BRIEFING

JANUARY 2024

Electric vehicles market monitor for light-duty vehicles: China, Europe, United States, and India, 2023 H1

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This Major Markets Electric Vehicle Monitor analyzes the electric vehicle (EV) market development and fleet carbon dioxide (CO_2) emissions trends of manufacturers of light-duty vehicles (LDVs) in China, Europe, the United States, and India in the first half of 2023 (2023 H1).[1] These four markets made up approximately 63% of global LDV sales in 2023 H1. Relevant definitions and details about the data sources, methodology, and assumptions that underlie the analysis are in the appendices.

THE GLOBAL MARKET

Global sales of light-duty EVs reached approximately 6 million in 2023 H1 and were nearly 14% of new LDVs sold worldwide. Nearly 80% of global EV sales were in the four largest markets: China, the United States, Europe, and India.

In 2023 H1, **China** was the world's largest EV market, both in terms of the EV share of new sales and absolute sales of EVs. Approximately 3 million EVs were sold in China in 2023 H1, about 29% of all new LDVs sold in the country, a 5 percentage point increase from the 24% EV share in 2022. In **Europe**, EVs were 20% of all new LDVs sold in 2023 H1, a decrease from the 21% share in 2022. The EV share in the **United States** was at about 9% in 2023 H1, an increase over the 7% share in 2022. **India's** EV market grew in 2023 H1 to 2% from 1% in 2022, though it still lagged the other major markets in terms of both the absolute number of EVs sold and EV sales share.

In **Figure 1**, the EV share of LDV sales is on the y-axis, the total number of EV models sold is on the x-axis, and the size of the circles represents the number of EVs sold for

1 The second Major Markets Monitor was published in June 2023 and covered analysis for year 2022. Ilma Fadhil et al., "Electric Vehicle Market Monitor For Light-Duty Vehicles: China, Europe, United States, and India, 2022," (Washington, DC: ICCT, 2023), https://theicct.org/publication/ev-ldv-major-markets-monitor-2022-jun23/.

Acknowledgments: We thank ClimateWorks Foundation for generous support and Atlas Public Policy for providing and processing the U.S. data. Thanks also to Zifei Yang and Michael Doerrer for helpful reviews.

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each region. As the figure also shows, in 2023 H1, battery electric vehicles (BEVs) still dominated EV sales in terms of absolute numbers, and the split between BEVs and plug-in hybrid electric vehicles (PHEVs) has slightly changed compared to 2022 across markets with a more noticeable change in China. Both Europe and the United States saw a slightly lower share of PHEVs in 2023 H1, 34% and 19% of the total EVs sold, respectively.[2] The share of PHEVs increased in China from 22% in 2022 to 31% in 2023 H1. PHEVs started entering the market in India, but their share was negligible; they were approximately 0.1% of total EVs sold in 2023 H1.

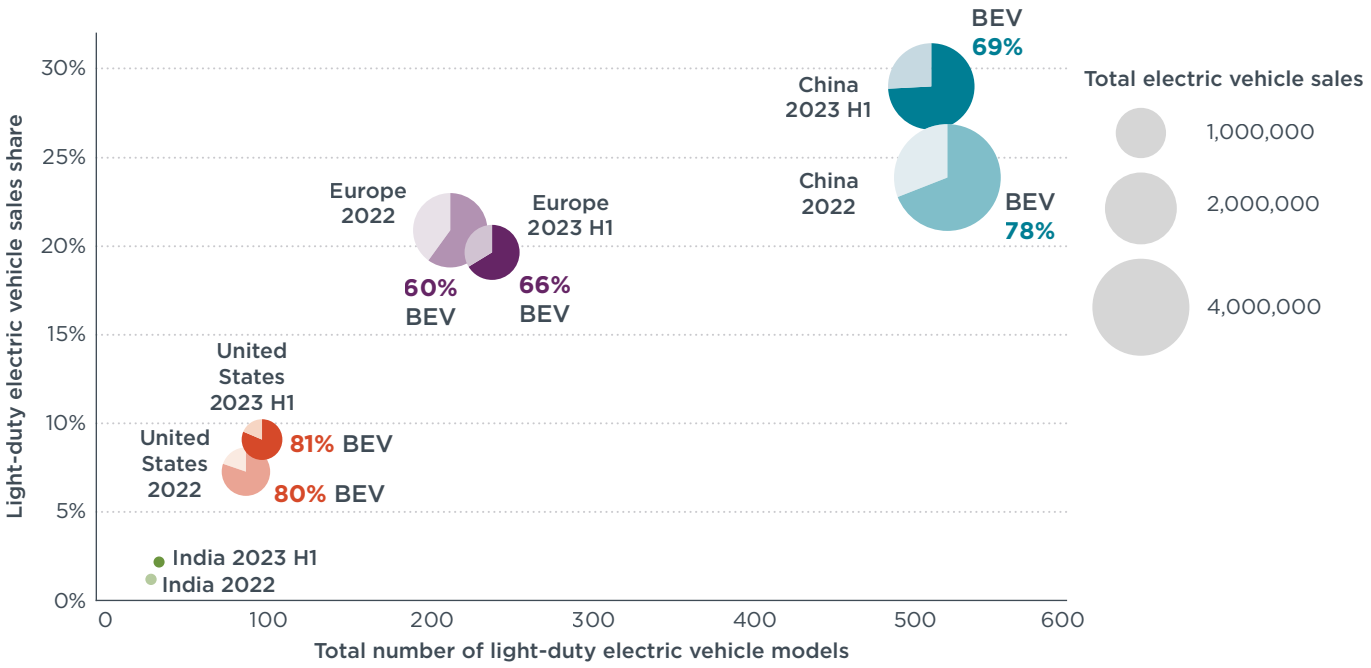

Figure 1. Light-duty EV sales share, number of EV models for sale, and technology mix in the four regions, 2022 and 2023 H1.[3]

Figure 2 presents the 10 best-selling BEV models and their corresponding market shares in each of the four regions in 2023 H1. The gray bars reflect the absolute number of sales for each model and the teal circles reflect their combined market share starting from the number one bestseller to the tenth most popular model. While the 10 best-selling BEV models accounted for approximately 43% and 48% of the total BEV sales in Europe and China, respectively, they were a larger portion of BEV sales in the United States (78%) and almost all BEV sales in India (95%). In China, sales were dominated by three manufacturers: Tesla, BYD, and SAIC Motor (which produces the Wuling Hongguang Mini). In the United States, more models became available in 2023, but Tesla still recorded the most sales of any manufacturer; its Model Y and Model 3 together accounted for 56% of all BEV sales. Model Y and Model 3 together also recorded the most sales in Europe and were 18% of BEV sales in the region in 2023 H1, an increase of share from 12% in 2022. Among legacy automakers, Volkswagen (VW) Group continued to maintain its top-selling models in Europe with four of its models under three brands, VW (ID.4 and ID.3), Škoda (Enyaq iV), and Audi (Q4 E-Tron). Stellantis, Renault, and Hyundai also produced top-selling BEV models in Europe in

2 The potential of PHEVs to reduce fuel consumption and greenhouse gas emissions depends on their real-world use in electric driving mode. A recent ICCT study found that the average real-world fuel consumption of PHEVs in Europe is 3–5 times higher than the Worldwide harmonized Light vehicles Test Procedure (WLTP) type-approval values. See the full report: Patrick Plotz et al., "Real-World Usage of PHEVs in Europe: A 2022 Update on Fuel Consumption, Electric Driving, and CO_2 emissions," (Berlin, Germany: ICCT, 2022), https://theicct.org/publication/real-world-phev-use-jun22/.

3 We set a minimum threshold of 10 sales and above when counting EV models to exclude models that are not available to the mass market. Particularly for China data, this is an effective way to minimize data-entry errors in the raw vehicle registration database.

2023 H1. In India, the second-largest auto manufacturer, Tata Motors, sold the most BEVs. It sold four best-selling models and the top two in sales, based on strong sales of its Tiago and Nexon, which account for nearly 60% of the BEV sales in 2023 H1. Mahindra's XUV400 accounted for 9% of BEV sales, followed by other models including the MG ZS (7%), MG Cornet (4%), and the newcomer PMV Electric (2%).

