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Greening India's Automotive Sector

EV Policies, Categories and Subnational Trends

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Image: iStock

Executive summary

India's automotive sector is on the brink of something new. On the one hand, sales of traditional internal combustion engine vehicles (ICEV) have been slow to bounce back to pre-pandemic levels. While on the other, the new and emerging electric vehicle (EV) segment has been in the news for all the right reasons and shows no signs of slowing down (Figure 3). A segment that constituted only 1 per cent of all new auto sales in January 2021, formed 6 per cent of it in September 2022. Already, more EVs were sold in the first six months of FY 2022-23 than were sold in the whole year before that. Multiple Indian states have launched EV policies with subsidies for EV buyers. However, there are three primary facets to this success – policies, categories and subnational trends. This issue brief examines each of these in detail.

A. Policies

The consumer EV segment in India rests on multiple policy pillars – both at the national level (i.e. the 'Faster Adoption and Manufacturing of Electric Vehicles (FAME) – II' policy) and at the level of the individual state's policies. We found that in most of the targets set by the FAME II policy – both in monetary terms and the number of vehicles – plenty of headroom was left. Set to end in FY 2023–24, the policy's achievements as of September 2022 are as follows:

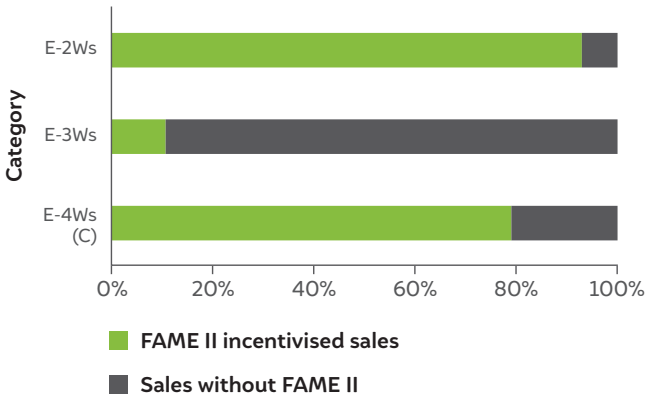
Policy target achieved

- Utilisation of 30.6 per cent of the INR 8,570 crore allocated as purchase incentives
- Incentivized 40.7 per cent of the 15,42,090 EV units targeted
- Incentivized 56.1 per cent of the 10,00,000 e-2Ws targeted
- Incentivized 12.5 per cent of the 5,00,000 e-3Ws targeted (including e-rickshaws)
- Incentivized 12.8 per cent of the 35,000 commercial e-4Ws targeted
- Incentivized most of the 7,090 e-buses it targeted

Policy coverage

In addition to this, we found that the policy was most impactful in driving volumes in the e-2W (92 per cent) and commercial 4W (79 per cent) categories, whereas only 12 per cent of e-3Ws benefited from it (Figure ES1). The strict domestic manufacturing restrictions may be a major factor contributing to the slow success of this particular category.

Figure ES1 Category-wise share of EV sales incentivized by FAME II (FY 2019-20 – H1 FY 2022-23)



Source: CEEW-CEF analysis

On the other hand, of the 21 states with EV policies, 15 provide purchase incentives for consumers. These are generally in the form of direct subsidies linked to either the battery size or cost of the vehicle, early bird discounts, road tax and registration charge exemptions, goods, and services tax (GST) reimbursements, etc. These can significantly bring down the on-road cost of EVs and help attain of price parity with traditional vehicles. We demonstrate this later in this report by comparing the final on-road price of representative e-2Ws (an Ather 450 X) and ICEV 2Ws (a Hero Maestro Edge 125). While the ex-showroom price of the EV starts off as higher, the on-road price is brought down significantly by subsidies and further exemptions.

However, policies are only as effective as their impact on sales numbers and therefore we also attempt to answer the following questions –

Are states with policies experiencing superior EV volume growth?

In figure 14, group A combines all states with consumer incentives for EV buyers and group B combines all those without. We rebase yearly sales to FY 2017-18 - which was when India launched its first EV policy, to compare the two groups.

Group A is seen consistently performing better than group B and the national aggregate, especially post FY 2020-21. It demonstrates market growth that is 2X that of states without EV policies and consumer incentives.

Are states with higher incentives experiencing superior EV volume growth?

Figure 15 displays five Indian states with e-2W incentives provided in INR/ kWh form. E-2W sales figures have been rebased to six months before the announcement of their respective policies. It displays a one-year timeline, comparing sales six months before and after the announcement of a state's EV policy. Some states provide smaller e-2W subsidies up to INR 5,000/ kWh whereas others provide higher subsidies up to INR 10,000/ kWh.

1. H1 FY 2022-23 here and in all following uses implies 01 April 2022 – 30 September 2022.

Our analysis shows that larger incentives are linked to more visible market growth. States such as Assam, Goa and Gujarat have registered a near 20X growth, whereas states with lower incentive amounts have seen their markets grow by only 4.5X.

B. Vehicle categories

The traditional ICEV segment is led by 2Ws and 4Ws, which together form nearly 90 per cent of the market. However, the EV market sees both e-2Ws and e-rickshaws jointly lead the segment. Nearly 300,000 e-2Ws were sold in the first six months of FY 2022-23 alone, the highest ever recorded. However, despite such high numbers, the penetration of EVs amongst all 2Ws remains low at only 4 per cent. E-rickshaws too form an integral part of India's EV success, especially in states such as Uttar Pradesh and Tripura. These states depend heavily on this category for first and last mile connectivity. E-rickshaws, therefore, form most of their EV sales. India sold ~170,000 e-rickshaws in the first six months of FY 2022-23 - more than what it had sold in all of FY 2021-22.

C. Subnational trends

The subnational narrative is of utmost importance in understanding India's transition to EVs. We turn to states and road transport offices (RTO) to further highlight some underlying trends. With 164,338 units sold in FY 2021–22 and the first six months of FY 2022–23, Uttar Pradesh (UP) leads as the state with the highest number of EV sales in the country. It has an EV penetration of nearly 4 per cent. However, Delhi leads as India's greenest state with an EV penetration of ~ 8 per cent. Similarly, in RTOs - Pune leads in absolute sales with 21,665 EVs sold through FY 2021-22 and the first six months of FY 2022-23 but Delhi's Burari taxi unit is currently the greenest RTO in the country with an EV penetration of ~ 46 per cent.

> **Nearly 300,000 e-2Ws were sold in the first six months of FY 2022-23 alone, the highest ever recorded.**

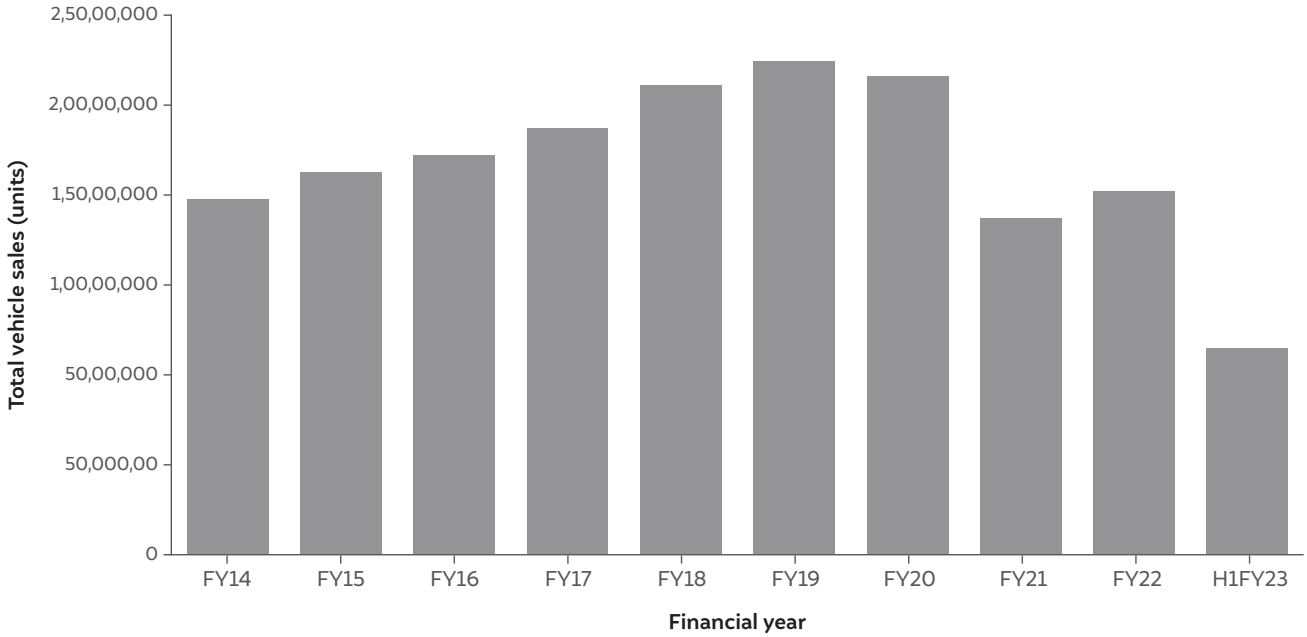
1. Introduction

India's auto sector has traditionally been a key driver of economic growth. In pre-pandemic times, it is estimated to have contributed to 7 per cent of the country's gross domestic product (GDP), 27 per cent of its industrial GDP and 49 per cent of its manufacturing GDP (Ministry of Heavy Industries and Public Enterprises 2019). The Covid-19 pandemic has had contradicting effects on India's automotive sales. On the one hand, as figure 1 shows, FY 2020-21 saw absolute automotive sales drop to a decadal low of 15 million, and it may take some time to bounce back to pre-pandemic levels. India, however, outperformed its contemporaries in terms of post-pandemic sales volume growth (Mohile 2022). All of this occurred while it slowly and steadily surpassed Japan to become the third largest market in absolute vehicle sales.

