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Fuel consumption of new passenger cars in India: Manufacturers' performance in fiscal year 2018–19

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Keywords: India CO_2 standards, corporate average fuel consumption, CO_2 compliance and enforcement, GHG emissions, fuel efficiency

Introduction

Passenger vehicles sold in India have been subjected to fuel-consumption standards established by the Ministry of Power since fiscal year (FY) 2017–18.[1] In 2018, the ICCT evaluated how well manufacturers of new vehicles sold in FY 2017–18 complied with the standards.[2] Building on that, this paper examines the fuel consumption of manufacturer groups for passenger vehicles sold in FY 2018–19 and evaluates their readiness to meet more stringent requirements that will take effect in FY 2022–23. We evaluate new passenger vehicle performance and identify basic vehicle specifications by fuel type and manufacturer group. This paper also considers the potential impact of flexibility mechanisms on manufacturers' compliance with the standards, and compares results with the summary compliance report published by Ministry of Road Transport and Highways (MoRTH).[3]

Our analysis is based on FY 2018–19 sales data and vehicle characteristic information from Segment Y Automotive Intelligence Pvt. Ltd., which focuses on automotive markets in Asia. Annual data purchased from Segment Y covered FY 2006–07 through 2012–13, 2015–16, 2017–18, and 2018–19. Moreover, the fuel economy data was verified with data from the Society of Indian Automobile Manufacturers (SIAM) and updated.[4] This verified data covers 99.6% of the new vehicle sales in FY 2018–19.

1 Government of India, Ministry of Power, "Gazette of India: Extraordinary. [Part II-Sec. 3(ii)]," April 23 2015, https://beeindia.gov.in/sites/default/files/Fuel%20Efficiency%20Notification%20%2823April2015%29.pdf. Note that the fiscal year in India runs from April 1 to March 31 of the following year.

2 Zifei Yang, *Compliance with India's first fuel consumption standards for new passenger cars (FY 2017–2018)*, (ICCT: Washington, DC, 2018), https://theicct.org/publications/compliance-india-fuel-consumption-standards-pv

3 Government of India, Ministry of Road Transport and Highways, "Annual fuel consumption compliance report in respect of M1 Category vehicles for the year 2018–19," November 6, 2019, https://morth.gov.in/Circulars-Notifications-related-to-Road-Transport. This report gives the compliance target and actual performance of each passenger car manufacturer, but there is no detailed information on parameters like fleet average curb weight, or the impact of electric vehicles, hybrids, and CO_2-reducing technologies on overall performance.

4 The fuel economy of vehicles sold in FY 2015–16 through 2018–19 are from SIAM, http://www.siamindia.com/cpage.aspx?mpgid=31andpgidtrail=82 , accessed on December 8, 2019. For models that do not have SIAM fuel economy information and for the fuel economy of vehicles sold in FY 2006–07 through 2011–12, we collected information from manufacturers' websites and from advertisements.

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Background

India is the fifth-largest passenger vehicle market in the world by sales volume, and SIAM data shows annual sales in FY 2018–19 reached 3.4 million (Figure 1). Compared to FY 2017–18, passenger car sales in FY 2018–19 marginally increased by about 3%.

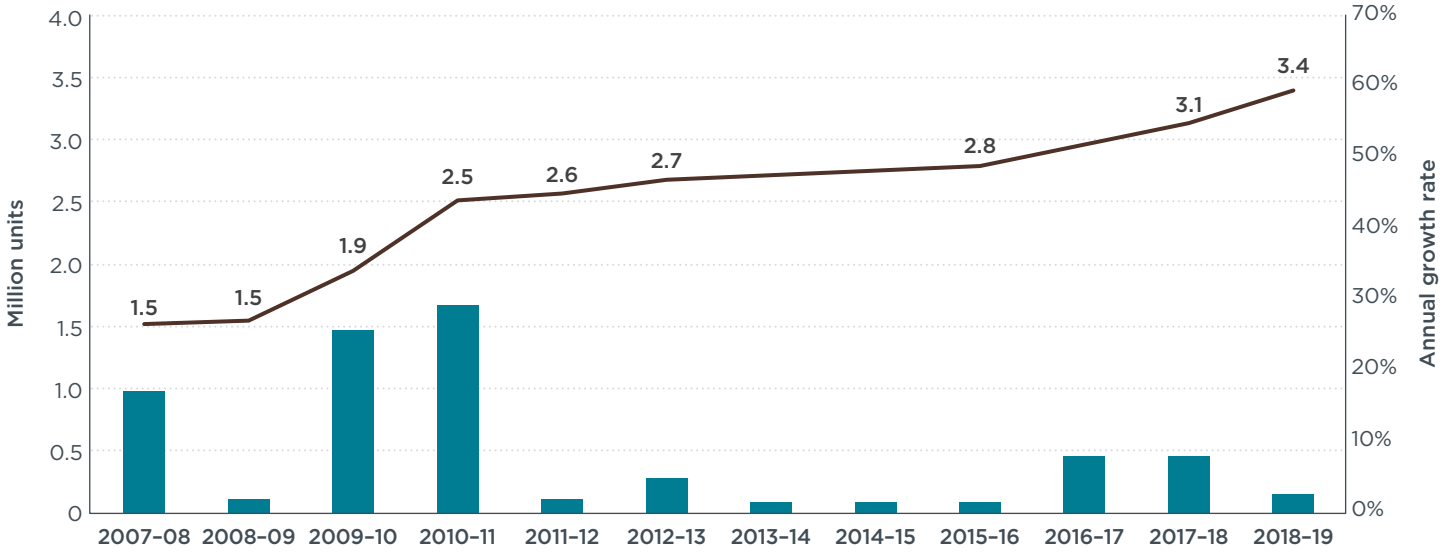

Figure 1. The trend of passenger vehicle sales in India. Source: SIAM data.

