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Atamnirbhar Bharat: A transition to electric mobility

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Abstract
Electric mobility transition of the Indian automobile sector is the key for making the economic growth process sustainable. India being one of the largest automobile markets, holds the potential of becoming one of the largest electric vehicle markets also by the end of the next decade. Coordinated efforts between industry and the policy makers will lead to exponential growth in the EV sector. Currently the EV industry is highly dependent on imports from China and other countries. All the EV components, with exception of just few components, can be made in India. For a smooth EV transition the government has formulated many policies both at the center and state level. Setting up a domestic value chain, creating a skilled workforce, and enhancing the local demand are imperative for EV sector growth. Heavy dependence on imports of EV components must be replaced by indigenous manufacturing and R&D to bring down the EV costs. EV adoption will have a three-fold impact on the Indian economy in terms of reduction in oil import bill, cutting down on pollution and employment generation. Manufacturing the EV components locally will create multiple supply chains and hence jobs in India. the EV Under the CEM-Electric Vehicles Initiative, coordinated by the International Energy Agency, policy makers in India have set a goal of 30 per cent penetration of EVs in new sales by 2030.

Keywords: e-mobility, Atamnirbhar Bharat, FAME II, e-rickshaws, EV powertrain, green energy

Introduction

Indian automobile sector is going through a transitionary phase. A slow but consistent movement is taking place towards adoption of electric vehicles. The electro mobility process formally started in 2013 with the National electric Mobility Plan (NEMMP). This scheme had set a sales target of 6-7 million electric vehicles by 2020. As part of this scheme the department of heavy industries formulated another scheme, Faster adoption, and manufacturing of electric vehicles in India (FAME), to enhance manufacturing and sustainable growth of electric vehicles in India. This scheme was operative till 31st March 2019. FAME II, with an outlay of 10,000 crore rupees, and for a period of 3 years started in April 2019. This scheme provides upfront incentives for purchase of electric vehicles and focuses on development of charging infrastructure.

These government schemes aim at boosting manufacturing, providing technology platforms, increasing demand, and developing a robust charging infrastructure. They envision a roadmap for faster adoption of EVs and their manufacturing in the country. This will enhance fuel security through adoption of green energy and help India achieve global EV manufacturing leadership in the automobile industry.

The aspects of analysis

Most of the components of the EV powertrain are being imported from China, Japan, South Korea, and some European countries. Due to these imported components the price of EVs in comparison to ICE vehicles is high. Most of these components can be manufactured in India government industry collaborations. Certain protection barriers also need to be set up. There should be an attempt to gradually localize and manufacture EV components in India.

Need for green energy adoption in India

India has a population equivalent to 17.7% of the world population. It is the youngest population having a median age of 28.4 years. Around 30% of the population is living in the urban areas. The urban population is expected to grow to 40% by 2030 In these urban areas there is an absence of a well-developed transportation sector and people rely on personal vehicles for commuting.

Two wheelers, comprising scooters and motorcycles dominate the transportation space with a whooping share of 79%. Three wheelers have a share of 4%, buses and trucks comprise 3% of the total vehicles, economy four wheelers (cars costing less than 1 million rupees) are 12% of the total vehicles and premium wheelers (cars costing more than 1 million rupees) are 2% of total vehicles.

The dynamics of the Indian vehicles market are different from the world automobile market where advanced technologies for electric four wheelers are being developed. India needs to develop technology and market capabilities for small vehicles like two wheelers, three wheelers and economy cars. Developing these capabilities and technologies will help India meet the domestic demand and attain a global leadership position.