2. Data source

The country's automobile sales volumes are an aggregate of the sales in individual categories across each of its states and union territories (UTs). All data on volumes used in this issue brief have been sourced from the Ministry of Road, Transport and Highways (MoRTH) – Vahan Sewa portal. The portal captures registration figures for all categories of automobiles, recorded at 1,340 road transport offices (RTO) spread across 31 states and union territories. However, it currently excludes data from Andhra Pradesh, Madhya Pradesh, Lakshadweep, and Telangana. Registration figures as published on the portal, have been used as a proxy datapoint for sales or volumes (used interchangeably). Additionally, all data on the FAME II policy have been sourced from its official website as was depicted on 1st October 2022. FY 2022-23, wherever mentioned implies the first six months of the financial year (till 30 September 2022). The data used in this issue brief were collected in the first week of October 2022 and may be subject to minor changes. For the sake of simplicity, vehicles have been segregated into two major segments - internal combustion engine vehicles (ICEV) and electric vehicles (EV).

Figure 1 Recovery from the Covid-caused contraction in vehicle sales has been slow



Source: CEEW-CEF analysis

All variations such as hybrid technologies have been included under the former. These segments are further composed of the following categories -

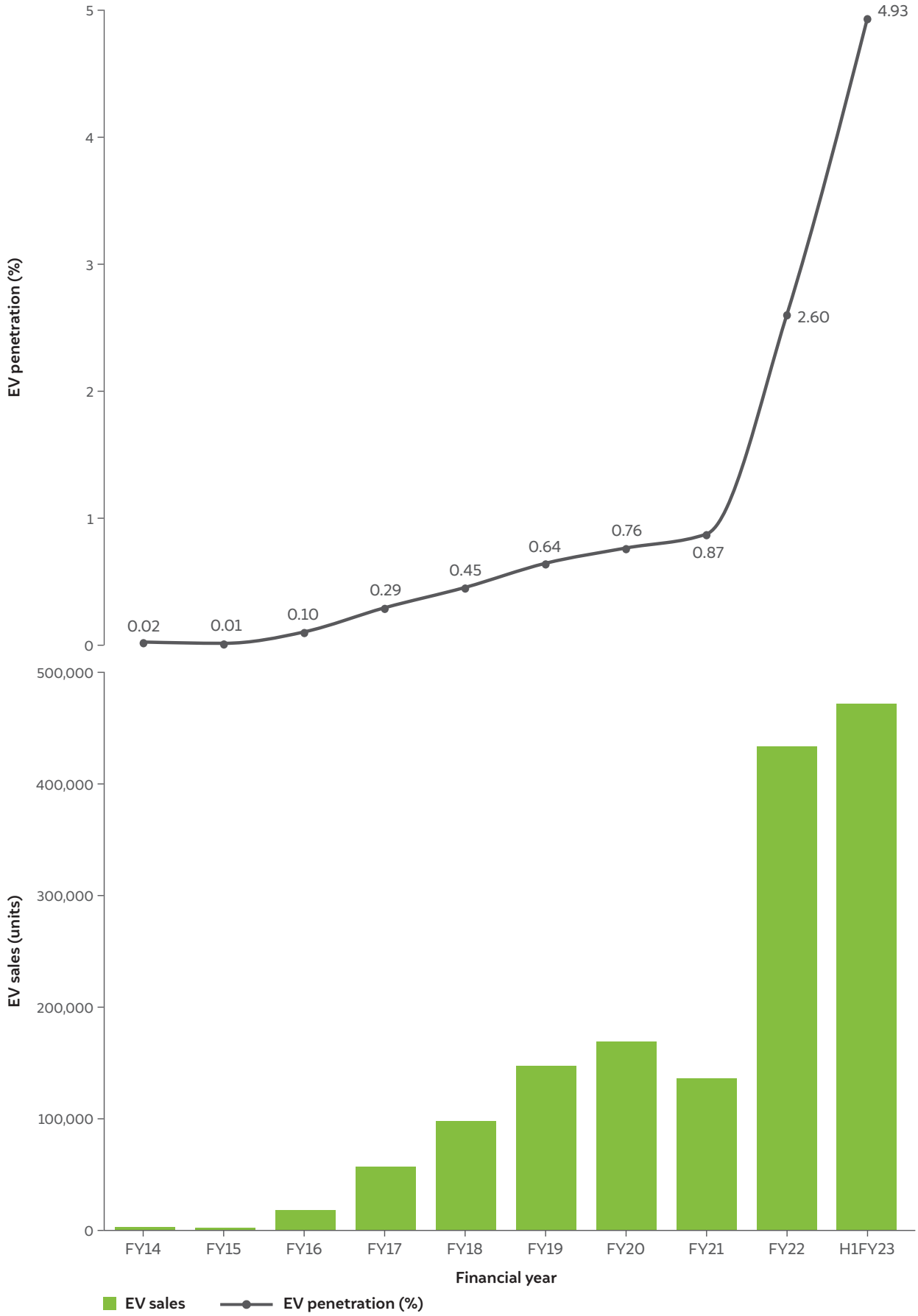
- Two-wheelers (2W)
- Three-wheelers (3W)
- E-rickshaws (not applicable for ICEVs)
- Four-wheelers (4W)
  - » Personal 4Ws
  - » Commercial 4Ws
- Buses
- All other vehicles

> **In January 2021 – EVs formed 1 per cent of all monthly auto sales, which then doubled to 2 per cent by August 2021 and reached 4 per cent by March 2022.**

3. India's electric vehicles

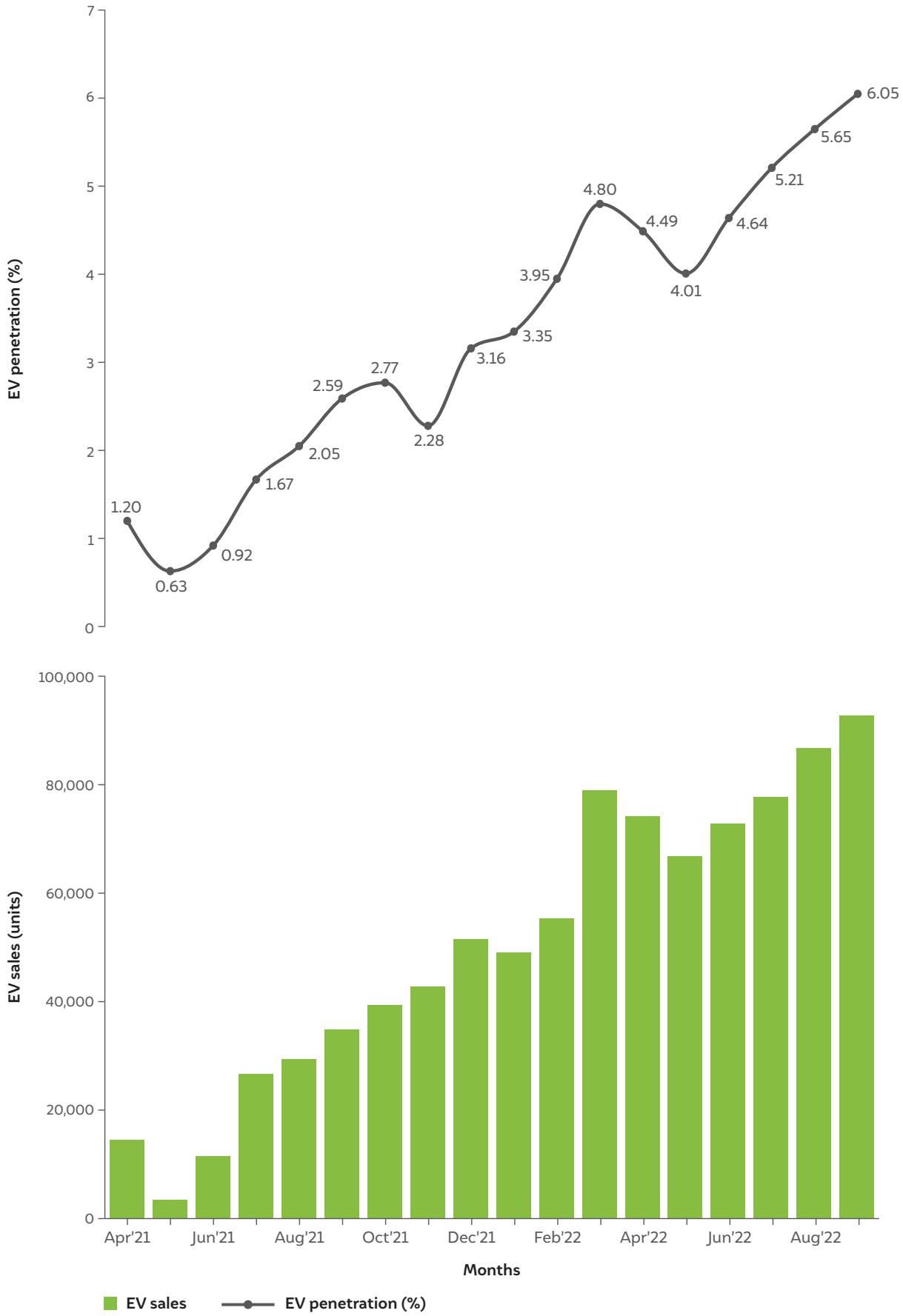
In contrast to India's automobile sector, which contracted by ~ 30 per cent following the onset of the pandemic, the EV segment showed a contraction of only 19 per cent. Moreover, it was quick to recover, as it went on to register a 3X growth in FY 2021-22 and has seen momentous growth ever since. This segment, which sold less than 3,000 vehicles in FY 2013-14, has now sold ~500,000 units in the first six months of FY 2022-23 alone (Figure 2). In January 2021 – EVs formed 1 per cent of all monthly auto sales, which then doubled to 2 per cent by August 2021 and reached 4 per cent by March 2022 (Figure 3). Despite a blip in trends due to the incidents of electric 2Ws catching fire, timely policy reaction helped EV sales recover soon after. Electric vehicles comprised 2.6 per cent of the country's total auto sales in FY 2021-22. However, these are penetration numbers the segment has long overshot since as EVs formed 6 per cent of India's monthly auto sales in September 2022. The average EV penetration for the first six months of FY 2022-23 stood at 4.9 per cent.

