of a free lunch. But fuel efficiency standards are an extremely poor policy tool. If enforced, they would reduce consumer welfare and motorist safety, harm the environment, and increase the profits of foreign firms. Worst of all, they do not save gasoline very effectively.

If policymakers wish to reduce energy consumption, they should tax gasoline consumption. It is that simple. Unfortunately, altering the CAFE standards is a politically attractive policy to invoke to reduce gasoline consumption’s external costs. Because of that attractiveness, there is little debate on the real issues involved in energy consumption.

### READINGS

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