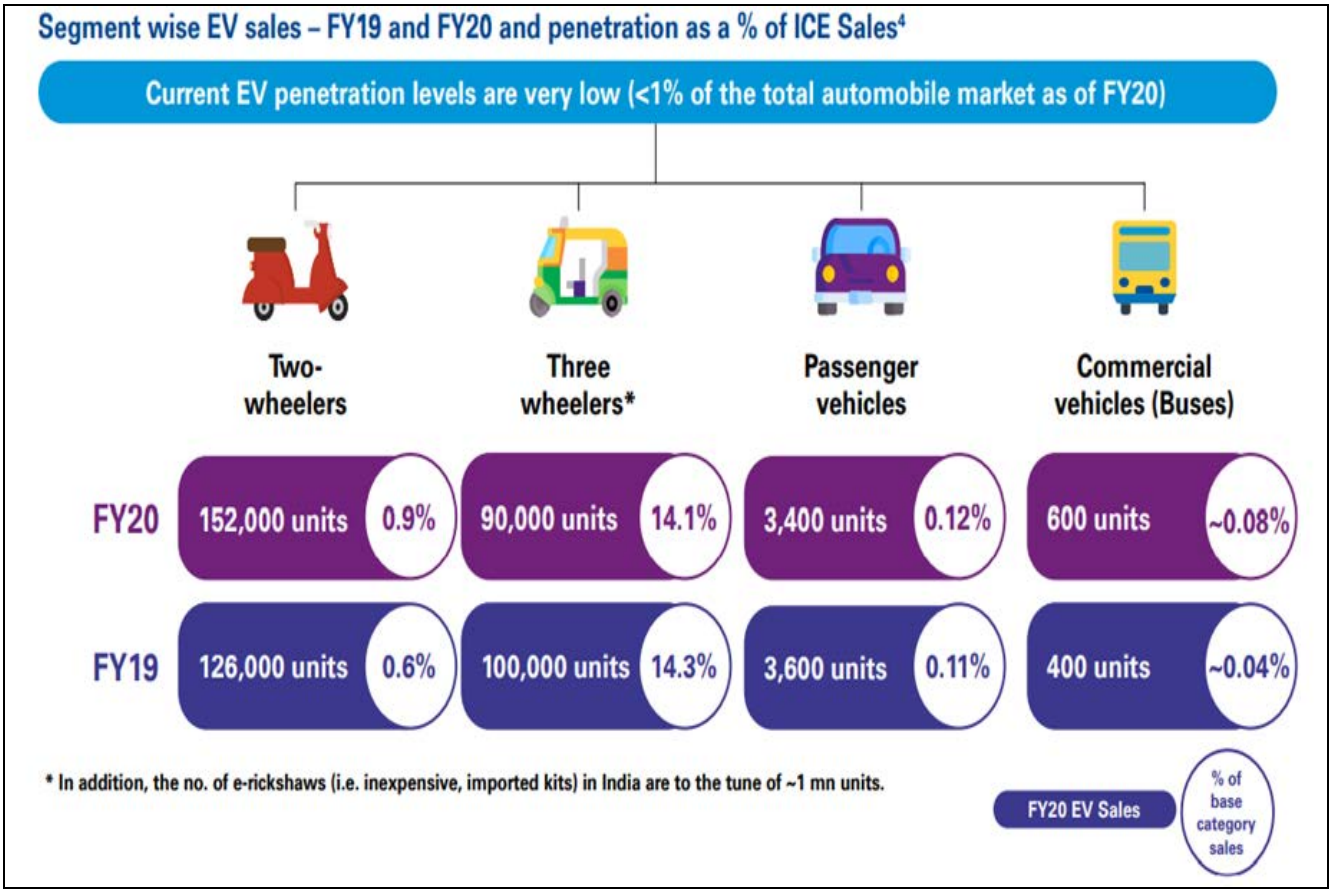
Another aspect of the Indian mobility market is an increasing trend of shared mobility. Shared mobility has expanded, changing the way India travels. Taxi aggregators

like Ola, Uber increased from 130 million rides in 2015 to 500 million rides in 2016. Shared mobility increases vehicle utilization and increases cost efficiency of large-scale purchases.

