

CRS Report for Congress

Automobile and Light Truck Fuel Economy: The CAFE Standards

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Summary

On April 22, 2008, the National Highway Traffic Safety Administration (NHTSA) released a Notice of Proposed Rulemaking (NOPR) that would establish fuel economy standards for model year (MY) 2011-MY2015 passenger cars and light trucks. The rulemaking is in followup to the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140), enacted in mid-December 2007, which restructured the automotive fuel economy program. It established a corporate average fuel economy (CAFE) standard of 35 miles per gallon (mpg) by MY2020 for the combined passenger automobile and light truck fleet. However, to meet the combined standard, automakers will continue the practice of calculating the CAFE of their car and light truck fleets separately. The proposed rule would establish passenger car fuel economy at 31.2 mpg in MY2011, increasing to 35.7 mpg in MY2015. For trucks, the comparable goals for compliance are 25.0 to 28.6 mpg. Lastly, the design of the program will be “attribute” based; every model of new vehicle will have its own target, based on the vehicle’s footprint.

Manufacturers’ passenger car fleets will be required to come within 92% of the overall standard for a given model year. Above that floor, manufacturers can earn credits for exceeding the standards in one vehicle class and apply credits to boost the CAFE of a different vehicle class that is short of compliance. Additionally, credits may be sold and bought among manufacturers. CAFE credits for the manufacture of flexible-fueled vehicles (FFV) were retained by EISA, but will be phased out by MY2020. Civil penalties assessed for non-compliance will be deposited to the general fund of the U.S. Treasury to support future rulemaking and to provide grants to U.S. manufacturers for research and development, and retooling in support of increasing fuel efficiency. The law also requires the development of standards for “work trucks” and commercial medium- and heavy-duty on-highway vehicles.

An important development bearing on CAFE was the denial in late December 2007 of a waiver to the state of California by the Environmental Protection Agency that would have permitted California (and other interested states) to set vehicle greenhouse gas standards under the Clean Air Act. Reducing fuel consumption could be one of the major tools for reducing vehicle emissions. A waiver would allow these states to require more stringent fuel economy of vehicles sold in those states than required by the new standards established by EISA. Some have suggested that language in the NOPR pre-empting states from regulating tailpipe emissions would be challenged in court if included in any final rule.

A November 15, 2007, decision by the U.S. Court of Appeals for the Ninth Circuit overturned a final rule issued by NHTSA for MY2008-MY2011 light trucks. The Court ruled that NHTSA had not conducted a sufficiently rigorous analysis to measure whether the standards would have a beneficial effect in improving environmental quality through reduction of greenhouse gas emissions. The analysis accompanying the NOPR for MY2011-MY2015 appears intended to address the deficiencies identified by the Court in the earlier rulemaking.

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Automobile and Light Truck Fuel Economy: The CAFE Standards

Most Recent Developments

Corporate Average Fuel Economy (CAFE) standards are fleetwide fuel economy averages that motor vehicle manufacturers must meet each model year (MY). On April 22, 2008, the National Highway Traffic Safety Administration (NHTSA) released a Notice of Proposed Rulemaking (NOPR) that would establish fuel economy standards for MY2011-MY2015 passenger cars and light trucks. The rulemaking is in followup to the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140), enacted in mid-December 2007, which restructured the automotive fuel economy program. It established a corporate average fuel economy (CAFE) standard of 35 miles per gallon (mpg) by MY2020 for the combined passenger automobile and light truck fleet. However, to meet the combined standard, automakers will continue the practice of calculating the CAFE of their car and light truck fleets separately. The proposed rule would establish passenger car fuel economy at 31.2 mpg in MY2011, increasing to 35.7 mpg in MY2015. For trucks, the comparable goals for compliance are 25.0 to 28.6 mpg. Lastly, the design of the program will be “attribute” based; every model of new vehicle will have its own target, based on the vehicle’s footprint. The target fuel economy for a vehicle of a given footprint will increase over time, and will be derived from application of a mathematical function that will relate vehicle attributes to fuel efficiency levels.

Manufacturers’ passenger car fleets will be required to come within 92% of the overall standard for a given model year. Above that floor, manufacturers can earn credits for exceeding the standards in one vehicle class and apply credits to boost the CAFE of a different vehicle class that is short of compliance. Additionally, credits may be sold and bought among manufacturers. CAFE credits for the manufacture of flexible-fueled vehicles (FFV) were retained by EISA, but will be phased out by MY2020. Civil penalties assessed for non-compliance will be deposited to the general fund of the U.S. Treasury to support future rulemaking and to provide grants to U.S. manufacturers for research and development, and retooling in support of increasing fuel efficiency. The law also requires the development of standards for “work trucks” and commercial medium- and heavy-duty on-highway vehicles.