In 2015, the government of India established corporate average fuel consumption standards for passenger cars. They take effect in two phases—the first targets began in FY 2017–18 and the second are slated to begin FY 2022–23. The standards are set in terms of gasoline-equivalent liters per 100 kilometers (L/100 km) and are based on vehicle curb weight. In 2018, MoRTH, the agency in charge of implementing the vehicle fuel-consumption standards, finalized the document that describes how to determine the compliance of manufacturers with the fuel-consumption standards.[5]

The actual fuel consumption for compliance is measured as grams of carbon dioxide (CO_2) emissions per kilometer (g/km) during vehicle type approval. The factors for converting consumption of different fuel types into gasoline-equivalent fuel consumption and for converting from gasoline-equivalent fuel consumption to CO_2 emissions are defined in the regulation.[6] The CO_2 values provided by the manufacturer during type approval are called the declared value (DV).[7] The CO_2 value derived from the type approval test should not exceed the DV by more than 4%. The accuracy of the DV is again checked during conformity of production (COP) tests. The CO_2 values used in our analysis are DVs.

The compliance document includes flexibility mechanisms that are intended to reduce compliance costs and promote innovative technologies that reduce CO_2 emissions. The flexibility mechanisms that would influence manufacturers' compliance with standards include derogation factors for CO_2-reducing technologies and super credits for battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and strong hybrid electric vehicles (HEVs).

5 Government of India, Ministry of Road Transport and Highways, "Administrative and technical procedure for measurement and monitoring [average] fuel consumption in l/100 km of M1 category vehicles with GVW not exceeding 3500 kg," AMENDMENT No. 7 TO Doc. No.: MoRTH/CMVR/ TAP-115/116: Issue No. 4 (2018), https://www.icat.in/pdf/Amendment_7_TAP_CAFE_23052018.pdf

6 Fuel types include gasoline, diesel, liquid petroleum gas, compressed natural gas, and electricity. Gasoline equivalent fuel consumption (liters/100 km) = 0.04217 (g/liter) × CO_2 emissions (g/km)

7 Government of India, Ministry of Road Transport and Highways, "Administrative and technical procedure"

Derogation factors for CO_2-reducing technologies aim to reward innovative technologies that produce real-world CO_2 savings beyond what is measured over a standardized test cycle during vehicle type approval. The compliance provisions allow manufacturers to use derogation factors for four CO_2-reducing technologies—regenerative braking, start-stop systems, tire pressure monitoring systems (TPMS), and 6-speed or more transmissions. Note, meanwhile, that TPMS is mandatory for safety under U.S. and EU regulations. In India's standard, CO_2 emissions values are multiplied by 0.98 for each CO_2-reducing technology applied on a vehicle. While manufacturers are allowed to demonstrate the savings of CO_2-reducing technologies (1 g/km or more) other than the four on the list, the total CO_2 reduction due to the derogation factors of listed technologies or additional technologies cannot exceed 9 g/km.

The first compliance report published by the MoRTH showed that all car manufacturers met the FY 2017–18 fuel consumption standards when various flexibility mechanisms were taken into account.[8] This paper evaluates compliance for 2018–19 by referring to the fuel-consumption standards and the rules for evaluating compliance by manufacturer groups. Fuel-consumption standards and compliance are reported in terms of equivalent CO_2 emissions.

Basic specifications of the fleet

Figure 2 plots the recent trend of market share of annual new passenger vehicle sales by fuel type. In FY 2018–19, 37% of the new vehicles sold in India were diesel vehicles and 63% were gasoline vehicles. Compared with FY 2017–18, the diesel market share dropped 4.4%.

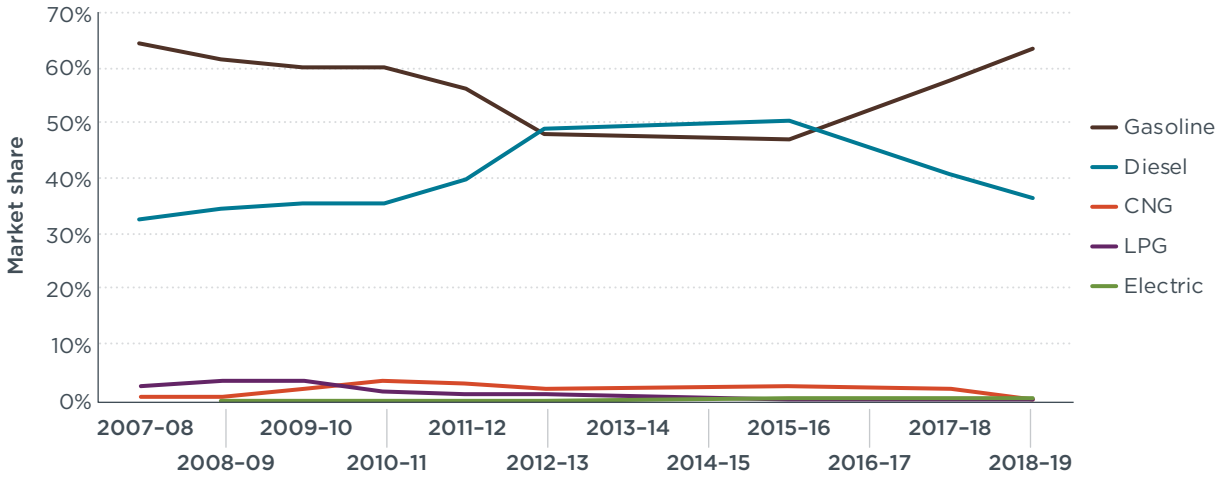

Figure 2. Trends of passenger vehicle sales in India by fuel type

Prior to 2014, the price of diesel fuel was regulated by the Government of India, and diesel prices were lower than gasoline prices. Cheap diesel prices combined with higher fuel efficiency made the total cost of ownership of diesel vehicles much more affordable than gasoline vehicles. However, after the deregulation of diesel fuel, the price gap with gasoline decreased steadily and diesel vehicles became costlier to own. In addition, the new Bharat Stage (BS) VI emission standards require diesel vehicles to contain advanced emission control technologies that increase the upfront cost. As a result, the market share of diesel vehicles, especially smaller ones, is likely to continue declining.

8 Government of India, Ministry of Road Transport and Highways, "Annual fuel consumption compliance report in respect of M1 category of vehicles with GVW less than 3.5 T for year 2017–2018," https://morth.gov.in/sites/default/files/circulars_document/Annual_Fuel_Consumption_compliance_report_in_respect_of_M1_category_of_vehicles_with_GVW_less_than_3.5_T_for_year_2017-2018%C2%A0%2837KB%2C%C2%A0.pdf

The market share of electric vehicles has remained fairly stagnant over the past decade at about 0.06%, while the market share of compressed natural gas (CNG) vehicles has decreased from 1.7% to 0.1%.

