Market Forecast for CAFE Analysis: Structure, Development, and Impact

Introduction

DOT's CAFE Compliance and Effects Modeling System begins with an input file defining a forecast of the future light vehicle market, expressed in terms of specific vehicle models with specified engineering characteristics (e.g., vehicle size and weight, fuel economy, engine and transmission properties), as well as production volumes in each model year. Forming the foundation for analysis of CAFE standards, the market forecast influences all calculations performed by the model.

Background

For CAFE rulemakings through 2009, NHTSA requested manufacturers to provide detailed product plans; reviewed these plans and sought explanations and corrections; and used these product plans in building a forecast of the future light vehicle market. Insofar as reflected in these plans, the resultant market forecast accounted for manufacturers' plans to introduce new vehicles, discontinue others, and make changes to vehicle characteristics (e.g., technology, dimensions, weight, footprint, etc.). Most recently, most major manufacturers responded to this request. Manufacturers' responses varied in detail, and generally reflected increasing uncertainty regarding longer time horizons. Because product plans are confidential business information, NHTSA is required to protect them—and correspondingly detailed (vehicle-level) results—from disclosure.

Since 2009, DOT has collaborated with EPA to build market forecasts using public and commercial sources. For the recent MYs 2017-2025 rulemaking, DOT conducted analysis using two such market forecasts—one beginning with CAFE compliance data from MY 2008, the other beginning with CAFE compliance data from MY 2010. Discussed below, the MY2010-based market forecast assumed that the same vehicles sold in MY 2010 would be sold through MY2025 without change in performance, amenities, or utility, in quantities estimated based on a commercial segment- and brand-level forecast acquired from LMC (then J.D. Power), and on an EIA forecast of overall volumes of passenger cars and light trucks. The MY2008-based market forecast was developed through similar methods, using the MY2008 stock of vehicle models and segment/brand and aggregate forecasts obtained earlier from CSM and EIA. All resultant detailed model inputs and outputs have been made public on NHTSA's web site, as have all corresponding detailed outputs from the CAFE model.

Chapter 1 of the TSD supporting the final rule presents details of the development of the MY2008-based and MY2010-based market forecasts.

Structure and Content

Inputs to the CAFE model define specific vehicle models (about 1,200 records in the MY2010-based forecast, as in the underlying CAFE compliance data), each identified with a specific engine and a specific transmission, either of which may be present on multiple vehicle models. As discussed in Chapter 1 of the TSD, some engine, transmission, and vehicle attributes (e.g., cylinder count, drive and transmission type, curb weight, fuel economy) were available from CAFE compliance data for the MY2010 fleet, and other attributes (e.g., track width, wheelbase, seating capacity) were derived from public and commercial sources (e.g., manufacturers' web sites, Motortrend.com, Edmunds.com, Ward's). The MY2010-based market forecast holds all vehicle attributes constant through MY2025, although the CAFE model can accommodate changes in vehicle attributes over time.

Projected Production Volumes

Chapter 1 of the agencies' TSD explains the development of projected production volumes in the MY2010-based market forecast. Steps included:

- The list of individual vehicle models was taken from CAFE compliance data for MY2010.
- Industry total passenger car and light truck volumes were estimated for each year covered by the analysis by Volpe Center staff using DOE/EIA's National Energy Modeling System (NEMS).[1]
- Sales forecasts reflecting shifts among market segments and manufacturers were acquired from LMC Automotive (then J.D. Power).
- EPA staff mapped individual vehicles to market segments, developed growth factors (see below) and sales forecasts at the individual vehicle level, and adjusted these to match the NEMS-based forecast of total sales volumes for passenger cars and light trucks.

Vehicle Model List

The vehicle model list in the market data input file comes from the MY 2010 CAFE compliance data. This data file is also the source of the MY 2010 sales volumes and fuel economy figures for the individual vehicle models analyzed by the CAFE model, although Saab vehicles were deleted to account for Saab's exit from the market. There are 1,171 individual vehicles in the market data input file, differentiated on the basis of manufacturer, nameplate, engine, transmission, drive type, wheelbase (pickups), etc.