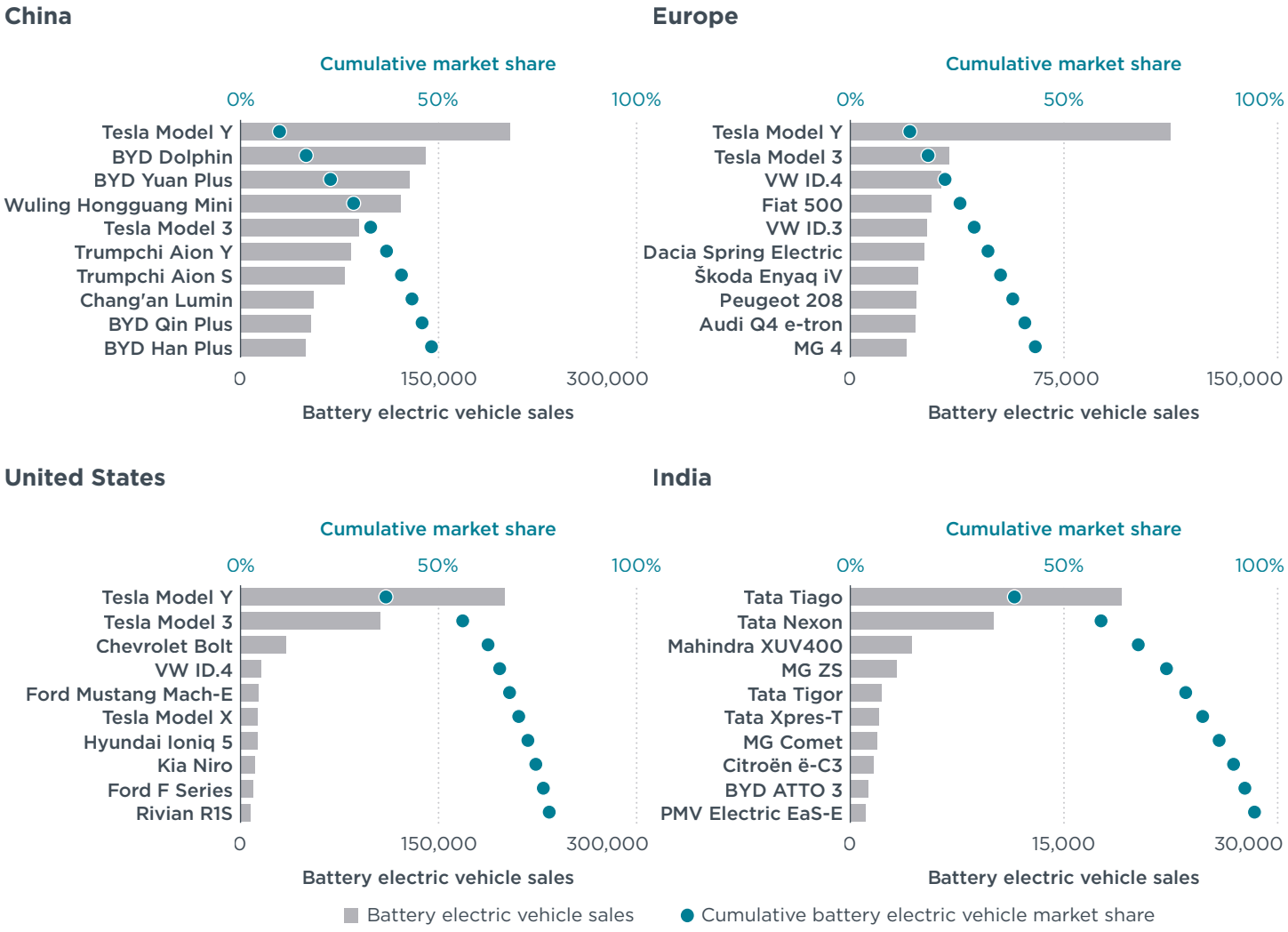

Figure 2. Top 10 best-selling battery electric vehicle models in the four regions in 2023 H1.

CHINA

In 2023 H1, around 3 million new light-duty EVs were sold in China, 29% of total new LDV sales. This marks a 5 percentage point increase from the 2022 EV share of 24%. **Figure 3** shows the 2023 H1 EV market trends in China at the manufacturer level. The left panel shows the EV share of the total LDV sales for each manufacturer in 2023 H1. The light blue portions of the bars represent the EV sales share in 2022, and the darker blue (or dashed light gray) portions represent the increase (or decrease) in sales share from 2022 to 2023 H1. The middle panel illustrates the technology mix of the sales, with BEVs in green and PHEVs in gray, and the right panel reflects the corresponding 2023 H1 LDV market share of each manufacturer. **Figure 4** shows the 2023 H1 fleet-average CO_2 emissions of each manufacturer against the region's fleet-average CO_2 emissions levels in both 2023 H1 and 2022. The width of the bars represents the market share of the manufacturer in 2023 H1.

Key highlights for China in 2023 H1 include:

- Tesla and BYD each sold 100% EVs during this period. Tesla has always produced only EVs and BYD has been exclusively producing EVs since March 2022. Together, these manufacturers constituted 50% of China's EV market. Geely continued its rapid growth of more than 5 percentage points in 2023 H1 and reached 29% of China's EV sales share.
- Eight of the 12 major manufacturers increased their EV sales share in 2023 H1 compared to 2022 (**Figure 3**). However, EV sales share growth slowed or remained stable during this period for most major manufacturers except GAC, Brilliance Group, and Great Wall. GAC experienced the largest growth in EV sales share with a 12 percentage point increase over 2022, reaching 21%. Two of GAC's models were among the top 10 best-selling BEV models in 2023 H1. Chery, despite increases in 2022, experienced a decline of 8 percentage points in EV sales share in 23 H1, dropping to 19%.
- About 69% of EVs sold in 2022 were BEVs. All manufacturers except BYD sold more BEVs than PHEVs, and more than 95% of EVs sold by Tesla and GAC were BEVs.
- With a 29% EV market share, China outpaced the 20% by 2025 EV target set in the China NEV Development Plan (2021–2035), which was issued in 2020.[4]
- Fleet-wide CO_2 emissions in China dropped from 149 g/km in 2021 to 130 g/km in 2022 and to 125 g/km in 2023 H1, measured under the Worldwide harmonized Light vehicles Test Cycle (WLTC). Tesla, BYD, Geely, and GAC (the top four manufacturers in terms of EV sales share), had sales-weighted CO_2 emissions below the national fleet average (**Figure 4**).