The decrease in the diesel portfolio has also impacted the average curb weight of all major passenger car manufacturers. Figure 3 plots the historical trend of curb weight and engine displacement of the new vehicles sold by fuel type.

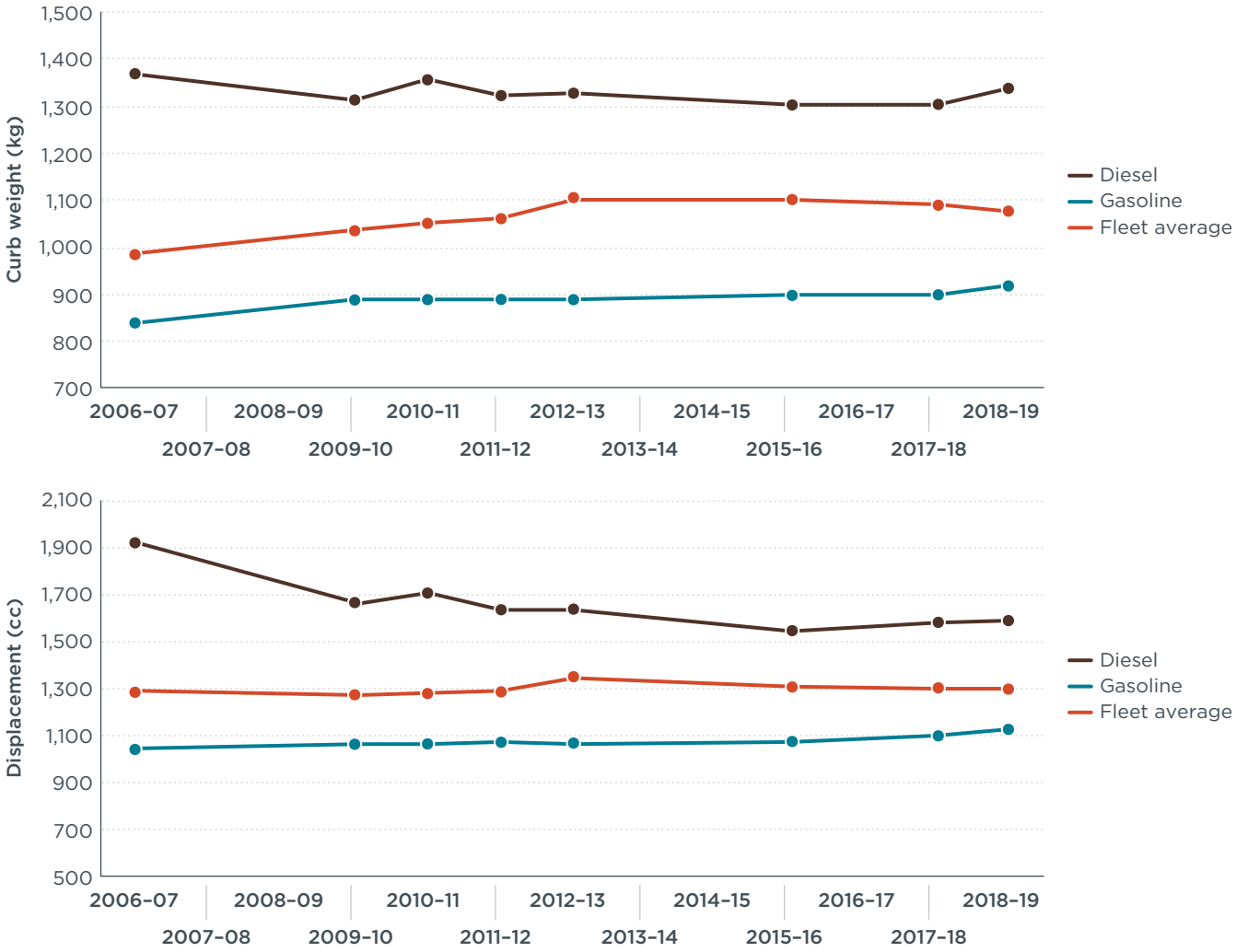

Figure 3. Trend of fleet average curb weight and engine displacement by fuel type

The passenger car fleet in India has traditionally been lighter and less powerful than fleets in most other major markets.[9] In FY 2017–18, the fleet had an average curb weight of 1,093 kg, and in FY 2018–19 it was marginally smaller, 1,078 kg or 1.3% smaller. In FY 2018–19 the fleet average displacement was 1,304 cubic centimeters (cc). The average displacement for diesel vehicles was 1,597 cc and average gasoline displacement was 1,132 cc. The diesel fleet has always been heavier and more powerful than the gasoline fleet. In FY 2018–19, the average curb weight of diesel vehicles was 1,336 kg—24% higher than the fleet average curb weight of 1,078 kg. In comparison, the gasoline average curb weight was 15% lower, 918 kg.

9 Zifei Yang and Anup Bandivadekar, *2017 global update: Light-duty vehicle greenhouse gas and fuel economy standards,* (ICCT: Washington DC, 2017), https://theicct.org/publications/2017-global-update-LDV-GHG-FE-standards

The average ratio of passenger cars to sport utility vehicles (SUVs)/vans was roughly 4:1 between FY 2006–07 and FY 2011–12. This ratio shifted suddenly by about 10% toward SUVs/vans in FY 2012–13. Since then, the market share of SUVs has been hovering around 30%. Figure 4 illustrates the trends in market shares for SUVs and vans.