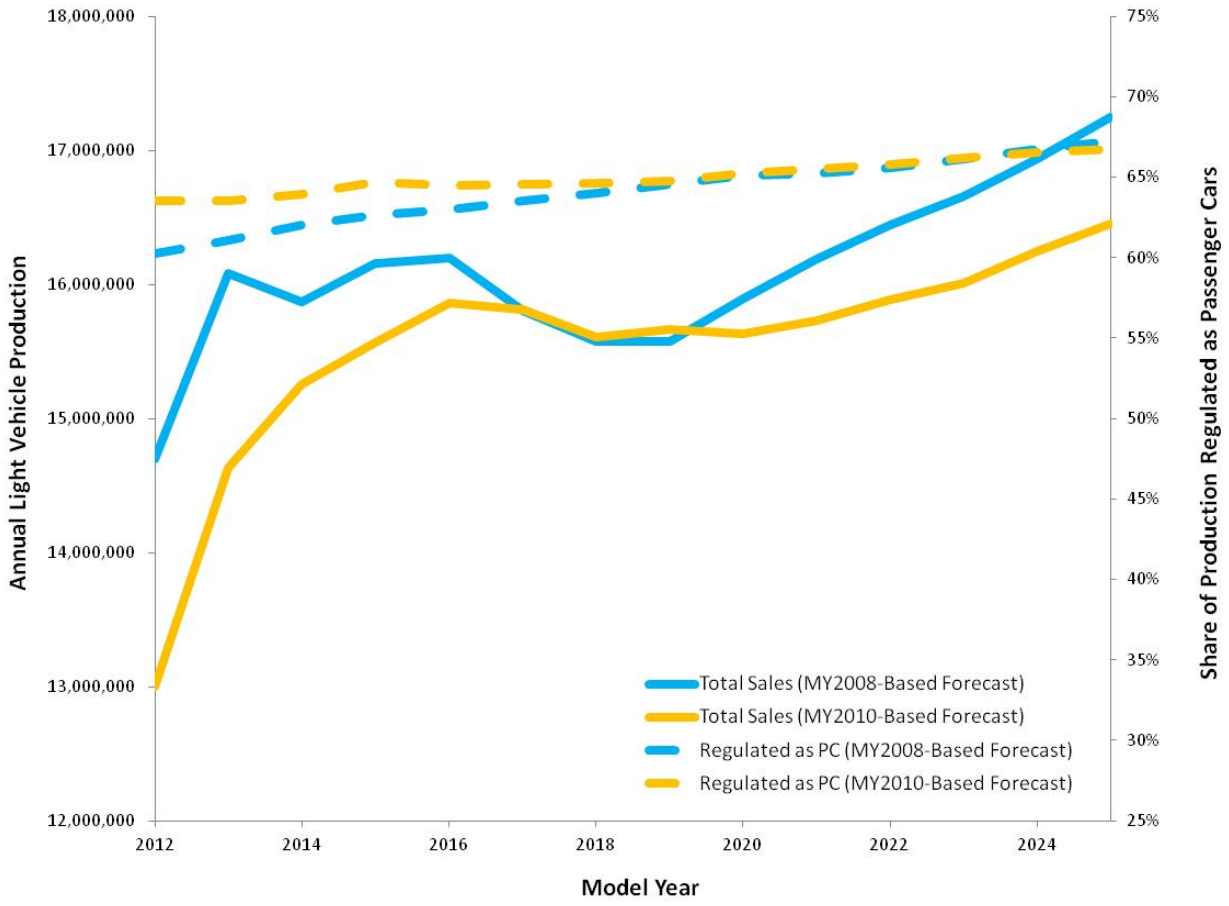
NEMS-Based Forecasting of Passenger Car and Light Truck Sales

For the MY2010-based forecast, total car and light truck sales volumes were estimated using the version of NEMS for the "early release" version of AEO 2012 issued in January 2012. As provided by EIA, NEMS shifted the market toward passenger cars in order to ensure compliance with EISA's requirement that CAFE standards cause the fleet to achieve 35 mpg by 2020. However, NHTSA's CAFE analysis measures impacts relative to continuation of the MY2016 CAFE standards. Therefore, Volpe Center staff deactivated the above-mentioned sales-volume shifting methodology and re-ran NEMS, holding post-2016 CAFE standards constant at MY 2016 levels. The following chart shows the result of this process in

[1] This increases consistency with EIA's reference case fuel prices, which DOT uses as another modeling input.

terms of total light vehicle production and the share regulated as passenger cars (after accounting for 2WD SUVs being regulated as passenger cars), comparing results to those obtained earlier for development of the MY2008-based forecast. Total production volumes are plotted as solid lines against the first (left) *y* axis, and passenger car shares of the light vehicle market are plotted as dashed lines against the second (right) *y* axis:

Total Size and Passenger Car (PC) Share of Light Vehicle Market



LMC Automotive Segment- and Brand-Level Forecast

Tables 1, 2 and 3 below provide examples of forecast information purchased by EPA from LMC Automotive, in all cases based on reference fuel prices. These forecasts, along with the AEO forecasts, are the basis of forecast shifts in sales of the individual vehicle models in the market data input file.

Table 1 shows the 2010 LMC market segment distribution and their forecasted 2025 market segment distribution. The forecast indicates small shifts in market segment shares from 2010 to 2025. Market segments losing share are indicated in bold.

