JMK Research & Analytics

E-CARS MARKET IN INDIA

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JMK Research & Analytics

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Executive Summary

The adoption of Electric cars (E-Cars) globally has witnessed a surge, with sales in the first half of 2021 already surpassing the 2020 sales. Similar trends can be observed in India too. However, this growth is not at the same scale as in other countries. For instance, while the share of Battery Electric vehicles (BEVs) in the total number of passenger vehicles sold in Europe was 5.4%, the same in India was a minuscule 0.2% in FY2020. However, as per JMK Research's projections, E-Cars are expected to account for nearly 12% of all passenger cars by FY2026.

While positive steps have been taken by the Central government to promote and accelerate the growth of an EV ecosystem in India, recent restructuring in FAME-II policies suggest that the government has shifted its focus on electric 2 wheelers (E2Ws) to generate demand for achieving short-term growth. However, from a long-term perspective, E-Cars are expected to play a pivotal role, especially in the aftermath of the COVID-19 pandemic with a surge in the need for personal mobility.

Switching to E-Cars from the traditional fuel-driven cars has many advantages even in the present scenario. The Total Cost of Ownership (TCO) analysis done by JMK Research for this report shows that while E-Cars may demand a higher upfront cost versus its ICE counterparts, the TCO over a 5-year and 10-year period will be 35-56% lower for E-Cars, depending on the driving scenario. Nevertheless, there are some notable barriers when it comes to choosing E-Cars over ICE cars, the major one being the lack of options in the market presently.

Over the last four years, the E-Car sales have been driven by two players, namely Tata Motors and Mahindra, which together account for 80% of the total market. These players have single models each, which are available for prices between INR 8 lakh and INR 14 lakhs. However, the absence of options in the affordable segment (Price < Rs. 8 lakhs) could translate to slower adoption of E-Cars. Other notable barriers to E-Car adoption are range concerns, lack of charging infrastructure, absence of financing mechanisms, and safety concerns among end users regarding the batteries.

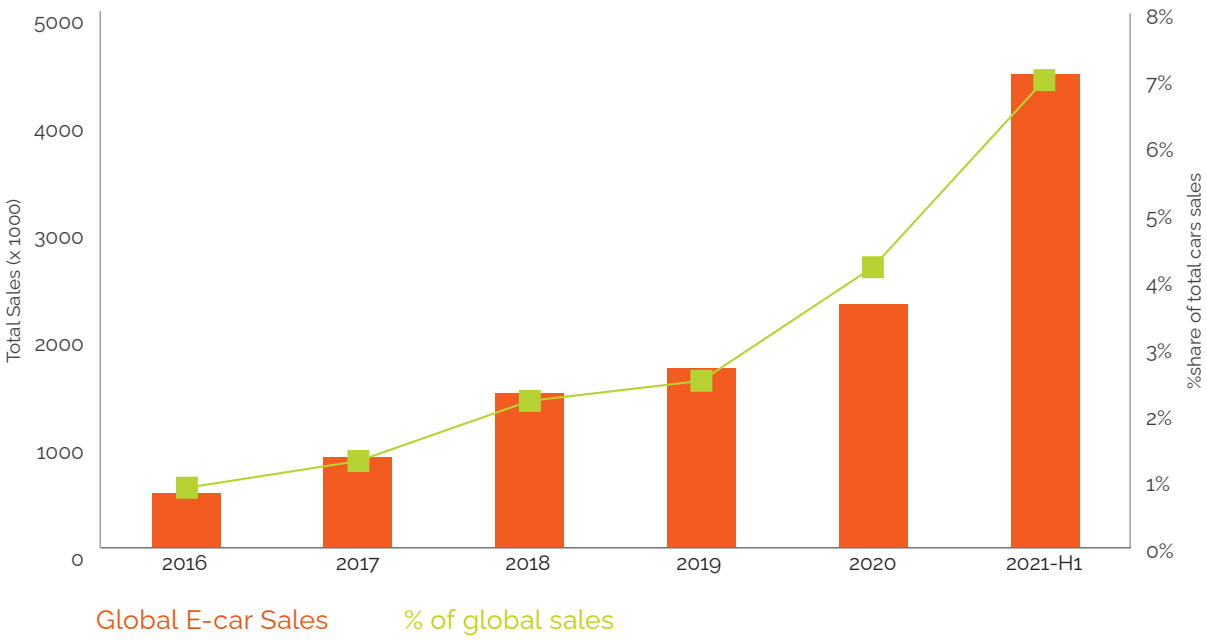
This report maps out the present status of the E-Car market in India, studies the key players present in the market, highlights the challenges and barriers to its adoption, analyses the central and state-level policies in place to understand its effects and gives an outlook to where the E-Car market is headed towards in the future.

1. Global E-cars Sales Trends

With the lingering threat of climate change over all regions alike, there is an immediate need to decarbonize our countries to minimize its impact. The transport sector is the third[1] biggest contributor to Greenhouse gases (GHG) in India, majority of which comes from the road transportation sector alone. Switching to electric mobility offers major benefits, with a study[2] by International Council on Clean Transport (ICCT) showing that India's currently registered average-sized E-Cars will emit 19-34% less GHG emissions as compared to their Internal Combustion Engines (ICE) counterparts over the lifetime.

Globally, EVs accounted for 4.2%[3] of the total vehicle sales in 2020, signifying a 43% increase in sales as compared to 2019 sales, despite the disruption caused by COVID-19. Europe was the largest market with E-Car sales in 2021, followed by China and the United States of America.

Figure 1.1 : Global E-Car Sales Trend



Source: EV Volumes, JMK Research

As illustrated in the figure above, global E-Car sales in the first half of 2021 clocked 44,16,000 units, which is more than twice the sales numbers achieved in 2020. This phenomenal growth can be attributed to major efforts undertaken by Europe, China, and the USA, which are the major drivers of sales globally. This, coupled with the availability of an extensive EV charging infrastructure and the various model options available to consumers which are at par with ICE alternatives, have made E-Cars extremely popular.

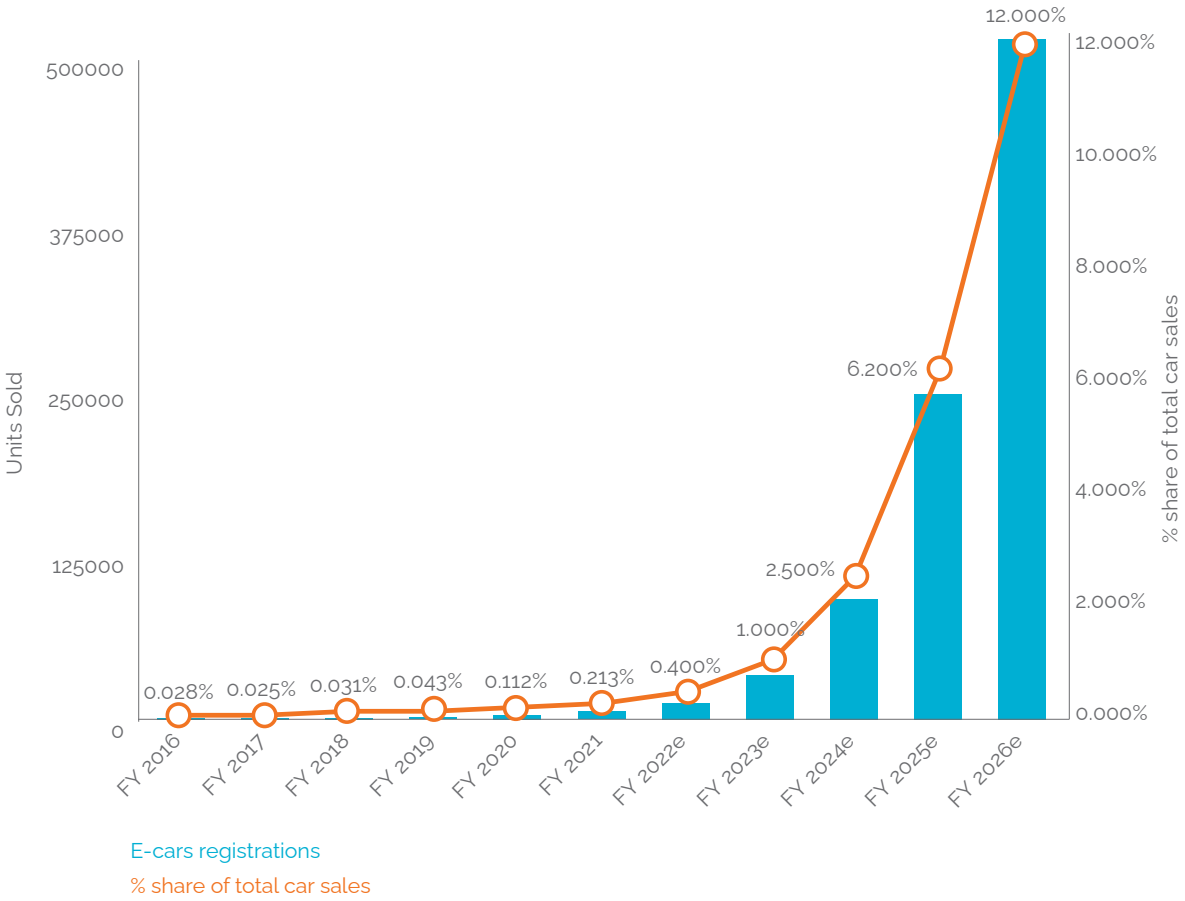
1. *Springer, 'Greenhouse Gas Emissions in India's Road Transport Sector', January 2019*
2. *ICCT, 'A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars', July 2021*
3. *Europe overtakes China in EV sales growth in 2020 | S&P Global Platts (spglobal.com)*