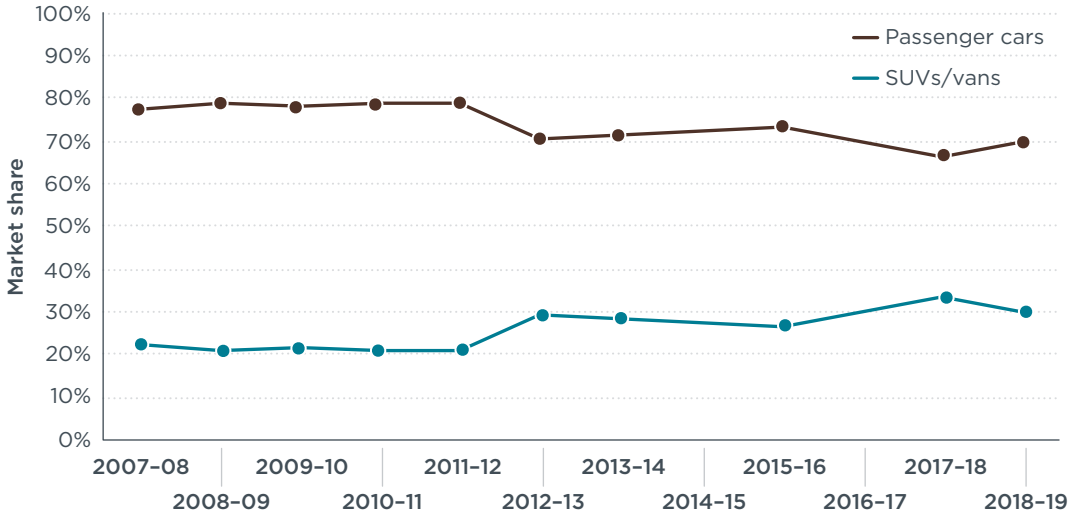

Figure 4. Trend of market share by vehicle type

Figure 5 shows the top 10 passenger car manufacturers; these account for 99% of the new passenger vehicle market in India. Maruti has the largest market share with 50.6% and is followed by Hyundai with 15.9%. The top five manufacturers have 85% of the market and thus mostly govern industry trends in terms of new technologies and CO_2 emissions.

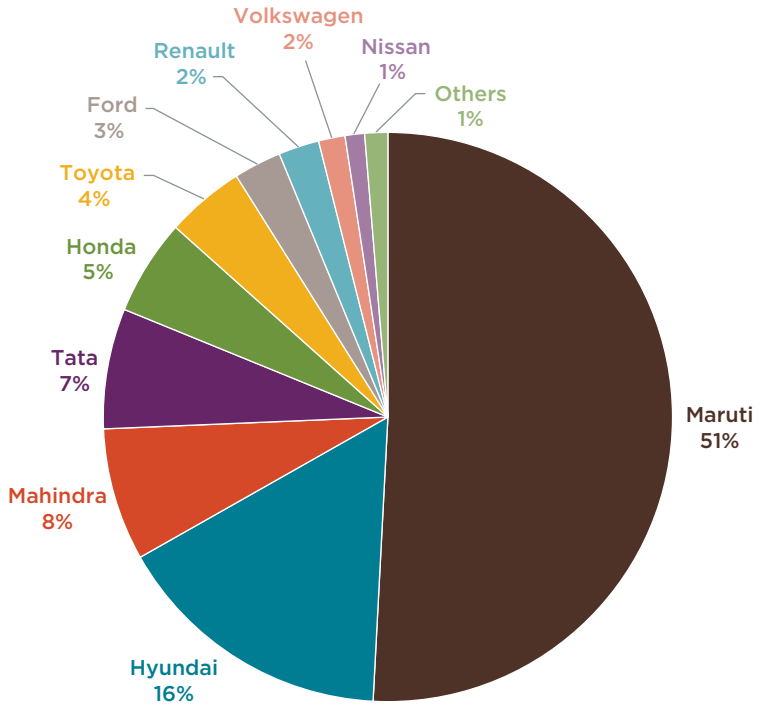

Figure 5. Market share of top manufacturers in FY 2018–19

Historical fleet average CO_2 emissions

Our analysis shows that the sales-weighted industry average CO_2 emissions in FY 2018–19 from new passenger cars in India was 121.9 g/km with a fleet average curb weight of 1,078 kg. The fleet target was 132.5 g/km and the fleet met the target with a margin of 8%. Figure 6 shows the historical fleet average performance of CO_2 from FY 2006–07 to FY 2018–19.

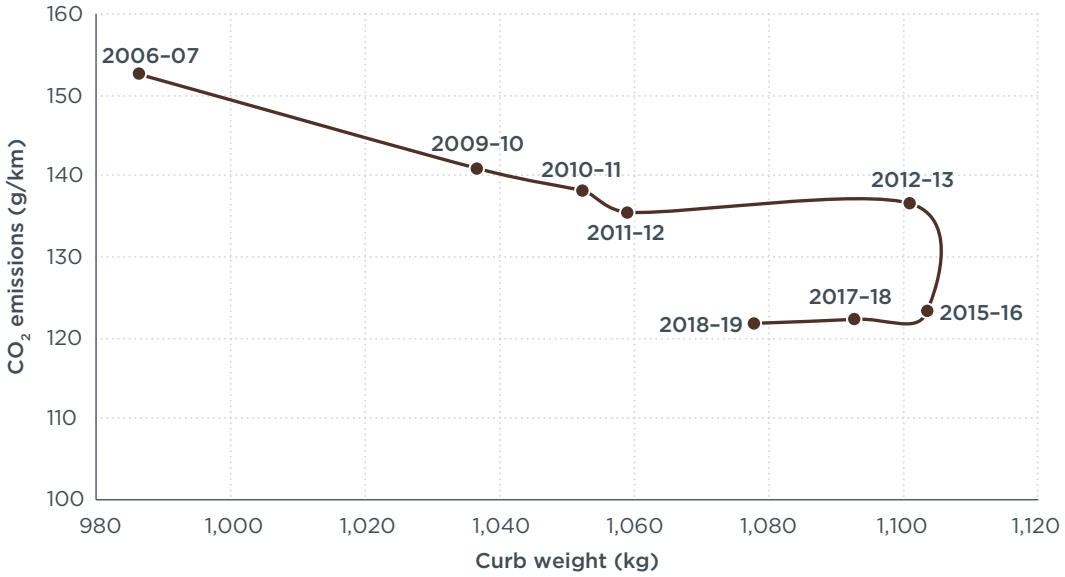

Figure 6. Trend of historical fleet average CO_2 performance and curb weight

Looking at a timeframe of 10 years from 2009–10 to 2018–19, average CO_2 emissions decreased 1.4% a year while average curb weight rose 0.5% annually. The three-year period between FY 2012–13 and FY 2015–16 saw the sharpest decline in CO_2 emissions, averaging 3.4% per year, along with the smallest increase in curb weight of 0.2% a year. In 2017–18, the fleet dropped significantly in curb weight; recall that this mainly reflects a decrease in the market share of diesel vehicles. FY 2018–19 continued the trend and there was a marginal drop in both fleet average curb weight and CO_2 emissions.