1 - LMC Automotive Segment Forecast

Segment	2010		2025		Difference
Midsize Conventional	1,779,049	15.4%	3,136,084	17.1%	1.7%
Compact Conventional	1,658,852	14.3%	2,210,271	12.0%	**-2.3%**
Large Pickup	1,344,036	11.6%	2,358,883	12.8%	1.2%
Compact CUV	1,206,797	10.4%	1,342,544	7.3%	**-3.1%**
Midsize CUV	976,481	8.4%	1,628,306	8.9%	0.4%
Compact Premium Conventional	545,107	4.7%	869,058	4.7%	0.0%
Large Conventional	534,783	4.6%	779,207	4.2%	**-0.4%**
Midsize Van	460,154	4.0%	585,621	3.2%	**-0.8%**
Sub-Compact Conventional	361,697	3.1%	708,637	3.9%	0.7%
Midsize Utility	330,663	2.9%	394,108	2.1%	**-0.7%**
Midsize Premium CUV	291,864	2.5%	567,557	3.1%	0.6%
Midsize Pickup	282,454	2.4%	527,595	2.9%	0.4%
Large Utility	243,933	2.1%	406,583	2.2%	0.1%
Compact MPV	241,959	2.1%	467,973	2.5%	0.5%
Compact Utility	201,974	1.7%	279,246	1.5%	**-0.2%**
Midsize Sporty	197,342	1.7%	242,399	1.3%	**-0.4%**
Midsize Premium Conventional	194,514	1.7%	451,672	2.5%	0.8%
Large Van	190,765	1.6%	438,589	2.4%	0.7%
Compact Premium CUV	140,018	1.2%	283,621	1.5%	0.3%
Compact Sporty	95,660	0.8%	159,917	0.9%	0.0%
Large Premium Utility	93,555	0.8%	166,211	0.9%	0.1%
Large Premium Conventional	83,941	0.7%	190,883	1.0%	0.3%
Compact Premium Sporty	52,242	0.5%	55,953	0.3%	**-0.1%**
Midsize Premium Utility	23,556	0.2%	39,360	0.2%	0.0%
Midsize Premium Sporty	22,530	0.2%	62,987	0.3%	0.1%
Large Premium Sporty	6,965	0.1%	21,998	0.1%	0.1%
Large Premium Pickup	2,082	0.0%	0	0.0%	0.0%
Total	11,562,973	100.0%	18,375,262	100.0%	

Table 2 shows the 2010 LMC manufacturer distribution and their forecasted 2025 manufacturer distribution. The forecast indicates insignificant shifts in market shares from 2010 to 2025, with all shifts, either loss or gain, of <1% over the course of that time period. Manufacturers losing share are indicated in bold.

2 - LMC Automotive Sales Group Forecast

Sales Group	2010		2025		Difference
General Motors Group	2,211,091	19.1%	3,675,481	20.0%	0.9%
Ford Group	1,910,400	16.5%	2,935,408	16.0%	**-0.5%**
Toyota Group	1,763,595	15.3%	2,658,145	14.5%	**-0.8%**
Honda Group	1,230,480	10.6%	1,838,444	10.0%	**-0.6%**
Fiat-Chrysler Group	1,085,211	9.4%	1,948,062	10.6%	1.2%
Renault-Nissan Group	908,570	7.9%	1,288,609	7.0%	**-0.8%**
Hyundai Group	894,497	7.7%	1,438,426	7.8%	0.1%
Volkswagen Group	383,778	3.3%	617,728	3.4%	0.0%
BMW Group	265,757	2.3%	460,868	2.5%	0.2%
Fuji Heavy	263,820	2.3%	339,206	1.8%	**-0.4%**
Daimler Group	230,863	2.0%	404,897	2.2%	0.2%
Mazda Motors	229,566	2.0%	318,449	1.7%	**-0.3%**
Mitsubishi Motors	55,683	0.5%	87,467	0.5%	0.0%
Geely Group	53,949	0.5%	100,912	0.5%	0.1%
Jaguar Land Rover	45,204	0.4%	89,013	0.5%	0.1%
Suzuki Group	23,994	0.2%	52,594	0.3%	0.1%
Spyker Cars	5,445	0.0%	17,357	0.1%	0.0%
Other	1,070	0.0%	104,194	0.6%	0.6%
Total	11,562,973	100.0%	18,375,262	100.0%	

Table 3 shows the 2010 distribution of sales by market segment for an example manufacturer, Geely (Volvo), and LMC's forecast for 2025. Note that for this particular manufacturer LMC is forecasting a significant shift in market segment mix in going from 2010 to 2025.

3 - LMC Automotive Sales Group & Segment Forecast

Sales Group	Segment	2010		2025		Difference
Geely Group	Compact Premium Conventional	12,686	23.5%	34,026	33.7%	10.2%
Geely Group	Compact Premium CUV	12,031	22.3%	25,752	25.5%	3.2%
Geely Group	**Compact Premium Sporty**	3,714	6.9%	5,473	5.4%	**-1.5%**
Geely Group	Midsize Conventional	0	0.0%	0	0.0%	0.0%
Geely Group	**Midsize Premium Conventional**	15,400	28.5%	16,880	16.7%	**-11.8%**
Geely Group	**Midsize Premium CUV**	10,118	18.8%	18,781	18.6%	**-0.1%**
		53,949	100.0%	100,912	100.0%	

Vehicle Level Sales Forecasts

Also using Geely as an example, Table 4 illustrates the process used by EPA staff to develop vehicle-level sales forecasts, using model year 2025 as an example.

- Each vehicle model was mapped to a market segment in LMC's forecast.
- The growth factor indicated by LMC's forecast for the corresponding manufacturer/market segment was applied to get an initial sales estimate for each vehicle for each forecast year.
- For each forecast year, adjustment factors for passenger cars and light trucks were calculated by comparing total sales from the initial sales estimates by LMC to total sales from the NEMS-based forecasts.
- Resultant "AEO-normalized" sales volumes were applied in the market forecast input file used by the CAFE model.