Figure 2 Electric vehicles witnessed rapid post-pandemic recovery in sales growth and market penetration



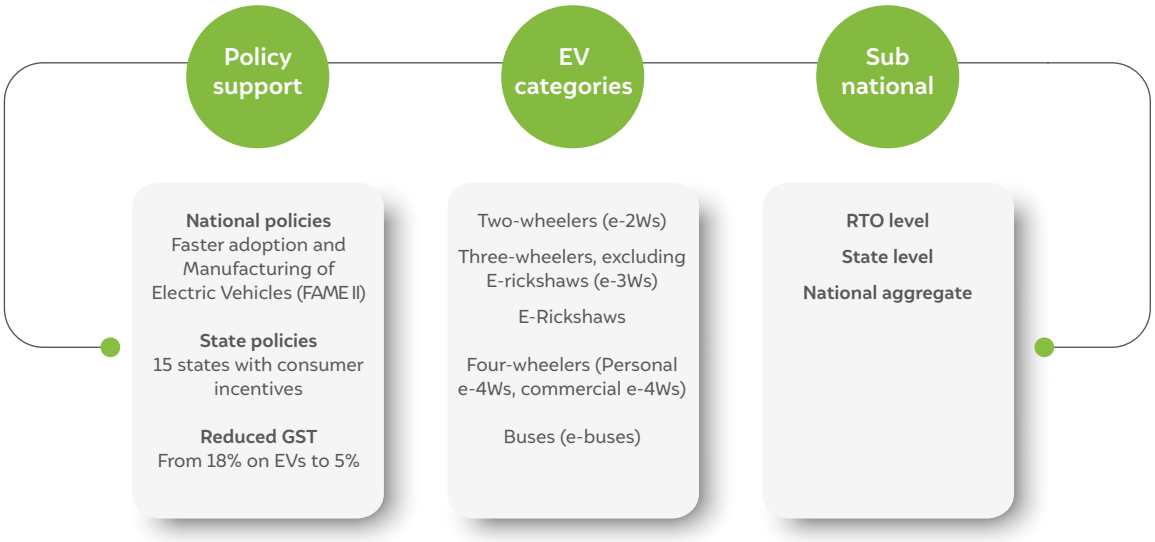
Source: CEEW-CEF analysis

Figure 3 India's electric vehicle market witnessed robust growth in monthly sales



Source: CEEW-CEF analysis

Figure 4 Major focus areas of this report



Source: CEEW-CEF analysis

The recent success of this new and emerging transition can be attributed to multiple factors. In this issue brief, we look at three facets of India's EV transition – policies, vehicle categories and subnational trends (Figure 4).

- On the policy front, the country's foremost national EV policy – the *Faster Adoption and Manufacturing of Electric Vehicles (FAME) II* policy - operates in parallel with 21 state EV policies. Of these 21 state policies, 15 provide consumer-specific incentives. We discuss each of these policies, their impacts, their impact on sales numbers, the progress made, and the major gaps in them.
- Categories within India's EV segment include electric two-wheelers (e-2W), electric three-wheelers (e-3W), electric rickshaws (e-rickshaw), personal and commercial electric four-wheelers (e-4W), and electric buses (e-bus). Each of these categories see differences in policy focus and demonstrates unique trends.
- Subnational include sales at the RTO and state levels. This issue brief also displays an aggregated national view.

4. Policies

EV policies in India have typically been applied at both the national and the state level as direct subsidies, goods and service tax (GST) concessions and income tax reliefs. Each of these incentives comes with its own unique features, and in some cases, may vary in their nature. The most common are direct purchase subsidies, which help bring down the cost of the vehicle. These may come with upper limits on the subsidy amount for each vehicle or an upper limit on the total number of EVs to be incentivized. Typically, these are calculated in one of the following ways -

- **Battery capacity**: where the subsidy amount is calculated based on the size of the vehicle's battery. Purchase subsidies are provided in 'INR/ kWh' form, eg., Delhi's EV policy provides a subsidy of INR 5,000/ kWh on the purchase of e-2Ws. Therefore, an e-2W of 2 kWh would receive a subsidy of INR 10,000 through the national capital's EV policy.
- **Cost**: where purchase subsidies are calculated as percentage of cost, eg., Odisha provides a purchase subsidy of 15 per cent on the cost of an e-2W. However, the state's policy also imposes a price ceiling of INR 5,000 per e-2W. Therefore, an e-2W costing INR 100,000 would receive a final purchase subsidy of INR 5,000.

Other types of consumer subsidies include:

- Demand generation incentives
- Early bird discounts
- Scrapping or retrofit incentives on ICEVs
- Road tax and registration charge exemptions
- SGST reimbursements

Incentives provided to EV buyers in India are often an amalgamation of India's 15 state-level and 1 national consumer centric policies. The following table summarises the evolution of these policies.

Table 1 An insight into India's EV policy evolution

National			
Year	**FAME**	**Tax**	**State**
FY15-16	**FAME I** • Implementable over two years • INR 7.95 billion allocated towards demand incentives (INR 4.95 billion), charging infrastructure (INR 300 million), pilot projects (INR 700 million) and others • Categories incentivized - e-2Ws, e-3W Auto, e-4W personal, LCVs and e-buses	–	–
FY16-17	–	–	–
FY17-18	**FAME I extended for two more years** *(INR 5.29 billion utilised in FAME I by its end)*		Karnataka
FY18-19	–	**GST concession** - Lithium-ion batteries reduced from 28% to 18%	Kerala* Andhra Pradesh Uttarakhand
FY19-20	**FAME II** • Implementable over three years • INR 100 billion allocated towards demand incentives (INR 85.96 billion) and charging infrastructure (INR 10 billion) • 133 specified models of following categories incentivized - e-2Ws, e-3Ws, e-rickshaws, e-4Ws, e-4W hybrids and e-buses[2]	**Income tax relief under section 80EEB** - Tax deduction up to INR 150,000 on interest paid on loans taken to finance EVs **GST concession** - EVs reduced from 12% to 5% (ICEVs - 28% - 43%) and chargers and charging stations reduced from 18% to 5%	Tamil Nadu Madhya Pradesh
FY20-21	–	–	Delhi* Telangana
FY21-22	**FAME II extended for two years with the following changes** • Energy Efficiency Services Limited (EESL) to aggregate e-3Ws and e-buses • E-2W incentives raised to INR 15,000/ kWh with a 40% cap on cost of vehicle	–	Assam* Goa* Gujarat* Maharashtra* Meghalaya* Odisha* West Bengal
FY22-23	–	Clarification released that concessional 5% GST rate applicable to EVs both with and without batteries	Haryana* Ladakh* Rajasthan* Chattisgarh* Chandigarh* Uttar Pradesh*

Source: CEEW-CEF compilation based on multiple policy documents

2. As on 30 September 2022,

*Indicates states with consumer subsidies for EVs

4.1 National policies

India's FAME policy is the bedrock of all Indian EV policies. FAME I was introduced in FY 2015-16 for a period of two years, and it was further extended for two more years. FAME II was subsequently launched in FY 2019-20 to be implemented over three years but was then further extended to FY 2023-24. The latter currently incentivises all e-2Ws, e-3Ws, e-rickshaws, commercial e-4Ws and e-buses, uniformly across all Indian states and UTs. However, benefits are further funnelled down to select original equipment manufacturers (OEM) and models that meet the criteria specified by the policy. As of September 2022, the policy incentivized a total of 133 EV models, most of which were e-3Ws and e-rickshaws, followed by e-2Ws and finally a few e-4Ws.