2. India Market Overview

In India, compared to its global counterparts, the growth of E-cars has been particularly slow. As depicted in figure 2.1, the growth of E-cars remained stagnant between 2015 and 2019. However, sales have increased post-2019, with a 361.78% y-o-y increase in 2020. The 2021 registrations, as of July 2021, have further increased, having already crossed the 2020 sales figure. While the growth is impressive, E-cars accounted for a minuscule 0.2% in 2020 of the total passenger vehicle registrations in India.

However, going ahead, with the increasing focus on local manufacturing of EV components & batteries, prices are expected to drop further which will allow more number of players to enter this market as well as allow existing players to switch to EV offerings. JMK Research estimates the share of E-cars to grow to 12% by FY2026, clocking 514,365 units in E-car sales, which translates to a CAGR of 152.94% from FY2021 to FY2026.

Figure 2.1 : Registration Trends of E-Cars (FY2016 to FY2021) and 5-Year Projection Data



Source: Vahan Dashboard, Telangana Open Data, JMK Research
Note: FY2020 and FY2021 data includes Telangana sales data too. Sales data from Madhya Pradesh and Andhra Pradesh is not included. The data above is a compilation of Motor Cars and Motor Cabs vehicle categories in Vahan; 'e' stands for estimated

2.A Policies

2.A.1 Central Policies

NEMMP 2020

In 2013, the Government of India launched the National Electric Mobility Mission Plan (NEMMP) 2020, intending to reduce dependence on crude oil for transportation by promoting electric vehicles in India. The NEMMP 2020 aims to achieve national fuel security by promoting hybrid and electric vehicles in the country. Department of Heavy Industries (DHI) had estimated Government support in the range of INR 135 - 153 billion for R&D and building EV infrastructure. There is an ambitious target to achieve 6-7 million sales of hybrid and electric vehicles year-on-year from 2020 onwards.

FAME – I

Under the national mission, DHI formulated the Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME) scheme with an approved financial outlay of INR 7.95 billion for a period of two years. The focused areas of development in this scheme were R&D of pilot projects, charging infrastructure, and demand creation.

FAME – II

In March 2019, DHI notified phase II of the FAME scheme with a total budget outlay of INR 100 billion until March 2022, which has been extended till March 2023. FAME–II proposes INR 86 billion as demand incentives to be provided upfront during the purchase of EVs. For E-Cars, the incentive structure is as follows:

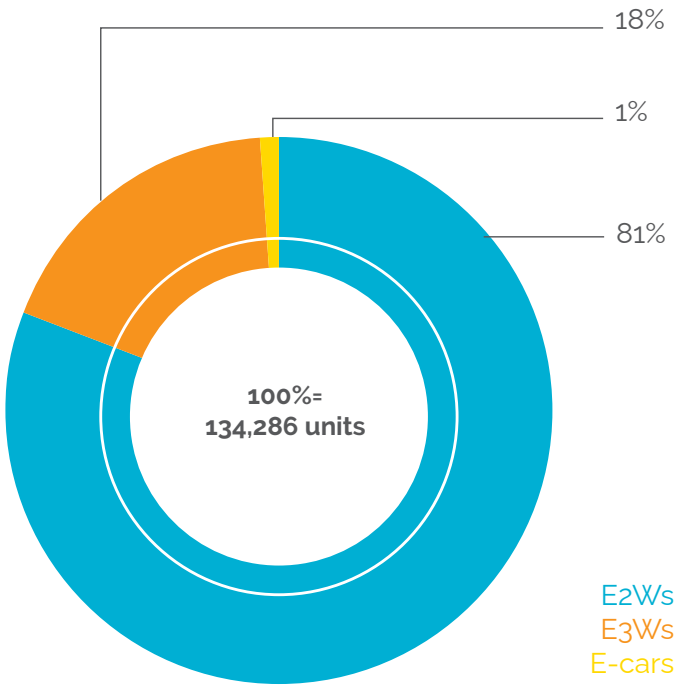
Table 2.1: FAME-II Incentive for E cars

No. of Vehicles to be supported	Approximate Battery Size	Total Incentive/ vehicle @ Rs. 10,000/kWh	Max. Ex-Factory Price	Total funding support by DHI*
35,000	15 kWh	Rs. 1,50,000	Rs. 15,00,000	Rs. 525 crores

Source: FAME-II, Department of Heavy Industries, Government of India

Currently under the FAME-II Scheme, only the offerings from Tata Motors are eligible. Mahindra's EV models, which were approved earlier, are no longer revalidated under the scheme. In contrast, E2Ws have 8 OEMs validated under the scheme and E3Ws have a whooping 28 OEMs validated under the scheme. This trend can also be seen in the share of total vehicles registered under this scheme.

Figure 2.2: Registration of Models under the FAME-II Scheme as of October 14, 2021



Source: Department of Heavy Industries, JMK Research

2.A.2 State-wise Policies

Apart from the Central policies, state governments too have drafted their EV policies to further catalyze EV adoption in their respective states. These state incentives can be availed on top of the FAME-II incentives as elaborated above. The following table provides an overview of the different incentives available at the state level, in addition to the central incentives.

Table 2.2: E-car incentives in different states

State	Per kWh of battery capacity	Max. subsidy	Road tax exemption
Maharashtra	Rs. 5000	Rs. 2,50,000*	100%
Delhi	Rs. 10,000	Rs. 1,50,000	100%
Gujarat	Rs. 10,000	Rs. 1,50,000	50%
Assam	Rs. 10,000	Rs. 1,50,000	100%
Bihar#	Rs. 10,000	Rs. 1,50,000	100%
West Bengal	Rs. 10,000	Rs. 1,50,000	100%
Goa#	Rs. 10,000	Rs. 1,50,000	100%

State	Per kWh of battery capacity	Max. subsidy	Road tax exemption
Odisha	Not Mentioned	Rs. 50,000	100%
Meghalaya	Rs. 4,000	Rs. 60,000	100%
Uttar Pradesh	None	None	75%
Kerala	None	None	50%
Karnataka	None	None	100%
Tamil Nadu	None	None	100%
Telangana	None	None	100%
Madhya Pradesh	None	None	99%
Andhra Pradesh	None	None	100%
Punjab	None	None	100%