4 - Producing Projected Sales Volumes for Geely Vehicles for 2025

Manufacturer	Name Plate	Model	LMC SEGMENT	C/T	Volume 2010	LMC Geely Segment Multiplier for 2025	2025 Volume before AEO Normalization	AEO 2025 Normalizing Multiplier	Volume 2025
Geely	Volvo	C30 FWD	Compact Premium Conventional	C	1,147	3.0961	3,551	1.0638	3,778
Geely	Volvo	C30 FWD	Compact Premium Conventional	C	389	3.0961	1,204	1.0638	1,281
Geely	Volvo	C70 FWD	Compact Premium Sporty	C	50	2.4454	122	1.0638	130
Geely	Volvo	C70 FWD	Compact Premium Sporty	C	2,188	2.4454	5,350	1.0638	5,692
Geely	Volvo	S40 AWD	Compact Premium Conventional	C	129	3.0961	399	1.0638	425
Geely	Volvo	S40 AWD	Compact Premium Conventional	C	394	3.0961	1,220	1.0638	1,298
Geely	Volvo	S40 FWD	Compact Premium Conventional	C	169	3.0961	523	1.0638	557
Geely	Volvo	S40 FWD	Compact Premium Conventional	C	6,246	3.0961	19,338	1.0638	20,572
Geely	Volvo	S40 FWD	Compact Premium Conventional	C	368	3.0961	1,139	1.0638	1,212
Geely	Volvo	S80 AWD	Midsize Premium Conventional	C	2,169	1.6386	3,554	1.0638	3,781
Geely	Volvo	S80 AWD	Midsize Premium Conventional	C	353	1.6386	578	1.0638	615
Geely	Volvo	S80 FWD	Midsize Premium Conventional	C	6,283	1.6386	10,296	1.0638	10,952
Geely	Volvo	V50 AWD	Compact Premium Conventional	C	104	3.0961	322	1.0638	343
Geely	Volvo	V50 AWD	Compact Premium Conventional	C	183	3.0961	567	1.0638	603
Geely	Volvo	V50 FWD	Compact Premium Conventional	C	1,861	3.0961	5,762	1.0638	6,129
Geely	Volvo	V70 FWD	Midsize Premium Conventional	C	1,496	1.6386	2,451	1.0638	2,608
Geely	Volvo	XC60 FWD	Compact Premium CUV	T	4,694	1.4970	7,027	0.8406	5,907
Geely	Volvo	XC60 AWD	Compact Premium CUV	T	10,039	1.4970	15,029	0.8406	12,633
Geely	Volvo	XC60 AWD	Compact Premium CUV	T	2,469	1.4970	3,696	0.8406	3,107
Geely	Volvo	XC70 AWD	Midsize Premium CUV	T	1,163	1.0912	1,269	0.8406	1,067
Geely	Volvo	XC70 AWD	Midsize Premium CUV	T	5,216	1.0912	5,692	0.8406	4,785
Geely	Volvo	XC90 AWD	Midsize Premium CUV	T	986	1.0912	1,076	0.8406	904
Geely	Volvo	XC90 AWD	Midsize Premium CUV	T	6,134	1.0912	6,694	0.8406	5,627

Influence of Market Forecast

Comparison of the MY2008- and MY2010- market forecasts applied in analysis for the MYs 2017-2025 final rule helps to illustrate the forecast's influence over model calculations. OEM-level volumes, shown below, were among the differences between the two forecasts.

5 - Production Volumes[2] in MY2008-Based and MY2010-Based Market Forecasts

	Estimated MY2016 Production		Estimated MY2025 Production	
Manufacturer	MY2008-Based	MY2010-Based	MY2008-Based	MY2010-Based
Aston Martin	1.0	0.6	1.2	0.6
BMW	566.5	423.9	550.7	464.4
Mercedes	381.1	347.7	441.8	380.3
Chrysler/Fiat	889.6	1,518.8	775.9	1,628.1
Ford	2,323.3	2,393.2	2,224.6	2,439.0
Geely (Volvo)	144.5	92.2	143.7	97.4
General Motors	2,835.0	2,893.9	3,197.9	2,958.0
Honda	1,449.8	1,658.1	1,898.0	1,799.3
Hyundai	588.6	983.5	845.4	1,053.3
Kia	636.1	378.2	460.4	388.7
Lotus	0.3	0.4	0.3	0.4
Mazda	470.6	317.8	368.2	315.9
Mitsubishi	140.0	69.8	109.7	83.4
Nissan	1,279.2	1,217.3	1,441.2	1,231.9
Porsche	48.1	39.6	51.9	36.7
Spyker	20.0		26.6	
Subaru	309.6	306.6	331.7	315.2
Suzuki	115.8	46.7	124.5	52.9
Tata (Jaguar/Land Rover)	105.0	81.9	122.2	81.3
Tesla	27.3		32.0	
Toyota	3,202.4	2,502.1	3,318.1	2,543.4
Volkswagen	661.4	589.9	784.4	584.4
Total	16.2	15.9	17.3	16.5

Section 1.5 (pp. 1-54 to 1-59) of the TSD supporting the final rule discusses some additional differences between the two forecasts.