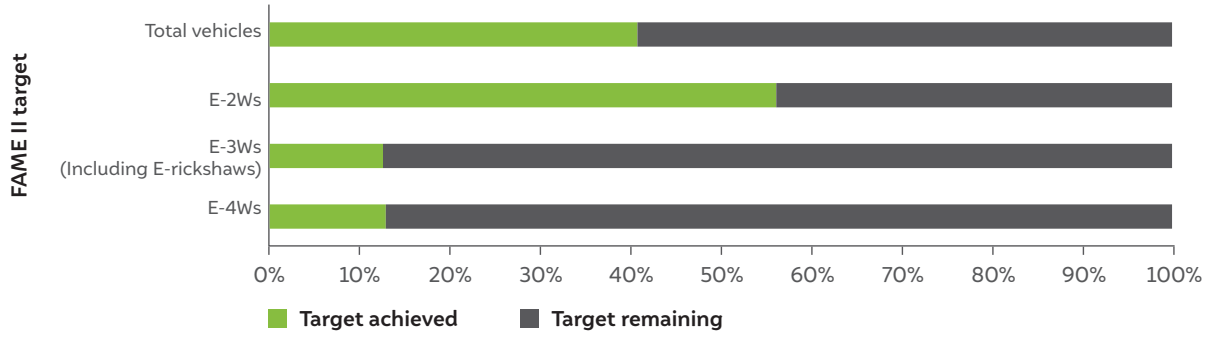
We find that FAME II still has a lot of headroom. The policy has two kinds of targets - monetary and the total number of vehicles to be subsidised. Only INR 26 billion had been utilised of the earmarked INR 85.7 billion as of September 2022. Additionally, while the policy aimed to incentivise 1,542,090 EVs (excluding hybrids) across categories, only 40 per cent of that target has been met. FAME II has been most impactful in driving E-2W volumes, with 56 per cent of their unit target achieved, whereas e-3Ws (including e-rickshaws) and commercial e-4Ws lag abysmally behind, both at 12 per cent.

E-buses present a more complicated picture. No source accurately specifies the total number of e-buses that have been incentivized by FAME II till date. States across the country have availed of benefits under the scheme. For example, Maharashtra's – Brihanmumbai electricity supply and transport (BEST) announced the deployment of 300 electric buses in Mumbai under the central FAME II scheme (PTI 2020). Further, a FAME II policy amendment released in June 2021 assigned EESL with the responsibility of aggregating demand for e-buses across nine 'four-million-plus' cities in India on an operating cost (OPEX) basis (Ministry of Heavy Industries and Public Enterprises and Department of Heavy Industries 2021). In accordance with this, a notification released in early 2022 noted that Convergence Energy Service Limited (CESL) had deployed 5,450 e-buses in the five major Indian cities of Kolkata, Delhi, Bangalore, Hyderabad and Surat (Ministry of Power 2022). Therefore, while no official number exists on the total number of e-buses that have been sold with FAME II incentives, a large share of the e-bus target appears to have already been met.

4.2 State policies

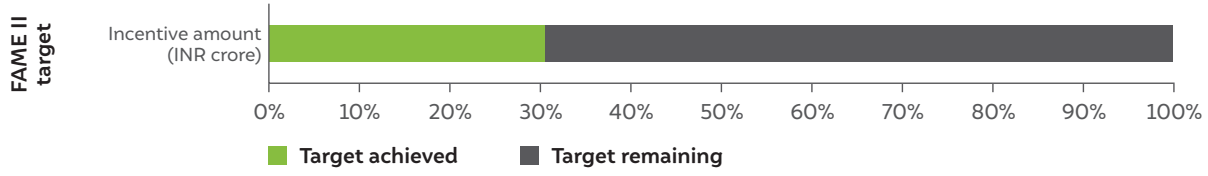
21 Indian states have currently released their own EV policies, with 15 of these providing subsidies to EV buyers. Chandigarh and Uttar Pradesh most recently announced their policies in October 2022. The policy comparison table provides a detailed comparison on the quantum of incentives and their various forms.

Figure 5a FAME II targets (units) achieved since FY 2019-20



Source: CEEW-CEF analysis

Figure 5b FAME II incentive amount disbursed



Source: CEEW-CEF analysis

Table 2 15 states provide consumer subsidies under their EV policies

Consumer subsidy	Vehicle category	Particulars	Kerala	Delhi	Odisha	Meghalaya	Gujarat	Assam	Maharashtra
			Mar-19	Aug-20	Feb-21	Apr-21	Jun-21	Jul-21	Sep-21
Purchase subsidy	E-2W	Incentive (INR/ kWh)		5,000	15%	10,000	10,000	10,000	5,000
		Value cap (INR)		30,000	5,000				10,000
		Vehicle cap (units)				3,500			1,00,000
	E-3W	Incentive (INR/ kWh)	25%	30,000[1]	15%	4,000	10,000	10,000	5,000
		Value cap (INR)	30,000		12,000				30,000
		Vehicle cap (units)				200			15,000
	E-4W	Incentive (INR/ kWh)		10,000	15%	4,000	10,000	10,000	5,000
		Value cap (INR)		1,50,000	1,00,000				1,50,000
		Vehicle cap (units)		1,000		2,530[6]			10,000
	Bus	Incentive (INR/ kWh)			10%	4,000			10%
		Value cap (INR)			20,00,000				20,00,000
		Vehicle cap (units)				30			1,000
Other subsidies		E-2W	3% interest subvention	Scrapping incentive of INR 5,000					Early bird discount of INR 5,000/ kWh[8] and scrapping incentive of INR 7,000
		E-3W		5% interest subvention[2] and scrapping incentive of INR 7,500				15% retrofitment incentive[7]	Early bird discount of INR 5,000/ kWh[9] and scrapping incentive of INR 15,000
		E-4W							Early bird discount of INR 5,000/ kWh[10] and scrapping incentive of INR 25,000
		E-Bus			5% interest subvention				
Road tax				100%	100%[3]	100%		100%	100%
Registration charges				100%	100%[4]	100%		100%	100%
SGST					100%[5]				
Policy document			Link	Link	Link	Link	Link	Link	Link
States with policies but without consumer incentives			Andhra Pradesh, Karnataka, Madhya Pradesh, Telangana, Tamil Nadu, Uttarakhand & West Bengal						

Source: CEEW-CEF compilation based on multiple state EV policy documents

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Purchase incentives are of two kinds - 1) INR / kWh or 2) % of cost. All incentives are provided in INR/kWh form, unless specifically mentioned otherwise.

Approximate battery size for e-2W is 2 kWh, e-3W is 5 kWh and e-4W is 15 kWh.

Models assumed for conversion of % of cost incentives into INR/kWh format are - Ather 450X (e-2W), Yatri Super (e-3W) and Tata Xpres T EV XM+ (e-4W). All chosen models are incentivised under FAME II.

Road tax, registration charges and SGST mentioned are all reimbursements, unless specifically mentioned otherwise.

Delhi EV policy

1 - Purchase incentive to be provided per vehicle to e-autos, e-rickshaws and e-carts
2 - Interest subvention only on loans taken from Delhi Finance Corporation

Odisha EV policy

3, 4, 5 - Only for e-buses

Meghalaya EV policy

6 - 2,500 e-4Ws and 30 strong hybrid 4Ws

Assam EV policy

7 - Up to INR 15,000 for 3 seater e-autos

Maharashtra EV policy

8, 9, 10 - Early bird incentive up to INR 1,00,000

Goa EV policy

11, 12, 13 - INR 10,000 in FY22, INR 8,000 in FY23, INR 6,000 in FY24, INR 4,000 in FY25 and INR 2,000 in FY26
14 - Scrapping incentive of INR 5,000 provided by OEM and Gov. of Goa, each

Haryana EV policy

15, 16 - 1,000 e-4Ws of price up to INR 6,00,000; 1,000 e-4Ws of price up to INR 10,00,000; 200 hybrid 4Ws of price up to INR 3,00,000; 200 units of hybrid 4W of price up to 5,00,000 and 200 units of hydrogen based vehicles
17 - Registration charges of INR 200 for 30,000 e-2Ws, 15,000 e-3Ws; and INR 500 for 10,000 e-4Ws, 2,500 hybrid 4Ws and 1,000 e-buses

Goa	Haryana	Rajasthan	Chhattisgarh	Ladakh	Chandigarh	Uttar Pradesh	Tamil Nadu
Dec-21	Jul-22	Aug-22	Aug-22	Aug-22	Sep-22	Oct-22	Feb-23
2,000 - 10,000[11]		**2,000 - 10,000**[18]	**10%**	**10%**	**3,000 - 5,000**[27]	**15%**[36]	**10,000**[43]
30,000			1,50,000	15,000	15,000 - 30,000[28]	5,000	30,000
3,000		1,00,000			10,000	2,00,000	6,000
2,000 - 10,000[12]		**2,000 - 10,000**[19]	**10%**	**10%**	**3,000 - 5,000**[29]	**15%**[37]	**10,000**[44,47]
60,000			1,50,000	30,000 - 50,000[23]	10,000 - 30,000[30]	12,000	40,000
50		50,000[20]			2,000[31]	50,000	15,000
2,000 - 10,000[13]	**15%**[15]	**30,000 - 50,000**	**10%**	**10%**	**5,000 - 10,000**[32]	**15%**[38]	**10,000**[45,48]
3,00,000			1,50,000	2,50,000 - 3,00,000[24]	1,50,000 - 2,00,000[33]	1,00,000	1,50,000
300	2,600[16]	4,000[21]			3,000[34]	25,000	3,000
	10%	**1,00,000 - 5,00,000**	**10%**	**25%**		**15%**[39]	**20,000**[46]
	200		1,50,000	50,00,000		20,00,000	10,00,000
		500				400	300
Scrapping incentive of INR 10,000[14] and manufacturing incentive of INR 5,000							Retrofit incentive - INR 10,000/ kWh[49]
Scrapping incentive of INR 10,000 and manufacturing incentive of INR 10,000						10% Early bird incentive for E-Goods carriers[40]	Retrofit incentive - INR 10,000/ kWh[50]
Scrapping incentive of INR 10,000 and manufacturing incentive of INR 15,000			Hybrid EVs to get 50% of BEV's subsidy	20% Early bird incentive[25]	Early bird incentive of INR 3,500/ kWh and retrofit/ scrapping incentive[35]		
		15% retrofit incentive[22]		50% Early bird incentive[26]			
						100%[41]	**100%**[51]
	INR 200 - 500[17]		**100%**			**100%**[42]	**100%**[52]
		100%	**Buses - 100%**				
Link	**Link**	**Link**	**Link**	**Link**	**Link**	**Link**	**Link**