CO_2 compliance by corporate group

Table 1, below, gives an estimation of the annual corporate average CO_2 performance and average CO_2 target of all manufacturers in FY 2018-2019. It also details the market share, CO_2 emissions, and compliance relative to the 2017–18 and 2022–23 targets of each corporate group. Note that, according to the compliance standard, corporate group is defined as having a minimum of 51% direct shareholding in each manufacturing company by the group. This may be considered as one manufacturer for the purpose of complying with fuel consumption standards.

Further, Segment Y data provides information on 6-speed transmissions, electric variants, and hybrid vehicles. Because it lacks information on other CO_2-reducing technologies like start stop, regenerative braking, and TPMS, these are not treated in our calculations.

As compared to FY 2017–18, the list of manufacturers is different. General Motors, which previously qualified as a small manufacturer, stopped production in the Indian market.[10] Additionally, based on sales volumes in FY 2018–19, Force Motors, Jaguar Land

10 Pankaj Doval, "General Motors to stop India sales on rising losses," *The Times of India,* May 19, 2017, https://timesofindia.indiatimes.com/business/india-business/general-motors-to-stop-india-sales-on-rising-losses/articleshow/58742167.cms

Rover, Isuzu, and Volvo should all be categorized as small manufacturers. Small car manufacturers are considered compliant under the provisions which set the FY 2018–19 target for them at actual performance. The 2022–23 targets for these manufacturers will be 17% below their 2017–18 performance.

Table 1. Curb weight, CO_2 performance, and market share for passenger cars in FY 2018–19

Corporate group	Market share	Curb wt (kg)	Without flexibility mechanism	With Flexibility mechanism	FY 2018–19 compliance			FY 2022–23 compliance			Small manufacturer
					Target for 2018–19 standard	Gap without flexibility mechanisms	Gap with flexibility mechanisms	Target for 2022–23 standard	Gap without flexibility mechanisms	Gap with flexibility mechanisms	
Maruti	50.6%	921	109.1	109.0	123.6	11.8%	11.8%	102.5	-6.1%	-6.0%	N
Hyundai	15.9%	1,091	125.6	124.6	133.3	5.8%	6.5%	110.5	-12.0%	-11.3%	N
Mahindra	7.5%	1,612	165.4	161.8	163.5	-1.2%	0.7%	135.3	-18.0%	-16.4%	N
Tata	6.8%	1,188	135.1	133.8	138.8	3.0%	3.6%	115.2	-14.7%	-13.9%	N
Honda	5.4%	1,051	121.7	120.8	131.0	7.1%	7.8%	108.6	-10.7%	-10.1%	N
Toyota	4.4%	1,637	161.2	159.4	164.4	2.0%	3.0%	136.4	-15.3%	-14.4%	N
Ford	2.7%	1,244	126.7	126.3	142.0	10.8%	11.1%	117.8	-7.0%	-6.7%	N
Renault	2.3%	813	112.2	111.9	117.5	4.5%	4.7%	97.4	-13.2%	-13.0%	N
Volkswagen	1.5%	1,218	136.8	136.1	140.5	2.6%	3.2%	116.6	-14.8%	-14.4%	N
Nissan	1.1%	800	111.5	111.3	116.8	4.5%	4.6%	96.8	-13.3%	-13.1%	N
FCA	0.5%	1,522	159.4	156.2	157.9	-1.0%	1.0%	131.0	-17.8%	-16.1%	N
Mercedes	0.4%	1,743	176.6	173.1	170.4	-3.7%	-1.6%	141.5	-19.9%	-18.3%	N
BMW	0.3%	1,710	149.3	146.3	168.6	11.4%	13.2%	139.9	-6.3%	-4.4%	N
Force Motors	0.3%	—	—	—	—	—	—	—	—	—	Y
Jaguar Land Rover	0.1%	,1911	186.1	182.4	180.0	-3.4%	-1.3%	149.4	-19.7%	-18.1%	Y
Volvo	0.1%	1,704	142.8	139.3	168.2	15.5%	17.2%	139.6	-1.8%	0.2%	Y
Isuzu	0.0%	2,048	215.5	215.5	187.8	-14.8%	-14.8%	155.9	-27.6%	-27.6%	Y
Fleet total	**100.0%**	**1,078**	**122.6**	**121.9**	**132.5**	**7.6%**	**8.0%**	**109.9**	**-10.3%**	**-9.8%**	**—**

Maruti retains the position of top-selling manufacturer with a 50.6% market share and an average curb weight of 921 kg. As the compliance targets are based on curb weight, Maruti has to meet a more stringent target than the industry average target. In the table we used the fleet sales-weighted average weight of FY 2018–19 to calculate the 2022–23 targets. Maruti has the smallest gap to bridge and FCA and Mahindra have the largest gap to meet the compliance targets for FY 2022–23. Assuming that the fleet average curb weight remains the same as FY 2018–19, the industry fleet average CO_2 target in FY 2022–23 will be 109.9 g/km. Therefore, the new passenger car fleet will need to reduce CO_2 emissions/fuel consumption by only 9.8% in the next four years, or about 2.55% annually.

Table 1 also compares the margins with respect to the target for FY 2018–19 and the upcoming 2022–23 standard. Among the top 10 manufacturers, Maruti has the largest margin, and is followed by Ford and Honda. On the other end of the spectrum, Mahindra, Tata, Toyota, FCA, and Volkswagen are meeting their compliance targets with less than a 4% margin when flexibility mechanisms are taken into account. The lower the margin with the current target, the more these manufacturers will have to improve to meet FY 2022–23 standards; many will have to reduce fuel consumption by another 14%–20% including flexibility mechanisms. Our analysis also shows that Mercedes, a luxury segment manufacturer, is not meeting the compliance target without the flexibility mechanisms other than 6 speed.

India's FY 2022–23 standards are much less stringent than the EU 2021 standards. Figure 7 includes the EU standards and gives a pictorial representation of annual corporate performance of all Indian manufacturers as a function of average curb weight without flexibility mechanisms. CO_2 reducing technologies, electrification, and hybridization benefits are not included in this chart. As you can see, FCA, Mahindra, Mercedes, Jaguar Land Rover, and Isuzu are not complying with the targets before application of flexibility mechanisms.