Despite the compelling case for adoption, the penetration of EV's in the automobile sector is very low. Share of EVs in the total automobile sector is less than 1% which implies tremendous potential for growth. Increase in EV sales volumes in India will have a huge global impact also. Two wheelers and three wheelers dominate the Indian EV space, and it is expected that growth will be maximum in these two segments in the coming years. At 0.1% the EV penetration is lowest in the four wheelers segment. Currently there are many gaps in EV adoption in this segment due to high costs, low availability of batteries, and an underdeveloped charging infrastructure.

Due to all these constraints the EV adoption in the four wheelers segment will lag the other segments for a few years.

Based on KPMG analysis the expected EV penetration in two wheelers segment would be between 25 to 35per cent, and it would be 65 to 75 per cent for three wheelers by the year 2030. For four wheelers it would lag behind at10 to 15 per cent, and for buses 10 to 12 percent by the year 2030.



Source: KPMG / CII 2020; Shifting Gears: The evolving EV landscape in India

Fig 1

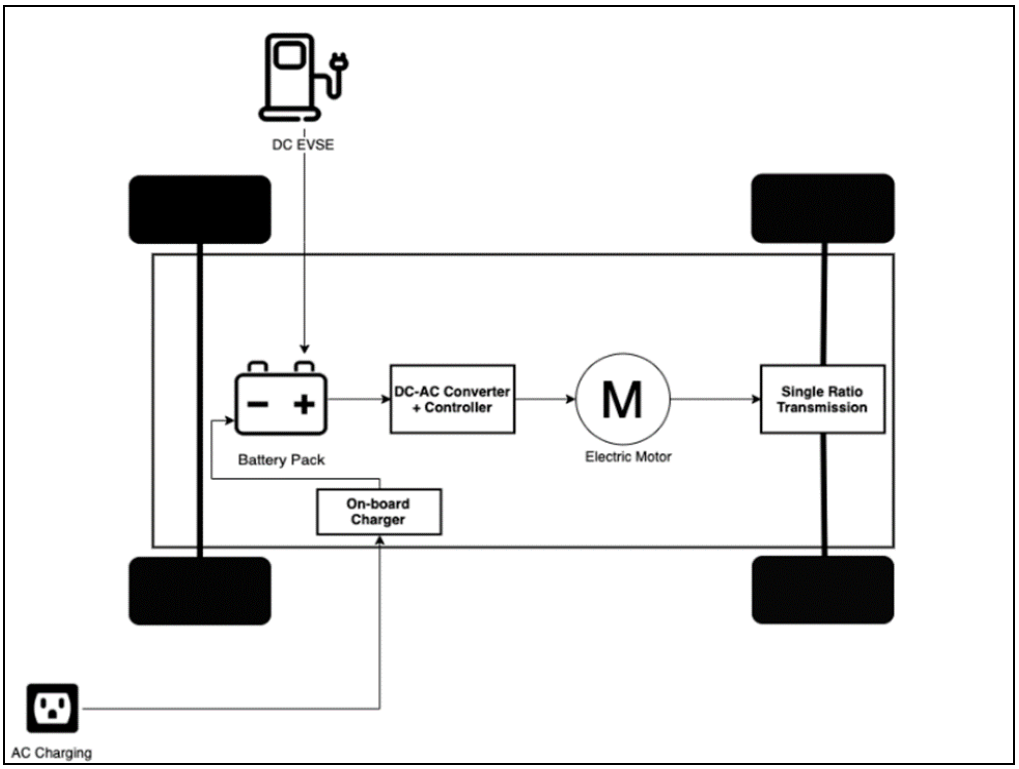
The increasing vehicular population and growing travel demand presents a tremendous market growth opportunity for electric vehicles. Government's target of 30% EV adoption by 2030, will promote sustainable growth in the long run. EV adoption in India would considerably reduce the oil import bill, create employment, and value addition and will substantially cut the Green House Gas emissions.