An important development having a bearing on CAFE was the denial in late December 2007 of a waiver to the state of California by the Environmental Protection Agency that would have permitted California (and other interested states) to set vehicle greenhouse gas standards under the Clean Air Act. Reducing fuel consumption could be one of the major tools for reducing vehicle emissions. A waiver would allow these states to require more stringent fuel economy of vehicles sold in those states than required by the new standards established by EISA. Some

have suggested that language in the NOPR pre-empting states from regulating tailpipe emissions would be challenged in court if included in any final rule.

A November 15, 2007, decision by the U.S. Court of Appeals for the Ninth Circuit overturned a final rule issued by NHTSA for MY2008-MY2011 for light trucks. The Court ruled that NHTSA had not conducted a sufficiently rigorous analysis to measure whether the standards would have a beneficial effect in improving environmental quality through reduction of greenhouse gas emissions. The analysis accompanying the NOPR for MY2011-MY2015 appears intended to address the deficiencies identified by the Court in the earlier rulemaking. Whether, if challenged, the Court would find it sufficient, is uncertain. At this point, there would be no reason for NHTSA to resubmit its light truck rule for MY2008-MY2011.

Current CAFE Standards

The Arab oil embargo of 1973-1974 and the subsequent tripling in the price of crude oil brought into sharp focus the fuel inefficiency of U.S. automobiles. New car fleet fuel economy had declined from 14.8 mpg in MY1967 to 12.9 mpg in MY1974. In the search for ways to reduce dependence on imported oil, automobiles were an obvious target. The Energy Policy and Conservation Act (EPCA) established CAFE standards for passenger cars for MY1978. The CAFE standards called for an eventual doubling in new car fleet fuel economy. EPCA also granted NHTSA the authority to establish CAFE standards for other classes of vehicles, including light-duty trucks.¹ NHTSA established fuel economy standards for light trucks, beginning in MY1979. For passenger cars, the current standard is 27.5 mpg. For light trucks, the standard was set at 22.2 mpg for MY2007. The CAFE standards to MY2011 are summarized in **Table 2**.

As noted, on April 6, 2006, NHTSA issued additional rules to further increase light truck fuel economy through MY2011, a rule that was remanded to NHTSA. The MY2008-MY2011 light truck fuel economy standards shown in the table below are included for informational purposes to show the path of the interim standards that were proposed by NHTSA. Given the remanding of the rule, the standard of 22.2 mpg for light duty trucks prevails until raised by a final (and unchallenged) rule.

¹ Light-duty trucks include most sport utility vehicles (SUVs), vans, and pickup trucks.

Table 1. Fuel Economy Standards for Passenger Cars and Light Trucks: Model Years 2000 Through 2011
(miles per gallon)

Model year	Passenger cars	Light trucks ^a
2000	^b 27.5	20.7
2001	^b 27.5	20.7
2002	^b 27.5	20.7
2003	^b 27.5	20.7
2004	^b 27.5	20.7
2005	^b 27.5	21.0
2006	^b 27.5	21.6
2007	^b 27.5	22.2
2008	^b 27.5	22.2/ ^c 22.5
2009	^b 27.5	22.2/ ^c 23.1
2010	^b 27.5	22.2/ ^c 23.5
2011	^b 27.5	22.2/ ^d 24.0

Source: Automotive Fuel Economy Program, Annual Update, Calendar Year 2001; U.S. Department of Transportation. National Highway Traffic Safety Administration, *Light Truck Average Fuel Economy Standard, Model Year 2004*, Final Rule; and U.S. Department of Transportation, National Highway Traffic Safety Administration, *Average Fuel Economy Standards for Light Trucks Model Years 2008-2011*, Final Rule (remanded to NHTSA in December 2007).