Such differences led to differences in some key model results. Below, tables 6 and 7 compare results between the market forecasts, with all other model inputs held constant.

[2] Among brand-level volumes, the MY2008-based forecast contains the Hummer and Pontiac brands in GM's future fleet. Hummer is absent from the MY2010-based forecast; Pontiac nearly so. Both the MY2008-based and MY2010-based forecasts contain the Mercury brand in Ford's future fleet. The MY2008-based fleet contains the Saab brand in Spyker's fleet (which also includes the Spyker C8).

6 – Average Incremental Technology Costs ($, Relative to Continuation of MY2016 Standards)

MY2008-Based Fleet → MY2010-Based Fleet

NHTSA's MYs 2017-2025 rulemaking measured costs, impacts, and benefits of new standards on an incremental basis, relative to a baseline scenario defined by continuation of standards at MY 2016 levels. Shown below, the MY2008-based and MY2010-based market forecasts produced different estimates of average incremental technology costs. Other comparisons can be found in the final rule (e.g., tables IV-47 through IV-114 of the preamble) and accompanying final RIA (chapters VII-X).

Passenger Cars

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industry	233 → 354	434 → 471	602 → 643	904 → 837	1,105 → 965	1,219 → 1,053	1,326 → 1,173	1,666 → 1,430	1,738 → 1,519
Fiat	278 → 338	644 → 372	628 → 579	1,088 → 811	1,114 → 1,077	1,349 → 1,095	1,692 → 1,530	1,770 → 1,692	2,045 → 1,910
Ford	390 → 309	443 → 326	755 → 438	1,515 → 945	1,854 → 993	2,075 → 1,172	2,076 → 1,184	3,345 → 1,651	2,961 → 1,780
General Motors	144 → 225	526 → 462	630 → 486	1,015 → 758	1,185 → 868	1,189 → 879	1,475 → 1,062	1,739 → 1,220	2,010 → 1,531
Honda	228 → 632	484 → 805	510 → 825	513 → 816	1,100 → 1,009	1,132 → 1,009	1,309 → 1,249	1,310 → 1,254	1,284 → 1,229
Hyundai	510 → 605	549 → 591	844 → 898	920 → 913	969 → 1,060	1,126 → 1,226	1,133 → 1,259	1,585 → 1,408	1,501 → 1,419
Kia	13 → 353	94 → 414	339 → 759	780 → 988	915 → 1,081	999 → 1,330	1,154 → 1,316	1,163 → 1,302	1,447 → 1,497
Mazda	337 → 737	447 → 845	423 → 773	767 → 1,086	758 → 1,073	1,676 → 1,481	1,784 → 1,589	1,875 → 1,589	2,070 → 1,782
Mitsubishi	500 → 575	1,015 → 634	988 → 580	1,299 → 1,722	1,737 → 2,022	1,686 → 2,001	1,646 → 1,982	1,920 → 1,962	3,757 → 2,007
Nissan	409 → 565	645 → 653	1,054 → 864	1,100 → 926	1,125 → 953	1,368 → 1,080	1,440 → 1,191	1,851 → 1,555	1,805 → 1,531
Subaru	148 → 2	183 → 2	434 → 895	1,191 → 1,407	1,152 → 1,367	1,121 → 1,333	1,100 → 1,315	1,835 → 3,963	3,335 → 3,231
Suzuki	13 → 84	20 → 109	1,420 → 825	1,555 → 1,080	1,666 → 1,426	1,687 → 1,435	1,662 → 1,426	1,682 → 1,401	2,283 → 1,630
Toyota	220 → 322	507 → 460	657 → 840	852 → 957	1,082 → 1,189	1,125 → 1,247	1,115 → 1,248	1,276 → 1,493	1,265 → 1,433
Volkswagen	2 → 13	5 → 387	5 → 413	474 → 632	537 → 756	587 → 780	669 → 811	691 → 1,000	1,020 → 1,322