Rajasthan EV policy

18 - Fixed battery INR 5,000 - 10,000 and swappable battery INR 2,000 - 5,000
19 - Fixed battery INR 10,000 - 20,000 and swappable battery INR 4,000 - 10,000
20 - 25,000 E-Rickshaws , e-carts and 25,000 e-auto and carrier category
21 - 1,000 personal e-4Ws, 1,000 commercial e-4Ws, and 2,000 maxi cabs
22 - 3,000 E-3Ws up to INR 10,000, 2,000 e-4Ws up to INR 15,000, 200 e-buses up to INR 2,50,000

Ladakh EV policy

23 - E-rickshaw & e-cart up to INR 30,000 and e-3W up to INR 50,000
24 - Car up to INR 2,50,000 and LCV/ state carriages, maxi cabs up to INR 3,00,000
25 - 28 E-2Ws up to INR 30,000, 10 e-rickshaw & e-cart up to INR 60,000, 10 e-3W up to 1,00,000, 33 cars up to INR 5,00,000, 9 LCV/ state carriages, maxi cabs up to INR 6,00,000 (for one year only)
26 - 11 E-buses to get up to INR 1,00,00,000 (for one year only)

Chandigarh EV policy

27, 28 - Fixed battery INR 5,000 up to INR 30,000 and swappable battery INR 3,000 up to INR 15,000
29, 30 - E-Cart and e-auto fixed battery INR 5,000 up to INR 30,000 and swappable battery INR 3,000 up to INR 15,000
31 - 1,000 E-Carts and 1,000 e-autos
32 - Personal e-4Ws fixed battery INR 5,000 up to INR 1,50,000 and commercial e-4Ws fixed battery INR 10,000 up to INR 2,00,000
33 - 2,000 personal e-4Ws and 1,000 commercial e-4Ws
34 - Maximum early bird incentive INR 50,000
35 - Scrapping incentive of INR 5,000 for e-2Ws, INR 7,000 for personal and commercial e-4Ws; retrofit incentive of 15% for all others up to INR 10,000 for e-carts and INR 15,000 for e-autos

Uttar Pradesh EV policy

36, 37, 38, 39 - Early bird incentive provided at dealerships for a period of 1 year from date of policy notification
40 - 1,000 E-Goods carriers upto INR 1,00,000
41, 42 - Exemption provided to all EVs purchased and registered in UP for first 3 years of policy, then to only those manufactured, purchased and registered in UP for year 4 and 5 of policy term

Tamil Nadu EV policy

43, 44, 45, 46 - EVs manufactured, sold and registered in Tamil Nadu
47 - E-autos and light good carriers
48 - Cabs and goods vehicles
49 - 30,000 e-2Ws upto INR 15,000/ vehicle
50 - 15,000 e-3Ws (e-autos and electric light goods carriers) upto INR 20,000
51, 52 - E-2Ws, e-rickshaws, electric transport vehicles, electric light goods carriers, e-4W (personal) and e-buses till 31st December 2025.

Subsidies are essential in bringing down the currently high upfront cost of EVs, especially e-2Ws and e-3Ws. Concessions provided to buyers at the national and state level help make them cost competitive with similar ICEVs. 13 Indian states provide incentives for e-2Ws and 13 for e-3Ws (including e-rickshaws in some cases). The following chart tries to provide an example on how the various cost components of a vehicle purchase may differ based on its fuel type. It demonstrates the price movement of an average e-2W and internal combustion engine vehicle (ICEV) 2W in the state of Maharashtra. The models chosen for each segment are as follows –

- E-2W – Ather 450X priced at INR 117,000 (including 5 per cent of GST)[3]
- ICEV 2W – Hero Maestro Edge 125 priced at INR 86,000 (including 28 per cent of GST)[4]

The various price components included are –

- Central GST (CGST)
- State GST (SGST)
- Road tax
- Registration chargers
- Purchase incentives – State subsidy and FAME II subsidy

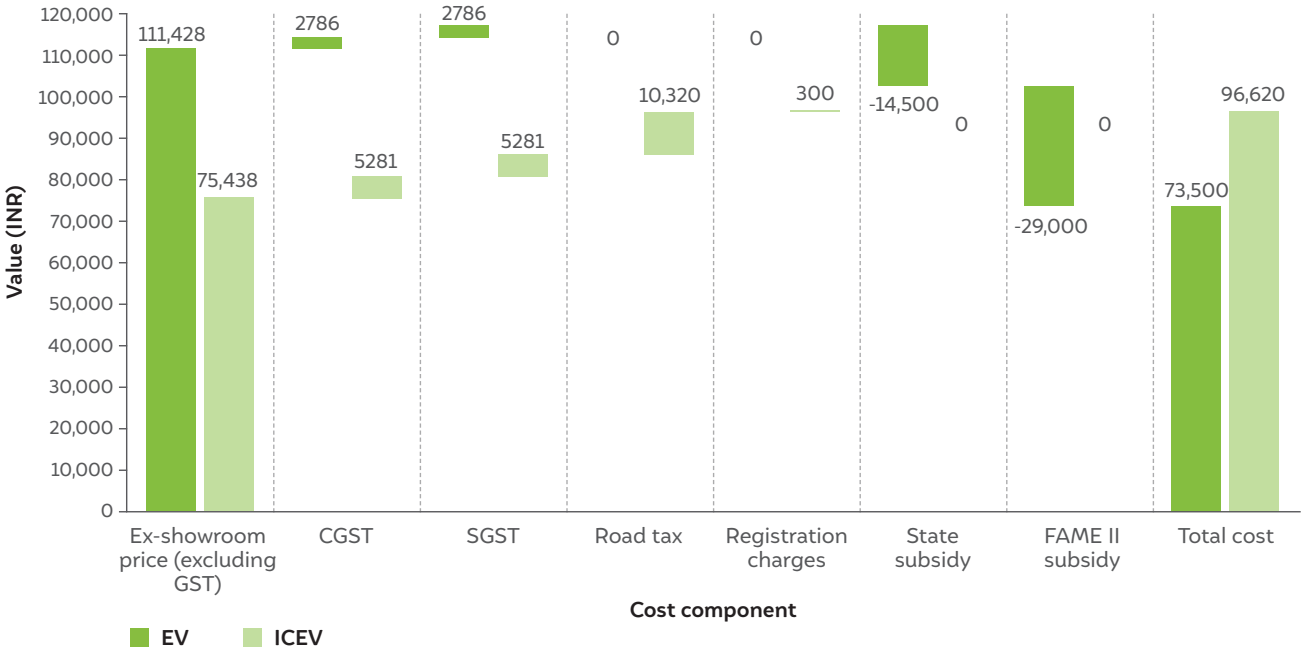
E-2Ws are excluded from road tax and registration charges in Maharashtra and receive a FAME II subsidy of INR 29,000. An incentive of INR 5,000/ kWh incentive for a vehicle with a 2.9 kWh battery sees a further reduction of INR 14,500. The e-2W, which starts out at a considerably higher price than its traditional counterpart, eventually becomes cheaper. Its final on-road price stands at ~INR 73,000 as compared to the ICEV 2W, which is finally priced at ~INR 96,000.

5. Vehicle categories

Indian 2Ws have long dominated both global and domestic sales. As the world's largest 2W market, it also forms the backbone of the domestic auto industry. 2Ws formed nearly three-quarters of the traditional ICEV market in FY 2021-22 and H1 FY 2022-23[6], accounting for ~73 per cent of all sales (Figures 7 and 8). Personal 4Ws came a distant second, comprising 16 per cent of the market. 3Ws, commercial 4Ws and other categories formed only slivers in India's traditional auto market pie.

India's EV segment however tells a different story (Figures 9 and 10). Combined sales from FY 2021-22 and H1 FY 2022-23[7] show that the market was jointly

Figure 6 Subsidies and exemptions can heavily impact the final price of an EV[5]



Source: CEEW-CEF analysis

3. Based on rough industry estimates. The chosen model was incentivized by FAME II as of September 2022.
4. Based on rough industry estimates.
5. Ex-factory price here excludes GST, which has been shown separately.

6, 7 Till 30 September 2022.

led by e-2Ws and e-rickshaws. Together, they formed ~93 per cent of the total market. E-4Ws (personal and commercial), although only comprising a slim share of 3.6 per cent, have seen a huge spurt in sales over the last few years. From 1,300 units in FY 2017-18, this vehicle category sold more than 19,000 units in the first six months of FY 2022-23 alone.

E-2Ws drive India's EV market like they do its traditional ICEV market. And there may be many reasons behind this - competitive prices, the large number of available models, easy charging options, low operational cost, and rural and urban popularity, to name a few. The raging popularity of EVs in India can be almost entirely attributed to the success of this category.

Approximately 25,000 e-2Ws were sold in FY 2019-20, a number that has since jumped to nearly 300,000 units in the first half of FY 2022-23 alone (Figure 11). While in isolation these trends might seem encouraging, the penetration of e-2Ws in total 2Ws still remains low. E-2Ws formed only 4 per cent of all 2Ws in the first six months of FY 2022-23.