Source: JMK Research

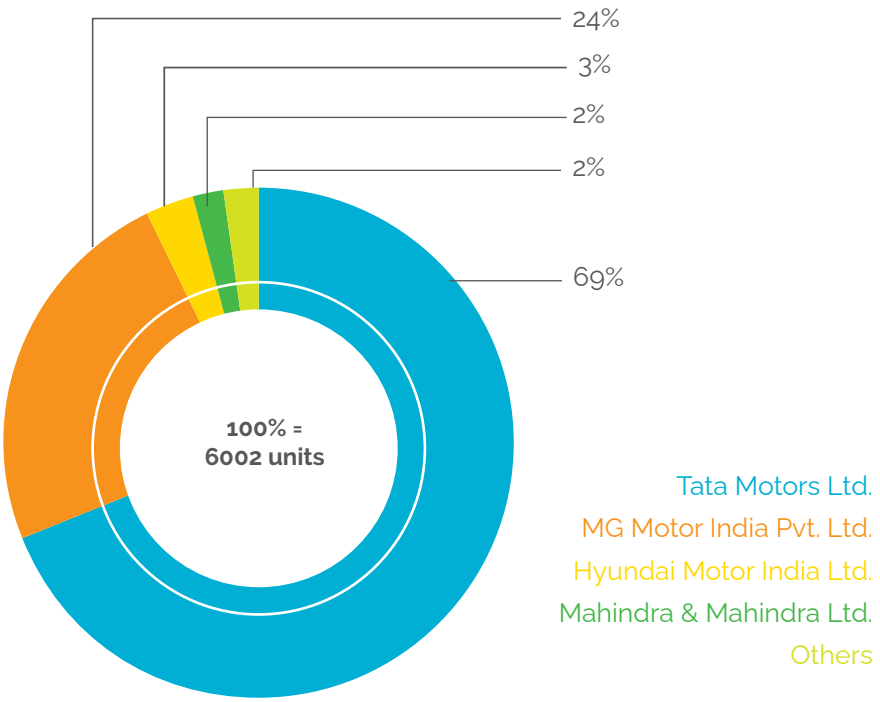
*Including early bird incentive; #Draft policy-yet to be notified

Details of the EV policies for the above-mentioned states can be found in the Annexure at the end of this report.

2.B Key Players

Unlike the E2W market where the consumer has many options, the E-car market has fewer players. In FY2021, Tata Motors held the largest market share of 72% with its Nexon EV model, followed by MG Motors at 22% with its ZS EV model, together making up 94% of the market. Tata's dominance in the E-car sector is because it is currently the only e-car in the segment which qualifies for FAME-II incentives, ergo the state level incentives too (since only the models approved under the FAME-II scheme can avail state-level incentives). The inclusion of these incentives has driven prices further down, making the Nexon EV more affordable by almost Rs. 2.5 lakhs-Rs. 3lakhs (depending on the state subsidy).

Figure 2.3: Share of E-car Registrations in FY2021

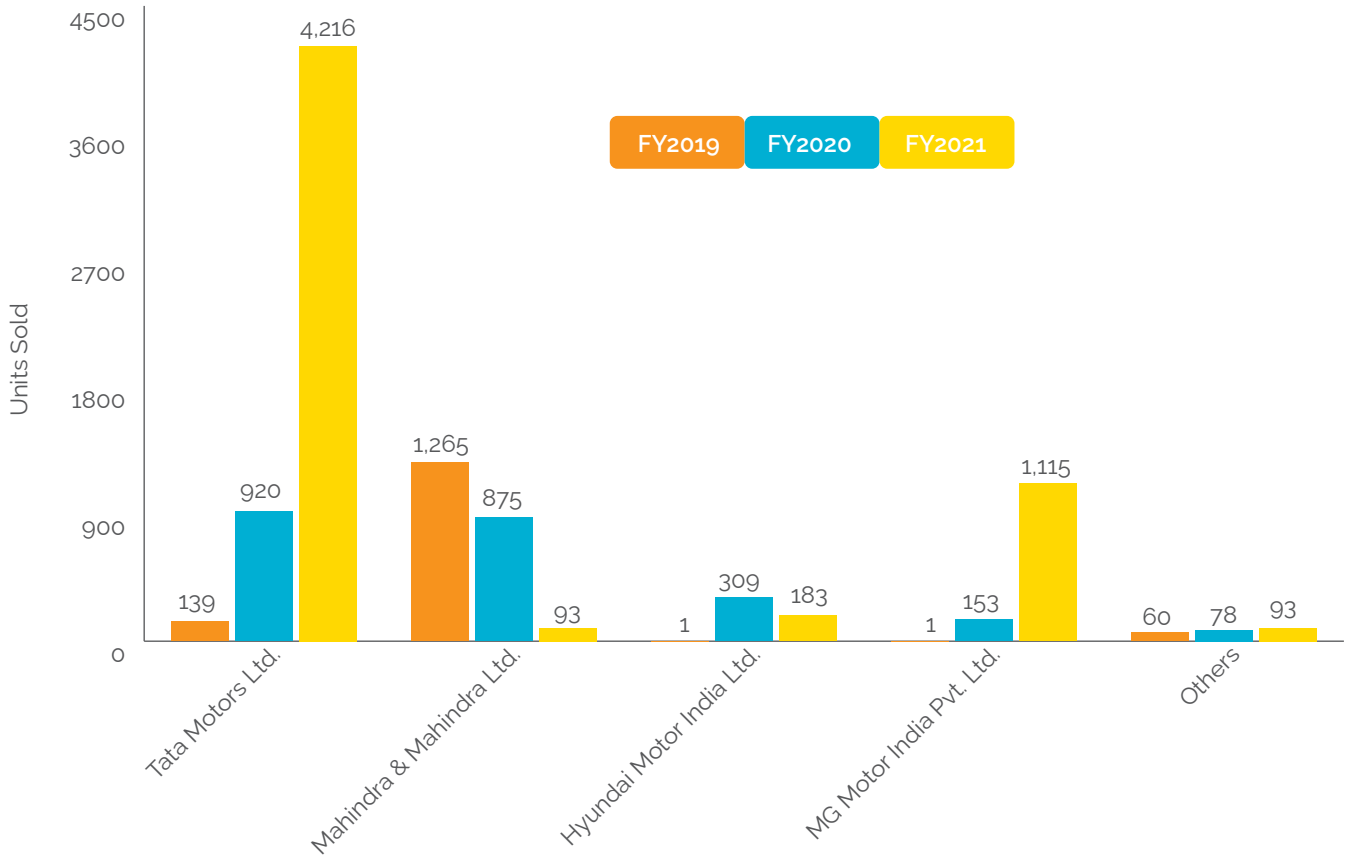


Source: Vahan Dashboard, JMK Research

Note: Others include Jaguar, Mercedes Benz, and Audi

As depicted in figure 2.3, Tata Motors' sales have soared post FY2020, which was when it launched its Nexon EV (in January 2020). MG Motors too launched its popular MG ZS EV around the same time as the Tata Nexon EV but was not covered by the FAME-II scheme which could explain its lower sales figures. Mahindra, on the other hand, was the market leader in this segment till FY2019 since it was the only player with E-car offerings (Mahindra e20). However, its sales started diminishing with the availability of alternative options from FY2020 onwards. Hyundai is another key player which launched the Hyundai Kona EV in April 2019 which was a popular option in FY2020. The sales post FY2020 declined due to the availability of more economical options (Tata Nexon and MG ZS EV), and possibly the disruption caused by the COVID pandemic. There were also reports of battery safety issues in multiple units of Kona across the globe which dented customer confidence.