Light Trucks

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industry	78 → 147	191 → 196	422 → 396	620 → 628	853 → 907	949 → 942	994 → 1,053	1,076 → 1,141	1,171 → 1,213
Fiat	100 → 469	108 → 468	173 → 538	939 → 1,199	1,013 → 1,316	992 → 1,295	1,286 → 1,747	1,324 → 1,726	1,611 → 1,816
Ford	7 → 87	85 → 116	97 → 195	297 → 303	1,089 → 1,150	1,166 → 1,126	1,187 → 1,118	1,198 → 1,120	1,389 → 1,209
General Motors	1 → 1	162 → 40	656 → 471	993 → 921	957 → 905	940 → 887	928 → 894	974 → 972	1,233 → 1,169
Honda	196 → 210	199 → 252	345 → 310	395 → 336	688 → 741	911 → 878	978 → 897	959 → 1,025	945 → 1,002
Hyundai	288 → 272	301 → 282	423 → 911	418 → 949	408 → 932	901 → 1,174	865 → 1,175	1,288 → 1,413	1,254 → 1,369
Kia	49 → 316	103 → 324	229 → 369	342 → 365	833 → 825	818 → 780	934 → 1,089	919 → 1,060	936 → 1,016
Mazda	4 → 15	561 → 762	509 → 686	532 → 690	502 → 669	488 → 661	739 → 901	811 → 1,051	793 → 1,008
Mitsubishi	284 → 276	319 → 283	269 → 258	269 → 254	2,092 → 1,509	2,020 → 1,462	1,986 → 1,441	1,958 → 1,421	1,824 → 1,337
Nissan	237 → 178	252 → 201	481 → 414	609 → 608	993 → 682	1,221 → 791	1,172 → 786	1,256 → 1,007	1,415 → 997
Subaru	-70 → 807	78 → 824	663 → 1,238	644 → 1,218	607 → 1,200	597 → 1,222	589 → 1,188	1,318 → 1,501	1,238 → 1,464
Suzuki	1 → 252	13 → 251	594 → 231	585 → 228	745 → 1,719	712 → 1,668	702 → 1,643	691 → 1,618	1,015 → 1,504
Toyota	13 → 6	234 → 88	402 → 313	479 → 327	749 → 650	776 → 674	817 → 887	938 → 1,086	895 → 1,095
Volkswagen	1 → 25	102 → 180	673 → 340	684 → 583	735 → 570	733 → 583	985 → 755	1,458 → 1,091	1,314 → 1,318

Overall Fleet

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industry	176 → 281	347 → 374	538 → 556	805 → 764	1,018 → 945	1,126 → 1,015	1,213 → 1,133	1,470 → 1,333	1,552 → 1,417
Fiat	192 → 405	385 → 420	412 → 559	1,020 → 999	1,069 → 1,191	1,188 → 1,189	1,509 → 1,630	1,575 → 1,707	1,861 → 1,868
Ford	248 → 212	313 → 235	525 → 333	1,098 → 672	1,596 → 1,059	1,770 → 1,153	1,790 → 1,157	2,671 → 1,433	2,478 → 1,547
General Motors	78 → 130	355 → 282	642 → 480	1,004 → 828	1,077 → 884	1,072 → 883	1,222 → 990	1,389 → 1,114	1,655 → 1,377
Honda	217 → 496	392 → 631	458 → 662	477 → 669	972 → 928	1,065 → 970	1,210 → 1,146	1,208 → 1,189	1,185 → 1,166
Hyundai	465 → 561	497 → 551	755 → 900	817 → 917	855 → 1,045	1,081 → 1,220	1,079 → 1,250	1,525 → 1,408	1,452 → 1,413
Kia	22 → 348	96 → 404	313 → 715	680 → 920	897 → 1,054	959 → 1,273	1,106 → 1,293	1,110 → 1,278	1,338 → 1,450
Mazda	260 → 600	475 → 829	443 → 757	710 → 1,016	693 → 1,002	1,372 → 1,339	1,518 → 1,472	1,610 → 1,497	1,761 → 1,652
Mitsubishi	446 → 520	842 → 566	813 → 518	1,052 → 1,442	1,822 → 1,925	1,765 → 1,899	1,726 → 1,880	1,929 → 1,862	3,319 → 1,882
Nissan	351 → 466	517 → 535	872 → 746	948 → 843	1,084 → 884	1,323 → 1,006	1,358 → 1,088	1,672 → 1,416	1,690 → 1,396
Subaru	91 → 257	156 → 261	492 → 1,001	1,057 → 1,349	1,022 → 1,316	999 → 1,299	981 → 1,277	1,716 → 3,214	2,863 → 2,691
Suzuki	11 → 96	19 → 119	1,266 → 778	1,380 → 1,015	1,502 → 1,449	1,516 → 1,454	1,495 → 1,442	1,509 → 1,418	2,066 → 1,620
Toyota	134 → 200	398 → 315	559 → 636	710 → 717	952 → 985	991 → 1,033	1,003 → 1,115	1,152 → 1,344	1,130 → 1,311
Volkswagen	2 → 15	26 → 350	148 → 400	518 → 623	577 → 722	616 → 744	734 → 801	849 → 1,017	1,078 → 1,321

7 – Averages of Required Fuel Economy Levels (mpg)
MY2008-Based Fleet → MY2010-Based Fleet

Overall averages of required fuel economy levels are estimated to be lower under the MY2010-based forecast than under the MY2008-based forecast. For example, the MY2025 average under the MY2010-based forecast is 48.7 mpg, 1.0 mpg lower than the 49.7 mpg value calculated under the MY2008-based forecast (corresponding to the 54.5 "mpg CAFE-equivalent" value for EPA's MY2025 standards). This is explained by lower averages of required fuel economy levels for the passenger car and light truck fleets, resulting from differences in distributions among vehicle footprints, with the MY2010-based forecast being shifted less toward smaller footprints than the MY2008-based forecast. Of course, the standards—*i.e.*, the mathematical functions defining fuel economy targets at each footprint—are identical for both forecasts, and manufacturers' *actual* fuel economy requirements will be based on their *actual* production.

