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MIDTERM EVALUATION OF THE FUTURE FUEL-ECONOMY STANDARDS, NEW VEHICLE MIX, AND FUEL CONSUMED

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16. Abstract

The 2022-2025 fuel-economy (CAFE) standards for light-duty vehicles, which were reaffirmed by the EPA on November 30, 2016 in the midterm evaluation of the standards, will substantially reduce future fuel consumption and emissions, even if the future vehicle mix (cars vs. light trucks) does not change. However, in addition to these *direct* benefits, we can also expect *indirect* benefits via the influence of more stringent standards on the future mix of vehicles produced (and sold). For example, more stringent standards will likely increase pressure on automobile manufacturers to produce (and sell) vehicles with high fuel efficiency, and thus increase marketing efforts (incentives, production goals, etc.) for cars (and especially small cars), which tend to be the most fuel-efficient gasoline- and diesel-powered vehicles for sale today. Thus, it is reasonable to postulate that the vehicle mix under the 2022-2025 standards will contain proportionally more cars and less light trucks than would have been the case without these standards in place. In turn, proportionally more cars among new vehicles would indirectly reduce the fuel consumption by the new-vehicle fleet.

This brief report calculated the amount of fuel consumed by different production mixes of cars and light trucks. The calculations were performed for one- and four-year periods. The results indicate, for example, that if the production mix were to stay the same as the model year 2015 mix of 57.4% cars and 42.6% light trucks—compared to a possible mix of 40% cars and 60% light trucks without the new 2022-2025 standards—the fuel saved by the new vehicles during the first four years would amount to 3.3 billion gallons of fuel.

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Contents

Introduction

As part of the midterm review of the proposed emissions and fuel-economy (CAFE) standards for model years 2022-2025, on November 30, 2016 a determination was issued by the EPA that reaffirms these standards (EPA, 2016b). These standards call for continuing improvements in emissions and fuel economy (EPA/NHTSA, 2012), resulting in substantial reductions in future emissions and fuel consumed, even if the future vehicle mix (cars vs. light trucks) does not change. However, in addition to these *direct* benefits, we can also expect *indirect* benefits via the influence of more stringent standards on the future mix of vehicles produced (and sold).

While there is no reason to believe that modifications to the applicable CAFE standards would directly impact consumer purchasing habits in any meaningful way, it is possible that more stringent standards would indirectly influence purchasing trends. For example, if there were more pressure placed on the manufacturers to produce (and sell) vehicles with high fuel efficiency, then it is possible that marketing efforts (incentives, production goals, etc.) would increase for cars (and especially small cars), which tend to be the most fuel-efficient gasoline- and diesel-powered vehicles for sale today. Additionally, this increased pressure to produce more fuel-efficient vehicles could also result in more resources being devoted to developing and refining the technologies needed to enable greater fuel efficiency in future model years, regardless of the vehicle type.

Consequently, it is likely that the more stringent CAFE standards will counteract, at least in part, the recent trend (influenced largely by the recent downturn in the price of gasoline) of increasing market share of light trucks relative to cars. In turn, given that light trucks tend to have poorer fuel economy than cars (EPA, 2016a), proportionally more cars among new vehicles would indirectly reduce total fuel consumption by the new-vehicle fleet.

This brief report examines this indirect pathway towards lower fuel consumption by analyzing the effects of different car/light truck mixes on fuel consumed by new vehicles.

Approach

Table 1 shows the adjusted fuel economy values that are expected to be reached for model year 2022 through 2025 vehicles under the recently affirmed CAFE standards (EPA/NHTSA, 2012).[1] Fuel economy is shown separately for cars and light trucks.

Table 1
Expected adjusted (window-sticker) fuel economy for cars and light trucks for model years 2022 through 2025 under the CAFE standards (EPA/NHTSA, 2012).

Model year	Cars	Light trucks
2022	39.9	27.9
2023	41.3	29.3
2024	43.4	30.8
2025	45.4	32.1

The analysis calculates the change in the amount of fuel consumed for different ratios of cars to trucks in the production mix for each model year 2022 through 2025, assuming that the average fuel economy of cars and light trucks will be as shown in Table 1. The following simplifying assumptions were made for the period examined:

(1) The latest available annual mileage for light-duty vehicles (11,287 miles in 2014; FHWA, 2015) would continue to apply.

(2) The total annual number of gasoline- and diesel-powered light-duty vehicles produced would be the same as for model year 2015 (16,739,000; EPA, 2016a).

[1] The adjusted ("window-sticker") fuel-economy values are designed to reflect real-world performance, and they are not comparable to CAFE standards compliance levels (EPA, 2016a).