Figure 2.4: Sales trend of E-cars of key players in India over the last three financial years

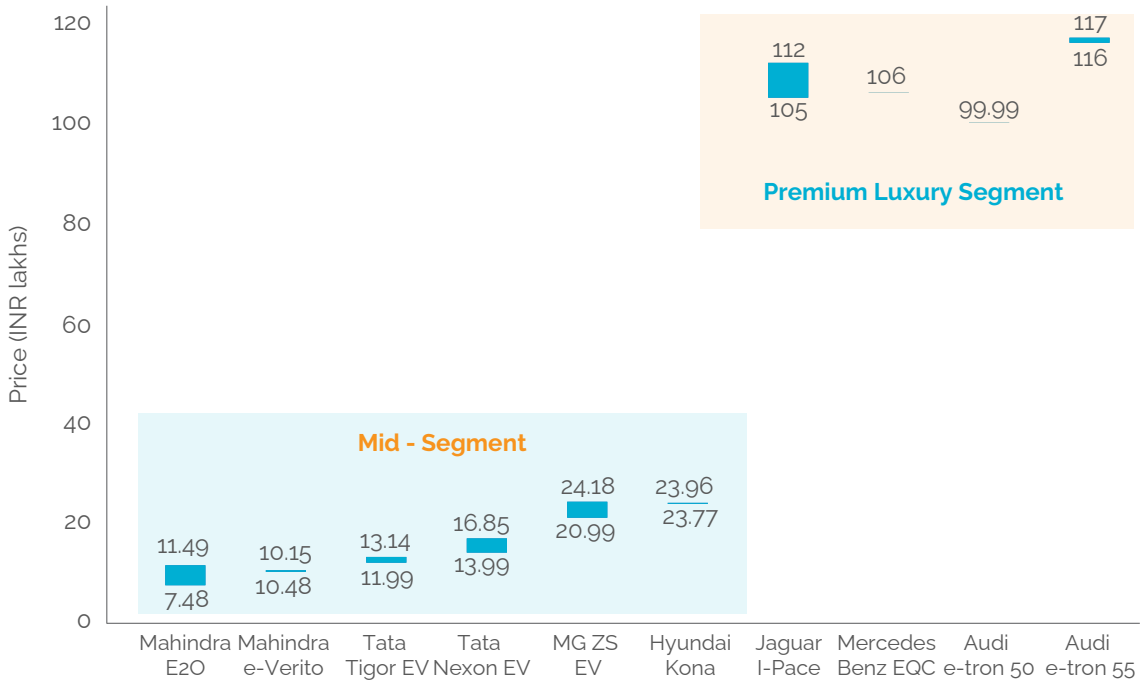


Source: Vahan Dashboard, Telangana Open Data, JMK Research

Note: Tata Motors FY2019 and FY2020 data Includes registration numbers of Tata Motors and Jayem Automotive; Others include Audi, Mercedes Benz, and Jaguar

Only the offerings from Tata, MG Motors, Hyundai, and Mahindra are below INR 30 lakh, the other offerings being well above INR 1 crore, which represents the Premium luxury segment.

Figure 2.5: Price range of currently available E-Car offerings in the Indian Market

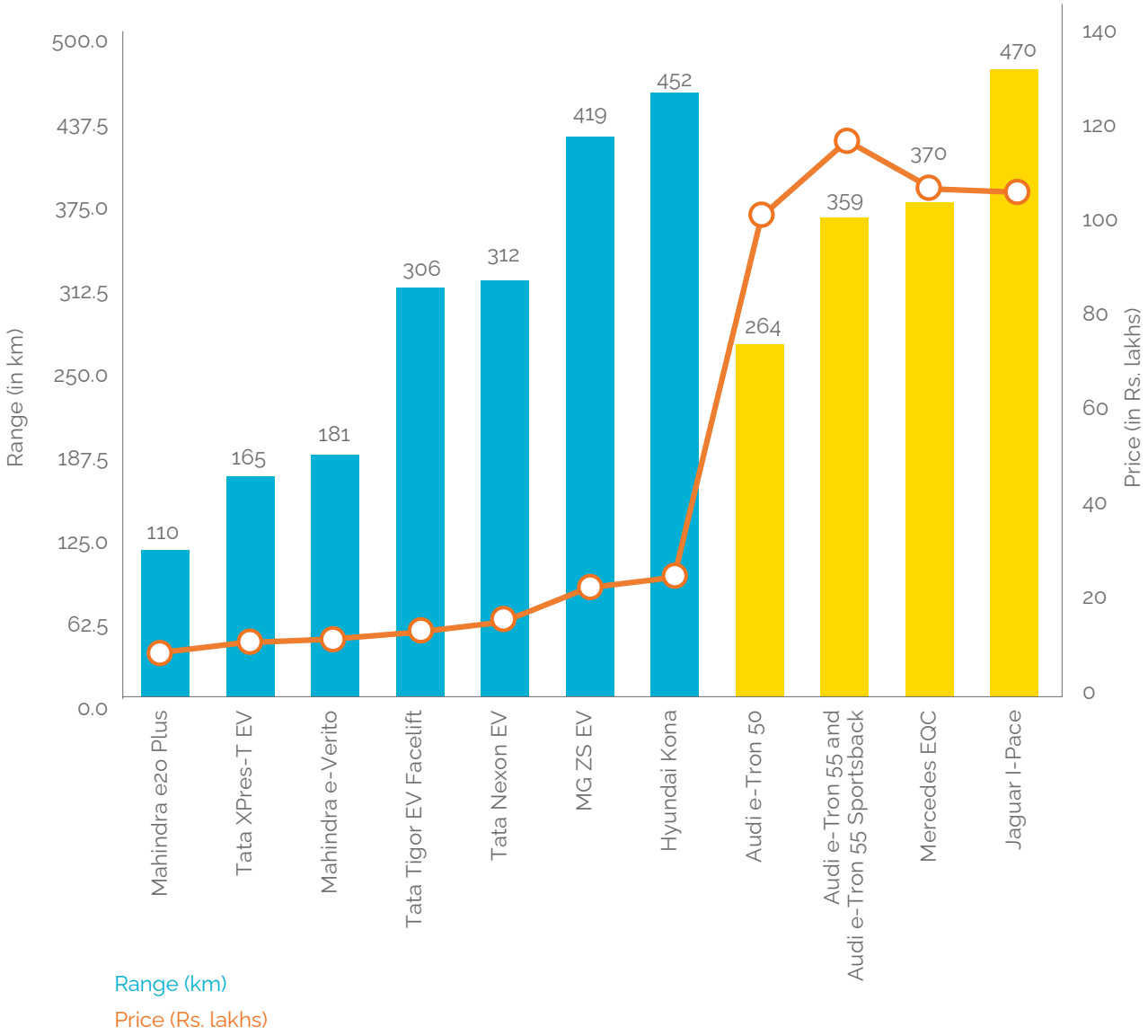


Source: JMK Research

Note: Mid-segment Cars are priced between INR 8-24 lakhs; Premium Luxury Segment are priced above INR 99.99 lakhs

The figure above clearly illustrates the difference in prices of the two segments currently available in the market, the mid-segment and the premium luxury segment. The figure further highlights the gaps currently present in the market. For example, there are little to no options in the affordable segment (Price < Rs. 8 lakhs), where the sales by volumes are traditionally the highest. Absence of options in this range could translate to slower adoption of E-Cars until such options are made available. The figure below shows a price and range (per full charge) comparison of E-cars available currently. An interesting trend to note here is that while there is a linear relationship between the increase in price and range of the mid-segment vehicles, this trend does not hold true in the premium luxury segment vehicles.

Figure 2.6: Price and Range comparison of different models



Source: JMK Research

The table below summarizes the models currently available in the Indian market.