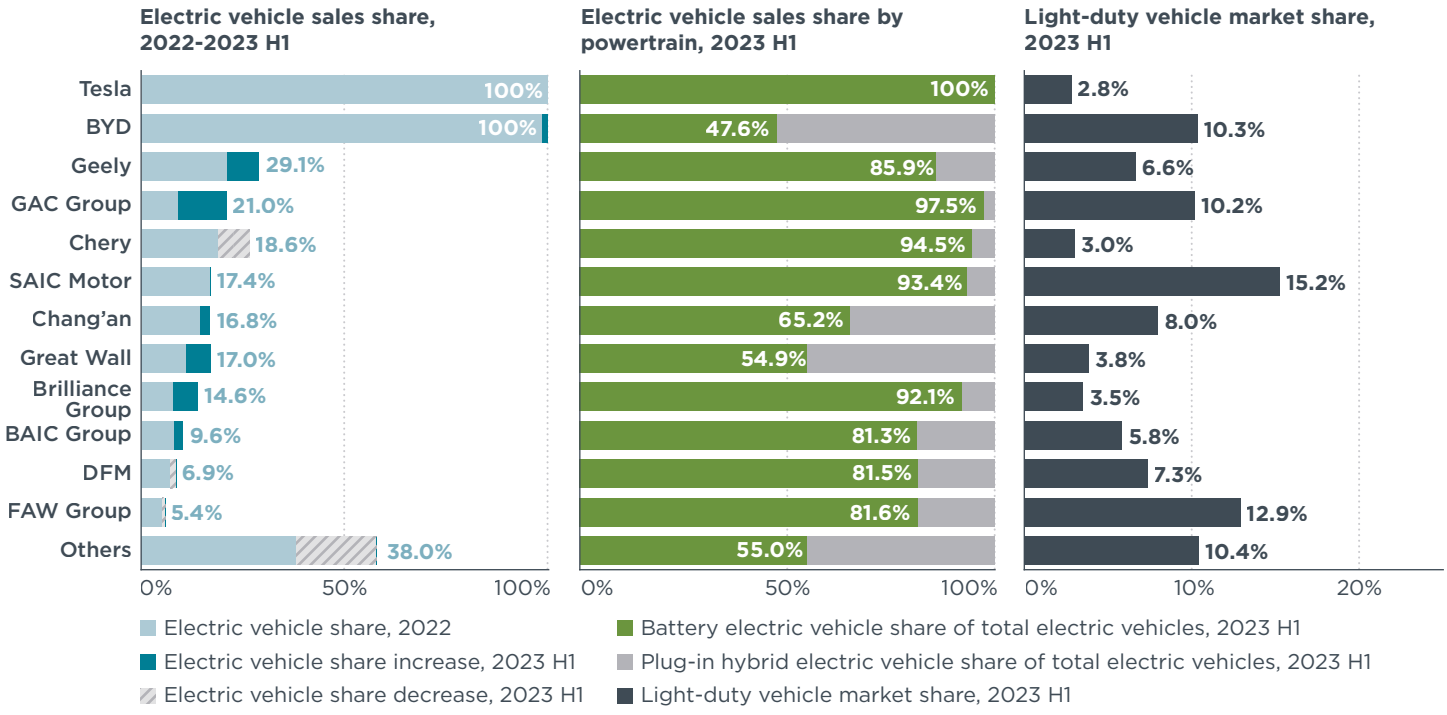

Figure 3. Light-duty EV sales share, technology mix, and market share by manufacturer in China, 2022 and 2023 H1.

4 "New Development Plan for NEVs Unveiled," The State Council of the People's Republic of China, updated November 2, 2020, http://english.www.gov.cn/policies/latestreleases/202011/02/content_WS5f9ff225c6d0f7257693ece2.html.

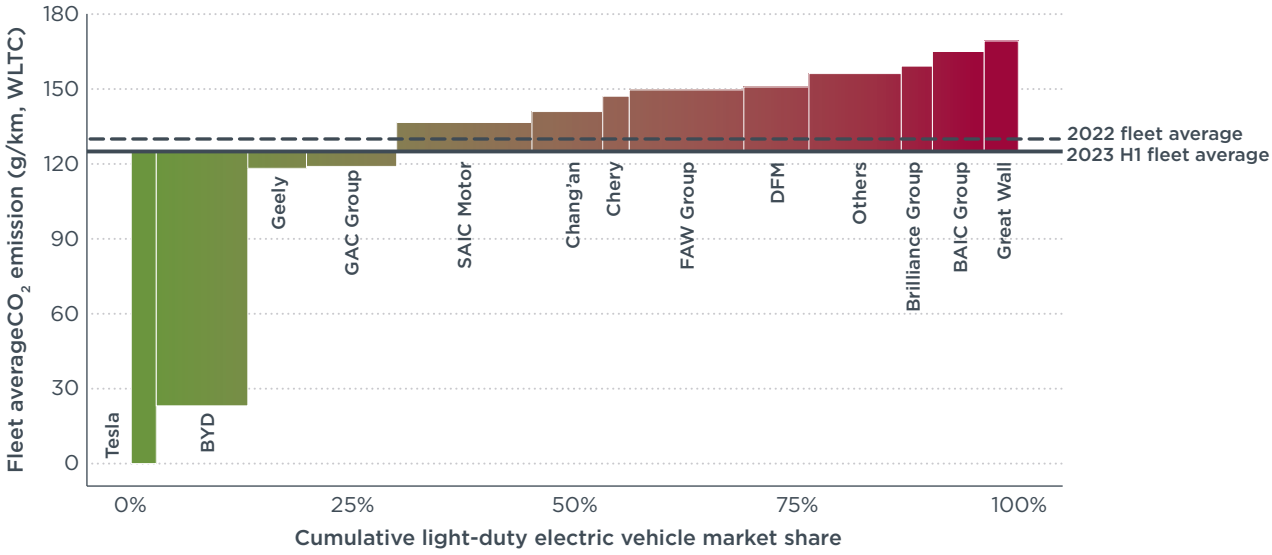

Figure 4. Fleet-average type-approval CO_2 emissions in g/km (WLTC) by manufacturer in China, 2023 H1.

EUROPE

In 2023 H1, approximately 20% of LDVs sold in Europe were electric, a drop from 21% in 2022. **Figure 5** shows the 2023 H1 EV market trends in Europe at the manufacturer level. The left panel shows the EV share of the total LDV sales for each manufacturer in 2023 H1. The light blue portions of the bars represent the EV sales share in 2022, and the darker blue (or dashed light gray) portions represent the increase (or decrease) in sales share from 2022 to 2023 H1. The middle panel illustrates the technology mix of the sales, with BEVs in green and PHEVs in gray, and the right panel reflects the corresponding 2023 H1 LDV market share of each manufacturer. **Figure 6** shows the 2023 H1 fleet-average CO_2 emissions of each manufacturer against the region's fleet-average CO_2 emissions levels in both 2023 H1 and 2022. The width of the bars represents the market share of the manufacturer in 2023 H1.

Key highlights for Europe in 2023 H1 include:

- Only Jaguar Land Rover, Volvo, Mazda, Toyota, and Stellantis had a higher EV sales share in 2023 H1 (**Figure 5**). Following Tesla, Jaguar Land Rover and Volvo led with EV sales shares of 67% and 40%, respectively, which was attributable to the increasing number of PHEVs sold in 2023 H1. Jaguar Land Rover and Volvo saw a bigger increase EV sales share and are on track to meet their internal combustion engine vehicle phase-out targets (Jaguar: 100% by 2025; Land Rover: 100% by 2035; Volvo Cars 100% by 2030).
- While sales slowed across manufacturers compared to 2022, more EVs were still registered in 2023 H1 compared to 2022 H1 with approximately 28% year-over-year (YoY) growth. Following the EV sales trend in Europe over the past few years, more EV sales are expected in the second half of 2023.
- Stellantis, while small, is the only major manufacturer with increased EV sales share growth in 2023 H1 (from 15% to 16%). Smaller manufacturers (categorized under "Others" in the figures in this briefing) increased EV sales share to 37% from 23% in 2022. This is mainly attributable to the increase of EV sales from MG, which more than doubled its sales with 119% YoY growth compared to the same period last year. While new manufacturers are entering the market (including Lucid, a U.S. based all electric company, and Great Wall, a China based manufacturer), sales remained small.

» The PHEV sales share of the European market declined further in 2023 H1; PHEVs were 34% of all EVs sold, down from 40% in 2022. Despite the shrinking proportion in the fleet, PHEVs still dominate sales of automakers with high shares of EVs including Volvo, Jaguar Land Rover, and Mercedes-Benz as indicated in the middle panel of **Figure 5**.

» **Figure 6** shows that fleet-wide CO_2 emissions increased from 117 g/km in 2022 to 118 g/km (WLTC) in 2023 H1. Several manufacturers with larger LDV market shares, including Stellantis, Renault, VW Group, and Mercedes-Benz, had higher-than-average CO_2 emissions. The next CO_2 emission standards LDVs need to meet are 93 g/km (WLTC) for PC and 153 g/km (WLTC) for LCVs and 100 g/km (WLTC) combined based on the sales split. Manufacturers are currently not under pressure to meet these more stringent standards which do not take effect until 2025.