Passenger Cars

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industry	40.1 → 39.6	41.6 → 41.1	43.1 → 42.5	44.8 → 44.2	46.8 → 46.1	49.0 → 48.2	51.2 → 50.5	53.6 → 52.9	56.2 → 55.3
Fiat	39.1 → 38.7	40.6 → 39.9	42.1 → 41.4	43.7 → 43.0	45.7 → 44.9	47.9 → 47.0	50.2 → 49.2	52.6 → 51.6	55.1 → 54.0
Ford	39.1 → 39.5	40.6 → 41.0	42.1 → 42.5	43.7 → 44.1	45.6 → 46.0	47.7 → 48.2	49.9 → 50.4	52.3 → 52.8	54.7 → 55.3
General Motors	39.6 → 39.3	41.1 → 40.8	42.6 → 42.2	44.3 → 43.9	46.2 → 45.7	48.4 → 47.9	50.7 → 50.1	53.1 → 52.5	55.6 → 54.9
Honda	40.4 → 39.7	41.9 → 41.1	43.4 → 42.6	45.2 → 44.2	47.1 → 46.1	49.3 → 48.3	51.6 → 50.5	54.0 → 52.9	56.6 → 55.4
Hyundai	40.4 → 39.8	41.9 → 41.3	43.4 → 42.7	45.2 → 44.5	47.1 → 46.4	49.3 → 48.6	51.6 → 50.8	54.1 → 53.2	56.6 → 55.7
Kia	41.1 → 40.8	42.6 → 42.3	44.2 → 43.8	46.0 → 45.6	48.0 → 47.5	50.3 → 49.8	52.6 → 52.1	55.1 → 54.5	57.7 → 57.1
Mazda	41.5 → 40.1	43.0 → 41.6	44.5 → 43.0	46.3 → 44.7	48.3 → 46.6	50.6 → 48.8	53.0 → 51.1	55.5 → 53.5	58.1 → 56.0
Mitsubishi	40.5 → 41.8	42.0 → 43.3	43.6 → 44.9	45.3 → 46.7	47.3 → 48.7	49.5 → 51.0	51.8 → 53.4	54.2 → 55.9	56.8 → 58.6
Nissan	39.8 → 39.6	41.2 → 41.0	42.8 → 42.5	44.4 → 44.2	46.3 → 46.0	48.5 → 48.2	50.7 → 50.4	53.1 → 52.8	55.6 → 55.2
Subaru	42.6 → 41.1	44.2 → 42.6	45.8 → 44.1	47.6 → 45.8	49.7 → 47.7	52.0 → 49.9	54.4 → 52.2	57.0 → 54.7	59.6 → 57.2
Suzuki	43.3 → 42.1	44.9 → 43.6	46.5 → 45.2	48.4 → 46.9	50.5 → 48.9	52.8 → 51.2	55.3 → 53.6	57.9 → 56.1	60.6 → 58.7
Toyota	40.6 → 39.7	42.1 → 41.2	43.7 → 42.7	45.4 → 44.3	47.4 → 46.2	49.6 → 48.4	51.9 → 50.7	54.3 → 53.0	56.9 → 55.5
Volkswagen	41.4 → 40.5	43.0 → 41.9	44.5 → 43.5	46.3 → 45.2	48.3 → 47.1	50.6 → 49.3	52.9 → 51.6	55.4 → 54.1	58.0 → 56.6