Electric rickshaws too have found much success in certain parts of the country. These seem to be extremely popular as first and last mile transport in states like Uttar Pradesh and Tripura. The traditionally high sales volumes saw a dip owing to the Covid-19 pandemic, but they have since recovered (Figure 12). More e-rickshaws were sold in the first six months of FY 2022-23 than in the whole previous year.

Figure 7 Category wise split of ICEVs (FY 2021-22)

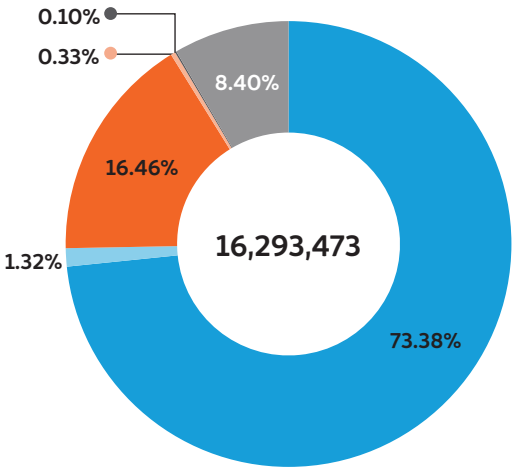


Figure 8 Category wise split of ICEVs (H1 FY 2022-23[8])

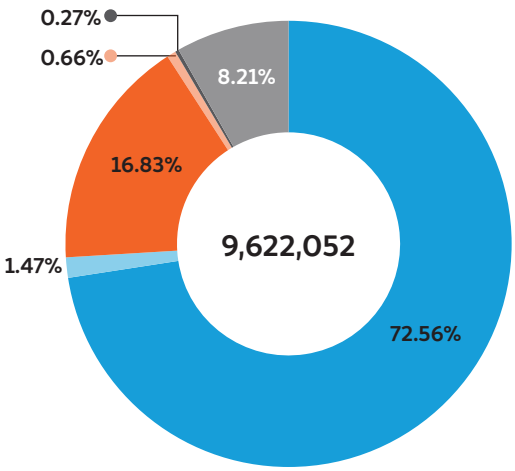


Figure 9 Category wise split of EVs (FY 2021-22)

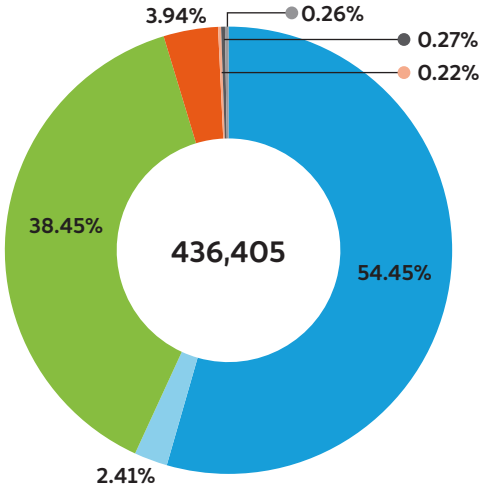
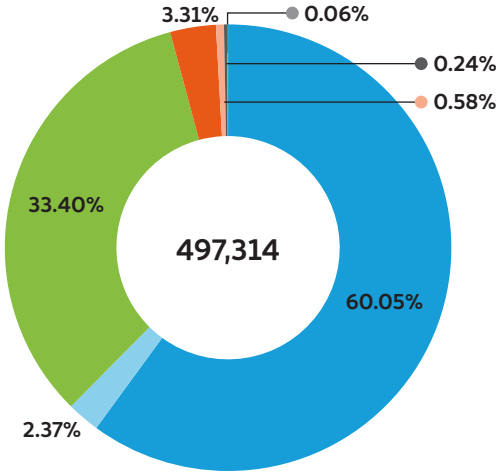


Figure 10 Category wise split of EVs (H1 FY 2022-23[9])

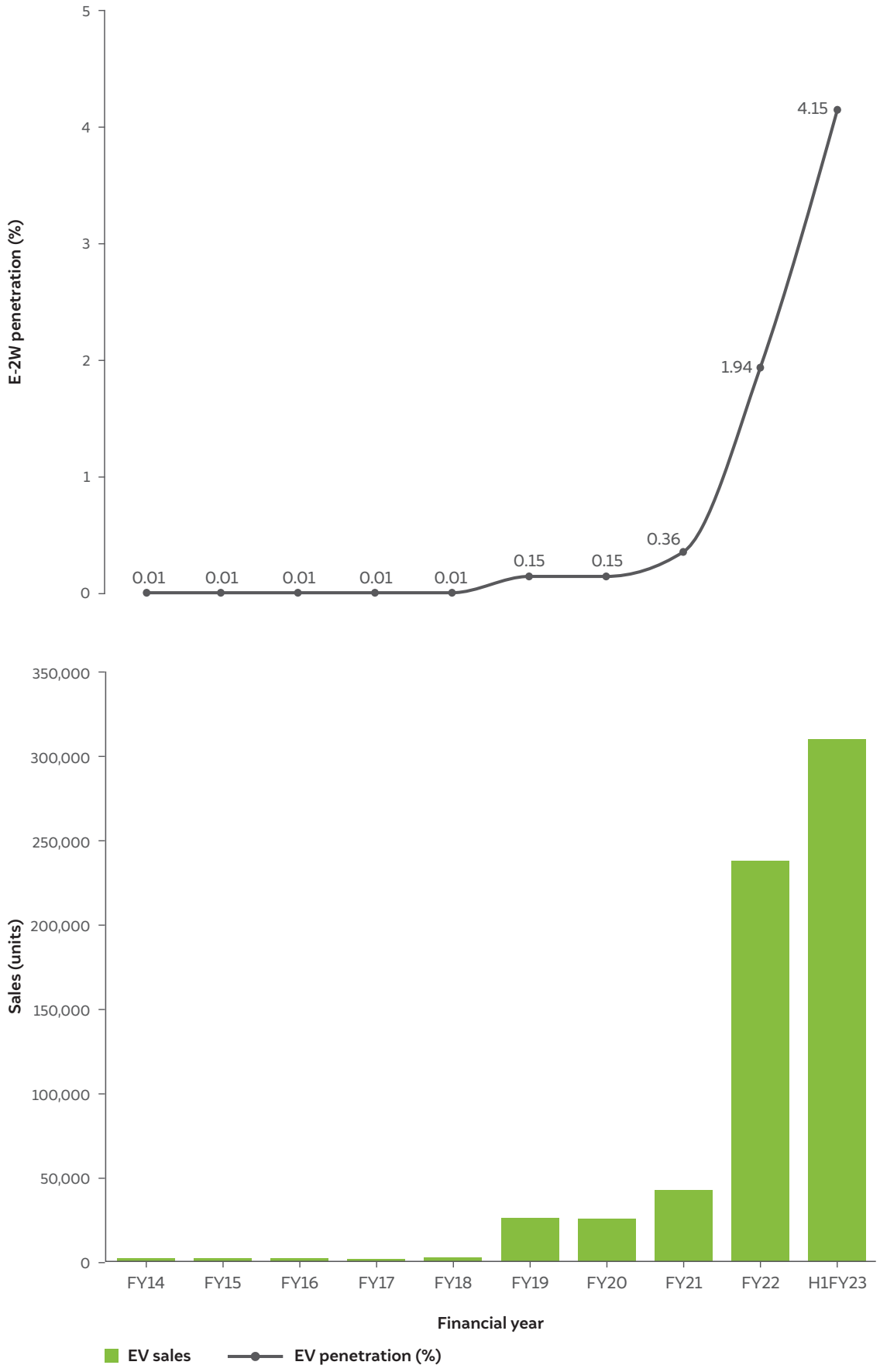


2W 3W E-Rick 4W (P) 4W (C) Bus Others

Source: CEEW-CEF analysis

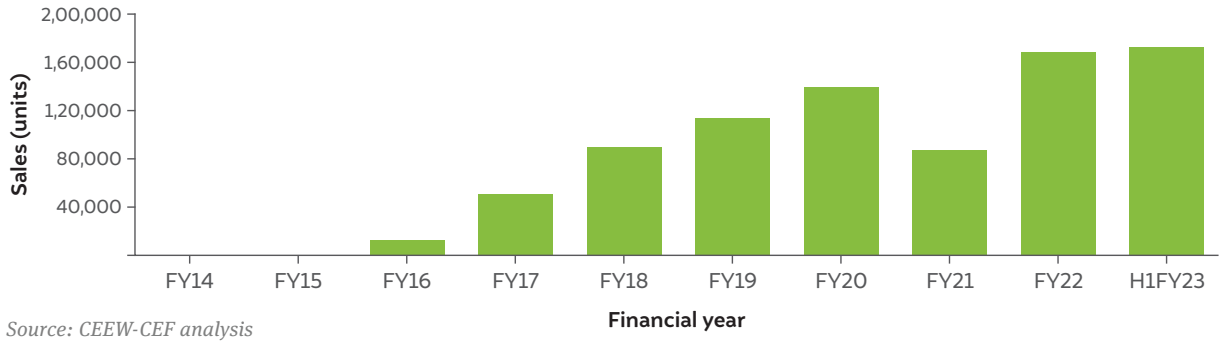
8, 9 Till 30 September 2022.