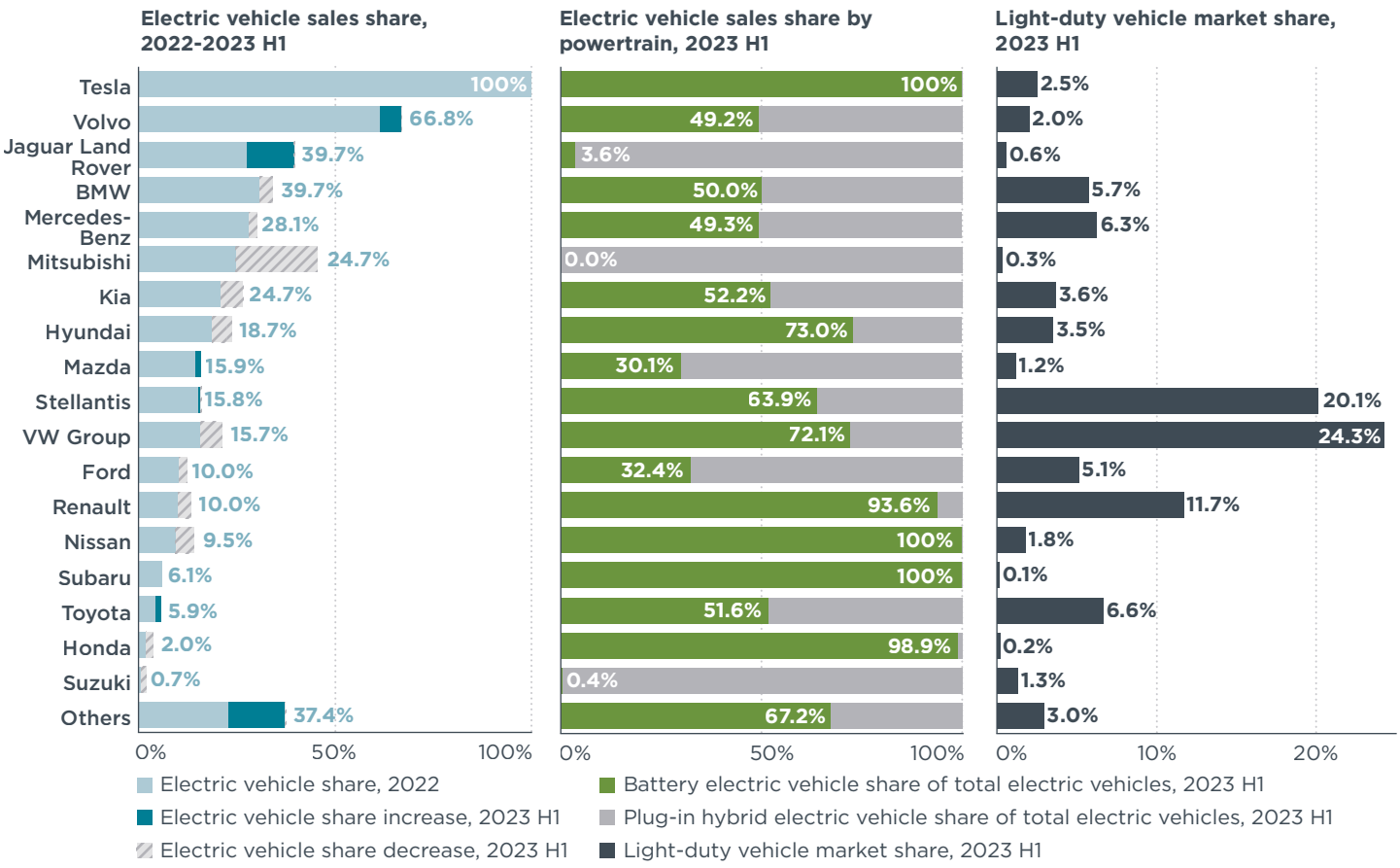

Figure 5. Light-duty EV sales share, technology mix, and market share by manufacturer in Europe, 2022 and 2023 H1.

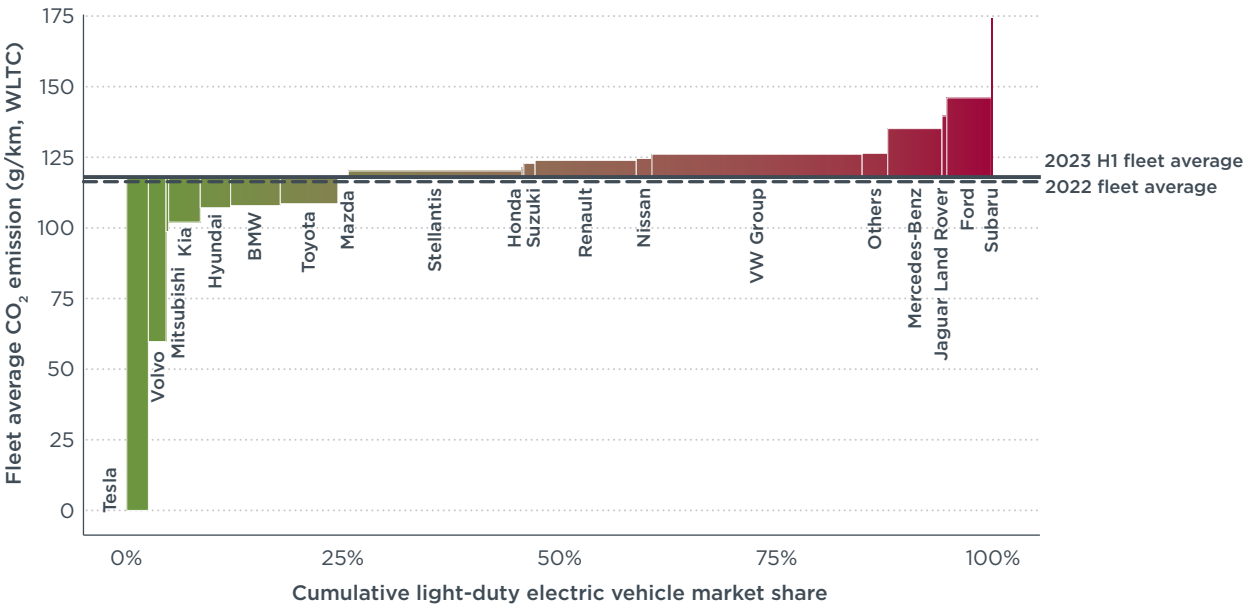

Figure 6. Fleet-average type-approval CO_2 emissions (g/km, WLTC) by manufacturer in Europe, 2023 H1.

UNITED STATES

Figure 7 shows the 2023 H1 EV market trends in the United States at the manufacturer level. The left panel shows the EV share of the total LDV sales for each manufacturer in 2023 H1. The light blue portions of the bars represent the EV sales share in 2022, and the darker blue (or dashed light gray) portions represent the increase (or decrease) in sales share from 2022 to 2023 H1. The middle panel illustrates the technology mix of the sales, with BEVs in green and PHEVs in gray, and the right panel reflects the corresponding 2023 H1 LDV market share of each manufacturer. **Figure 8** shows the 2023 H1 average CO_2 emissions of each manufacturer against the region's fleet-average CO_2 emissions level in both 2023 H1 and 2022. The width of the bars represents the market share of the manufacturer in 2023 H1.

Key highlights for the United States in 2023 H1 include:

- The U.S. EV vehicle market sales share increased in 2023 H1. Following Tesla, Volvo continued to lead the U.S. market with approximately 35% of EV sales share, and followed by BMW, VW Group, and Mercedes-Benz, the next three highest-ranking manufacturers, at 16%, 12% and 11% respectively. Only Ford and Nissan saw a slight decline in EV share from the previous year.
- The EV share of smaller manufacturers continued to grow to nearly 87% as all-electric manufacturers such as Rivian and Lucid expanded, and newer companies such as GEM and Brightdrop (both U.S. based) and Vinfast (Vietnam based) entered the market in 2023 H1 (**Figure 7**). Major manufacturers with high LDV market shares including Ford, GM, and Toyota saw moderate increases, however their EV sales shares remained low at 4%, 3%, and 2%, respectively.
- Most manufacturers sold more BEVs than PHEVs; more manufacturers reflected a higher BEV share in their total EV sales. Volvo and BMW sold more BEVs in 2023 H1, dominating their EV sales by 57% and 61%, respectively. All EV sales for Tesla, GM, and Nissan in 2023 H1 were BEVs, whereas Stellantis and Mitsubishi sold entirely PHEVs, and Mazda sold nearly all PHEVs (98%), as shown on the middle panel of **Figure 7**.

» Fleet-wide CO_2 emissions dropped from 183 g/km in 2022 to 178 g/km in 2023 H1 (WLTC). While fleet-average CO_2 emissions were below average for manufacturers that make up about half of the LDV market, emissions were above average for a few larger manufacturers namely GM, Ford, and Stellantis (**Figure 8)**.