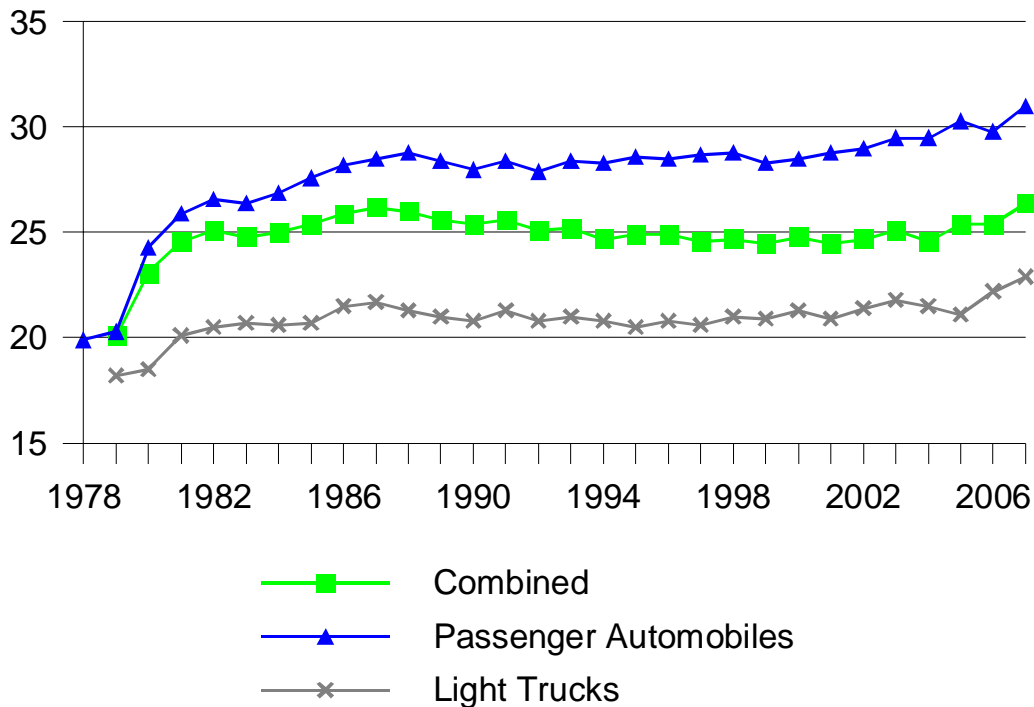
- a. Standards for MY1979 light trucks were established for vehicles with a gross vehicle weight rating (GVWR) of 6,000 pounds or less. Standards for MY1980 to MY2000 are for light trucks with a GVWR of 8,500 pounds or less. Starting in MY2011, the light truck CAFE program will include medium duty passenger vehicles (MDPVs), trucks with a GVWR between 8,500 and 10,000 pounds that primarily transport passengers (e.g., large SUVs, passenger vans).
- b. Established by Congress in Title V of the act.
- c. Unreformed CAFE standard. These are standards that were part of the MY2008-MY2011 NHTSA rule that was remanded back to the agency to be redone.
- d. Average that was estimated by NHTSA in the proposed rule, based on MY2011 reformed standard.

Compliance with the standards is measured by calculating a sales-weighted mean of the fuel economies of a given manufacturer's product line, with domestically produced and imported cars measured separately. The penalty for non-compliance is \$5.50 for every 0.1 mpg below the standard, multiplied by the number of cars in the manufacturer's new car fleet for that year. Civil penalties collected from 1983 to 2003 totaled slightly more than \$600 million. However, these penalties have been paid mostly by small and speciality European manufacturers, not by the major U.S. or Japanese automotive manufacturers.

The effectiveness of CAFE standards since inception has been controversial. Since 1974, domestic new car fuel economy has roughly doubled; the fuel economy of imports has increased by roughly one-third. Some argue that these improvements would have happened as a consequence of rising oil prices during the 1970s and 1980s regardless of the existence of the CAFE standards. Some studies suggested that the majority of the gains in passenger car fuel economy during the 1970s and

1980s were technical achievements, rather than the consequence of consumers' favoring smaller cars. Between 1976 and 1989, roughly 70% of the improvement in fuel economy was the result of weight reduction, improvements in transmissions and aerodynamics, wider use of front-wheel drive, and use of fuel-injection. The fact that overall passenger car fleet fuel economy remained comparatively flat during a period of declining real prices for gasoline also suggested that the CAFE program may have contributed to placing some sort of floor under new-car fuel economy. Recent and historic fleet fuel economy averages are shown in **Figure 1**.

Figure 1. Passenger Car and Light Truck Fuel Economy Averages for Model Years 1978-2006 (miles per gallon)



Source: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Summary of Fuel Economy Performance*, March 2007.

Major Issues in the CAFE Debate

Some of the arguments made on behalf of, or in opposition to, raising CAFE or making significant changes in the program touched on long-standing themes that are also complex. These issues include:

- **What is the effect of combining the passenger automobile and light-duty truck fleet for the purpose of calculating manufacturers' average CAFE?** During the congressional debate, some contended that it should make no difference whether the average is calculated across one entire fleet or weighted across two

if an umbrella standard has to be met for the entire fleet. On the other hand, had the classes been kept separate, there might be differential effects of the standards on different vehicle classes. Opponents of eliminating the distinction between the fleets referred to that policy as “backsliding.” Under the CAFE program prior to the enactment of EISA, a manufacturer was required to meet the CAFE standard separately for its fleet of passenger cars produced in the United States and abroad. The CAFE of each could not be averaged across one another. A manufacturer could not earn CAFE credits for one fleet that could be applied to bring its other fleet into compliance, nor could manufacturers buy and sell credits from one another. The two-fleet rule had been crafted originally to protect the diversity of models manufactured in the United States. The United Auto Workers (UAW) argued that eliminating the distinction between foreign and domestic fleets could cost jobs in the industry domestically. The final bill retained the distinction between the two vehicle classes. The presumption is that this will place greater weight for fuel economy improvement on passenger cars than on light trucks.