The supply chains and manufacturing of EVs in India

Electric vehicle industry in India is at a nascent stage. The current penetration level is extremely low at 1%, but there is a promising growth prospects of around 5% in the coming years. Currently there are around 5 lakh two wheelers and few thousand electric cars on Indian roads. More than 90% of the electric vehicles on road are low speed two wheelers, with a speed below 25 km/hr., which do not require registration and licenses.

The Core components of the EV powertrain are not entirely being manufactured in India and are being imported from countries like China, Taiwan, South Korea, Japan, and some European countries. Powertrain refers to the set of components that generate the power required to move the vehicles and deliver it to the wheels.

Core Components of EV Powertrain.



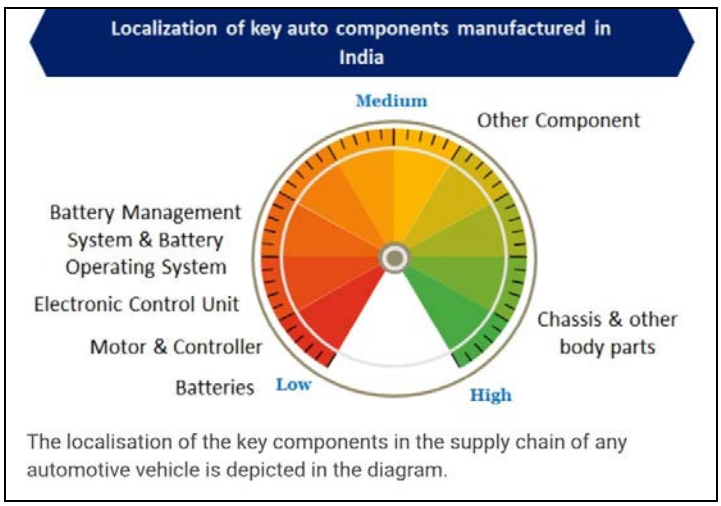
Source: EV reporter 2019, Top EV powertrain component manufacturers in India.

Fig 2

The major cost component in the EV powertrain is of lithium-ion-batteries. At present li-ion cells are being imported from China and Taiwan and the Indian battery makers are assembling them into battery packs. Assembled batteries pack are also being imported. Batteries comprise 40 to 50% of the cost component of an EV, importing of battery cells does not allow rationalization of the cost structure of EVs. One of the major constraints for the ambitious plans of EV adoption, is higher costs of EVs in comparison to ICE (internal combustion engine) vehicles. India neither has a known source of lithium or cobalt, nor does it have the lithium-ion-batteries manufacturing capabilities as of now. Developing local manufacturing of lithium-ion-batteries will bring down the EV costs drastically.

The electric vehicles power pack market is set to grow by $300 billion by 2030. Also, there is a huge secondary market also comprising of around 2.5 million e-rickshaws and 4 lakh lead -acid-battery powered two wheelers. Many players in the automobile energy space have teamed up and are finding synergies to manufacture batteries for EV application.

Other core powertrain components for EV application in two wheelers, three wheelers, four wheelers, light commercial vehicles, and buses are electric motors, controllers, and DC-AC convertors. Most of these core components are also being imported. Motors are being imported from China and European countries, gearboxes are coming from China, NMC cells are coming from South Korea and Japan, LFP cells again from China. According to ACMA (automotive components manufacturer association) report, Imports of EV components increased by 14.4 per cent in 2018-19. The government is trying to cut the imports of these components to push localization and create supply chains in the country.



Source: Indian Express; Push for domestic EV Ecosystem under Atamnirbhar Bharat.

Fig 3

It can be observed that major components are not localized, that is either manufactured or assembled in India. To unlock its potential in the electric mobility domain, it is critical for India to become self-reliant and increase its capacity in manufacturing critical components over a period. A domestic impetus can propel the growth in sunrise sector of EVs.