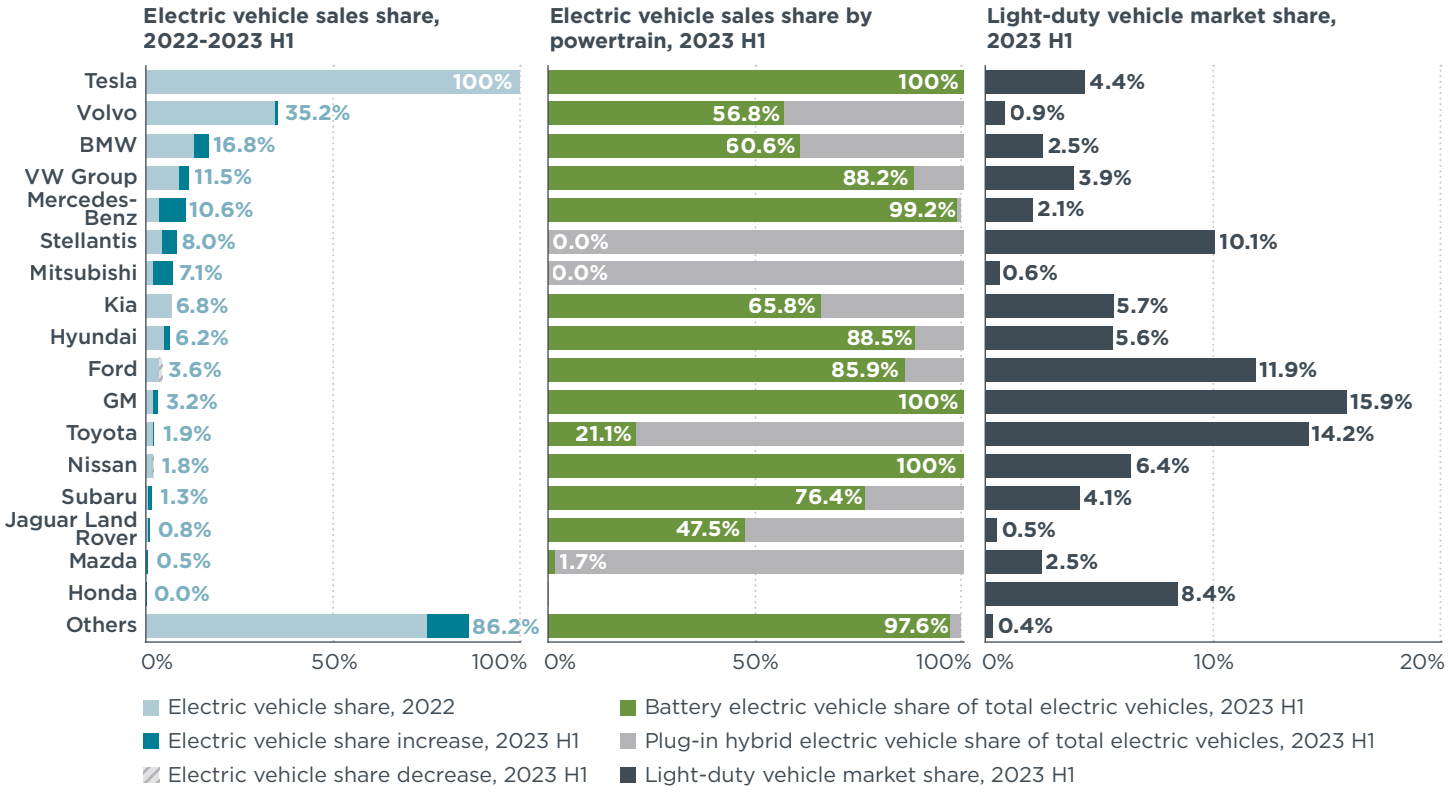

Figure 7. Light-duty EV sales share, technology mix, and market share by manufacturer in the United States, 2022 and 2023 H1.

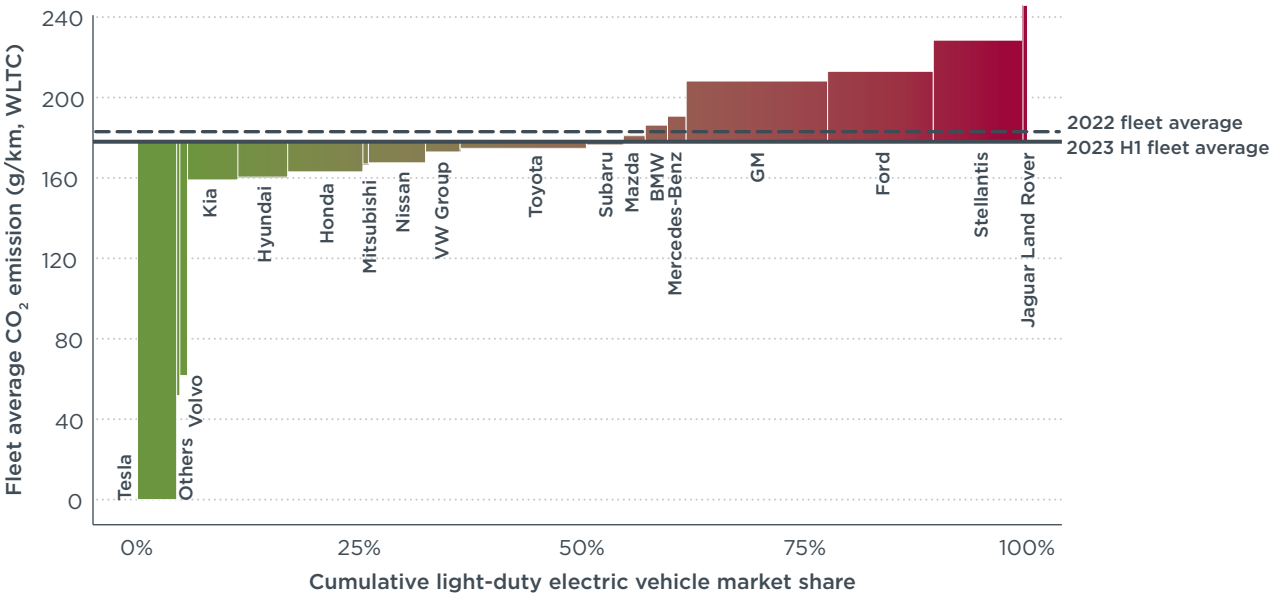

Figure 8. Fleet-average type-approval CO_2 emissions (g/km, WLTC) by manufacturer in the United States, 2023 H1.

INDIA

In 2023 H1, nearly 50,000 EVs were sold in India. This number is close to the total EVs sold in all of 2022, indicating fast EV growth in 2023 H1. As a result, EVs account for 2.2% of the total LDV market. **Figure 9** shows the 2023 H1 EV market trends in India at the manufacturer level. The left panel shows the EV share of the total LDV sales for each manufacturer in 2023 H1. The light blue portions of the bars represent the EV sales share in 2022, and the darker blue (or light gray) portions represent the increase (or decrease) in sales share from 2022 to 2023 H1. The middle panel illustrates the technology mix of the sales, with BEVs in green and PHEVs in gray, and the right panel reflects the corresponding 2023 H1 LDV market share of each manufacturer. **Figure 10** shows the 2023 H1 fleet-average CO_2 emissions of each manufacturer against the region's fleet-average CO_2 emissions level in both 2023 H1 and 2022. The width of the bars represents the market share of the manufacturer in 2023 H1.

Key highlights for India in 2023 H1 include:

- Most manufacturers saw an increase in EV sales share from 2022 to 2023 H1 (left panel of **Figure 9**). MG remained a top player with an EV sales share of approximately 18%. Stellantis reported the second highest sales growth in 2023 H1 with EVs comprising 17% of LDVs sold. This is followed by Tata Motors with an EV sales share of 9%, a jump from 6% in 2022. While BEVs remained dominant, PHEVs have entered the Indian EV market, as shown in the middle panel. However, the PHEV share was less than 0.1% of the total EV sales share.
- As one of the largest manufacturers in India, Tata Motors makes up the majority of EV sales in India. However this year, the share of Tata Motors in the national EV market decreased to 67% in 2023 H1 from 83% in 2022, mainly attributable to the increasing number of EVs from brands such as Mercedes-Benz and BMW as well as competition from new comers including BYD (China's largest EV manufacturer, which continues to expand its global presence) and PMV Electric, maker of India's popular two-seater micro car. Together, these automakers outpaced bigger established auto manufacturers such as Hyundai, Kia, and VW Group in terms of EV sales. Combined, manufactured categorized as "Others" in this briefing made up approximately 17% of the EV market in 2023 H1, a large jump from 2.3% in 2022.
- **Figure 10** shows that fleet-wide CO_2 emissions dropped by 3% in 2023 H1 to 134 g/km (WLTC) from 138 g/km in 2022. Suzuki and Tata Motors, the two largest manufacturers stayed below the fleet average while other manufacturers remained above the fleet-average emissions level, including those with the highest EV sales shares, MG and Mahindra.

