

## New two-wheeler vehicle fleet in India for fiscal year 2017–18

**Authors:** Sunitha Anup and Zifei Yang

**Keywords:** Two-wheelers, fleet characteristics, fuel consumption, fuel efficiency

### Introduction

Two-wheelers are the largest segment of the automobile industry in India and consume more gasoline than all other forms of on-road transport combined. According to data from the Society of Indian Automobile Manufacturers (SIAM), annual two-wheeler sales surpassed 20 million in both fiscal year (FY) 2017–18 and FY 2018–19.<sup>1</sup> Comparatively, passenger vehicle sales were around 3.4 million in FY 2018–19.<sup>2</sup> Passenger vehicles are also required to meet fuel efficiency standards, and thus the two-wheeler segment, where fuel efficiency standards do not currently apply, is becoming an increasingly significant portion of the nation's transportation fuel consumption.<sup>3</sup>

Specifically, the two-wheeler segment in India was responsible for more than 61% of the total transportation gasoline consumption in 2014, according to the Ministry of Petroleum and Natural Gas.<sup>4</sup> The ICCT's India Emissions Model produces a similar estimation that shows two-wheelers were approximately 60% of annual vehicle gasoline consumption from 2016 to 2019.<sup>5</sup> Information about the market for new two-wheelers is needed if India is to craft effective fuel economy regulations, and this paper offers an in-depth analysis of that market. We developed a database of new two-wheelers sold in India for FY 2017–18 and then analyzed fleet characteristics and fuel consumption; we also compared the vehicle characteristics of major two-wheeler classes and manufacturers. The results are a baseline of the fuel consumption of the new two-wheeler fleet in India and could inform future policies that seek to reduce carbon emissions from the fleet.

The rest of this paper is organized as follows. The next section describes the data from FY 2017–18 used, and that is followed by a summary of the characteristics of the

1 The fiscal year for Government of India runs from April 1 to March 31.

2 Society of Indian Automobile Manufacturers, "Automobile Domestic Sales Trends," (2018), <http://www.siamindia.com/statistics.aspx?mpgid=8&pgidtrail=14>

3 Government of India, Ministry of Power, "The 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>

4 Government of India, Ministry of Petroleum & Natural Gas, "Petrol consumption of transport sector," (2014), <https://pib.gov.in/newsite/printrelease.aspx?relid=102799>

5 Gaurav Bansal, Anup Bandivadekar, *Overview of India's vehicle emissions control program: Past successes and future prospects*, (ICCT: Washington, DC, 2013), <https://theicct.org/publications/indias-vehicle-emissions-control-program>

[www.theicct.org](http://www.theicct.org)

[communications@theicct.org](mailto:communications@theicct.org)

[twitter @theicct](https://twitter.com/theicct)

two-wheeler fleet. After that, we present by-class and by-manufacturer analysis, and then summarize the fuel consumption of the fleet. Subsequently, we focus on electric two-wheelers in the Indian market, and the final section is a summary of key findings.

## Data

Two-wheeler vehicles are defined as two-wheeled motor vehicles with a maximum speed of at least 25 kilometers per hour (km/h) and an engine capacity exceeding 25 cubic centimeters (cc), if fitted with a thermic engine, or motor power exceeding 0.25 kilowatts (kW), if fitted with an electric motor.<sup>6</sup> The seating capacity is limited to two people, although a sidecar with a seating capacity of one person may be attached to a two-wheeler.

Two-wheelers are categorized either as L1 or L2. L1 two-wheelers have a maximum speed not exceeding 45 km/h and engine capacity not exceeding 50 cc, if fitted with a thermic engine, or motor power not exceeding 0.5 kW, if fitted with an electric motor. Any two-wheeler that does not fit in the L1 category belongs to the L2 category. The data we collected for FY 2017-18 indicates that all the models sold fall under the category of L2 and therefore this paper discusses only L2 two-wheelers.

Additionally, this study adopts the classifications in the Automotive Industry Standard, Draft AIS-017 Part 5, which are based on engine size and maximum speed.<sup>7</sup> Table 1 describes the various classes.

**Table 1.** Classification of the two-wheeler fleet

Class	Subclass	Engine displacement (cc)	Maximum speed (km/h)
Class 1		50 – 150	≤ 50
		< 150	50 – 100
Class 2	Class 2-1	< 150	100 ≤ max speed < 115
		≥ 150	< 115
	Class 2-2		115 ≤ max speed < 130
Class 3	Class 3-1		130 ≤ max speed < 140
	Class 3-2		≥ 140

This paper analyzes the following two-wheeler characteristics: engine displacement, engine power, curb weight, transmission, fuel type, fuel consumption under the World Motorcycle Test Cycle, and carbon dioxide (CO<sub>2</sub>) emissions.<sup>8</sup> These are the primary features of and technical specifications for two-wheeler engines and transmissions.

The two-wheeler vehicle database we compiled contains data from a variety of sources, including:

- » Segment Y's India two-wheeler database for FY 2017-18
- » SIAM's two-wheeler fuel efficiency declaration for FY 2017-18 and FY 2018-19
- » Public websites bikedekho.com, bikewale.com, and team.bbp
- » Showroom information

<sup>6</sup> Government of India, Ministry of Road Transport and Highways, "Automotive industry standard: Criteria for vehicle types, variants and versions," (2015), [https://morth.gov.in/sites/default/files/ASI/810201552915PMAIS-017\\_Part\\_5\\_Rev\\_1\\_D1\\_Aug\\_15.pdf](https://morth.gov.in/sites/default/files/ASI/810201552915PMAIS-017_Part_5_Rev_1_D1_Aug_15.pdf)

<sup>7</sup> *ibid.*

<sup>8</sup> The emission factor is aligned with the factors used in passenger vehicle fuel efficiency standards, CO<sub>2</sub> emissions (g/km) = Fuel consumption(l/100 km) ÷ emission factor 0.04217.