- **Will higher CAFE standards bring about a loss in jobs?** Some argued that higher standards might compel manufacturers to make fewer vehicles that consumers want; as a result, older, less efficient vehicles might be retained longer. Others suggested that any impact on jobs in the industry would be selective — that is, unionized jobs might be more vulnerable if higher standards do affect demand for vehicles.
- **What might be the effects of allowing credit trading among manufacturers and/or between passenger car and light trucks fleets?** Under the previous structure of the CAFE program, automakers could bank excess CAFE credits for use in future years, but could not trade those credits with other automakers. Manufacturers also could not trade credits between their passenger car and light truck fleets — each fleet had to meet the standards independently. Under the fuel economy program restructure by EISA, credit trading is allowed. Supporters of this approach argued that it may improve the economic efficiency of the system and lower the cost of compliance. Opponents raised the possibility that allowing credit trading could lead to a competitive advantage for some manufacturers, and could affect auto industry employment.
- **Do higher CAFE standards have an effect on gasoline price?** There are many external and often short-term and cyclical variables that can affect gasoline prices. If higher standards do reduce overall oil demand from a baseline projection, world oil prices may be less volatile when an incident or sequence of events raises uncertainty about the adequacy and security of world supply. However, it is impossible to make any reliable projections given such a large universe of possible scenarios.

- **How do attribute-based standards work, and what are the advantages and disadvantages of them?** Any system for regulating CAFE will have winners and losers, whether an attribute-based system, or the previous straight-line average. Additionally, the choice of which attribute or attributes on which to base CAFE will also affect individual automakers differently. Under the new system, NHTSA will set a fuel economy target calculated for each new car as a mathematical function of individual vehicle attributes. The final regulations developed by NHTSA may, for example, base standards on vehicle size — or footprint. Under that scenario — and visualized on a graph — each year’s standard would no longer be represented by a single line, but appear instead as a curve that would peg a desirable fuel economy target for vehicles based upon their footprint. In successive model years, the curve would be replotted, with the intention of reaching a designated CAFE fleetwide average in some future model year. No individual vehicle would be required to meet a specific fuel economy standard, but the average of the fleet would need to meet or exceed the average of the individual vehicles’ size-based targets. (See **Figure 2** in the detailed discussion below.)
- **Are there arguments to be made for and against designating CAFE standards as an expression of both miles per gallon and as grams per mile of CO₂ emissions?** One bill (H.R. 2927) included such a provision. Technically, CO₂ emission rates are not measures of fuel economy but of greenhouse gas emissions. However, there may be few ways to reduce emissions other than increased fuel economy. Currently, states may establish emissions standards under the Clean Air Act, but are preempted from setting fuel economy standards by the Energy Policy and Conservation Act (EPCA). Amending EPCA to establish CAFE standards both in terms of miles per gallon and grams per mile of CO₂ could have a bearing on states’ authority to regulate CO₂. On April 2, 2007, the Supreme Court issued its ruling in a case (*Commonwealth of Massachusetts v. EPA*) brought by 12 states and the District of Columbia that challenged the Environmental Protection Agency’s (EPA) decision not to regulate greenhouse gas emissions from automobiles. The Supreme Court decision upheld the petition and requires EPA to regulate CO₂ emissions.² A ruling of the U.S. Court of Appeals for the Ninth Circuit overturning the final rule promulgated in April 2006 setting light truck fuel economy standards for MY2008-MY2011 was based, in part, on a determination that NHTSA failed to thoroughly analyze the effect of the final rule on CO₂.

² See additional discussion later in this report, “CAFE and Reduction of Carbon Dioxide Emissions.”

How the Interim Rule for MY2011-MY2015 Would Work

Overview of the Rule

On April 22, 2008, NHTSA released a Notice of Proposed Rulemaking (NOPR) that would establish fuel economy standards for model year MY2011-MY2015 passenger cars and light trucks. Under the rule, cars and light trucks would have a fuel economy “target” based on a specific vehicle’s “footprint” (the product of wheelbase and track width), with higher targets for smaller vehicles and lower targets for larger vehicles. For a given model year, the targets for a manufacturer’s fleet would be averaged to calculate that manufacturer’s mandated fuel economy.

The agency’s estimate of costs, benefits and net benefits from the proposed rule are shown in **Table 3**. The agency estimates that the total benefits of the proposed passenger care rule would be roughly \$31 billion over the lifetime of the 5 model years. “Societal benefits,” the agency notes, includes “direct impacts from lower fuel consumption as well as externalities such as reduction of air pollutants and greenhouse gases.”³ After netting out the \$15.8 billion cost of the rule, the net societal benefit is estimated at \$15.1 billion from the improvement in passenger car fuel economy.

For the proposed light truck standard, the table shows \$57.3 billion in gross benefits, nearly \$31 billion in costs, and a net societal benefit of \$26.4 billion. For both classes of vehicles, the greatest percentage of benefits — an estimated 84-85 percent — is projected to accrue to consumers. The 15-16 percent balance of benefits is attributed to environmental benefits, and a reduction in oil imports.