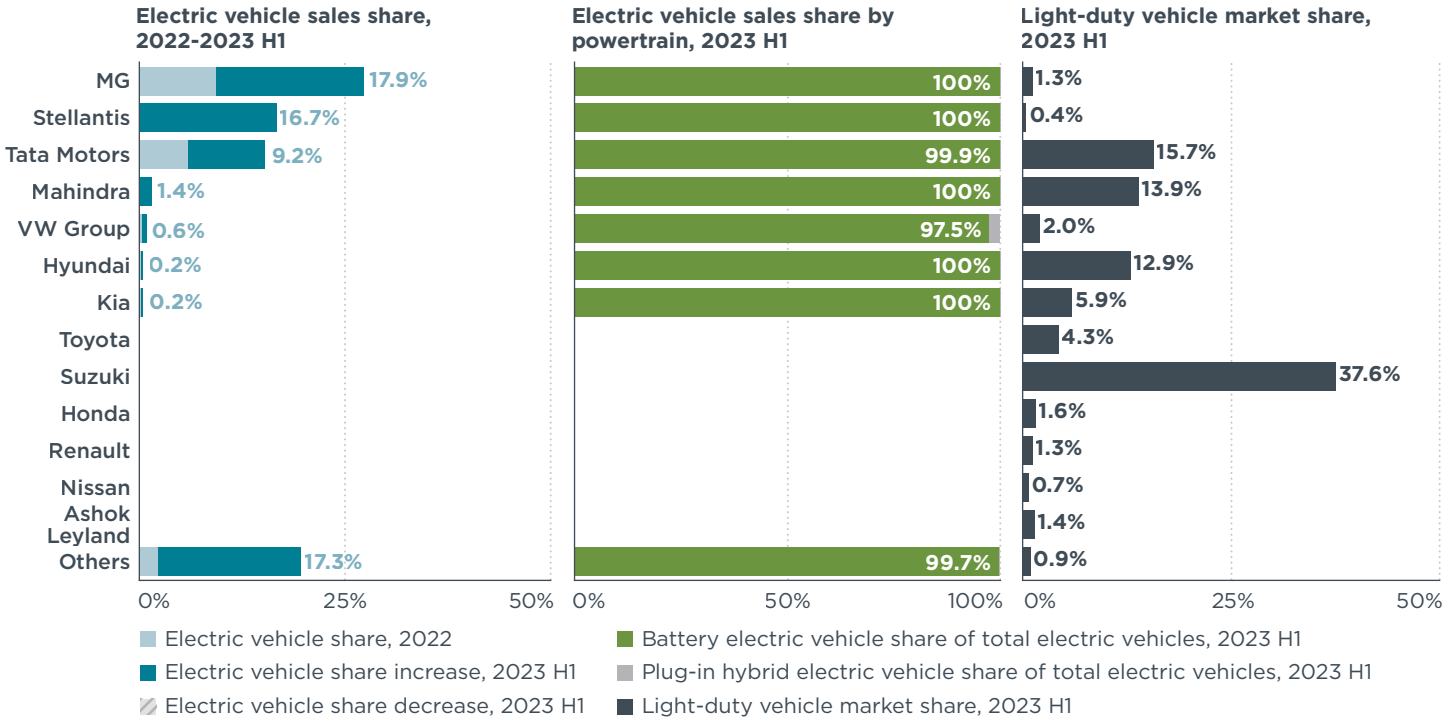

Figure 9. Light-duty EV sales share, technology mix, and market share by manufacturer in India, 2022 and 2023 H1.

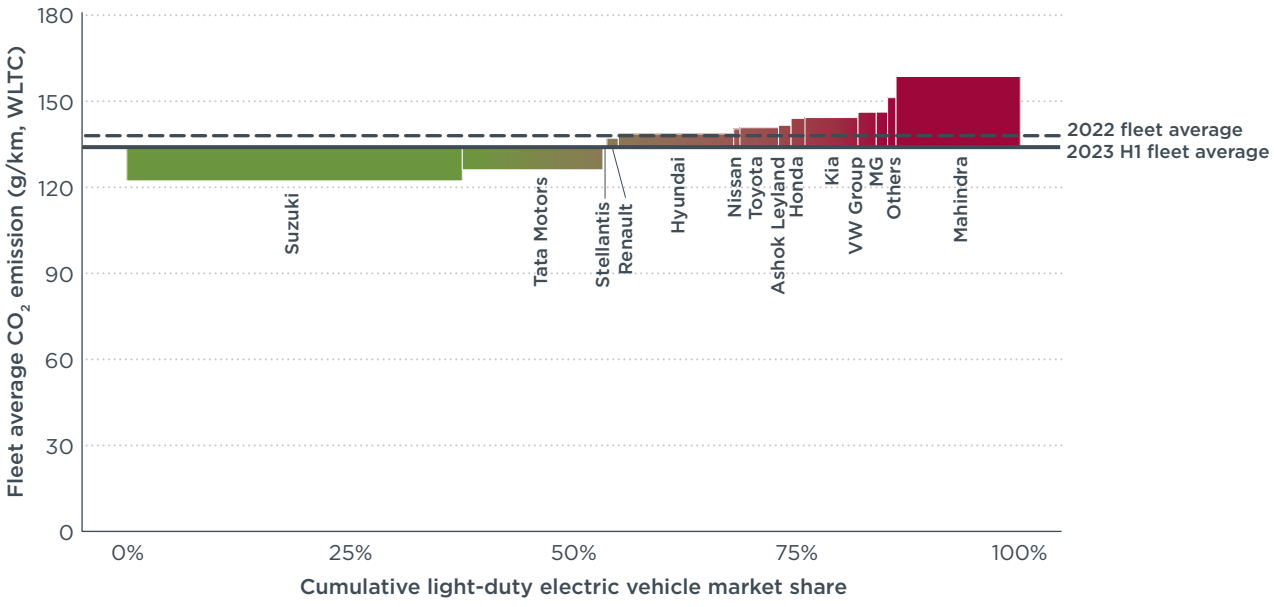

Figure 10. Fleet-average type-approval CO_2 emissions (g/km, WLTC) by manufacturer in India, 2023 H1.

APPENDIX A. LIGHT-DUTY ELECTRIC VEHICLE MARKET PERFORMANCE AND FLEET-AVERAGE CO_2 EMISSIONS BY REGION

Table A1 presents electric light-duty vehicle (LDV) market shares by segment and technology in all four major markets for 2023 H1 and 2022. PC is passenger car and LCV is light commercial vehicle. Note that the electric vehicle (EV) market share across technology and segment might not add up to the total LDV EV market share due to rounding. Tables A2, A3, A4, and A5 show EV market performance and fleet-average CO_2 emissions across manufacturers in the four markets in 2023 H1. Note that *EV sales share* refers to the EV percentage of the total LDV sales for each manufacturer. For example, Tesla's EV sales share is 100% because it only sells battery electric vehicles (BEVs). *EV market share* refers to a given manufacturer's EV sales share of the entire EV market in the region and *LDV market share* reflects the share of LDV sales of each manufacturer in each region. To illustrate, Tesla's sales are 10% of the EV market in China, but are only 3% of China's broader LDV market. All CO_2 values shown are under the Worldwide harmonized Light vehicles Test Cycle (WLTC) and reflect the sales-weighted, fleet-average, type-approved CO_2 values; they do not account for manufacturer use of any of the performance credits and adjustments that are allowed as compliance mechanisms.