Current status

The situation for model year 2015 is summarized in Table 2.

Table 2
Production, fuel economy, and fuel consumed by gasoline- and diesel-powered light-duty model year 2015 vehicles.

Measure	Cars	Light trucks
Production*	9,601,000 (57.4%)	7,138,000 (42.6%)
Adjusted fuel economy*	28.6 mpg	21.1 mpg
Annual fuel consumption	3,789,038,007 gallons	3,818,322,559 gallons

*EPA (2016b)

Effects of different car/light truck mixes

Table 3 shows the calculated changes in the amount of fuel consumed for a 1% change in the percentage of light trucks produced. The data are applicable for one year of driving, and they are shown for model years 2022 through 2025. The change in the amount of fuel consumed for any other percentage change in light trucks would be proportional to the corresponding change in Table 3. For example, a 5% increase in light trucks for model year 2022 would increase the amount of fuel consumed by 101,831,510 gallons (5 times the value shown in Table 3 for model year 2022 for a 1% increase).

Table 3
Effect of a 1%-change in the vehicle mix on fuel consumed for one year of driving.

Model year	Change in the amount of fuel consumed	
	1% increase in light trucks	1% increase in cars
2022	+20,366,302 gallons	-20,366,302 gallons
2023	+18,735,773 gallons	-18,735,773 gallons
2024	+17,808,943 gallons	-17,808,943 gallons
2025	+17,242,443 gallons	-17,242,443 gallons

Table 4 presents the effects on fuel consumption for five different car/light truck mixes (ranging from 70%/30% to 30%/70%). Two time periods are considered in Table 4—one year and four years. The four-year scenario includes fuel consumption for four years of model year 2022 vehicles, three years of model year 2023 vehicles, two years of model year 2024 vehicles, and one year of model year 2025 vehicles.

Table 4
Changes in the amount of fuel consumed by new vehicles for different car/light truck mixes for two time scenarios (relative to the model year 2015 car/light-truck production mix of 57.4%/42.6%).

Vehicle mix		Change in the amount of fuel consumed	
Car	Light Truck	First year (MY 2022)	First four years (MYs 2022-2025)
70%	30%	-257 million gallons (-4.6%)	-2.4 billion gallons (-4.5%)
60%	40%	-53 million gallons (-0.9%)	-0.5 billion gallons (-0.9%)
50%	50%	+151 million gallons (+2.7%)	+1.4 billion gallons (+2.6%)
40%	60%	+354 million gallons (+6.3%)	+3.3 billion gallons (+6.2%)
30%	70%	+558 million gallons (+10.0%)	+5.2 billion gallons (+9.7%)

Discussion

Two simplifying assumptions were made in the calculations. The first assumption was that the average annual distance driven per light-duty vehicle would not change from that in 2014. This is consistent with the apparent recent leveling of the distance driven per vehicle in the United States (Sivak, 2015).

The second assumption was that the *total* number of gasoline- and diesel-powered vehicles would stay at the level of those produced for model year 2015. Battery-electric vehicles currently represent less than 1% of vehicles sold (EDTA, 2016), but manufacturers are expected to gradually reduce the number of gasoline- and diesel-powered vehicles produced. This likely trend was not taken into account in the calculations.

The calculations presented here account for the first full year of vehicle usage following the year of sale for each model year. This was done to simplify the fact that vehicles sold during a given year will be sold throughout the year: some vehicles will accumulate close to 12 months of mileage (those sold during the first month of the model year), while others will accumulate less than 1 month of mileage (those sold during the last month of the model year). Inclusion of the partial-year mileage for the year of sale would slightly increase the consumption values presented in this report.

Conclusions

The 2022-2025 fuel-economy (CAFE) standards for light-duty vehicles, which were reaffirmed by the EPA on November 30, 2016 in the midterm evaluation of the standards, will substantially reduce future fuel consumption and emissions, even if the future vehicle mix (cars vs. light trucks) does not change. However, in addition to these *direct* benefits, we can also expect *indirect* benefits via the influence of more stringent standards on the future mix of vehicles produced (and sold). For example, more stringent standards will likely increase pressure on automobile manufacturers to produce (and sell) vehicles with high fuel efficiency, and thus increase marketing efforts (incentives, production goals, etc.) for cars (and especially small cars), which tend to be the most fuel-efficient gasoline- and diesel-powered vehicles for sale today. Thus, it is reasonable to postulate that the vehicle mix under the 2022-2025 standards will contain proportionally more cars and less light trucks than would have been the case without these standards in place. In turn, proportionally more cars among new vehicles would indirectly reduce the fuel consumption by the new-vehicle fleet.

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