However, it’s important to note that the agency calculations assume a lower gasoline price — of \$2.26 to \$2.51 per gallon — than was being observed when the NOPR was released.⁴

³ U.S. Department of Transportation. National Highway Traffic Safety Administration. Average Fuel Economy Standards Passenger Cars and Light Trucks Model Years 2011-2015. [Docket No. NHTSA-2008 -0089], p. 289.

⁴ Ibid., p. 290.

Table 2. NHTSA-Estimated Societal Benefits and Costs From Proposed CAFE Rule

Passenger Cars						
	Model Year					Total
	2011	2012	2013	2014	2015	2011-2015
Benefits	2,596	4,933	6,148	7,889	9,420	30,986
Costs	1,884	2,373	2,879	3,798	4,862	15,796
Net Benefits	712	2,560	3,269	4,091	4,558	15,190
Light Trucks						
	Model Year					Total
	2011	2012	2013	2014	2015	2011-2015
Benefits	3,909	8,779	13,560	14,915	16,192	57,355
Costs	1,649	4,986	7,394	8,160	8,761	30,949
Net Benefits	2,260	3,793	6,166	6,755	7,431	26,406

Source: U.S. Department of Transportation. National Highway Traffic Safety Administration. Average Fuel Economy Standards Passenger Cars and Light Trucks Model Years 2011-2015. [Docket No. NHTSA-2008 -0089] p. 292.

To date, the CAFE standards have not applied to vehicles over 8,500 pounds GVW. Vehicles between 8,500-10,000 pounds GVW, which are categorized as medium-duty passenger vehicles (MDPV) would be included under the proposed rule, beginning in MY2011. Before MY2004, these vehicles were considered heavy-duty vehicles for both fuel economy and emissions purposes. For the purposes of emissions standards, starting in MY2004, the Environmental Protection Agency (EPA) first defined MDPVs and included them in the “Tier 2” emissions standards for passenger cars and light trucks. The justification at the time was that these vehicles are used primarily as passenger vehicles, and should be regulated as such. NHTSA reached a similar conclusion, adding that fuel economy standards for MDPVs were feasible, and that standards would save additional fuel — approximately 250 million gallons over the operating life of MY2011 MDPVs.

Under the proposed rule, work trucks (such as long-bed pickups and cargo vans), and trucks described as “multi-stage,” (built in stages by more than one manufacturer) would be excepted from regulation.⁵ Work trucks may subsequently

⁵ Under the provisions of EPCA, NHTSA has had the authority to regulate the fuel economy of vehicles up to a gross vehicle weight (GVW) of 10,000 pounds if, after study, it was determined that it was feasible to set standards for these vehicles, and if there was evidence that the vehicles were used for the same purposes as passenger automobiles, and that including them under CAFE regulation would save a significant amount of fuel. In EISA, Congress directed that vehicles up to 10,000 pounds be subject to CAFE standards, eliminating the need for any administrative determination that there were grounds to include

(continued...)

come under CAFE regulation, but EISA directed first that the National Academy of Sciences conduct a study on the feasibility of including work trucks, with NHTSA to conduct a subsequent evaluation of its own.

Reformed Standards

Prior to the passage of EISA, one of the key criticisms of the CAFE structure was that increased CAFE standards promoted smaller, lighter vehicles because fuel economy tends to decrease as vehicles get heavier. The concern was that fuel economy standards would be met to a great degree by decreasing vehicle weight. Because larger vehicles tend to offer greater passenger protection in accidents, and tend to be heavier, a fuel economy program structure that does not factor vehicle size into the setting of CAFE standards could promote the use of smaller, less safe vehicles. A corollary and further criticism of the program was that it favored producers of smaller vehicles that would tend to be more fuel efficient. Some proponents of higher CAFE standards responded by arguing that, through the use of new technology, vehicle efficiency can be improved without affecting size or performance.

Under the proposed rule, fuel economy targets vary with vehicle size, with smaller vehicles required to achieve higher fuel economy than larger vehicles. Under the system in the proposed rule, each vehicle would be assigned a fuel economy “target” based on its footprint, which is the product of a vehicle’s track width (the horizontal distance between the tires) and its wheelbase (the distance from the front to the rear axles). The average of the targets for a manufacturer’s fleet is the CAFE average that the manufacturer must achieve in a given model year. In this way, no *specific* vehicle is required to meet a *specific* fuel economy, but the average fuel economy required will vary from manufacturer to manufacturer.

The Challenge to the Rule and Court Decision

As noted earlier, a November 15, 2007, decision by the U.S. Court of Appeals for the Ninth Circuit overturned a final rule issued by NHTSA in April 2006 establishing fuel economy standards for light trucks, MY2008-MY2011. The Court ruled that NHTSA had not conducted a sufficiently rigorous analysis to measure whether the standards would have a beneficial effect in improving environmental quality through reduction of greenhouse gas emissions.