Light Trucks

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industry	29.4 → 29.1	30.0 → 29.6	30.6 → 30.0	31.2 → 30.6	33.3 → 32.6	34.9 → 34.2	36.6 → 35.8	38.5 → 37.5	40.3 → 39.3
Fiat	29.6 → 29.6	30.2 → 30.2	30.8 → 30.7	31.5 → 31.5	33.7 → 33.6	35.3 → 35.2	37.0 → 36.9	38.8 → 38.6	40.6 → 40.4
Ford	28.6 → 27.5	29.1 → 27.8	29.6 → 28.0	30.0 → 28.4	32.0 → 30.2	33.5 → 31.7	35.2 → 33.1	37.0 → 34.7	38.8 → 36.4
General Motors	28.0 → 27.8	28.5 → 28.1	29.1 → 28.6	29.6 → 29.2	31.7 → 31.2	33.2 → 32.8	34.9 → 34.3	36.6 → 36.0	38.4 → 37.8
Honda	31.0 → 30.4	31.7 → 31.1	32.3 → 31.7	33.1 → 32.5	35.4 → 34.7	37.0 → 36.4	38.8 → 38.1	40.7 → 39.9	42.6 → 41.8
Hyundai	31.3 → 32.1	32.1 → 33.0	32.8 → 33.7	33.6 → 34.6	35.9 → 36.9	37.6 → 38.7	39.4 → 40.5	41.3 → 42.5	43.2 → 44.5
Kia	30.0 → 30.3	30.6 → 31.0	31.2 → 31.7	32.0 → 32.5	34.2 → 34.8	35.8 → 36.5	37.5 → 38.3	39.3 → 40.1	41.1 → 42.1
Mazda	31.4 → 31.6	32.4 → 32.5	33.1 → 33.1	33.8 → 33.9	35.9 → 36.2	37.6 → 38.0	39.3 → 39.8	41.2 → 41.7	43.2 → 43.6
Mitsubishi	32.9 → 34.1	33.9 → 35.1	34.6 → 35.9	35.5 → 36.7	37.9 → 39.3	39.7 → 41.1	41.6 → 43.1	43.6 → 45.2	45.7 → 47.3
Nissan	29.6 → 29.6	30.3 → 30.1	30.9 → 30.5	31.6 → 31.1	33.5 → 33.1	35.1 → 34.6	36.8 → 36.2	38.7 → 37.9	40.6 → 39.7
Subaru	34.4 → 34.9	35.4 → 35.9	36.1 → 36.7	37.1 → 37.6	39.6 → 40.2	41.5 → 42.1	43.5 → 44.1	45.5 → 46.2	47.7 → 48.4
Suzuki	32.2 → 34.2	33.2 → 35.2	33.9 → 36.0	34.7 → 36.9	37.1 → 39.4	38.9 → 41.3	40.7 → 43.3	42.7 → 45.3	44.7 → 47.5
Toyota	29.7 → 29.4	30.4 → 30.0	31.0 → 30.5	31.6 → 31.1	33.7 → 32.9	35.3 → 34.4	37.0 → 36.1	38.9 → 37.8	40.7 → 39.6
Volkswagen	29.5 → 30.9	30.1 → 31.7	30.8 → 32.4	31.5 → 33.2	33.5 → 35.4	35.1 → 37.1	36.7 → 38.9	38.5 → 40.8	40.3 → 42.7

Overall Fleet

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industry	35.4 → 35.1	36.5 → 36.1	37.7 → 37.1	38.9 → 38.3	41.0 → 40.3	43.0 → 42.3	45.1 → 44.3	47.4 → 46.5	49.7 → 48.7
Fiat	33.8 → 33.4	34.8 → 34.4	35.9 → 35.3	37.1 → 36.5	39.5 → 38.7	41.2 → 40.6	43.2 → 42.6	45.5 → 44.8	47.9 → 46.9
Ford	34.4 → 33.2	35.5 → 34.0	36.7 → 34.7	37.8 → 35.7	39.9 → 37.7	41.8 → 39.6	44.0 → 41.4	46.3 → 43.5	48.6 → 45.6
General Motors	33.2 → 33.4	34.0 → 34.2	34.9 → 35.0	35.8 → 36.1	38.0 → 38.1	39.9 → 40.0	41.9 → 41.9	44.0 → 43.9	46.2 → 46.0
Honda	36.6 → 36.1	37.9 → 37.3	39.2 → 38.4	40.6 → 39.8	42.7 → 41.9	44.8 → 44.0	47.0 → 46.1	49.3 → 48.4	51.6 → 50.8
Hyundai	38.1 → 38.6	39.4 → 40.0	40.6 → 41.3	42.2 → 43.0	44.3 → 45.0	46.4 → 47.2	48.6 → 49.4	50.9 → 51.7	53.3 → 54.2
Kia	37.8 → 39.3	38.9 → 40.6	40.1 → 42.0	41.8 → 43.7	44.0 → 45.7	46.2 → 48.0	48.4 → 50.3	50.7 → 52.6	53.1 → 55.2
Mazda	38.6 → 38.1	39.8 → 39.5	41.1 → 40.8	42.5 → 42.3	44.4 → 44.4	46.5 → 46.5	48.7 → 48.7	51.1 → 51.0	53.6 → 53.4
Mitsubishi	38.3 → 40.1	39.6 → 41.4	41.0 → 42.8	42.5 → 44.4	44.7 → 46.6	46.8 → 48.8	49.0 → 51.1	51.3 → 53.6	53.8 → 56.1
Nissan	35.6 → 36.4	36.9 → 37.5	38.1 → 38.5	39.4 → 39.9	41.4 → 41.8	43.4 → 43.8	45.5 → 45.8	47.8 → 48.0	50.1 → 50.2
Subaru	40.1 → 38.9	41.5 → 40.2	42.9 → 41.5	44.5 → 42.9	46.8 → 45.1	49.1 → 47.2	51.4 → 49.4	53.9 → 51.8	56.4 → 54.2
Suzuki	40.6 → 41.4	42.1 → 42.9	43.5 → 44.3	45.2 → 45.9	47.4 → 48.0	49.7 → 50.3	52.1 → 52.6	54.5 → 55.1	57.1 → 57.6
Toyota	35.2 → 35.0	36.5 → 36.0	37.8 → 37.0	38.9 → 38.1	40.9 → 40.1	42.9 → 42.0	45.1 → 44.1	47.4 → 46.2	49.7 → 48.5
Volkswagen	38.5 → 38.4	39.4 → 39.7	40.6 → 41.0	42.2 → 42.4	44.3 → 44.5	46.5 → 46.5	48.5 → 48.8	50.8 → 51.1	53.4 → 53.5