Table 2.3: E-Cars currently available In the Indian Market

Player(s)	Offerings in Market	Launch Date	Specifications	Price
TATA MOTORS	Tata Nexon EV	January 2020	**Battery Pack:** 30.2 kWh with 8 year/160,000 km warranty **Range:** 312 km **AC Charging Time:** 8.5 hrs.	INR 13.99 - 16.85 lakhs
	Tata Tigor EV	August 2021	**Battery Pack:** 26 kWh with 8 year/160,000 km warranty **Range:** 306 km **AC Charging time:** 8.5 hrs. (0-80%)	INR 11.99 - 13.13 lakhs
	Tata XPres-T EV (Launched Exclusively for fleets)	July 2021	**Battery Pack:** 16.5/21.5 kWh **Range:** 165-213 km **Charging time:** 1.5 hours	INR 9.75 - 9.99 lakhs
MG	MG ZS EV	January 2020	**Battery Pack:** 44.5 kWh with 8 year/ 150,000 km warranty **Range:** 419 km **AC Charging Time:** 6-8 hrs.	INR 20.99 - 24.18 lakhs
HYUNDAI	Hyundai Kona	April 2019	**Battery Pack:** 39.2 kWh with optional 8 year/160,000 km warranty **Range:** 452 km **AC Charging Time:** 6-10 hrs.	INR 23.77- 23.96 lakhs
Mahindra electric	Mahindra e-Verito	Okhla Industrial Area, Delhi	**Battery Pack:** 21.2 kWh with 3 year/150,000 km warranty **Range:** 181 km **AC Charging Time:** 11.5 hrs.	INR 10.15 - 10.48 lakh
	Mahindra e2o Plus	June 2016	**Battery Pack:** 11/15 kWh with 3 year/60,000 km warranty **Range:** 110/140 km **AC Charging Time:** 6/7.2 hrs.	INR 7.48 - 11.49 lakh
JAGUAR	Jaguar I-Pace	March 2021	**Battery Pack:** 90 kWh with 8 year/160,000 km/70% battery state of health warranty **Range:** 470 km **AC Charging Time:** 8.6 hrs.	INR 1.05 - 1.12 crore

Player(s)	Offerings in Market	Launch Date	Specifications	Price
Mercedes-Benz	Mercedes EQC	October 2020	**Battery Pack:** 80 kWh with 8 year/160,000 km warranty **Range:** 370-414 km **AC Charging Time:** 11 hrs.	INR 1.06 crore
Audi	Audi e-Tron 50	July 2021	**Battery Pack:** : 71 kWh with 8 year/160,000 km warranty **Range:** 264-397 km **AC Charging Time:** 230 km	INR 99.99 lakh
	Audi e-Tron 55 and Audi e-Tron 55 Sportback	July 2021	**Battery Pack:** 95 kWh with 8 year/160,000 km warranty **Range:** 359-484 km **AC Charging Time:** 300 km	INR 1.16-1.17 crore

Source: Company Websites, JMK Research

2.B.1 Upcoming Players

Barring the abovementioned players who have a presence in the Indian E-Car market, other key automakers such as Maruti Suzuki, Volkswagen, and Ford are also expected to enter the EV market soon. Tesla, the US-based Electric vehicle company, is also expected to launch its models soon, having registered its Indian office in January 2021. Some of the upcoming models are mentioned below in the table along with their expected launch date. Going by the expected prices most of the upcoming models are targeted towards the mid-segment (~Rs. 10-30 lakhs) and the premium segment (~Rs. 30- 75 lakhs), with only three models (Renault Zoe, Tata Tigor, and Maruti WagonR) targeting the affordable segment.

Table 2.4: Upcoming E-Cars models in India

Upcoming Model(s)	Expected Launch Date	Expected Price
Renault Zoe	October 2021	INR 8 lakhs
Mahindra eKUV 100	December 2021	INR 8.25 lakhs
Tata Tiago EV	December 2021	INR 6 lakhs
Tesla Model 3	December 2021	INR 60 lakhs
Tesla Model S	December 2021	INR 1.5 Crore
ORA iQ	December 2021	INR 20 lakhs
Tata Sierra	January 2022	INR 14 lakhs
Maruti WagonR Electric	January 2022	INR 10 lakhs

Upcoming Model(s)	Expected Launch Date	Expected Price
Tesla Model X	January 2022	INR 2 Crore
Volvo XC40 Recharge	January 2022	INR 60 Lakhs
Maruti Futuro-e	February 2022	INR 15 lakhs
Nissan Leaf	February 2022	INR 30 lakhs
Tata Altroz EV	February 2022	INR 14 lakhs
Ford Mustang Mach E	March 2022	INR 70 lakhs
Tesla Model Y	March 2022	INR 70 lakhs
Renault K-ZE	March 2022	INR 10 lakhs
Mahindra XUV300 EV	April 2022	INR 18 lakhs
Porsche Taycan	April 2022	INR 2.5 Crore
Mercedes Benz EQS	June 2022	INR 1.75 Crore
Hyundai Kona 2022	August 2022	INR 23.75 lakhs
MG ZS EV 2022	August 2022	INR 22 lakhs
Mercedes Benz EQA	November 2022	INR 60 lakhs

Source: News Articles, JMK Research

2.B.2 Shared Mobility Segment

Companies such as Tata and Mahindra have become front-runners in the E-Car fleet space with their respective offerings for the shared mobility segment. With the increasing popularity of ride-hailing and shared mobility services such as Ola and Uber, this space provides a goldmine of opportunity to catalyze the shift to E-Cars since it allows for longer travel distances making e-cars an economically viable option. With an increasing number of shared mobility cars on road, converting them to electricity ones is an inevitable necessity to achieve emission goals. As of now in India, two major fleet organizations are running 100% electric fleets in India - Lithium Urban Technologies and BluSmart Mobility.

Table 2.5: Lithium Urban Technologies and BluSmart Mobility case studies

Player	Lithium Urban Technologies	BluSmart Mobility
About	Lithium Urban Technologies (Li) is a Bengaluru-based green mobility transport solutions organization, which first started operations in 2015with 10 Mahindra e20.	BluSmart Mobility was founded in 2019, and is part of the Gensol group. The organization is operational in Delhi-NCR region and Mumbai.

5. WBCSD, *'Advancing electrification of ride-hailing in India: A BluSmart case study'*, September 2020

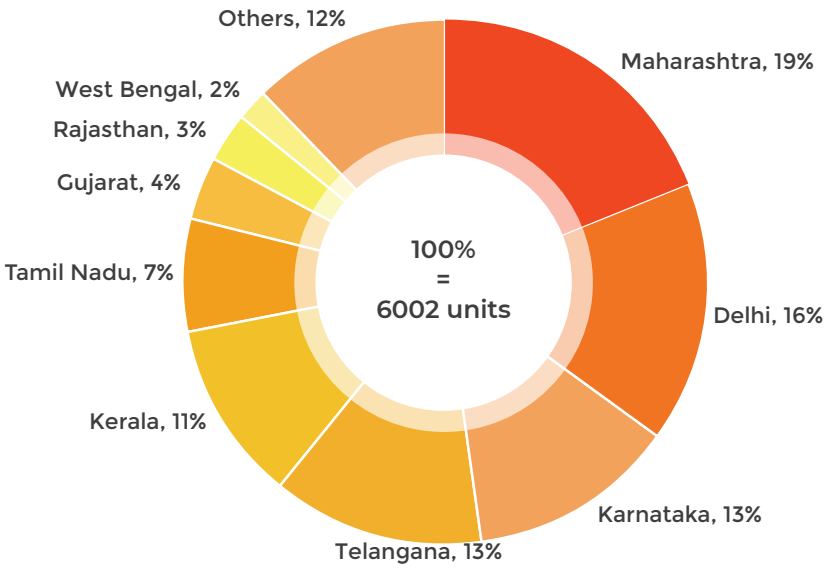
Player	Lithium Urban Technologies	BluSmart Mobility
Status	As of January 2020, Li has over 1,100 registered E-Cars plying across the cities of Bengaluru, Pune, Hyderabad, Pune, Delhi, Noida, Gurugram, and Jaipur with over 30 corporate clients.	Currently it has over 300 cars and 200 driver partners in its fleet and has installed 194 charging stations, 100 of which have AC slow charging and 94 have DC fast charging.
Business Case	Li offers corporate clients easy transition to green mobility with zero CAPEX, unlimited travel distance, 24x7 availability of vehicles and flat budget multi-year with zero fuel price escalations, all this with an integrated offering of drivers and on-site teams. In total, Li has more than 850 vehicles, traveling over 500,000 kms every day. Li has installed over 500 DC-fast chargers and AC-slow chargers across the country for its fleet.	It has tied up with Tata Motors for Tigor EV and Mahindra Electric for e-Verito as OEM partners and with EESL as its leasing company which leases cars to its driver partners on a fixed monthly cost with no upfront costs. BluSmart's revenue operations is similar to other ride hailing service providers. Customers can book for e-cabs on the BluSmart App. So far, the company has completed over 200,000 trips, covering a total of 50,00,000 km+, saving over 340 metric tons of CO2 emissions.