Major chunk of these EV component imports is coming from China. In the year 2018 auto components imports from China touched $4.3 billion, registering a growth of 27 per cent over FY2013. Non existing hardware manufacturing base in India is forcing OEMs and tier-1 suppliers to import more from China. There is a huge trade deficit with China which will increase the growth of EVs takes pace.

Government is providing incentives for localization of parts manufacturing increasing import duties. Despite the government support the Chinese components are more cost effective and fill the gaps in the local supply chains.

EV Manufacturing and Make in India

The Indian Electric Vehicle industry is highly dependent on Chinese imports for batteries and other components. There is an increasing push by the government to build a self-reliant EV ecosystem through local manufacturing of EV components. Self-reliance can be attained through concerted efforts of the government and the industry stake holders over a period. Huge government support, through R&D and tax benefits, is required for building up the local industry in the EV ecosystem. The timeline with strong mandate must be formulated to develop the whole ecosystem.

In the electric cars segments Tata Motors and Mahindra Electric are the two major player manufacturing models like eVerito, and eKUV, which have many domestically manufactured components. Hyundai Kona and MG Motors have also launched their electric cars, but they are getting kits from Korea and China.

In the electric bus segment, there are three major players Tata Motors, Olectra Greentech ltd, and PMI Electro Mobility Solutions. The bus manufacturing is heavily localized with made in India components to avail benefits of FAME II policy.

In case of e-rickshaws, a huge unorganized market exists. Most of the components used in e-rickshaws are imported from china but few manufacturers like Kinetic Green, Mahindra, Thukral etc. import only motors and sell heavily localized e-rickshaws. Bajaj, TVS are also launching e-rickshaws which will be fully localized. E-autos market is a relatively smaller market, with Mahindra Treo and Bajaj manufacturing indigenous e-autos.

Electric scooters are the largest component of the EV market and have tremendous growth potential. The FAME II policy has provided impetus for localization of the e-scooter manufacturing. Tork Motors, Ather Energy, Ultravoilet are few startups in this segment which are making their own components and are having vertical integration in their manufacturing process. Okinawa, Ampere, Hero Electric have also localized 50 to 60 percent of their manufacturing. Smaller e-scooter manufacturers Pure EV, NDS Eco, Batt: Re, are also moving towards localization to get FAME II benefits.

In the charging infrastructure market, it is possible to completely localize operations in case of AC charging stations as compared to DC charging stations in which some components must be imported. Big market players in this segment are Delta, Siemens and EO which import components from Europe. While companies like Exicom, Masstech, One Plug, Bright Blue are making Indian charging stations.

A completely transformative approach is required to fully localize the EV powertrain ecosystem in India. With a strong push from the government, collaboration between industry and academic institutions is required to bring down costs through innovation and R&D. The OEMs (original equipment manufacturers) and the government must work together to make India the largest EV market in the world in the next five years. Collaboration between government, industry and academia is the way forward towards Atamnirbhar Bharat in the EV ecosystem.

A package of 20 lakh crore for a self-reliant India was announced by the government in 2020. The package is worth 10% of India's GDP.