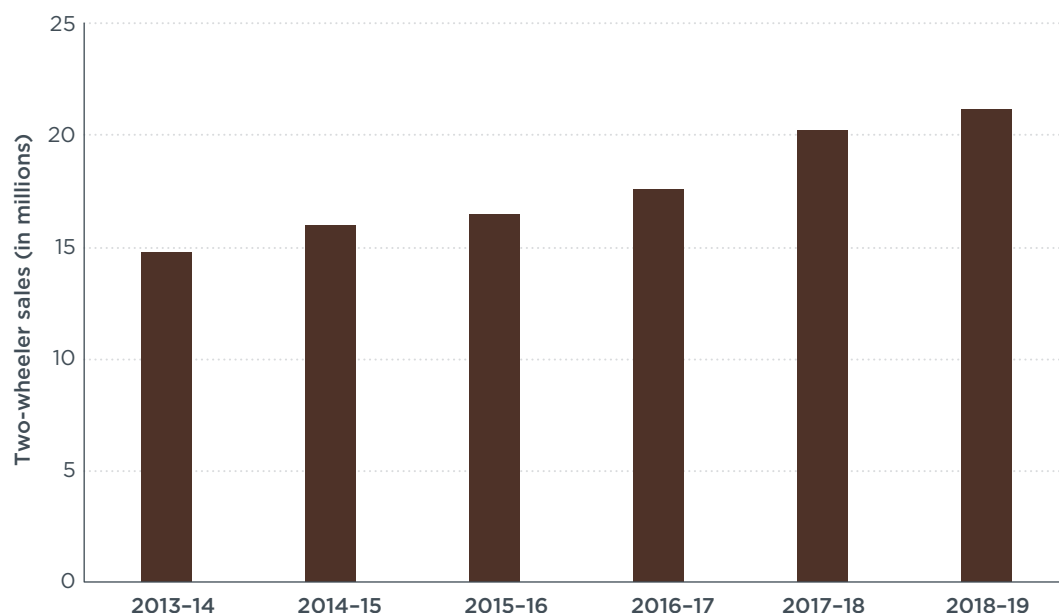
Table 2 summarizes the data availability, broken down by vehicle class. As shown, all key parameters, except fuel consumption, are 100% available. Fuel consumption information is available for more than 99% of the fleet, and this can sufficiently represent fleet performance. The missing data is because the FY 2017-18 SIAM declaration of fuel economy was not available for some of the models in the Segment Y database. To address this issue for these models, we obtained the fuel consumption information about the 12 top-selling models from other sources, including the FY 2018-19 SIAM fuel economy declaration, showroom information, and public websites. Where there were disparities in the fuel economy values from those sources, values from the FY 2018-19 SIAM declaration and respective showrooms were prioritized.

**Table 2.** Data availability of key parameters by class

Parameters	Fleet	Class 1	Class 2	Class 3
Engine displacement (cc)	100%	100%	100%	100%
Curb weight (kilogram [kg])	100%	100%	100%	100%
Engine power (kW)	100%	100%	100%	100%
Fuel type	100%	100%	100%	100%
Transmission type	100%	100%	100%	100%
Gear count	100%	100%	100%	100%
Fuel consumption (liters [l]/100 km)	99.2%	99.7%	98.2%	73.0%

## Two-wheeler sales market overview

The recent growth of the two-wheeler market in India is illustrated in Figure 1. From FY 2013-14 to FY 2018-19, the annual sales of two-wheelers increased by around 40%. This and the predominance of two-wheeler segment in the overall transportation sales in India has led to attention on the fuel consumption of the segment in the Auto Fuel Vision and Policy 2025, which has been submitted to the Ministry of Petroleum and Natural Gas.<sup>9</sup>

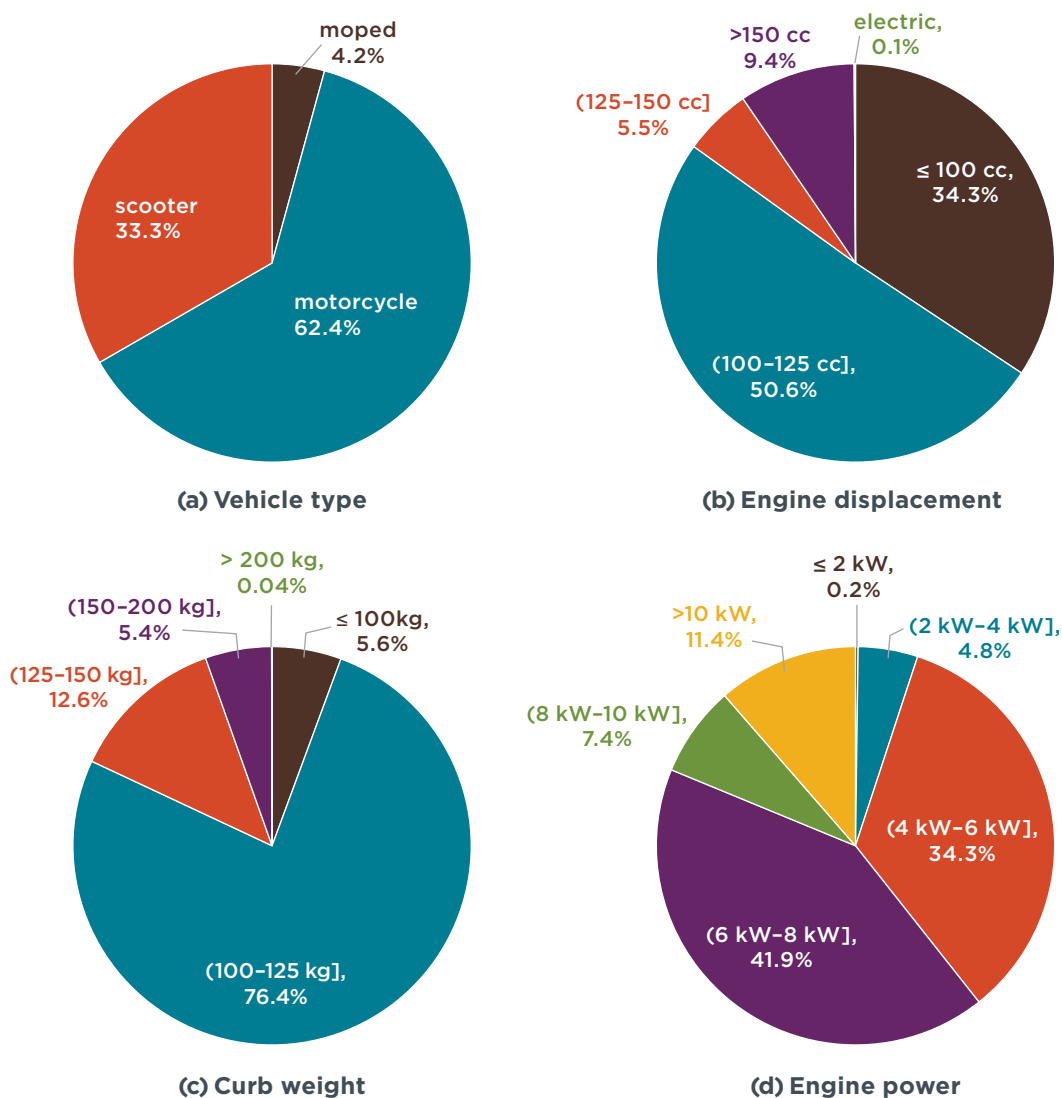


**Figure 1.** Annual two-wheeler sales in India. *Source:* SIAM statistics

<sup>9</sup> Government of India, Ministry of Petroleum and Natural Gas, "Auto Fuel Vision and Policy 2025," (2014), <http://petroleum.nic.in/sites/default/files/autopol.pdf>

In India, two-wheelers are differentiated by their frames, which are step through, scooter, and step over. In this study, the terminologies for these frames are moped, scooter, and motorcycle, respectively. We found that all two-wheelers that burn fossil fuel are gasoline vehicles. There are several electric scooter models, but electric scooters were just 0.1% of the market in FY 2017-18.