Source: Company websites, WBCSD, JMK Research

2.C State-wise Sales Trends

In FY2021, maximum number of e-cars were sold in Maharashtra with a 19% share, followed by Delhi (16%), Karnataka (13%), and Telangana (13%). With states such as Maharashtra, Gujarat, and Delhi formulating attractive policies, their respective shares are expected to increase further within the respective stipulated policy periods.

Figure 2.7: State-wise E-Car Registrations in FY2021



Source: Vahan Dashboard, Telangana RTO, JMK Research

Note: Madhya Pradesh and Andhra Pradesh data not included

3. Drivers for E-car Adoption

The increasing popularity of E-Cars is due to the many advantages they offer, with the caveat of being environmentally friendly, the biggest advantage being the elimination of of E-car is that they eliminates the fuel and maintenance costs associated with traditional ICE cars, as discussed below.

Little to No maintenance:

In the case of an ICE vehicle, as it gets old, its engine maintenance costs increase along with the maintenance of other mechanical parts, which can become a huge money sink. In an EV, however, since there is no engine, all these costs are done away with, with essentially no maintenance required, apart from the universal costs such as tires and brake costs. The only significant cost in an EV is the replacement cost of a battery, which usually lasts for 5-7 years on an average. However, as explained in figure 3.2, even with the battery replacement after the manufacturers' warranty (usually 8 years) lapses, the overall costs are still lower than that of ICE vehicles.

Rising Petrol/ Diesel Costs:

With fuel prices at an all-time high, consumers are looking for alternatives. Fuel prices account for nearly 13.08-58.73% of the total costs incurred, while electricity costs for charging are as low as INR 4/unit in the state of Gujarat, with the average across states being around INR 5.5/kWh. Details of EV Charging tariffs can be fond in Table 5.2 in the Annexure.

Table 3.1: Running costs: ICE Cars vs E-Cars

ICE		E-CARS	
Fuel Price	INR 100/liter	**Electricity Tariff**	INR 5.5/kWh
Approx. Mileage	17 kmpl	**Approx. range`**	200 km
Approx. Fuel capacity	50 liters	**Approx. Battery size**	30 kWh
Running costs	**INR 100/liter**	**Running costs**	**INR 0.825/km**

Source: JMK Research

Ownership Costs

One of the cited challenges for EV adoption is its high upfront costs when compared to ICE counterparts. However, an analysis done by JMK Research shows that the overall TCO of EVs is lower as compared to ICE 4-wheelers. The analysis is presented over two ownership periods. The following assumptions are made for the analysis:

Table 3.2: Assumptions made for the Total Cost of Ownership analysis

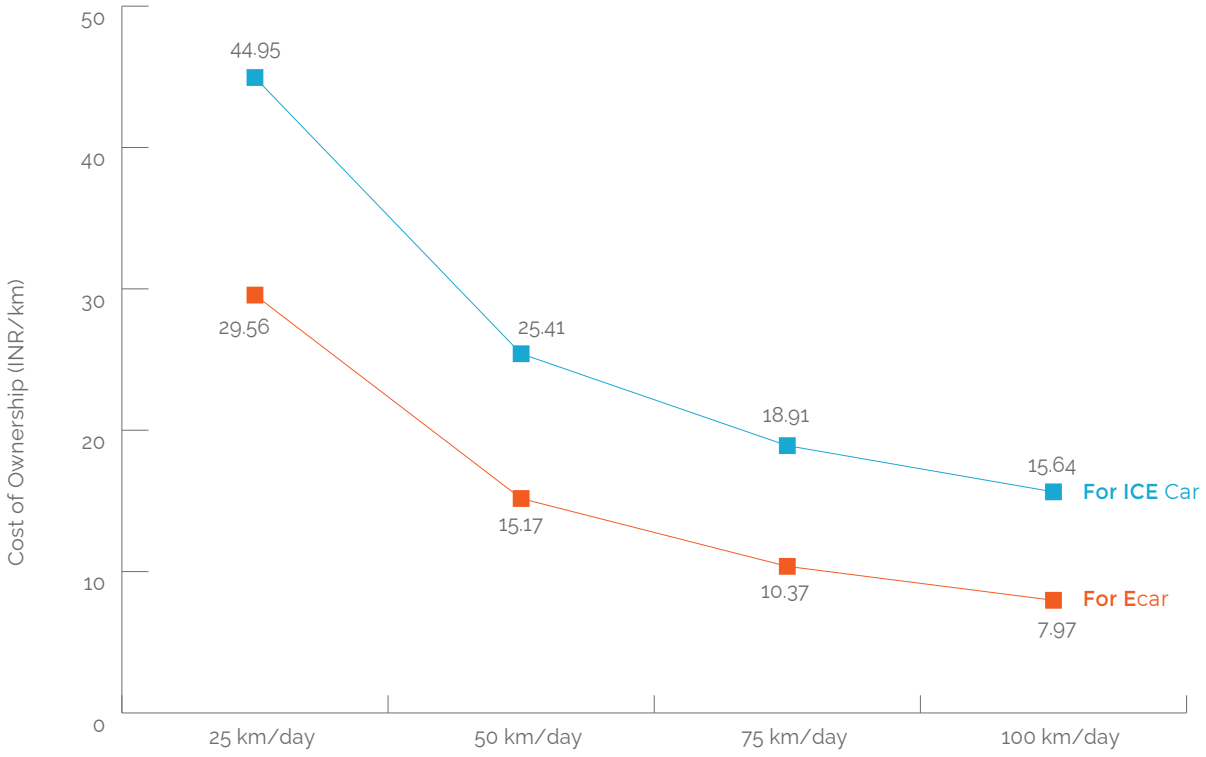
Electric Car		ICE Car	
Model	Tata Nexon EV Plus	**Model**	Hyundai Creta Petrol Automatic (CVT)
List Price	INR 13,99,999	**List Price**	INR 15,44,900
Insurance Cost	INR 63,222	**Insurance Cost**	INR 56,000
FAME-2 Subsidy	INR 1,50,000	**RTO Registration Costs**	INR 1,61,420
Net Total Cost	INR 13,13,821	**Net Total Cost**	INR 17,62,320
Charging Tariff	INR 5.5/kWh	**Fuel Cost**	INR 100/liter
Maintenance Costs	0	**Maintenance Cost**	INR 20,000/ year
Range	216 km	**Mileage**	17 km/liter

Source: Company websites, JMK Research

*Note: List Prices are ex-showroom prices; RTO Charges for E-Cars are assumed to be waived

Our analysis below shows that the overall ownership costs of E-Cars on an average is half of that of ICE vehicles. The biggest expense in the case of ICE vehicles is its fuel costs which ranges from 13.08% in the 25 km/day-5-year scenario to a whopping 58.73% over a period of 12 years; 100 km/day scenario.