Figure 11 Annual e-2W sales have seen a significant spurt in recent years



Source: CEEW-CEF analysis

Figure 12 Annual e-rickshaw sales recovered from the sharp decline caused by the pandemic



Source: CEEW-CEF analysis

6. Subnational trends: states and RTOs

Furthering our deep dive into what builds India's EV transition, we now look at the subnational narrative. Each of India's top ten states in EV sales demonstrates unique trends as seen in table 2. This table shows category-wise trends for the top five Indian states with the highest EV sales for the combined years of FY 2021-22 and H1 FY 2022-23[10]. The sales share of individual categories shows the break-up of total EV sales in these. The penetration percentage demonstrates the electrification of categories within each state. States like Maharashtra, Karnataka, Tamil Nadu, and Rajasthan can attribute their success in EV sales to the success of the e-2W category. In contrast, EV success in northern states such as UP are driven by e-rickshaw sales. While the share of e-buses in EV sales consistently remains low across all states, this category has high penetration numbers in Delhi, Maharashtra and UP.

Table 3 lists India's top five greenest states. This is defined as all states with absolute EV sales higher than the national average of 27,507 units, then listed as per EV penetration levels for FY 2021-22 and H1 FY 2022-23. Delhi leads with the country's highest EV penetration of 8.3 per cent, followed by Assam.

Table 3 Indian states with the highest EV sales (FY 2021-22 – H1 FY 2022-23[11])

			Share of individual categories (%) (Defined as the categorial break up of all EVs in a state)						Penetration (%) (Defined as the % of EVs in each category)				
State	EV sales (units)	EV penetration (%)	E-2W	E-3W	E-rickshaw	E-4W (P)	E-4W (C)	E-bus	2W	3W	4W (P)	4W (C)	Bus
Uttar Pradesh	165,338	3.91	12.74	0.81	85.95	0.12	0.02	0.34	0.65	2.50	0.04	0.27	11.05
Maharashtra	112,979	3.78	84.03	1.07	3.90	10.12	0.27	0.60	4.65	2.62	2.08	1.88	15.42
Karnataka	92,690	4.85	90.15	4.22	1.04	3.50	0.76	0.29	6.23	12.49	0.99	6.03	6.26
Tamil Nadu	69,980	3.04	90.15	4.20	0.91	3.29	0.02	0.00	3.47	12.73	0.75	0.25	0.00
Rajasthan	68,018	4.19	64.12	0.69	32.95	2.18	0.04	0.00	3.91	3.25	0.66	0.51	0.00

Source: CEEW-CEF analysis

Table 4 India's greenest states (FY 2021-22 – H1 FY 2022-23[12])

			Share of individual categories (%)						Penetration (%)				
State	EV penetration (%)	EV sales (units)	E-2W	E-3W	E-rickshaw	E-4W (P)	E-4W (C)	E-bus	2W	3W	4W (P)	4W (C)	Bus
Delhi	8.30	61,449	48.55	6.26	36.15	0.12	3.02	0.55	6.74	28.19	1.50	46.35	29.39
Assam	5.91	40,941	3.96	0.95	94.92	10.12	0.01	0.00	0.34	4.07	0.06	0.12	0.00
Karnataka	4.85	92,690	90.15	4.22	1.04	3.50	0.76	0.29	6.23	12.49	0.99	6.03	6.26
Rajasthan	4.19	68,018	64.12	0.69	32.95	3.29	0.04	0.00	3.91	3.25	0.66	0.51	0.00
Uttar Pradesh	3.91	165,338	12.74	0.81	85.95	2.18	0.02	0.34	0.65	2.50	0.04	0.27	11.05

Source: CEEW-CEF analysis

10, 11, 12. Till 30 September 2022

While Pune leads the country as the RTO with the highest number of EVs sold (at 21,665 units), it lags in terms of penetration. Table 4 lists out the top five RTOs with the highest absolute EV sales for FY 2021-22 and H1 FY 2022-23. Table 5 lists out lists out the top 5 greenest RTOs in India. These are RTOs with absolute sales above the national average of 452 units and have been listed according to their penetration percentages.

Delhi's Burari taxi unit presents as the country's greenest RTO. The centre, famously known as a hub for the registration of commercial vehicles such as e-rickshaws and passenger cabs, has a penetration level of ~46 per cent - i.e., 46 per cent of all vehicles registered at the RTO are EVs. This is followed by Delhi's I.P. estate with a penetration level of ~23 per cent, and RTOs in state capitals Chennai and Bengaluru.

Table 5 Indian RTOs with the highest EV sales (FY 2021-22 – H1 FY 2022-23[13])

RTO	State	Sales (units)	Penetration (%)
Pune	Maharashtra	21,665	7.40
Surat	Gujarat	17,488	8.11
Bengaluru (South)	Karnataka	17,063	12.91
Pimpri Chinchwad	Maharashtra	14,214	7.97
Jaipur (Jhalana)	Rajasthan	14,124	6.91

Source: CEEW-CEF analysis

Table 6 India's greenest RTOs (FY 2021-22 – H1 to FY 2022-23[14])

RTO	State	Penetration (%)	Sales (units)
Burari taxi unit	Delhi	46.38	1,853
I. P. estate	Delhi	22.79	3,059
Chennai (East)	Tamil Nadu	13.94	2,725
Bengaluru (South)	Karnataka	12.91	17,063
Electronic city	Karnataka	11.44	10,520

Source: CEEW-CEF analysis

7. Policies and impact

Policies can be viewed as levers to nudge behaviour to achieve desired outcomes. In that context, and from the specific perspective of consumer EV subsidies (whether embedded in FAME or state policies), their purpose is to drive EV volumes. This raises three very fundamental questions with respect to their impact as outlined below.

Question 1: Are states with policies experiencing superior EV volume growth?

Question 2: Are states with higher incentives experiencing superior EV volume growth?

Question 3: What are some gaps in EV policies?

As the national level, FAME II policy is uniformly applicable across the country, we have looked to the state policies to answer questions 1 and 2. This is because they feature some very visible differences including the following:

- The presence of consumer incentives
- The nature of consumer incentives

On the other hand, given that the FAME policy represents a much bigger corpus of incentive than any state policy, we have looked at FAME rather than the state-level policies to identify gaps to answer question 3.

Question 1: Are states with policies experiencing superior EV volume growth?

The implementation of the 15 state policies, coupled with the extension of the FAME II scheme, is testament to the belief that policies are instrumental in the growth of this sector. However, we must first attempt to examine whether EV policies do in fact impact and benefit sales. Do states with policies perform better than those without?

Figure 14 consists of the following state categorisations -

- National – A national aggregate of all Indian states
- Group A – States that provide purchase incentives for EV buyers
- Group B – States that do not provide purchase incentives for EV buyers

13, 14. Till 30 September 2022

When rebased to FY 2017-18 (when Karnataka launched the country's first state EV policy), we notice that the time series chart consistently shows group A outperforming both the national average and group B. Group A's performance is seen to be more than 2X of states without consumer incentives. Today, states with consumer policies show sales ~ 14X of their FY 2017-18 volumes. In contrast, states without any consumer incentives showed a smaller market growth of ~ 6X – much lesser than the national growth of ~ 9X.

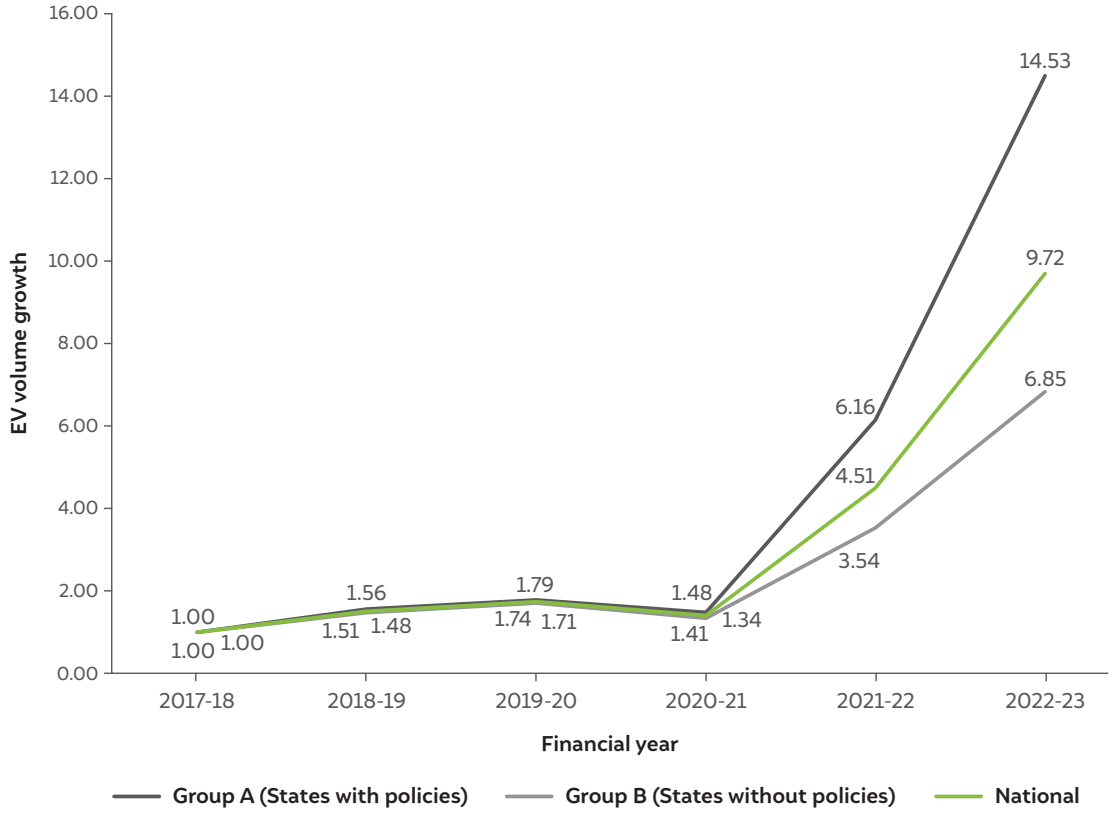
Question 2: Are states with higher incentives experiencing superior EV volume growth?