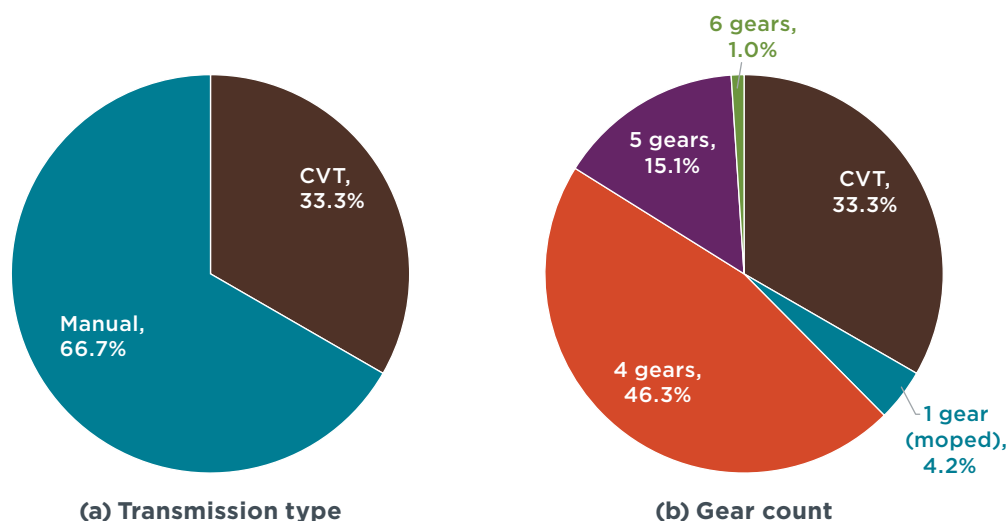
As shown in Figure 2a, motorcycles were approximately 62% of two-wheeler sales in FY 2017-18. The next largest segment was scooters with 33%, and mopeds were less than 5% of sales. Additionally, as illustrated in Figures 2b-d, 85% of the two-wheelers sold have engines smaller than 125cc; slightly more than 50% have engine displacement between 100 cc and 125 cc; and 34% have engine displacement of less than 100 cc. More than 76% of the two-wheelers sold in FY 2017-18 are lighter than 125 kg and around 13% weigh between 125 kg and 150 kg. There is more diversity in maximum engine power, with engines in the range of more than 6 kW of power up to and including 8 kW accounting for 42% of the market, followed by 4 kW < engine power ≤ 6 kW with 34%, and greater than 10 kW with 11%.



**Figure 2.** Representation of key parameters of the two-wheeler fleet

With respect to transmission technologies, Figure 3 shows that two-thirds of two-wheelers sold in FY 2017-18 are equipped with a manual transmission and the rest are equipped with continuous variable transmission (CVT). More of the two-wheelers sold had 4 gears than any other number; 46% had 4 gears, and that was followed by 5 gears

with 15%. A small percentage, about 4%, of two-wheelers sold have a single gear, and they were all mopeds.



**Figure 3.** Transmission technologies of the two-wheeler fleet

### Top-selling models

Two-wheeler sales in FY 2017-18 were fairly concentrated. The top 10 best-selling two-wheeler models accounted for 54.7% of the market. Table 3 details the key parameters of the top-selling models, all of which are Class 1, except for the model Classic 350 from Royal Enfield. Hero MotoCorp had four motorcycle models among the top 10, including the top two. The Activa 4G 110 from Honda was the best-selling scooter and the XL100 from TVS was the best-selling moped.

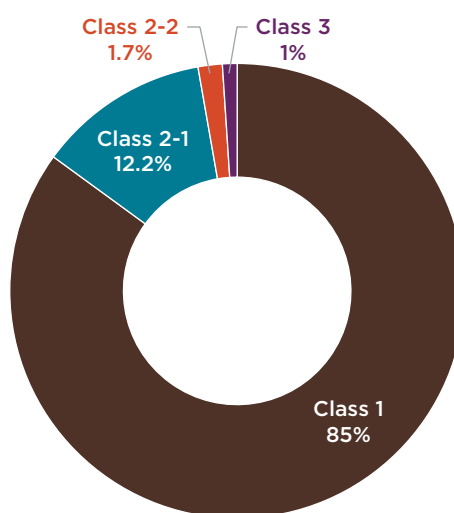
**Table 3.** Key parameters of 10 top-selling two-wheeler models

Rank	Original equipment manufacturer (OEM)	Model	Market share (%)	Class	Type	Engine size (cc)	Weight (kg)	Power (kW)	Max speed (km/hr)	Transmission type, gear count	FC (l/100 km)	CO <sub>2</sub> (g/km)
1	Hero MotoCorp	Splendor +	9.8	1	Motorcycle	97.2	113	6.2	87	Manual, 4	1.48	35.29
2	Hero MotoCorp	HF Deluxe	9.3	1	Motorcycle	97.2	109	6.2	87	Manual, 4	1.48	35.29
3	Honda	Activa 4G 110	8.3	1	Scooter	109.2	108	5.9	82	CVT	1.90	45.17
4	Honda	Activa i110	4.5	1	Scooter	109.2	103	5.9	83	CVT	1.79	42.65
5	Honda	CB Shine	4.4	1	Motorcycle	124.7	123	7.6	93	Manual, 4	1.55	36.71
6	Hero MotoCorp	Glamour	4.0	1	Motorcycle	124.7	127	8.5	94	Manual, 4	1.69	40.26
7	TVS	Jupiter	4.0	1	Scooter	109.7	108	5.9	85	CVT	1.84	43.59
8	TVS	XL 100	4.0	1	Moped	99.7	80	3.2	60	Manual, 1	1.66	39.39
9	Hero MotoCorp	Passion Pro i3s	3.7	1	Motorcycle	97.2	115	6.2	87	Manual, 4	1.54	36.48
10	Royal Enfield	Classic 350	2.7	2	Motorcycle	346	192	14.8	110	Manual, 5	2.45	58.12

### Breakdowns by class

Sales of new two-wheelers in FY 2017-18 are broken down by class in Figure 4. As shown, the market is dominated by Class 1 two-wheelers (85%) with engine size below 150 cc and maximum speed below 100 km/h. Sub-class 2-1 and sub-class 2-2 accounted for 12% and 1.7% of total sales, respectively, and Sub-class 3-1 and sub-class 3-2 together accounted for 1% of sales.

Table 4 provides a snapshot of FY 2017-18 sales by specifying the sales weighted average of the key vehicle parameters by class and the maximum and minimum values for each parameter. The key parameters vary. Class 1 models are, on average, lighter and less powerful than class 2 and 3 models. The heaviest model is in class 3—the Harley-Davidson CVO limited, which weighs 431 kg. The highest power output models of class 2 and class 3 and are from countries other than India; these are the Indian Chief Dark Horse from the United States and the Ducati 1299/1299 S Panigale from Thailand, respectively. Class 1 models consume less fuel on average than class 2 and 3 models mainly because Class 1 models have smaller engine and lower weight. Within each two-wheeler class, the spread of fuel consumption will be further illustrated in the analysis below, and it indicates there are opportunities to introduce advanced efficiency technologies to reduce the fuel consumption of each class of two-wheelers. Introducing advanced efficient technology into the two-wheeler market would help to reduce the average fuel consumption.