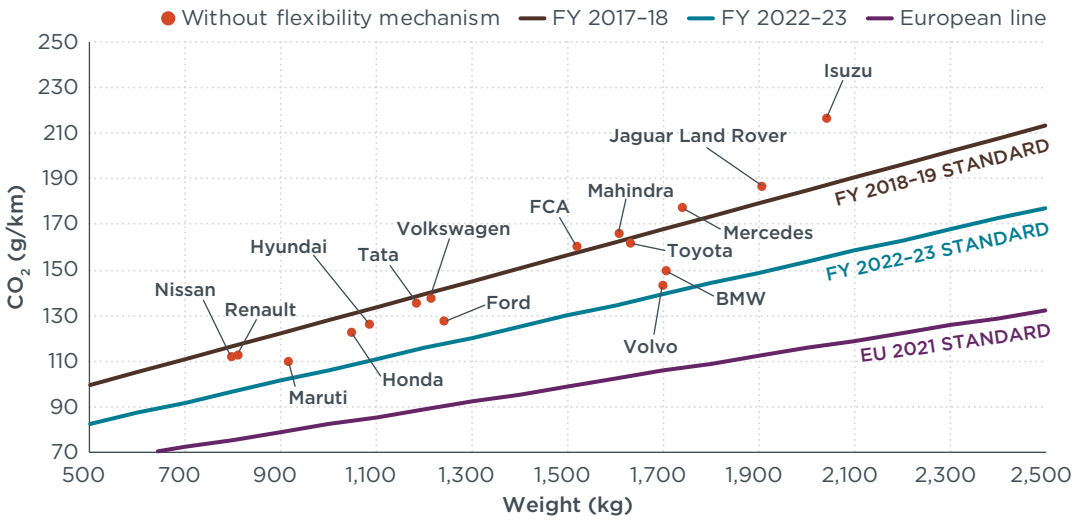

Figure 7. CO_2 performance of corporate groups in FY 2018–19 without flexibility mechanisms

Figure 8 gives the pictorial representation of annual corporate performance with flexibility mechanisms. This chart includes the benefit of 6-speed transmission as well as super credits from sales of electric vehicles and hybrid vehicles. For the purpose of calculating the corporate average CO_2 performance, a manufacturer uses a volume derogation factor of 3 for BEVs, 2.5 for PHEVs, and 2 for strong HEVs. This means that a BEV counts as three vehicles, a PHEV as 2.5 vehicles, and a strong HEV as two vehicles when calculating fleet average CO_2 emissions. The fuel consumption of the electricity driving portion for BEVs and PHEVs is converted from electricity consumption based on an equation provided in the regulations. This chart shows that manufacturers like Mahindra and FCA have clearly benefited from these flexibility mechanisms.

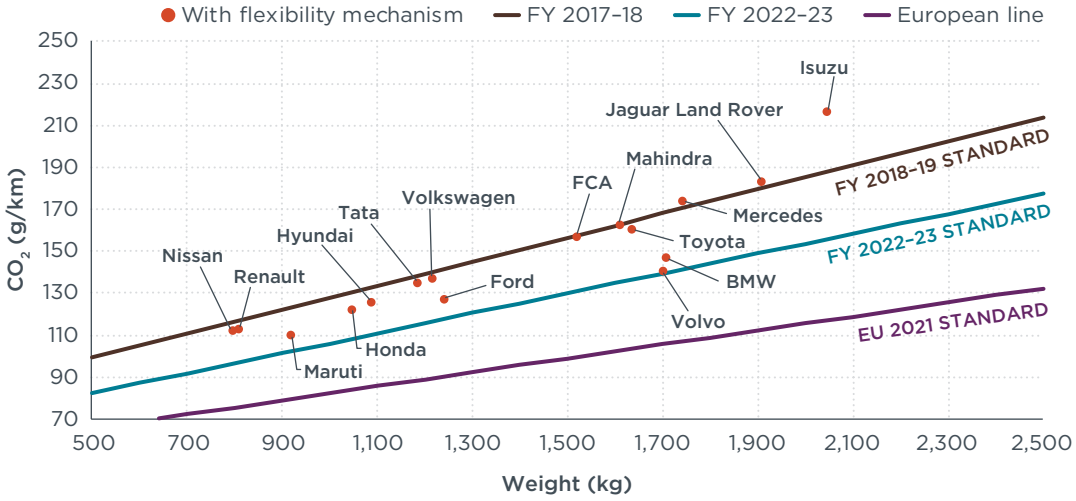

Figure 8. CO_2 performance of corporate groups in FY 2018–19 with flexibility mechanisms

Isuzu and Jaguar Land Rover do not meet compliance targets; however, they qualify as small manufacturers with total sales are fewer than 5,000 units per year. Force Motors is also a small car manufacturer, according to MoRTH's compliance report, but this analysis does not have sufficient data to evaluate fleet performance of Force Motors. Mercedes does not meet compliance targets, according to the analyses in this report, but MoRTH compliance data for Mercedes shows a much lower fleet average CO_2 emission level, which enables Mercedes to comply with the standards (see Table 5, below). The following section further explains the potential reasons for such differences. Mercedes is the only manufacturer that does not qualify as a small manufacturer and for which we found

significant differences in fleet average CO_2 performance when compared with MoRTH's report; therefore, we consider the evaluation of other manufacturers to be credible.

Table 2 lists the market share of vehicles equipped with 6-speed or more transmissions by corporate group. As you can see, corporate groups that sell luxury or high-end vehicles are 100% equipped with 6-speed or more transmissions, including FCA, Mercedes, and BMW. The trend for 6-speed transmission is increasing in mass-market passenger cars, too, largely because it is allowed as a CO_2-reducing technology under the compliance standard. The overall share of 6-speed transmissions increased from 15% in FY 2017–18 to 18.8% in FY 2018–19. FCA, Hyundai, Mahindra, Honda, Tata, and Renault all increased their share of 6-speed transmission vehicles over the previous year.