Figure 15 displays five Indian states with e-2W incentives provided in INR/ kWh form. E-2W sales figures have been rebased to six months before the announcement of states' respective policies. It displays a one year timeline, six months before and after the announcement of a state's EV policy. It excludes all states without six months of sales records such as Chandigarh and Rajasthan. Further, it also excludes Meghalaya because of its minimal sales volumes. Some states provide e-2W subsidies in the range of INR 2,000/ kWh - INR 5,000/ kWh whereas others provide higher subsidies up to INR 10,000/ kWh. This chart tries to analyse whether higher incentives do in fact translate into higher sales volumes. States that provide higher incentives up to INR 10,000/ kWh to e-2Ws have demonstrated more than a ~20X growth in their sales volumes compared to six months before following their policy announcements. These are states such as Assam, Goa and Gujarat. In contrast, Delhi and Maharashtra, which provide incentives up to INR 5,000/ kWH for e-2Ws have seen their markets grow by only 4.5X (Figure 15).

Question 3: What are some gaps in EV policies?

While policies may have a clear impact on the sales performance of a state, existing EV policies in the Indian context are not without flaws. While ~93 per cent of all e-2Ws and 79 per cent of commercial e-4Ws sold in the country since FY 2019-20 have been incentivized by the national FAME II policy, only 12 per cent of all e-3Ws have availed of subsidies (Figure 16).

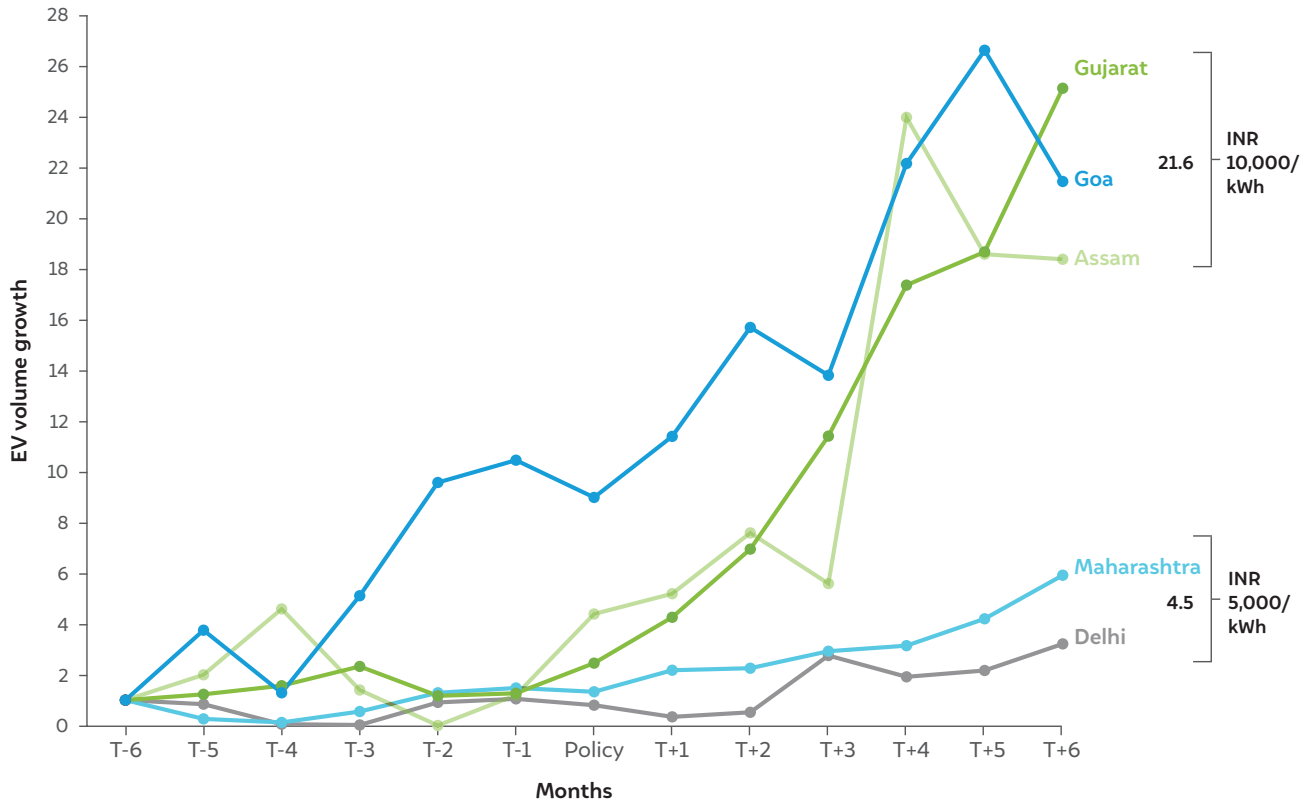
Figure 13 States with policies showed a much higher market growth than those without policies



Source: CEEW-CEF analysis

Note: FY23* is till September 2022

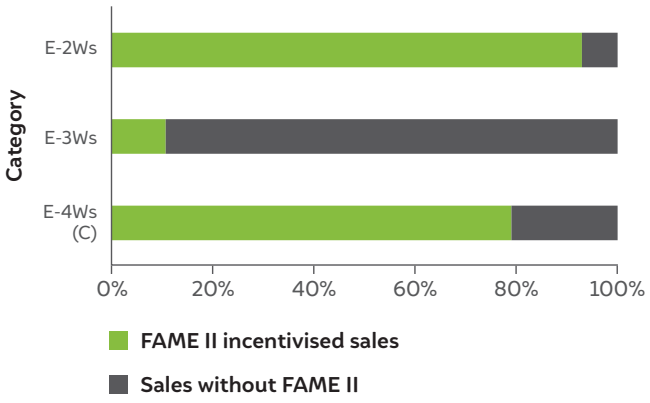
Figure 14 States with higher incentives saws a larger market growth than those with smaller incentives



Source: CEEW-CEF analysis

Note: FY23* is till September 2022

Figure 15 E-2Ws and commercial e-4Ws have been more successful in availing subsidies than e-3Ws



Source: CEEW-CEF analysis

Note: FY23* is till September 2022

This is despite the fact that of the 133 models incentivized by FAME II as of September 2022, the majority as e-3Ws (including e-rickshaws). This suggests that the more popular models are being excluded from incentives. In addition to this, the domestic manufacturing limits play a role which model receives the policy subsidy, too.

8. Conclusion and the way forward

The story of India's new and emerging EV sector cannot be told without considering the individual narratives of each of its categories and subnational trends. Policies, as demonstrated, shepherd not just the kickstart of this transition, but also its growth. Going forward, our recommendations are as follows.

8.1 National

- An official EV transition target for India's automotive sector that could provide appropriate direction for the subnational narrative.
- The vast majority of e-3Ws (including e-rickshaws) are sold without any FAME II subsidies and only 12.5% of the e-3W FAME II unit target has been achieved. This points to poor uptake of subsidised models. Policymakers may consider higher per vehicle incentives, to spur volume growth of approved e-3W models.
- FAME II could consider the inclusion of heavier vehicles to incentivise the electrification of more light duty vehicles (LDV) and medium duty vehicles (MDV).

> **Policymakers may consider higher per vehicle incentives to spur volume growth of approved e-3W models.**

8.2 State

- Our analysis depicts that states with subsidies for EV buyers may record a market growth that is more than 2X higher than those without subsidies for EV buyers. Therefore, states which have not already done so must consider introducing EV policies as an instrument to grow their local EV markets.
- States providing higher incentive amounts on a per kWh basis record more than a 4X sales growth over states providing lower incentive amounts. Therefore, states may carefully consider their preferred incentive amounts when announcing policy subsidies.
- State EV policies, when introduced, must carefully consider the prevalent use-case of vehicle categories in their states. By incentivising categories more suited for electrification, they could ensure the growth of their EV markets. For example, Indian states such as UP and Tripura that are more conducive to the first and last mile transport of people through e-rickshaws could target this successful category.
- The introduction of kick-starter incentives such as early bird incentives for states with low EV volumes may be successful in generating an initial demand for it.
- The exemption of road tax which has been introduced in 6 states and forms a high share of the on-road price, can form a high share of the on-road price, can help bring further price parity in vehicles.

References

Ministry of Heavy Industries and Public Enterprises. 2019. "Second Phase of the Fame India Scheme Commenced From 1st April 2019 Outlay of Rs. 10,000 Crore for 3 Years under Fame-II 5595 e-Buses to 64 Cities in 26 States under Fame-II." Press Information Bureau. 2019. https://pib.gov.in/newsite/PrintRelease.aspx?relid=196019.

Ministry of Heavy Industries and Public Enterprises, and Department of Heavy Industries. 2021. "Corrigendum."

Ministry of Power. 2022. "CESL Discovers Lowest Ever Prices for 5450 Buses under the FAME II Scheme." 2022. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1820225.

Mohile, Shaily Seth. 2022. "India Is the Only Growth Market for Autos Globally: S&P Global Mobility." *Business Standard*, 2022.

PTI. 2020. "BEST Gets 26 New Electric Buses under FAME India Scheme." ET Auto, 2020. https://auto.economictimes.indiatimes.com/news/commercial-vehicle/mhcv/best-gets-26-new-electric-buses-under-fame-india-scheme/79430245.

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