**Figure 4.** Sales shares of Indian two-wheelers by class, FY 2017-18

**Table 4.** Value range and sales weighted average for the key parameters of two-wheelers by class

Parameters		Fleet	Class 1	Class 2	Class 3
<b>Market share</b>		100%	85.0%	13.9%	1.0%
<b>Engine size (cc)</b>	Min	69.9	69.9	124	149.5
	Max	2,294	125	1,811	2,294
	<b>Avg</b>	123.5	106.7	215.2	276
<b>Curb weight (kg)</b>	Min	55	55	114	143
	Max	431	150	421	431
	<b>Avg</b>	116.1	109.2	155.0	160.6
<b>Engine power (kW)</b>	Min	0.18	0.18	7.1	12.5
	Max	154	8.7	74.7	154
	<b>Avg</b>	7.1	6.1	12.2	19.6
<b>Fuel consumption (l/100 km)</b>	Min	1.25	1.25	1.64	2.39
	Max	5.43	2.06	3.33	5.43
	<b>Avg</b>	1.74	1.66	2.18	2.61
<b>CO<sub>2</sub> emissions (g/km)</b>	Min	29.64	29.64	38.87	56.73
	Max	128.87	48.89	79.04	128.87
	<b>Avg</b>	41.19	39.31	51.68	61.97

Figure 5 further illustrates the vehicle characteristics of two-wheelers sold in FY 2017-18 by class. Most of the class 1 models sold were in the range of more than 100 cc and ≤ 125 cc in engine size. Class 2 engines were larger than class 1 models, and class 3 had the biggest engines of the two-wheelers sold; recall that the categorization of class 3 is only defined by the vehicle's maximum speed. With respect to curb weight, the vast majority of class 1 models sold weigh in the range of more than 100 kg and ≤ 125 kg, and class 3 models weighing in the range of more than 150 kg and ≤ 200 kg were the most popular. When comparing engine power, we see that the distribution across class 1 models is

similar to the overall fleet distribution, whereas all the class 2 and class 3 models have a maximum power that is more than 7 kW.

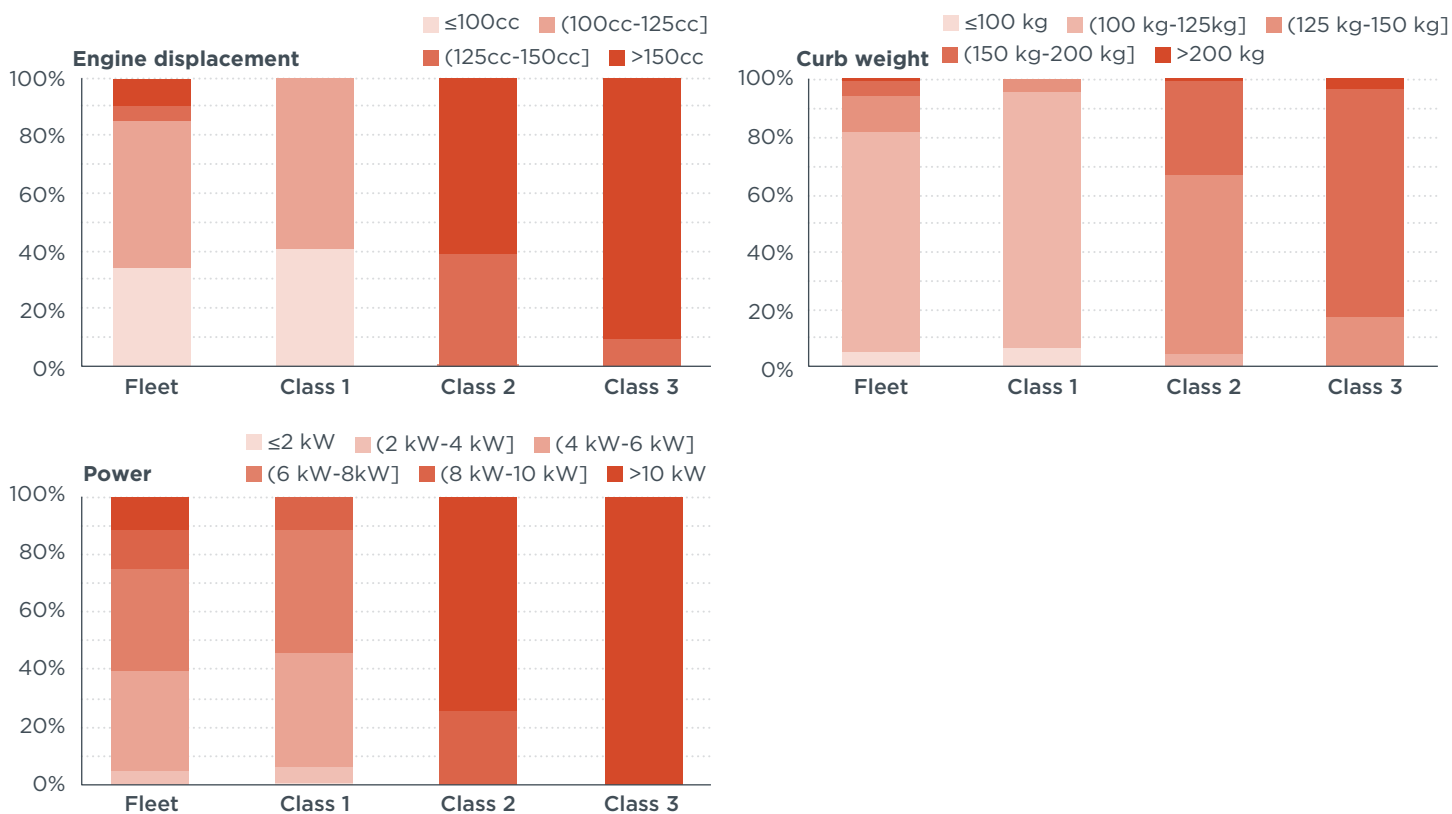


Figure 5. Key parameters of two-wheelers by class

Figure 6 compares the transmission types and gears of the two-wheelers sold in FY 2017-18. Most vehicles with CVT are class 1, and the vast majority of class 1 models that have manual transmission have 4 gears. Two-wheelers with 5- or 6-gear transmissions are present only in classes 2 and 3.