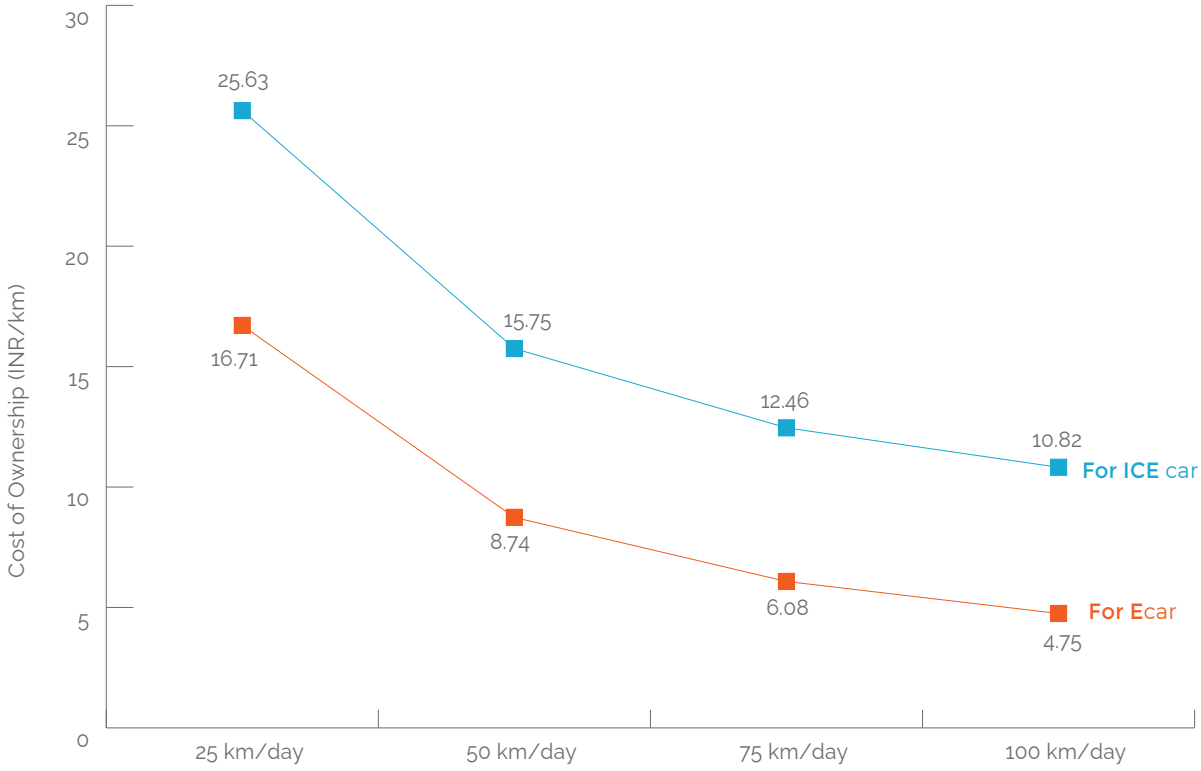
Figure 3.1: Total Cost of Ownership over a period of 5 years



Source: JMK Research

After the end of the manufacturers' warranty period, which is usually after 8 years, we have assumed that the battery must be changed in the 9th year of ownership. According to BNEF projections, the battery prices are expected to reach USD 65/kWh. For Tata Nexon EV's battery capacity of 30.2 kWh, the estimated replacement cost comes to INR 147,225 (1 USD= INR 72).

Figure 3.2: Total Cost of Ownership over a period of 10-years



Source: JMK Research

As depicted above, the cost of ownership for E-cars in all two scenarios presented above is well below the TCO of ICE vehicles, making E-cars a financially viable and attractive option.

Favorable Policies and Incentives

To catalyze the adoption of EVs in India, as discussed earlier, the central and state governments have developed respective policies (Section 2.A). The Central and State governments have taken major steps to increase EV adoption and to make it more affordable. These incentives extend to encouraging localized manufacturing of EV vehicles as well as components to achieve long terms goals, such as reaching 30% EV penetration by 2030. State-level incentives have been elaborated in-depth in the table 5.1 in the Annexure.

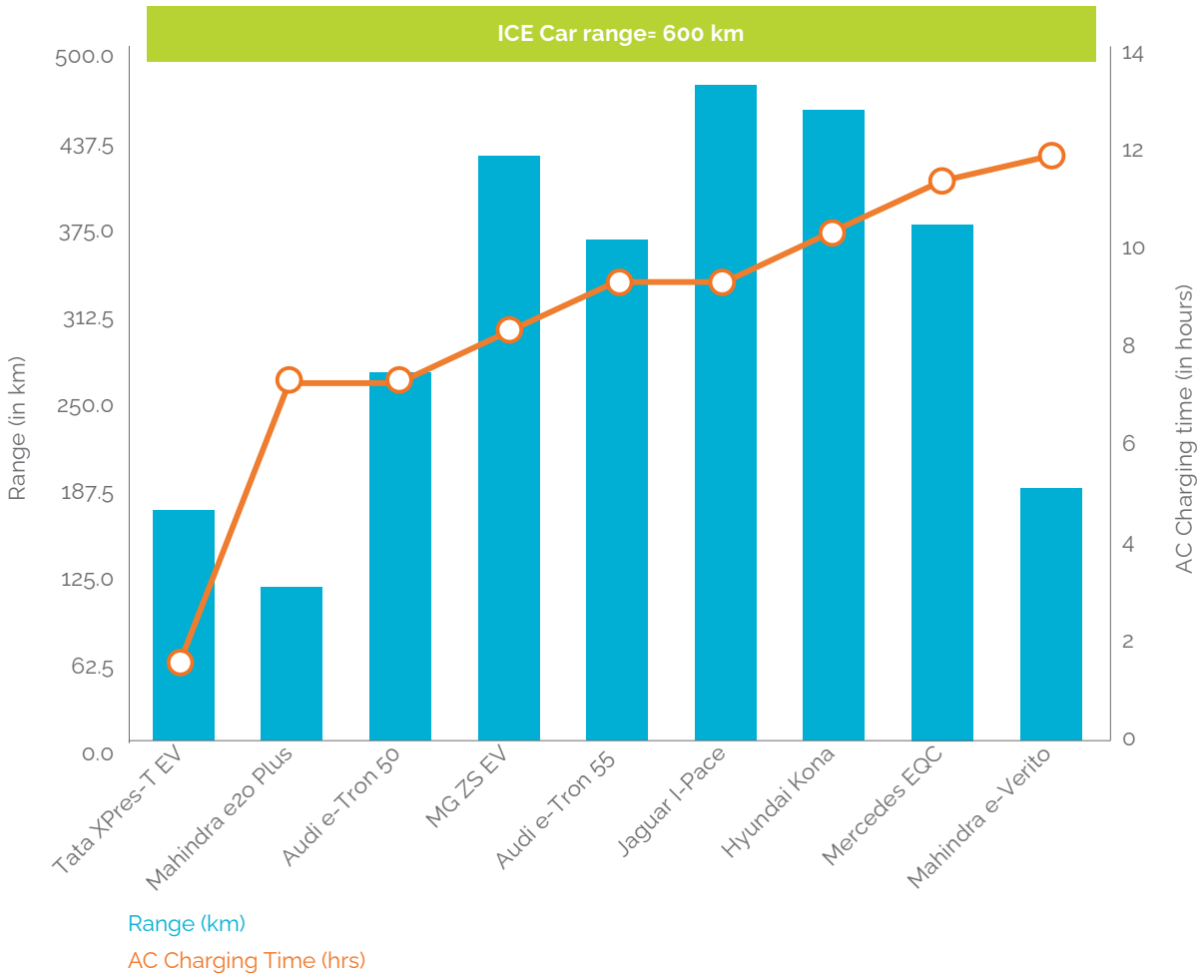
4. Challenges

Keeping aside the advantages, there are some obstacles as well that have made E-Cars less popular, as addressed below.

Range concerns among customers

The driving range is a major concern for a consumer when deciding to switch to a E-Cars since the range of EVs is lesser than that of traditional ICE cars as depicted in the figure below. Further, charging speed is another parameter closely linked to the range issue. Majority of the present charging infrastructure works on AC Charging, which can take anywhere between 6-12 hours to fully charge a battery depending on its size. In ICE vehicles, fuel filling can be done in minutes, and there is no waiting time when compared to E-Cars.

Fig 4.1 : Range vs Charging time of E-Cars in India



Source: JMK Research

Lack of Public Charging Infrastructure

Charging station infrastructure for E-cars is the same as petrol pumps for ICE cars. Without an accessible charging station in place, E-Cars will not be able to grow at the rate it is expected to grow. Unlike petrol pumps where vehicles can be refuelled in minutes, charging E-Cars can take anywhere from 30 minutes (if charged with fast DC chargers) to as high as 6-12 hours (if charged with AC Chargers as depicted in figure 2.1). This factor becomes extremely important when designing such infrastructures, especially for tier -1 cities such as Delhi, Mumbai, Chennai, Bangalore, etc. where most of the population resides in Multi-Unit Residential Blocks or high rises. Incidentally, these cities also represent the region's highest growth potential for E-Cars. Existing buildings in these cities however lack space even for parking facilities. Arranging for charging stations or simply charge points in such complexes is therefore a huge challenge. New complexes can be designed favourably but altering the existing ones would require a lot of investment and building plan alteration.