Table A1. Sales shares of light-duty EVs by region, segment, and technology

Region	2023 H1						2022					
	PC		LCV		LDV		PC		LCV		LDV	
	BEV	PHEV	BEV	PHEV	BEV	PHEV	BEV	PHEV	BEV	PHEV	BEV	PHEV
China	21%	10%	9%	0%	20%	9%	20%	6%	8%	0%	19%	5%
Europe	14%	7%	7%	0.2%	13%	7%	13%	10%	5%	0%	13%	8%
United States	12%	1%	6%	2%	7%	2%	8%	1%	3%	2%	6%	1%
India	2.5%	0.002%	0.05%	0%	2%	0.002%	1%	0%	0%	0%	1%	0%
Global	13%	5%	4%	1%	10%	4%	11%	4%	3%	1%	10%	3%

Table A2. Light-duty EV market performance and fleet-average CO_2 emissions in China, 2023 H1

Manufacturer	EV sales share		Percentage point change of EV sales shares from 2022		Number of EV models		LDV market share	EV market share	Fleet average CO_2 (g/km) WLTC
	BEV	PHEV	BEV	PHEV	BEV	PHEV			
Tesla	100%	0%	0 pp	0 pp	4	0	3%	10%	0
BYD	48%	52%	-1 pp	+3 pp	20	13	10%	36%	23
Geely	25%	4%	+7 pp	0 pp	35	16	7%	7%	118
GAC Group	20%	1%	+12 pp	0 pp	16	5	10%	7%	119
Chery	18%	1%	-8 pp	0 pp	19	7	3%	2%	147
SAIC Motor	16%	1%	0 pp	0 pp	44	11	15%	9%	137
Brilliance Group	13%	1%	+8 pp	-1 pp	16	2	4%	2%	159
Chang'an	11%	6%	-1 pp	+4 pp	20	8	8%	5%	141
Great Wall	9%	8%	0 pp	+7 pp	6	9	4%	2%	169
BAIC Group	8%	2%	+2 pp	0 pp	28	3	6%	2%	165
DFM	6%	1%	-2 pp	0 pp	29	5	7%	2%	151
FAW Group	4%	1%	-1 pp	0 pp	16	5	13%	2%	150
Others	21%	17%	+1 pp	+16 pp	70	5	10%	14%	156
Fleet	**20%**	**9%**	**+2 pp**	**+4 pp**	**405**	**111**	**100%**	**74%**	**125**

Table A3. Light-duty EV market performance and fleet-average CO_2 emissions in Europe, 2023 H1

Manufacturer	EV sales share		Percentage point change of EV sales shares from 2022		Number of EV models		LDV market share	EV market share	Fleet average CO_2 (g/km) WLTC
	BEV	PHEV	BEV	PHEV	BEV	PHEV			
Tesla	**100%**	0%	0 pp	0 pp	4	0	2%	13%	0
Volvo	**33%**	34%	+4 pp	+1 pp	3	7	2%	7%	60
BMW	**15%**	15%	0 pp	-4 pp	7	10	6%	9%	108
Mercedes-Benz	**14%**	14%	+1 pp	-4 pp	15	10	6%	9%	135
Hyundai	**14%**	5%	-2 pp	-3 pp	7	3	4%	3%	107
VW Group	**11%**	4%	-3 pp	-3 pp	14	26	24%	19%	126
Kia	**11%**	10%	-2 pp	-4 pp	3	6	4%	4%	102
Stellantis	**10%**	6%	+1 pp	0 pp	26	16	20%	16%	120
Nissan	**10%**	0%	-4 pp	0 pp	3	0	2%	1%	125
Renault	**9%**	1%	-3 pp	0 pp	5	2	12%	6%	124
Subaru	**6%**	0%	0 pp	0 pp	1	0	0%	0%	174
Mazda	**5%**	11%	0 pp	-1 pp	1	2	1%	1%	118
Ford	**3%**	7%	-1 pp	-2 pp	3	3	5%	3%	146
Toyota	**3%**	3%	+2 pp	0 pp	5	4	7%	2%	109
Honda	**2%**	0%	-2 pp	0 pp	1	0	0%	0%	121
Jaguar Land Rover	**1%**	38%	-2 pp	+13 pp	1	8	1%	1%	140
Mitsubishi	**0%**	25%	0 pp	-21 pp	0	2	0%	0%	99
Suzuki	**0%**	1%	0 pp	-1 pp	0	1	1%	0%	123
Others	**25%**	12%	+14 pp	0 pp	39	5	3%	6%	126
Fleet	**13%**	**7%**	**+1 pp**	**-1 pp**	**138**	**105**	**100%**	**100%**	**118**

Table A4. Light-duty EV market performance and fleet average CO_2 emissions in the United States, 2023 H1

Manufacturer	EV sales share		Percentage point change of EV sales shares from 2022		Number of EV models		LDV market share	EV market share	Fleet average CO_2 (g/km) WLTC
	BEV	PHEV	BEV	PHEV	BEV	PHEV			
Tesla	100%	0%	0 pp	0 pp	4	0	4%	48%	0
Volvo	20%	15%	+4 pp	-4 pp	3	5	1%	3%	62
VW Group	10%	1%	+2 pp	0 pp	8	5	4%	5%	173
Mercedes-Benz	10%	0%	+6 pp	0 pp	5	1	2%	2%	191
BMW	10%	7%	+5 pp	-1 pp	6	7	2%	5%	186
Hyundai	5%	1%	+1 pp	0 pp	6	2	6%	4%	160
Kia	4%	2%	+1 pp	0 pp	2	3	6%	4%	159
Ford	3%	1%	-1 pp	0 pp	3	3	12%	5%	213
GM	3%	0%	+1 pp	0 pp	3	0	16%	6%	208
Nissan	2%	0%	0 pp	0 pp	2	0	6%	1%	168
Subaru	1%	0%	+1 pp	0 pp	1	1	4%	1%	176
Jaguar Land Rover	0.4%	0%	0 pp	0 pp	1	2	1%	0%	246
Toyota	0.4%	2%	0 pp	0 pp	2	3	14%	3%	175
Mazda	0%	0%	0 pp	0 pp	1	1	2%	0%	181
Stellantis	0%	8%	0 pp	+4 pp	0	4	10%	9%	229
Mitsubishi	0%	7%	0 pp	+5 pp	0	1	1%	0%	167
Honda	0%	0%	0 pp	0 pp	0	0	8%	0%	163
Others	84%	2%	+11 pp	0 pp	11	4	0%	3%	52
Fleet	**7%**	**2%**	**+2 pp**	**0 pp**	**58**	**42**	**100%**	**100%**	**178**

Table A5. Light-duty EV market performance and fleet average CO_2 emissions in India, 2023 H1

Manufacturer	EV sales share		Percentage point change of EV sales shares from 2022		Number of EV models		LDV market share	EV market share	Fleet average CO_2 (g/km) WLTC
	BEV	PHEV	BEV	PHEV	BEV	PHEV			
MG	18%	0%	+9 pp	0 pp	2	0	1%	10%	146
Stellantis	17%	0%	+17 pp	0 pp	1	0	0%	3%	134
Tata Motors	9%	0.006%	+3 pp	0 pp	5	2	16%	67%	126
Mahindra	1%	0%	+1 pp	0 pp	2	0	14%	9%	159
VW Group	1%	0.015%	0 pp	0 pp	3	2	2%	1%	146
Hyundai	0.2%	0%	0 pp	0 pp	2	0	13%	1%	139
Kia	0.2%	0%	0 pp	0 pp	1	0	6%	1%	144
Suzuki	0%	0%	0 pp	0 pp	0	0	38%	0%	122
Toyota	0%	0%	0 pp	0 pp	0	0	4%	0%	141
Honda	0%	0%	0 pp	0 pp	0	0	2%	0%	144
Ashok Leyland	0%	0%	0 pp	0 pp	0	0	1%	0%	142
Renault	0%	0%	0 pp	0 pp	0	0	1%	0%	137
Nissan	0%	0%	0 pp	0 pp	0	0	1%	0%	140
Others	17%	0.05%	+15 pp	0 pp	13	3	1%	8%	151
Fleet	**2%**	**0.002%**	**+1 pp**	**0 pp**	**29**	**7**	**100%**	**100%**	**134**

APPENDIX B. DEFINITIONS, DATA SOURCES, METHODOLOGY, AND ASSUMPTIONS

DEFINITIONS OF LIGHT-DUTY VEHICLES

China, Europe, and India: LDVs are PCs and LCVs. PCs are motor vehicles with at least four wheels designed for the carriage of passengers that have no more than eight seats excluding the driver's seat and a maximum weight below 3.5 tons (these are the M1 category). LCVs are motor vehicles with at least four wheels designed for the carriage of goods (goods and passenger vehicles with more than nine seats for China) with a maximum weight below 3.5 tons; they are the N1 category in Europe and India and the N1 and M2 categories in China.

United States: LDVs are PCs, which are vehicles with gross vehicle weight rating (GVWR) below 6,000 lbs, and LCVs, which are vehicles with GVWR between 6,001 and 10,000 lbs (vehicle class 2) and SUVs with four-wheel drive.

DATA SOURCES

EV refers to battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) in all regions.