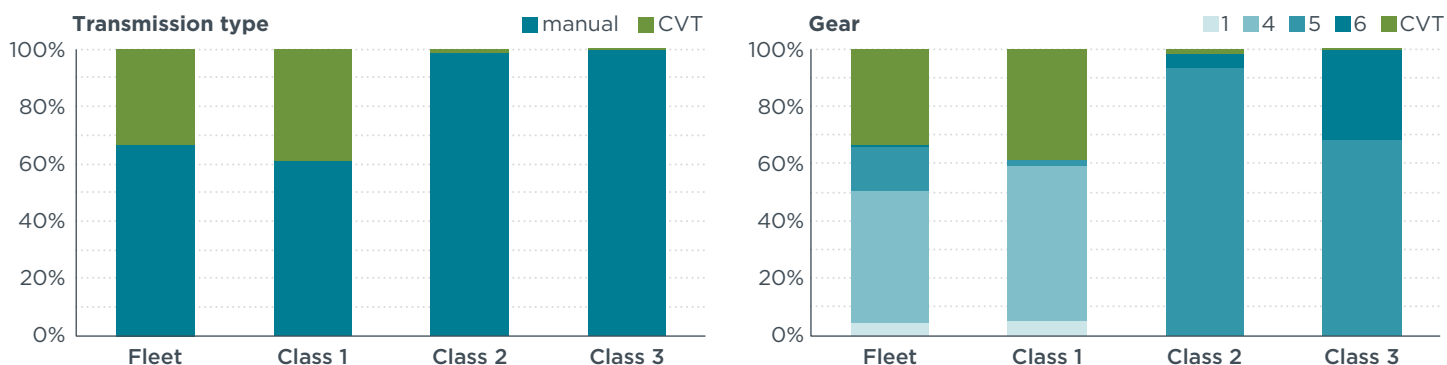
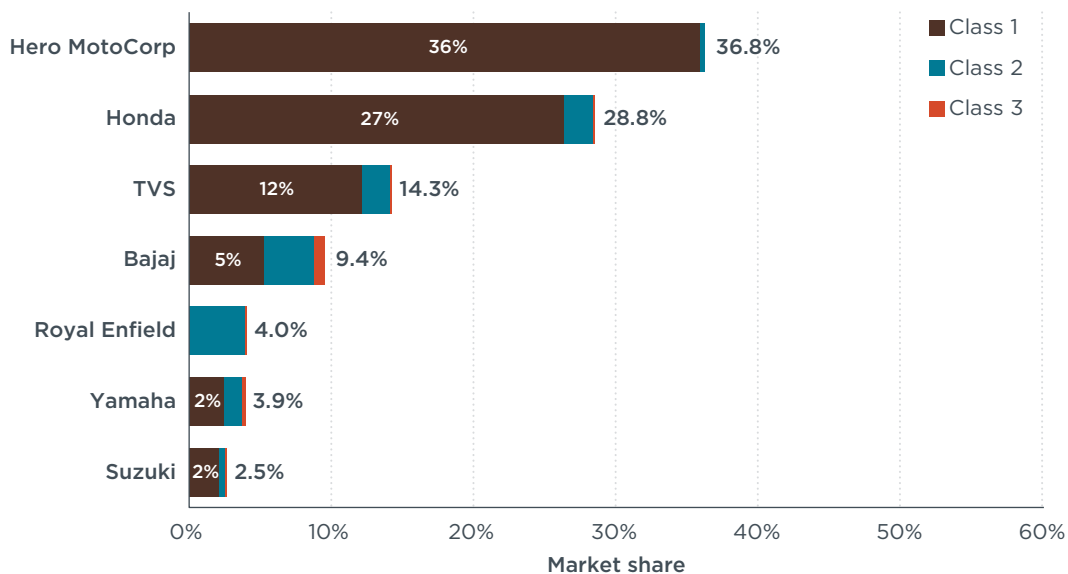


Figure 6. Transmission of two-wheelers by class

## Breakdowns by manufacturer

In this section, we look at the two-wheeler characteristics discussed above by manufacturer. The seven manufacturers in Figure 7 represent 99.7% of the new two-wheeler sales in FY 2017-18.



**Figure 7.** Market share percentage of two-wheelers by manufacturers for FY 2017-18

The fleet sales-weighted averages of all specifications for major manufacturers are shown in Table 5. Overall, Hero MotoCorp two-wheelers have the smallest engines and lowest fuel consumption. TVS has the lightest two-wheeler fleet.

**Table 5.** FY 2017-18 sales-weighted averages of two-wheeler specifications by manufacturer

Parameters	Fleet	Hero MotoCorp	Honda	TVS	Bajaj	Royal Enfield	Yamaha	Suzuki
Market share	—	36.8%	28.8%	14.3%	9.4%	4.0%	3.9%	2.5%
Engine size (cc)	123.5	102.7	115.9	113.5	134.1	353.6	131.8	128.6
Curb weight (kg)	116.1	113.6	111.9	103.4	126.9	190.9	116.4	106.7
Engine power (kW)	7.1	6.4	6.5	5.9	8.8	15.0	7.4	7.1
Fuel consumption (l/100km)	1.74	1.58	1.78	1.79	1.67	2.47	1.99	1.78
CO <sub>2</sub> (g/km)	41.19	37.42	42.37	42.48	39.71	58.54	47.07	42.37
Top selling model	—	Splendor+	Activa 4G 110	Jupiter	Platina 100 ComforTec	Classic 350	Fascino	Access

Figure 8 shows the type of two-wheelers offered by manufacturer. TVS is the only manufacturer that sells mopeds, and Bajaj and Royal Enfield sell only motorcycles. The figure also compares the fleet profile of each top manufacturer in terms of engine size, curb weight, and maximum power output. In Figure 9, we compare by transmission type and gear count. For each of these, manufacturers are arranged from left to right by market share from high to low. Hero MotoCorp and TVS offer more models with smaller engines equal to or below 100 cc, and Hero MotoCorp's models are heavier and more powerful than those sold by TVS. Royal Enfield sells heavier models that have large engines and more than 10 kW of power. Other manufacturers mainly offer models in the range of greater than 100 cc and  $\leq$  125 cc with diverse engine power. Regarding transmission, Suzuki sells the largest number of CVT models, and Bajaj and Royal Enfield have no CVT models. Overall, most manufacturers produce manual transmission two-wheelers with 4 gears, but Royal Enfield and Bajaj have a higher market share of 5-gear vehicles.