A mitigation technique can be integrating petrol pumps with charging infrastructure. As of August 2020, there are 69,924[4] petrol pumps spread across the country. Having charge points integrated with these petrol pumps can be an excellent way to increase the reach and penetration of EVs in the country. An example of this is HPLC (Hindustan Petroleum Corporation Ltd.), which has entered into partnerships with Tata Power and CESL to install over 5,000 charge points[5] in petrol pumps over the next three years. BPCL too has laid out similar plans, having committed to set up 1000 EV Charging stations[6] in the 'short-term'. However, this needs to be planned and designed in such a way that it does not create a bottleneck.

Lack of options in the market

Currently, only 7 OEMs are offering E-cars, 3 out of which are luxury options that cost over INR 1 crore. The only viable offerings come from Tata Motors, MG Motors, Mahindra, and Hyundai, out of which only Tata's offerings are eligible for FAME-II scheme. Given the price-sensitive nature of this market, other manufacturers with a presence in India are deferring their plans to enter the EV business due to the current high component prices and a lack of localized manufacturing units of EV powertrains. For foreign OEMs looking to enter the Indian market, high import duty charges as high as 60% stands as a major hindrance.

Higher interest rates for Financing E-Cars

While the government policies in place are aimed at making electric cars more affordable, financing options are still a major challenge for prospective consumers. Financiers club E-cars under the same asset class as ICE vehicles, and hence charge interest rates in the range of 12% to 16% for the loans they disburse. A study conducted by Rocky Mountains Institute (RMI)[7] finds that some lenders charge interest rates higher than that for commercial vehicles (14-15%). Further, major lenders (barring SBI) do not have products focusing on financing EV vehicles, forcing customers to pay high-interest rates for loans with shorter tenures. In some cases, the lender might require collateral in the absence of bankable credit history, further increasing the challenge for the customer.

Safety Concerns w.r.t. batteries

There have been instances, though handful, where EV batteries have caught fire, predominantly triggered by thermal issues. These instances dent the customers' confidence further. To avoid this, certain standards for battery specifications and appropriate Battery Management System (BMS) sizing need to be developed to ensure zero battery failures.

4. *Financial Times, 'Total-Adani to apply for petrol pump licence in India', August 2020*
5. *Live Mint, 'HPCL to set up 5000 EV charging stations over 3 years', 17 September 2021*
6. *India Times, 'BPCL planning to set up 1,000 EV charging stations', 28 September 2021*
7. *NITI Aayog and Rocky Mountain Institute, Mobilising Finance for EVs in India: A Toolkit of Solutions to Mitigate Risks and Address Market Barriers, January 2021.*

5. Annexure

Table 5.1: State-wise Policies with respect to E-Cars

State	Policy Period	Policy Targets
Tamil Nadu	Approved in September 2021	• 100% road tax exemption till 30 December 2022 and waiver on registration fees as per Government of India's notification • Policy focuses on providing supply side incentives to promote EV manufacturing in the state.
Maharashtra	Announced in 2018; revised in July 2021; applicable till 31st March 2025	Policy targets of a penetration of 5% of new 4-wheeler registrations from E-car by 2025.Demand side incentives are as follows: • For E-car, Incentive of INR 5,000/kWh with a cap of INR 1,00,000. A total of 10,000 vehicles will be incentivized under this policy • Buyers purchasing EVs before 31st December 2021 will be eligible for 'Early Bird discount' of INR 5,000/kWh of vehicle battery capacity (maximum incentive capped at INR 1,00,000/vehicle) • All EVs exempted from road tax and payment of fees for renewal of registration certificate till policy period. Scrappage incentive for E-car: up to INR 25,000
Gujarat	Valid for four years from 1st July 2021	Policy targets to achieve 20,000 E-car on road by 2025. For E-car, state subsidy of INR 10,000/kWh (Max. ex-factory price to avail incentive: INR 15 lakhs)
Meghalaya	Valid for 5 years from date of notification	5% E-car penetration in total registrations by 2025. For E-car, state subsidy of INR 4,000/kWh, for first 2500 E-car; max incentive per vehicle: INR 60,000 (Max. ex-factory price to avail incentive: INR 15 lakhs)
Telangana	Applicable for a period of 10 years from the date of notification (October 2020)	100% exemption of road tax and registration fees for first 5,000 E-car purchased and registered in the state
Karnataka	Valid for a period of 5 years from date of Notification (25thSeptember 2017)	The Karnataka EV Policy specifically targets OEMs and manufacturers to incentivize EV manufacturing to reduce its prices for consumers
Uttar Pradesh	Valid for a period of 5 years from date of Notification (7th Aug 2019)	The policy aims to roll out 10 lakh EVs across all segments. The policy specifically focuses on promoting green public transport and the creation of EV cities in the state.
Andhra Pradesh	Notified on 8th June 2018, Valid for 6 years from date of Notification	The policy aims to roll out 10 lakh EVs across all segments. The policy is focused more on providing supply-side incentives.
Delhi	Notified in August 2020, Valid for 3 years from the date of notification	• Purchase incentive of INR 10,000/kWh for first 1,000 cars (Max. ex-factory price to avail incentive: INR 15 lakhs) • Scrapping incentive up to INR 7,500 • Road tax and registration fees to be waived off for all E-car during the policy period

State	Policy Period	Policy Targets
Kerala	Notified in March 2019, Valid for 3 years from date of notification	• Policy targets 1 million EVs on road by 2022. • The policy focused on increasing charging infrastructure in the state, localization of EV manufacturing, and re-skilling of work force.
Bihar	Draft released in June 2019	• For E-car, first 4,000 vehicles manufactured within the state will receive incentive of INR 10,000/kWh with a cap of INR 1,50,000. • Interest subvention of 10% to buyers of light EVs and EVs manufactured in Bihar. • 100% exemption from road tax and registration fees
Madhya Pradesh	Released in November 2019, valid till 2026	• Policy aims to catalyze EV adoption such that they contribute 25% of total registrations by 2026. • First 6,000 E-car will be charged 1% motor vehicle tax. • Vehicle registration fees exemption for first 9,000 E-car
Chandigarh	Draft released in October 2019, notified in January 2021, valid for 5 years from notification	• Only EVs to be registered in the city after 2030 • Free one-year insurance for first 1,000 EV buyers • Road tax and registration charges exemption till 2024. Additional road tax and pollution cess applicable on all ICE vehicles after 2025.

Source: JMK Research

Table 5.2: EV Charging tariffs in different states

State	Energy Charge EV Tariff (Rs./ kWh)	Low Tension Demand Charge EV Tariff	High Tension Demand Charge EV Tariff
Andhra Pradesh	6.7		
Assam	5.25 - 6.75	Rs. 130/kW per month	Rs. 160/kVA per month
Bihar	6.3 - 7.4		
Chhattisgarh	5		
Delhi	4.5		
Gujarat	4 - 4.1		Rs. 25 - 50/kVA per month
Haryana	6.2	Rs. 100/kW per month	
Himachal Pradesh	4.7 - 5		Rs. 130/connection per month and Rs. 140/kVA per month
Jharkhand	6 - 6.25	Rs. 40 - 150/connection per month	
Karnataka	5	Rs. 60/kW per month	Rs. 190/kVA per month
Kerala	5	Rs. 75//kW	Rs. 250/kVA per month
Madhya Pradesh	5.9 - 6		Rs. 100 - 120/kVA of billing demand

State	Energy Charge EV Tariff (Rs./ kWh)	Low Tension Demand Charge EV Tariff	High Tension Demand Charge EV Tariff
Maharashtra	4.05 - 4.24		Rs. 70/kVA per month
Meghalaya	10.09	Rs. 100 - 230/connection per month	
Odisha	4.2 - 5.7	Rs. 200 - 250/kW per month	Rs. 200 - 250/kVA per month
Punjab	5.4		
Rajasthan	6	Rs. 40/HP per month	Rs. 135/kVA per month
Tamil Nadu	5 - 8.05	Rs. 70/kW per month	
Telangana	6		
Uttar Pradesh	5.9 - 7.7		
Uttarakhand	5.5		

Source: Industry Articles, JMK Research

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