Eleven states, the District of Columbia, New York City, and four public interest organizations had petitioned for review of the final rule governing light truck fuel economy for MY2008-MY2011. In its decision, the Court ruled that NHTSA would have to promulgate a new rule that, among other elements, assessed the costs and benefits from different levels of standards in reducing carbon dioxide (CO₂) emissions. Among the petitioners’ arguments were that the cost-benefit analysis performed by NHTSA assigned no benefit to reducing CO₂ emissions, and that the

⁵ (...continued)
them.

rule did not establish a floor fuel economy that an individual manufacturer had to achieve in a given model year.

At this point, there would be no reason for NHTSA to resubmit its rule for MY2008-MY2011 because there is insufficient advance notice to the manufacturers, whose product lines are planned well in advance of their introduction. The analysis accompanying the NOPR for MY2011-MY2015 appears intended to address the deficiencies identified by the Court in the earlier rulemaking. Whether, if challenged, the Court would find it sufficient is uncertain.

However, there is some prospect of a challenge should NHTSA issue a final rule that maintains, as is expressed in the NOPR, that any state regulation that affects fuel economy, including any state regulation governing tailpipe emissions, is forbidden by EPCA. The text of the NOPR observes (with emphasis added):

For those rulemaking actions undertaken at an agency's discretion, agencies [are instructed] to closely examine their statutory authority supporting any action that would limit the policymaking discretion of the States and assess the necessity for such action. *This is not such a rulemaking action.* NHTSA has no discretion not to issue the CAFE standards proposed in this document. EPCA mandates that the issuance of CAFE standards for passenger cars and light trucks for model years 2011-2015. *Given that a State regulation for tailpipe emissions of CO₂ is the functional equivalent of a CAFE standard, there is no way that NHTSA can tailor a fuel economy standard so as to avoid preemption. Further, EPCA itself precludes a State from adopting or enforcing a law or regulation related to fuel economy (49 U.S.C. 32919(a)).*⁶

CAFE and Reduction of Carbon Dioxide Emissions: Additional History and Discussion

Carbon dioxide emissions clearly figured into the challenge and ruling on the NHTSA MY2008-MY2011 light truck fuel economy rulemaking. Mobile sources are a key source of greenhouse gas (GHG) emissions in the United States. Transportation accounts for roughly one-third of all U.S. carbon dioxide (CO₂) emissions. Passenger vehicles alone represent roughly 60% of transportation emissions, or roughly 20% of total U.S. CO₂ emissions. Because passenger vehicles play such a significant role in U.S. GHG emissions, there is growing interest in reducing their emissions as part of a strategy to address climate change concerns.

In general, there are three ways to reduce vehicle greenhouse gas emissions. These choices are to: (1) reduce vehicle miles traveled (through strategies such as carpooling, transit, or teleworking); (2) reduce vehicle per-mile fuel consumption

⁶ U.S. Department of Transportation. National Highway Traffic Safety Administration. Average Fuel Economy Standards. Passenger Cars and Light Trucks Model Years 2011-2015, p. 378-379. [Docket No. NHTSA-2008 -0089]

(through improved fuel economy) and per-mile non-carbon emissions⁷ (through improvements in vehicle systems); and (3) convert to lower-carbon transportation fuels. As a consequence, there is likelihood that any program to reduce GHG emissions will likely raise fuel economy. Conversely, any program to increase fuel economy will lower GHG emissions.

There is some debate whether raising the CAFE standards would be an effective or marginal way to reduce emissions of carbon dioxide. On one hand, improvements in fuel economy should enable the same vehicle to burn less fuel to travel a given distance. However, to the extent that technologies to improve fuel economy add cost to new vehicles, it has been argued that consumers will tend to retain older, less efficient cars longer. Further, improving fuel economy lowers the per-mile cost of driving. To the extent that fuel savings are reduced by additional driving, the reduction in greenhouse gas emissions will also be offset some. This is what is referred to as the “rebound effect.”

Perhaps the most significant current issue regarding automotive fuel economy has its origins in the 2002 decision by the state of California to require carbon dioxide emissions standards for passenger cars and light trucks. Legislation passed by the state legislature that year, A.B. 1498, requires the state to promulgate regulations to achieve the maximum feasible and cost-effective reduction of greenhouse gases from cars and trucks. The regulations, adopted by the California Air Resources Board on September 24, 2004, require a reduction of greenhouse gas emissions of 30% by 2016. The regulation covers passenger vehicles, but would not affect heavier vehicles such as commercial trucks or buses.

Although states do not have authority to regulate fuel economy, under the Clean Air Act California solely may be granted an exemption from restrictions on setting vehicle pollutant emissions standards — subject to the state filing a petition with the Environmental Protection Agency (EPA) and being granted a waiver by that agency. Any state-established standards must be at least as stringent as the federal standards, and as long as they are needed to meet “compelling and extraordinary conditions.”⁸ While only California can petition for a waiver, other states may adopt any California standards that are put into place following the granting of the waiver.