Table 2. Share of vehicles equipped with 6-speed or more transmissions

Manufacturer	FY 2018–19	FY2017–18
FCA	100.0%	91.0%
Mercedes	100.0%	—
BMW	100.0%	100.0%
Jaguar Land Rover	100.0%	—
Volvo	100.0%	100.0%
Toyota	48.8%	49.0%
Hyundai	37.1%	35.0%
Mahindra	30.9%	15.0%
Tata	28.9%	21.0%
Volkswagen	25.0%	37.0%
Honda	39.3%	31.0%
Ford	11.2%	13.0%
Renault	8.7%	5.0%
Nissan	8.2%	—
Maruti	0.0%	0.0%

Table 3 gives the electric and strong hybrid sales volume in comparison with total sales volume of the respective manufacturers.

Table 3. Share of electric and strong hybrids in total sales volume (Segment Y data)

Manufacturer	Electric/strong hybrid	Sales in FY 2018–19	Total sales volume in FY 2018–19	EV/hybrid %
Mahindra	EV	1,623	252,486	0.6%
Tata	EV	343	229,892	0.1%
Toyota	Strong hybrid	439	150,558	0.3%
Volvo	Strong hybrid	21	2,596	0.8%

Table 4 summarizes the impact of flexibility mechanisms in CO_2 g/km and the average CO_2 emissions level with and without the flexibility mechanisms. The super credit column gives the benefits achieved through the sale of electric and hybrid vehicles, and another column gives benefits achieved through 6-speed transmission, as the data for other CO_2-reducing technologies are not available. Domestic car manufacturers like Mahindra and Tata have gained super credits through the sale of electric vehicles. Toyota and Volvo sold strong hybrids, although, as related above, the sales were minimal in FY 2018–19. As you can see, Mahindra met its compliance target using super credits and FCA could meet its compliance target using 6-speed transmission benefits. The fleet average

benefit is 0.2 g/km with super credits and 0.5 g/km with CO_2-reducing technologies, and this makes the overall benefit of flexibility mechanisms 0.7 g/km.

Table 4. Effect of flexibility mechanisms on CO_2 emissions by corporate group in FY 2018–19

Corporate group	Target (g/km)	Avg CO_2 without flexibility mechanism (g/km)	Impact of flexibility mechanisms			With flexibility (g/km)	Small manufacturer
			Super credit (g/km)	Benefit due to 6-speed transmission (g/km)	Total (g/km)		
Maruti	123.6	109.1	0.0	-0.1	-0.1	109.0	N
Hyundai	133.3	125.6	0.0	-1.0	-1.0	124.6	N
Mahindra	163.0	165.4	-2.6	-1.0	-3.6	161.8	N
Tata	138.8	135.1	-0.4	-0.8	-1.3	133.8	N
Honda	131.0	121.7	0.0	-0.9	-0.9	120.8	N
Toyota	164.4	161.2	-0.1	-1.7	-1.9	159.4	N
Ford	142.0	126.7	0.0	-0.4	-0.4	126.3	N
Renault	117.5	112.2	0.0	-0.2	-0.2	111.9	N
Volkswagen	140.5	136.8	0.0	-0.7	-0.7	136.1	N
Nissan	116.8	111.5	0.0	-0.2	-0.2	111.3	N
FCA	157.9	159.4	0.0	-3.2	-3.2	156.2	N
Mercedes	170.4	176.6	0.0	-3.5	-3.5	173.1	N
BMW	168.6	149.3	0.0	-3.0	-3.0	146.3	N
Force	—	—	—	—	—	—	Y
Jaguar Land Rover	180.0	186.1	0.0	-3.7	-3.7	182.4	Y
Volvo	168.2	142.8	-0.7	-2.8	-3.5	139.3	Y
Isuzu	187.8	215.5	0.0	0.0	0.0	215.5	Y
Fleet average	**132.5**	**122.6**	**-0.2**	**-0.5**	**-0.7**	**121.9**	

Comparison with MoRTH

Table 5 compares MoRTH's report with our analysis of Segment Y data. It also shows, in terms of percentage, the difference between the target and performance values of the two analyses. For the top car manufacturers, there is not much difference between our estimates and MoRTH data, and these top manufacturers cover 99% of the market share. However, there is a difference between our estimates and MoRTH values for manufacturers like Mercedes and Jaguar because Segment Y data lacked information on technologies other than 6-speed transmission. This suggests that Jaguar and Mercedes are using more than one CO_2-reducing technology for compliance. Bigger differences are identified for Force and Isuzu, but these two manufacturers do not have big impact on our overall analysis due their minimal market share.

Table 5. Comparison between MoRTH and evaluation in this report

No.	Manufacturer / Importer	MoRTH			Evaluation in this report			Difference from MoRTH Target	Difference from MoRTH performance
		Market share	Target (g/km)	Performance (g/km)	Market share	Target (g/km)	Performance (g/km)		
1	**Maruti**	50.80%	124.3	108.7	50.60%	123.6	109.0	0.55%	-0.25%
2	**Hyundai**	16.20%	134.3	123.7	15.95%	133.3	124.6	0.74%	-0.76%
3	**Mahindra**	7.40%	162.1	156.4	7.53%	163.0	161.8	-0.54%	-3.46%
4	**Tata**	6.70%	138.9	135.4	6.75%	138.8	133.8	0.04%	1.19%
5	**Honda**	5.40%	131.1	120.4	5.38%	131.0	120.8	0.06%	-0.31%
6	**Toyota**	4.40%	164.2	156.7	4.40%	164.4	159.4	-0.12%	-1.72%
7	**Ford**	2.70%	142.7	127.5	2.72%	142.0	126.3	0.46%	0.93%
8	**Renault**	2.20%	117.9	112.7	2.33%	117.5	111.9	0.35%	0.69%
9	**Volkswagen**	1.70%	142.7	134.8	1.50%	140.5	136.1	1.52%	-0.97%
10	**Nissan Motor**	1.10%	120.4	116.1	1.07%	116.8	111.3	3.02%	4.10%
11	**FCA**	0.50%	158.9	155.9	0.47%	157.9	156.2	0.66%	-0.20%
12	**Mercedes**	0.40%	176.6	162.6	0.43%	170.4	173.1	3.5%	-6.4%
13	**BMW**	0.30%	170.5	142.3	0.33%	168.6	146.3	1.14%	-2.80%
14	**Jaguar Land Rover**	0.10%	180.8	169.9	0.12%	180.0	182.4	0.44%	-7.34%
15	**Force Motors**	—	240.7	240.7	—	—	—	—	—
16	**HMFCL**	—	223.7	223.7	—	—	—	—	—
17	**Isuzu**	—	212	212	0.03%	187.8	215.5	11.42%	-1.70%
18	**JT**	—	150.3	150.3	—	—	—	—	—
19	**Volvo**	—	242.9	242.9	—	—	—	—	—
	Total		**133**	**120.9**		**132.5**	**121.9**	**0.53%**	**-1.70%**

Figure 9 gives the comparison of MoRTH published CO_2 values of both FY 2017–18 and FY 2018–19 for the top 10 manufacturers. Except Renault and Nissan, all manufacturers have improved their performance with respect to the previous year. Maruti and Ford are close to meeting the FY 2022–23 standard, but Mahindra, Tata, and Volkswagen have a wider gap to bridge in the coming years.