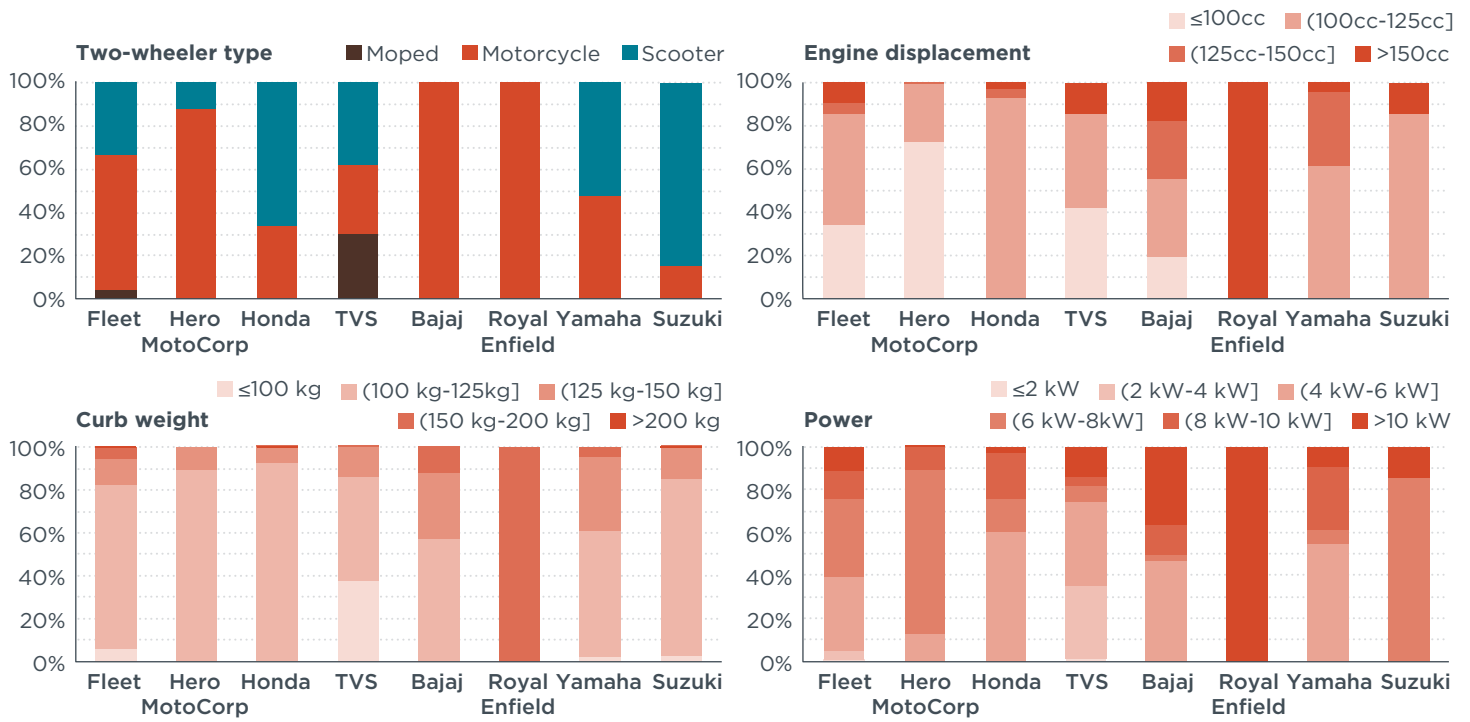


Figure 8. Key parameters of FY 2017-18 two-wheeler sales by manufacturer

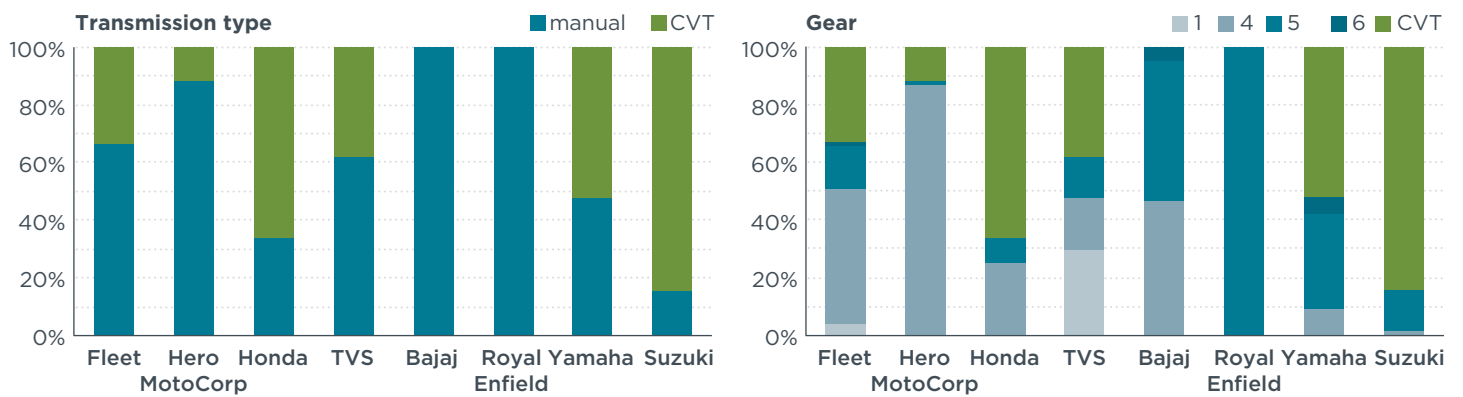
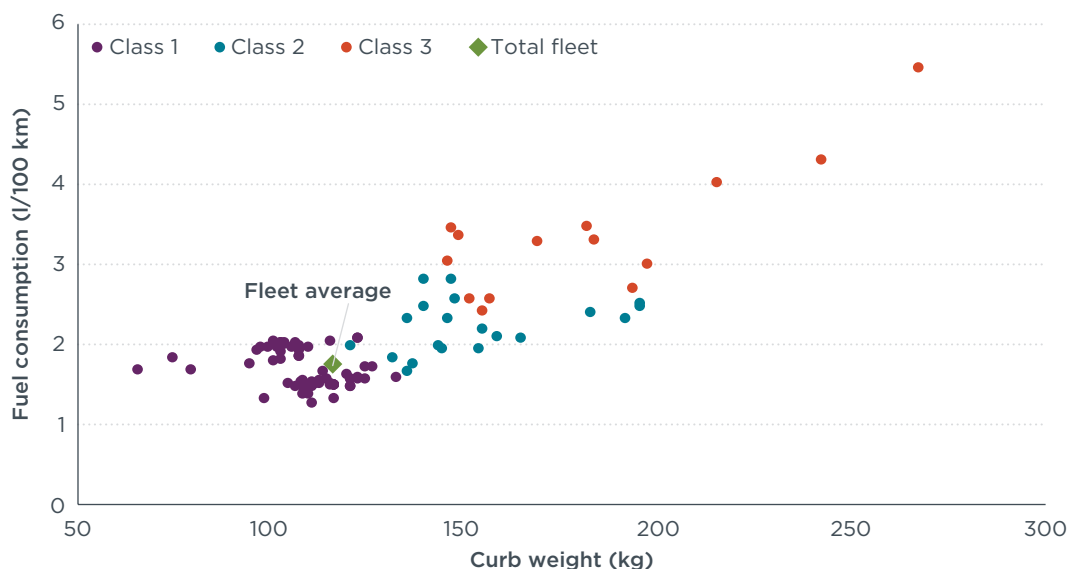


Figure 9. Transmissions and gears of FY 2017-18 two-wheeler sales by manufacturer