China: Sales, model information, and CO_2 emissions data comes from insurance data from Daas-Auto.[5] Sales are based on new registrations of LDVs because the insurance data for new registrations is a close proxy for retail sales.

Europe: Sales and CO2 emissions data are from Dataforce[6], model information is from MarkLines.[7] Sales are based on new registrations of LDVs. Europe covers the European Union (EU) countries except Bulgaria and Malta, which are excluded due to data limitations, and Iceland and Norway are included. The United Kingdom is excluded from the analysis, and Liechtenstein is also excluded, due to limited data availability. Hungary, Lithuania, Poland, Portugal, and Romania are excluded from the CO_2 emissions values due to incomplete data.

United States: Sales, model information, and CO_2 emissions data are from Atlas Public Policy.[8] Sales numbers are based on new registrations, but we excluded vehicles that did not have matching fuel economy values.

India: Sales, model information, and CO_2 emissions data are from Segment Y.[9]

Global: Sales data is from the EV-Volumes database.[10]

METHODOLOGY AND ASSUMPTIONS

China, United States, and India: The CO_2 emissions of individual models were converted from type-approval fuel economy or fuel consumption values using the conversion factors listed in Tables B1 to B3. Then the fleet-average CO_2 emission values were converted from the country-specific test cycle, the New European Drive Cycle (NEDC) in China and India (NEDC cycle capped at 90kmph) and Corporate Average Fuel Economy in the United States, to WLTC based on ICCT's conversion tool.[11]

5 Dass-Auto, (2023), https://www.daas-auto.com/.
6 Dataforce, (2023), https://www.dataforce.de/en/.
7 MarkLines, (MarkLines Automotive Sales Data Center, 2023), https://www.marklines.com/en/vehicle_sales/index.
8 Atlas Public Policy, (2023), https://atlaspolicy.com/.
9 Segment Y, (2023), https://www.segmenty.com/.
10 EV Volumes, (2023) http://www.ev-volumes.com/datacenter/.
11 ICCT conversion tool, https://theicct.org/wp-content/uploads/2022/03/Conversion-tool-20141121-Protect.xlsx.

Europe: Conversion from NEDC to WLTC utilized manufacturer-specific factors based on the 2020 market data.[12]

Table B1. China CO_2 emission factors by fuel type

Fuel type	CO_2 emission factor (kg/l)	Source
Gasoline	2.37	National standard GB 27999-2019[a]
Diesel	2.6	
CNG	1.54	U.S. Environmental Protection Agency (EPA)[b]
Methanol	1.66	China Economic Weekly[c]

[a] Ministry of Industry and Information Technology of the People's Republic of China, "Fuel Consumption Evaluation Methods and Targets for Passenger Cars," December 2019,

https://openstd.samr.gov.cn/bzgk/gb/newGbInfo?hcno=A0D5C7C6DE851F1FB293B6CA09C757EB

[b] U.S. Environmental Protection Agency (EPA), "Emission Factors for Greenhouse Gas Inventories," (2021), https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf.

[c] Lv Jiangtao, "Will Methanol Cars Take Off After Battery Electric and Hydrogen Fuel Cell Cars in China?," *China Economic Weekly*, April 15, 2022, https://finance.sina.com.cn/chanjing/cyxw/2022-04-15/doc-imcwiwst2023519.shtml.

Table B2. U.S. CO_2 emission factors by fuel type

Fuel type	CO_2 emission factor (g/gal)
Gasoline	8,887
Diesel	10,180
Ethanol-85	6,226
CNG	8,887

Source: U.S. EPA, "The 2021 EPA Automotive Trends Report," November 2021, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013L1O.pdf.

Table B3. India CO_2 emission factors by fuel type

Fuel type	CO_2 emission factor (g/l)
Gasoline	0.04217
Diesel	0.03766
LPG	0.0165
CNG	0.03467

Source: Ministry of Power of the Government of India, "Ministerial Notification on Energy Consumption Standards for Motor Vehicles," April 2015, https://beeindia.gov.in/sites/default/files/Fuel%20Efficiency%20Notification%20%2823April2015%29.pdf.

12 We applied the methodology outlined in Peter Mock et al., "Market Monitor: European Passenger Car and Light Commercial Vehicle Registrations, January–December 2022," (Berlin, Germany: ICCT, 2023), https://theicct.org/publication/market-monitor-eu-jan-to-dec-feb23/.

MANUFACTURER GROUPS

China: For joint ventures, manufacturers are grouped under the name of the dominant shareholder. For example, two manufacturers, DFM and Nissan, are grouped under DFM in this analysis.

Europe: We no longer follow the European Commission's pooling list for CO_2 target compliance, as was done in the first paper. Here we list each manufacturer individually.[13]

Others: This group refers to manufacturers that make up a smaller share in the market and reflect the corresponding main brands sold under the listed manufacturers.

Table B4. Manufacturers and corresponding main brands in China

Light-duty vehicles in China	
Manufacturer	**Main brands**
BAIC Group	Beijing, Benz, Foton, Hyundai
Brilliance Group	BMW, Jinbei
BYD	BYD
Chang'an	Chang'an
Chery	Chery, Jaguar, Jetour, Karry, Land Rover, Exeed
DFM	Dongfeng, Nissan, Honda
FAW Group	Hongqi, Audi, Volkswagen, Toyota, Jetta, Mazda, Bestune, Jiefang
GAC Group	Trumpchi, Honda, Fiat, Toyota, Jeep, Mitsubishi
Geely	Geely, Volvo Cars, Lynk & Co
Great Wall	Great Wall, Haval, Wey
SAIC Motor	Volkswagen, Wuling, Buick, Yuejing, MG
Tesla	Tesla

Table B5. Manufacturers and corresponding main brands in Europe

Light-duty vehicles in Europe	
Manufacturer	**Main brands**
BMW	BMW, MINI
Ford	Ford, Lincoln
Honda	Honda
Hyundai	Hyundai, Genesis
Jaguar Land Rover	Jaguar, Jaguar Land Rover
Kia	Kia
Mazda	Mazda
Mercedes-Benz	Mercedes-Benz, Smart
Mitsubishi	Mitsubishi
Nissan	Nissan, Infiniti
Renault	Renault, Dacia
Stellantis	Alfa Romeo, Citröen, DS Automobiles, Fiat, Jeep, Lancia, Opel, Peugeot, Vauxhall
Subaru	Subaru
Suzuki	Suzuki
Tesla	Tesla
Toyota	Toyota, Lexus
Volvo	Volvo, Polestar
VW Group	Audi, Porsche, Seat, Škoda, Volkswagen
Others	GM, MG, Iveco, SsangYong, Isuzu

13 Europe: Manufacturers are allowed to form pools to jointly meet the CO_2 targets. We refer to the European Commission's M1 and N1 pooling list as of December 20, 2021.

Table B6. Manufacturers and corresponding main brands in the United States

Light-duty vehicles in the United States	
Manufacturer	**Main brands**
BMW	BMW, MINI
Ford	Ford, Lincoln
GM	Chevrolet, GMC, Buick, Cadillac
Honda	Honda, Acura
Hyundai	Hyundai, Genesis
Jaguar Land Rover	Jaguar, Jaguar Land Rover
Kia	Kia
Mazda	Mazda
Mercedes-Benz	Mercedes-Benz
Mitsubishi	Mitsubishi
Nissan	Nissan, Infiniti
Stellantis	Jeep, Dodge, Fiat, Alfa Romeo, Chrysler, Maserati, RAM
Subaru	Subaru
Tesla	Tesla
Toyota	Toyota, Lexus
Volvo	Volvo
VW Group	Volkswagen, Audi, Porsche, Bentley
Others	Karma, Rivian, Lucid, McLaren

Table B7. Manufacturers and corresponding main brands in India

Light-duty vehicles in India	
Manufacturer	**Main brands**
Ashok Leyland	Ashok Leyland
Honda	Honda
Hyundai	Hyundai
Kia	Kia
Mahindra	Mahindra & Mahindra, Mahindra electric
MG	MG
Nissan	Nissan, Datsun
Renault	Renault
Suzuki	Maruti, Suzuki
Stellantis	Jeep, Dodge, Fiat, Alfa Romeo, Chrysler, Maserati, RAM
Tata Motors	Tata, Jaguar, Jaguar Land Rover
Toyota	Toyota, Lexus
VW Group	Volkswagen, Audi, Škoda
Others	Mercedes-Benz, BMW, Volvo, Force, BYD, PMV Electric