Several auto manufacturers and dealers challenged the California auto greenhouse gas standard in court. (*Central Valley Chrysler-Jeep, Inc., vs. Witherspoon, No. 1:04-CV-06663*, E.D. Cal., filed December 7, 2004.) The plaintiffs argued that California lacks the authority to establish standards that are almost certain to bear on vehicle fuel economy requirements, and that greenhouse gases are not a pollutant under the Clean Air Act. California officials maintain that they have the authority under the Clean Air Act to regulate vehicle greenhouse gas emissions. The state estimates that complying with the standard could cost \$1,000 per vehicle by 2016, while opponents argue that costs could be as much as \$3,000 per vehicle. Depending upon the cost of compliance, the new standards could reduce demand for

⁷ E.g., fluorinated gas emissions from air conditioner systems.

⁸ For more information on the Clean Air Act waiver process, see CRS Report RL34099, *California's Waiver Request to Control Greenhouse Gases Under the Clean Air Act*.

new vehicles. The impact of the standards on manufacturers would likely vary depending upon the mix of vehicles they offer. In early 2007, the Court indicated that it would withhold a decision, pending resolution by the Supreme Court of a case that might bear on the one before the Court.

On April 2, 2007, the Supreme Court issued its ruling on that related case (*Commonwealth of Massachusetts v. EPA*). In that case, 12 states and the District of Columbia challenged EPA's decision not to regulate greenhouse gas emissions from automobiles, arguing that EPA has the responsibility to set greenhouse gas standards for passenger vehicles. Under that decision, EPA is required to establish greenhouse gas standards for automobiles or explicitly justify why such standards are not "justified." The decision in that case will likely affect the outcome of the case against California.⁹

On December 11, 2007, the United States District Court for the Eastern District of California ruled that both EPA and California, through the waiver process, are "equally empowered" to regulate GHG, and that preemption of state laws regulating fuel economy did not preempt the proposed California standard to reduce GHG. Then, on December 19, 2007, EPA Administrator Stephen Johnson sent a letter to California Governor Arnold Schwarzenegger informing him of EPA's plan to deny California's waiver request. Without this waiver, California's program cannot move forward.

EPA's rationale appeared to consist of two arguments: first, that California has not shown that its regulations are needed to meet compelling and extraordinary conditions, as required by the Clean Air Act; and second, that the Administration and Congress are addressing climate change through national standards. Specific reference was made to the newly enacted CAFE standards in EISA as addressing vehicle emissions. Officials in California were not satisfied by the agency explanation for its decision. On January 2, 2008, California (along with 15 other states) filed a suit against EPA in the U.S. Court of Appeals, 9th Circuit, challenging EPA's rejection of the petition.

Overview of Congressional Interest in CAFE (1991-2005)

Significant efforts to raise CAFE began in the early 1990s and were highly controversial. One proposal included in omnibus energy legislation was so controversial that it contributed to an insufficient number of votes in the Senate in 1991 to bring the bill up for debate on the floor. A general criticism of raising the CAFE standards was that, owing to the significant lead times manufacturers need to change model lines and because of the roughly ten years it generally takes for the vehicle fleet to turn over, increasing CAFE is a slow and inefficient means of achieving reductions in fuel consumption. Further, it was argued that the standards

⁹ For additional background, see CRS Report RL32764, *Climate Change Litigation: A Growing Phenomenon*, by Robert Meltz.

risked interfering with consumer choice and jeopardizing the economic well-being of the automotive industry. Opponents of raising CAFE have often cited a concern that higher efficiency will likely be obtained by decreasing vehicle size and weight, jeopardizing vehicle safety. Proponents of CAFE increases have argued that boosting the standards could bring about the introduction of technological improvements that would not compromise features that consumers value, but which would otherwise not be added because of the increase in vehicle cost stemming from these improvements.

Language in the FY1996-FY2000 Department of Transportation (DOT) Appropriations prohibited expenditures for any rulemaking that would make any adjustment to the CAFE standards. In conference on the FY2001 appropriations, the Senate insisted that the language be dropped, opening the way for NHTSA to initiate rulemakings once again. The conferees also agreed to authorize a study of CAFE by the National Academy of Sciences (NAS) in conjunction with DOT. That study, *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*, released on July 30, 2001, concluded that it was possible to achieve more than a 40% improvement in light truck and SUV fuel economy over a 10- to 15-year period at costs that would be recoverable over the lifetime of vehicle ownership. A study released in December 2004 by the National Commission on Energy Policy, *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*, established by foundation money, recommended that Congress instruct NHTSA to raise CAFE standards over a five-year period beginning not later than 2010. The commission recommended that manufacturers be able to trade fuel economy credits earned by exceeding the standards.