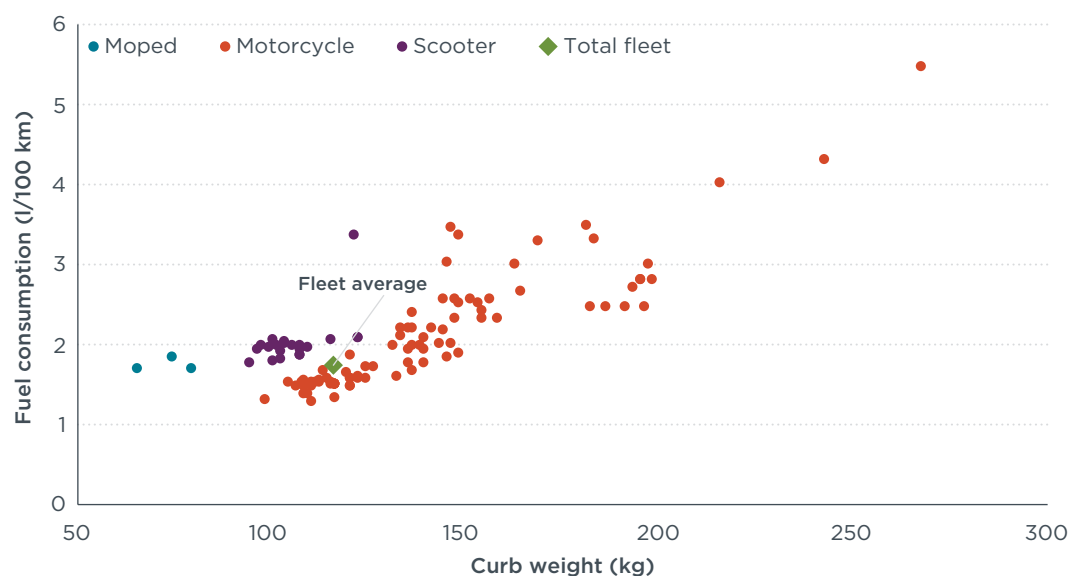
## Fuel consumption

This section analyses the fleet features and fuel consumption of two-wheelers sold in FY 2017-18 by class and by manufacturer. Figure 10 shows the fuel consumption by class, plotted as a function of curb weight. Class 1 models have lower curb weight than class 2, and class 2 models, which have comparatively lower fuel consumption, have curb weight less than 150 kg. Class 3 models have higher fuel consumption.

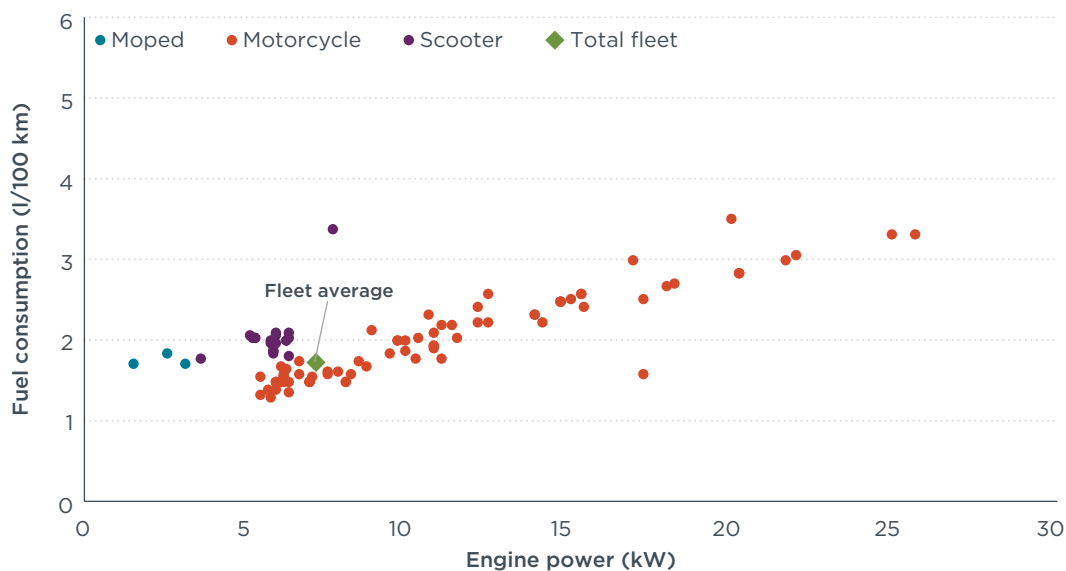


**Figure 10.** Average fuel consumption of new two-wheelers sold in FY 2017-18 as a function of curb weight. Each dot represents a two-wheeler model.

A comparison of the fuel consumption of the three types of two-wheelers is shown in Figure 11 as a function of weight and in Figure 12 as a function of power. Mopeds are the lightest and least powerful models, but they do not have the lowest fuel consumption. For models with similar weight and engine power, scooters usually have higher fuel consumption than motorcycles. The fuel consumption of motorcycles also varies widely for models with similar weight and power. This is likely caused by engine and transmission technology differences between scooters and motorcycles or among the various motorcycle models; it implies there is the potential for technology improvement in the two-wheelers that have higher fuel consumption values compared with their counterparts.

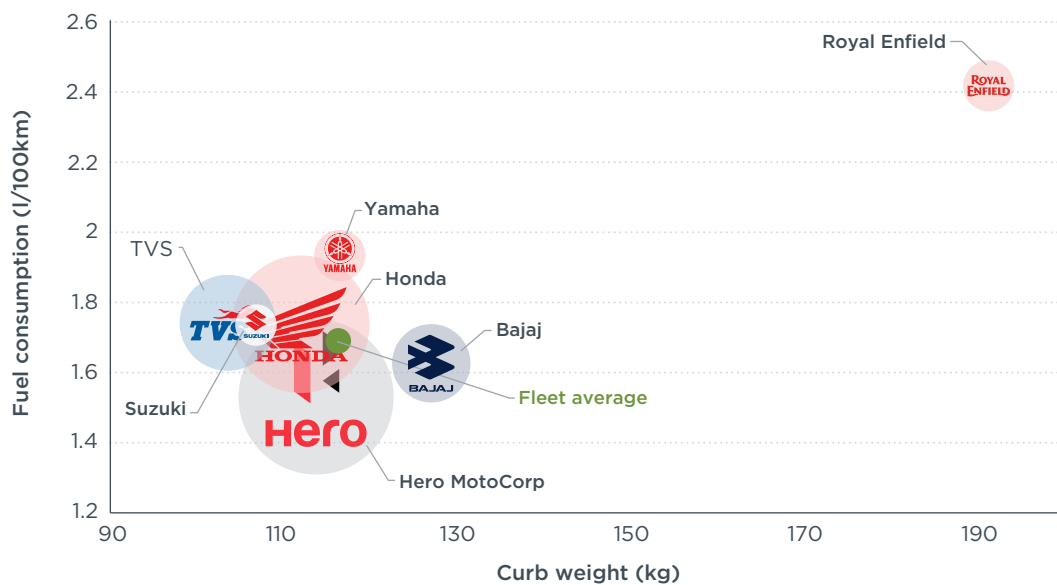


**Figure 11.** Average fuel consumption as a function of curb weight of different two-wheeler types sold in FY 2017-18



**Figure 12.** Average fuel consumption as a function of engine power of different two-wheeler types sold in FY 2017-18

The fuel consumption of the major manufacturers is compared in Figure 13. Royal Enfield has the heaviest and highest fuel consumption fleet, and Hero MotoCorp and Bajaj are the only two manufacturers that have fleet average fuel consumption less than the overall fleet average for FY 2017-18. Even though Hero MotoCorp has a heavier fleet than Honda, its fleet average consumption is lower than Honda's. Here, too, this suggests there is room for technology improvements to reduce fuel consumption.