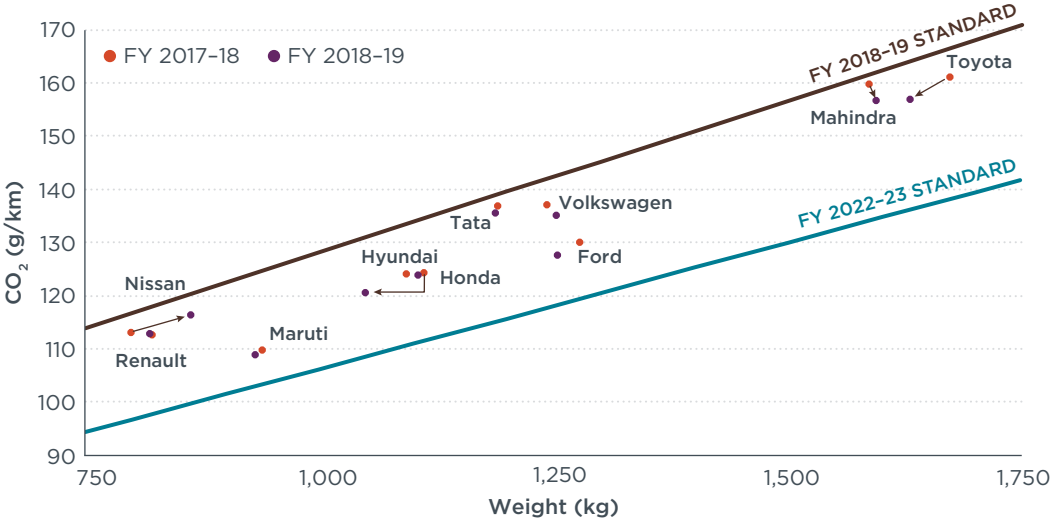

Figure 9. Fleet average CO_2 emissions of top 10 manufacturers FY 2017–18 versus 2018–19

Summary

FY 2018–19 was the first year for manufacturers to move toward FY 2022–23 fuel-consumption standards for new passenger vehicles in India. Based on our analysis of Segment Y data, the fleet average CO_2 emission for FY 2018–19 is 121.9 g/km. Assuming similar industry average weight going forward, the compliance target for FY 2022–23 will be 109.9 g/km. This means that to bridge the gap of 9.8% in the next 4 years, the industry needs to reduce fuel consumption by approximately 2.55% each year.

Based on the significant progress that manufacturers have already made toward compliance with FY 2022–23 standards, MoRTH should start to develop significantly more stringent post-FY 2022–23 CO_2 emissions standards. With BS VI in effect since April 1, 2020, it will be important to track and analyze the fleet compliance in the future years. This should help in deciding the stringency of post-FY 2022–23 standards.

As for the impact of flexibility mechanisms, corporate groups that sell luxury or high-end vehicles, including BMW, Volvo, Mercedes, and FCA, still benefit more from credits for 6-speed or more transmissions, as 100% of their fleets are equipped with the technology. Because 18.8% of the FY 2018–19 passenger cars sold in India were equipped with 6-speed or more transmissions, regulators should consider not granting CO_2 credits for this technology any longer, as the provision is intended to promote innovation and new technology adoption. In addition, TPMS, although not evaluated in this briefing, is already mandated for safety on vehicles in several big markets and thus is a relatively standard feature that could also be excluded from future credits.

Moreover, the impact of super credits is minimal for the 2018–19 fleet, but its impact could grow rapidly as the market share of BEVs, PHEVs, and strong hybrids goes up. Based on the analysis of Mahindra, sales of electric vehicles will help manufacturers meet their compliance targets, especially when decreasing diesel sales will make it more difficult to reduce emissions from internal combustion powered engines. As the impact of the CO_2-reducing technologies grows, MoRTH should publish compliance information about them, to make more transparent the impact of each individual technology on the overall fleet compliance. This could also help in analyzing whether a particular technology has reached wide penetration in the market and could be removed from the benefit list.

Appendix

Manufacturers	Referred name
BMW India Pvt. Ltd	BMW
FCA India Automobiles Private Limited	FCA
Force Motors Limited	Force Motors
Ford India Pvt. Ltd	Ford
General Motors India & CSIPL	General Motors
Hindustan Motor Finance Corporation Limited	HMFCL
Honda Cars India Limited	Honda
Hyundai Motor India Limited	Hyundai
Isuzu Motors India Pvt. Ltd.	Isuzu
Jaguar Land Rover	Jaguar Land Rover
Corporate Group - Mahindra & Mahindra Limited (Mahindra & Mahindra Ltd & Mahindra Electric Mobility Limited)	Mahindra
Maruti Suzuki India Limited	Maruti
Mercedes-Benz India Pvt Ltd	Mercedes
Nissan Motor India Private Limited	Nissan
Renault India Private Limited	Renault
Tata Motors Limited	Tata
Toyota Kirloskar Motor Pvt. Ltd	Toyota
Corporate Group - Volkswagen Group (Volkswagen , Audi, Skoda & Porsche) (Volkswagen India Private Limited (VWIPL), Skoda Auto India Private Limited (SAIPL), Volkswagen Group Sales India Private Limited (VWGSIPL), (Volkswagen AG, Germany is the parent company for VWIPL/VWGSIPL & SAIPL))	Volkswagen
Volvo Auto India Pvt. Ltd.	Volvo
JT Special Vehicles Private Limited	JT