A draft report from the National Petroleum Council, "Facing the Hard Truths About Energy: A Comprehensive Review to 2030 of Global Oil and Gas," released in late July 2007 argued that vehicle fuel efficiency could be doubled by 2030 "through the use of existing and anticipated technologies," and "assuming vehicle performance and other attributes remains the same as today." The draft report noted that technologies to improve fuel efficiency had been used to compensate for the addition of horsepower and other "amenities" to current vehicles. The Council estimated that doubling fuel economy could achieve a savings of 3-5 million barrels a day by 2030.¹⁰

The Energy Policy Act of 2005 (P.L. 109-58) authorized \$3.5 million annually during FY2006-FY2010 for NHTSA to carry out fuel economy rulemakings. It also required a study (submitted to Congress in August 2006) to explore the feasibility and effects of a significant reduction in fuel consumption by 2014, and required that the estimated in-use fuel economy posted to the window of new vehicles more closely approximate owners' experience.

In August 2006, NHTSA issued to Congress the report "Study of Feasibility and Effects of Reducing Use of Fuel for Automobiles." The report concluded that NHTSA's light truck rulemaking will lead to significant reductions in fuel

¹⁰ National Petroleum Council. Facing the Hard Truths about Energy, p. 86-87. The text of the report is currently available at [<http://www.npc.org>].

consumption, and that granting NHTSA the authority to establish similar rules for passenger cars would lead to even greater reductions.

In-Use Fuel Economy Estimates

The fuel economy of individual vehicles is calculated by running vehicles through a test on a dynamometer intended to simulate a driving cycle that assumes 11 miles driven in an urban setting and 10 miles on open highway. To bring this calculation more into line with in-use fuel economy experienced by drivers, the EPA makes a downward adjustment of 10% for the city portion of the cycle and 22% for the highway portion. However, many argued in the past that this adjustment was no longer sufficient, and that the gap between estimated fuel economy and actual in-use fuel economy had widened significantly.

EPACT required a revision of the adjustment factor applied against tested vehicle fuel economy to estimate consumer in-use fuel economy. On December 11, 2006, EPA finalized a rule to incorporate the effect of factors such as higher speed limits, faster acceleration, differences in the ratio between city and highway driving, and use of air conditioning on in-use fuel economy. The in-use fuel economy stickers posted to the windows of new cars will reflect the results of these tests beginning in MY2008.¹¹ The change affects only the estimation of in-use fuel economy. It does not affect the CAFE calculation for purposes of determining manufacturers' compliance with the CAFE standard.

For Additional Reading

National Petroleum Council. *Facing the Hard Truths about Energy* (2007).

National Research Council. Committee on the Effectiveness and Impact of Corporate Average Fuel Economy Standards. *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*. Washington, D.C., National Academy Press, 2001. 166 p.

Greene, D.L., P.D. Patterson, M. Sing and J. Li. (2004). "Feebates, Rebates and Gas-Guzzler Taxes: A Study of Incentives for Increased Fuel Economy," *Energy Policy*, vol. 33, no. 6, pp. 721-827, June 2004.

U.S. Congressional Budget Office. *Reducing Gasoline Consumption: Three Policy Options*. November 2002. 36 p.

U.S. Congressional Budget Office. *The Economic Costs of Fuel Economy Standards Versus A Gasoline Tax*. December 2003. 37 p.

¹¹ For more information, see U.S. Environmental Protection Agency (EPA), *Regulatory Fact Sheet: EPA Issues New Test Methods for Fuel Economy Window Stickers*, December 2006.

- U.S. Environmental Protection Agency. *Fuel Economy Labeling of Motor Vehicles: Revisions To Improve Calculation of Fuel Economy Estimates*. 71 *Federal Register* 77871. December 27, 2006.
- U.S. Department of Transportation. National Highway Traffic Safety Administration. *Average Fuel Economy Standards. Passenger Cars and Light Trucks Model Years 2011-2015*, p. 378-379. [Docket No. NHTSA-2008-0089]
- U.S. Department of Transportation. National Highway Traffic Safety Administration. *Light Truck Average Fuel Economy Standards, Model Years 2005-2007*. 68 FR 16867; April 7, 2003.
- U.S. Department of Transportation. National Highway Traffic Safety Administration. *Automotive Fuel Economy Program. Annual Update, Calendar Year 2004*. [http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/Vehicle%20Safety/CAFE/2004_Fuel_Economy_Program.pdf]
- U.S. Federal Register. Department of Transportation. National Highway Traffic Safety Administration. *Average Fuel Economy Standards for Light Trucks Model Years 2008-2011*. Final Rule. Vol. 71, No. 66. Thursday, April 6, 2006, pp. 17566-17679. [<http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/Rulemaking/Rules/Associated%20Files/2006FinalRule.pdf>]
- United States Court of Appeals, Ninth Circuit. *Center for Biological Diversity vs. National Highway Traffic Safety Administration*. Argued and Submitted August 14, 2007. Filed November 15, 2007. See [<http://www.altlaw.org/v1/cases/218574.pdf>].