**Figure 13.** Average fuel consumption as a function of curb weight of major two-wheeler manufacturers for models sold in FY 2017-18

## Electric two-wheelers

Electric two-wheelers are incentivized through the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme in India.<sup>10</sup> Many states also have policies that promote electric two-wheelers.<sup>11</sup> Phase-I of the FAME scheme (FAME-I) was in effect from FY 2015-16 until the end of FY 2018-19; it initially provided subsidies to all types of electric two-wheelers, including low-speed models that did not require registration and those based on both lead-acid and advanced battery chemistries.<sup>12</sup> This resulted in the rapid deployment of low-speed electric two-wheelers that use lead-acid chemistries, which are cheaper than advanced batteries.<sup>13</sup> FAME-I was amended in September 2018 to only provide subsidies to vehicles that meet the performance criteria for vehicle registration and utilize advanced battery chemistries such as lithium ion.<sup>14</sup> The latter is because the electrochemical potential of a lithium battery means large energy density for its weight and lithium-ion cells cause less harm when people are exposed. FAME-II came into effect at the beginning of FY 2019-20 and set even more stringent criteria for electric two-wheelers to qualify for subsidies.<sup>15</sup> For example, among other technical criteria, the vehicles need to get 80 km per charge and have a top speed of at least 40 km/h. Manufacturers are also required to meet certain criteria for local sourcing of parts and components to qualify.

Table 6 lists the OEMs that entered the electric two-wheeler market in FY 2017-18. All models are scooters. Most of the models weigh less than 100 kg and the heaviest model, the Okinawa Praise, weighs 150 kg. Although most of the electric scooter models have a driving range of no more than 80 km, there are two models that have a driving range of more than 100 km. The maximum speed of most electric models is in the range of 25-40 km/h. One Okinawa model can reach maximum speed of 75 km/h.

---

10 Government of India, Ministry of Heavy Industries & Public Enterprises, "Fame India Scheme," (2016), <https://pib.gov.in/newsite/mbereel.aspx?relid=154119>

11 TransportPolicy.net, "State level EV policies in India," <https://www.transportpolicy.net/standard/india-state-level-ev-policies/>

12 Press Trust of India, "FAME-India scheme launched to offer sops on hybrid, e-vehicles", *The Economic Times*, April 08, 2015, <https://economictimes.indiatimes.com/fame-india-scheme-launched-to-offer-sops-on-hybrid-e-vehicles/articleshow/46853934.cms?from=mdr>

13 Shikha Rokadiya, Anup Bandivadekar, *Hybrid and electric vehicles in India current scenario and market incentives*, (ICCT: Washington, DC, 2016), [https://theicct.org/sites/default/files/publications/India-hybrid-and-EV-incentives\\_working-paper\\_ICCT\\_27122016.pdf](https://theicct.org/sites/default/files/publications/India-hybrid-and-EV-incentives_working-paper_ICCT_27122016.pdf)

14 Government of India, Ministry of Heavy Industries & Public Enterprises, "Publication of notification in Gazette of India (Extraordinary) regarding Phase-II of FAME India Scheme," (2019), <https://dhi.nic.in/writereaddata/UploadFile/publicationNotificationFAME%20II%20March2019.pdf>

15 Government of India, Ministry of Heavy Industries & Public Enterprises, "FAME II Notification," (2019), <https://dhi.nic.in/UserView/index?mid=1378>

**Table 6.** Parameters of electric two-wheelers (all are class 1 scooters)

OEM	Model	Sales in 2017-18	Curb weight (kg)	Battery capacity (Ampere hr)	Range/charge (km)	Max speed (km/h)	Price (INR)
Avon	E-Mate	1,420	111	20	65	25	47,632
	E-Scoot	984	55	20	65	24	49,132
	E-Star	574	117	33	65	50	60,000
Hero Electric	Cruz	72	69	24	70	25	37,390
	Cruz Li	842	75	33	80	25	37,290
	E-Sprint	836	106	33	80	45	43,240
	Flash	802	69	20	50	40	44,490
	Maxi	931	75	24	70	25	34,380
	Nyx	686	86	24	70	40	63,403
	Nyx Li	834	77	20	60	30	52,190
	Optima Li Deluxe	416	82	56	65	25	57,990
	Optima Plus	1,393	82	24	70	25	36,037
	Photon	2,540	111	33	80	45	86,990
Wave Dx	1,567	107	33	100	25	44,363	
Okinawa	Praise	341	150	45	170	75	59,889
	Ridge	4,090	111	24	80	55	47,980
Yobykes	Electron ER	2,007	84	24	70	25	36,937
	EXL	99	115	48	60	55	50,171
	Spark	267	114	33	60	45	51,736
	Xplor	1,278	86	24	60	25	39,577

Because FAME-II has set higher technical criteria for electric two-wheelers, only four electric models sold in FY 2017-18 would qualify for subsidy, and these account for only 36% of the electric two-wheelers sold that year.<sup>16</sup> Additionally, the Phased Manufacturing Program (PMP) scheme, which has been aiming to promote indigenous manufacturing of components utilized in the supply chain of electric vehicles, would further reduce the percentage of models that could qualify for the incentives. Therefore, most of the models sold in FY 2017-18 are no longer on the market, and new models, such as Ather, have been introduced. These new electric models are not discussed in this paper, which focuses only on FY 2017-18.

## Summary of key findings

Two-wheelers make up 80% of vehicles in India today and consume nearly 60% of all on-road vehicle gasoline in the country. Characterizing the fleet and identifying a fuel consumption baseline is a necessary precondition for crafting any regulation that would seek to reduce the future carbon impact of two-wheelers. Our analysis, based on new sales in FY 2017-18, found the following:

- » The two-wheelers sold in India were dominantly fueled by gasoline. Motorcycles and scooters accounted for 62% and 33% of new sales, respectively.
- » Class 1 two-wheelers with engine size below 150 cc and maximum speed below 100 km/h were 85% of the market. The Class 1 market itself consisted exclusively of motorcycles having engine displacement below or equal to 125 cc.
- » The top 10 best-selling two-wheeler models accounted for 55% of the market and top-selling manufacturers Hero MotoCorp, Honda, TVS, and Bajaj accounted for 89% of sales. Thus, any efficiency technology improvements in popular two-wheeler models or technology innovation from main suppliers would mean a noticeable reduction in the fleet average fuel consumption.
- » The average fuel consumption of the new two-wheelers sold in FY 2017-18 was 1.74 l/100km. A wide range of fuel consumption levels were observed for two-wheeler

<sup>16</sup> Sharmistha Mukherjee, "With FAME harder to come by, electric 2-wheeler sales crash," *The Economic Times*, October 23, 2019, <https://economictimes.indiatimes.com/two-wheelers/with-fame-harder-to-come-by-electric-2-wheeler-sales-crash/articleshow/71697728.cms?from=mdr>.

models with similar weight and power, and this also indicates there is potential for technology improvements in less-efficient models.

- » Hero MotoCorp had the most efficient two-wheeler fleet with lighter and less powerful models. Bajaj had the second most efficient fleet.
- » Electric two-wheelers were only 0.1% of FY 2017-18 sales, and all of the electric two-wheeler models sold that year were scooters. The electric scooter models from Hero MotoCorp were the best-selling electric two-wheelers in India. Due to the more stringent eligibility criteria in FAME II, few electric models sold in FY 2017-18 will qualify for the FAME II incentive, in effect from April 1, 2019 onward.