Government initiatives for EV ecosystem development

- To give a boost to the EV sector GST was slashed from 12% to 5% on EVs and from 18% to 5% on charger and charging stations for EVs, in 2019. Hiring of electric buses (of carrying capacity of more than 12 passengers) by local authorities will be exempt from GST.
- Custom duty on import of EV components has been hiked in 2020 to boost the make in India initiative of the government. The custom duty exemption on battery pack for EVs has been removed and henceforth battery packs of EVs will attract a duty of 5%.
- To promote domestic assembling import duties on certain EV components have been lowered to 10 to 15%. Earlier these components were attracting a duty of 15 to 30%.
- The National Mission on Transformative Mobility & Battery Storage 2020 was formulated by the government to align EV policies, business opportunities and market developments. This mission has been designed in alignment with the government's vision for Atamnirbhar Bharat or Self -reliant India.
- A phased manufacturing program (PMP) has been launched by the government in March 2019 to localize the production along the entire EV value chain. PMP promotes indigenous manufacturing of electric vehicles, its assemblies, part, and sub- parts. PMP will increase value addition and capacity building in the EV sector of India.
- The FAME II scheme will give benefits to OEM's manufacturing vehicles covered under the scheme and having certain percentage of localization.
- Department of heavy industries has approved sanction of 5595 electric buses to 64 cities for intra-city operation. These buses will satisfy the localization norms under FAME II.
- To boost confidence of EV users and to encourage OEMs to launch new electric vehicles, Department of Heavy Industries has sanctioned 2636 charging stations to 62 cities across 24 states, in January 2020.
- Government's FAME II program aims to support, trough subsidies, 7000 e-buses, 10 lakh e- two wheelers, 5 lakh e-3 wheelers, and 55000 e-4 wheelers passenger cars, in a three-year period. In addition, charging infrastructure will also be created.
- A deduction for interest payments up to 1.5 lakh is available under section 80EEB, to individual taxpayers

on loans for electric vehicles for personal use or for business use.
- Government has waived Road Tax on all electric vehicles, transport, and non- transport, till 2022. This will give a big push to electric vehicles sales.

The electric vehicle adoption rate in India is less than 1%. Government has set a humungous task of 30% electrification by 2030. In the absence of an established EV market, manufacturing is quite low, and the supply chains are relying heavily on imports. There are no established market leaders in all vehicle types. There are 10 major players existing in the two wheelers segment, 3-4 in buses and few in car manufacturing. To name a few EV manufacturers of EV's, OLA electric, Mahindra electric, Tata motors, Hero electric, Hyundai, KIA motors, Ashok Leyland.

In the EV component manufacturing and assembling there is a myriad of players. In the past few years numerous startups have come up in the EV sector. All these Made in India EV manufacturers are paving way for Atamnirbhar Bharat. But for these startups it is not easy to sustain and grow, they require support from government and investors.

Source: Niti Aayog and RMI 2021; Mobilizing finance for EVs in India.

Fig 3

Recent developments in the wake of the pandemic indicate certain social and behavioral changes. E-commerce has picked up during the pandemic and acquiring of e-fleet by e-commerce giants is expected in the coming years. Two wheelers and three wheelers will see an exponential growth as this segment has reached the inflection point. Three wheelers and e-rickshaws provide last mile connectivity to people using public transportation. Shared mobility market is also rising and provides business opportunity to the start-ups. Significant venture capital has flown into the EV ecosystem in the past few years. EV start-ups have raised INR4490 crores between 2014 and 2019.

The adoption of EVs in the coming years will entail sustainability to the economic recovery in the post COVID scenario. Manufacturers are viewing the EV sector as a green field sector with tremendous opportunities of growth. Industry is supportive of enabling EV adoption and is continuously in research and manufacturing capabilities. The government efforts are complementing the industry initiatives to attain EV 30@ 2030.

Observations and conclusions

The segment wise analysis has shown in case of electric buses, electric cars, and e-scooters there is a clear movement towards indigenous component manufacturing and vertical integration. But in case of e-rickshaws, where a predominantly unorganized market exists, the adoption of made in India components is rather slow.

India requires setting up of a huge charging infrastructure for a faster EV adoption. The charging infrastructure market is dominated by the Taiwanese company Delta which relies heavily on import of components from Europe and China.

Domestic players are also fast entering the charging infrastructure market.

FAME II has played a critical role in creating a push towards Make in India in the EV ecosystem.

However, there are few components of EVs which have heavy dependence on imports. The battery cells are completely imported from China and there is no cell manufacturing in India. In the coming years it is expected that large companies like Tata Chemicals, Suzuki etc. will manufacture lithium-ion batteries in India.

Motors which are used in electric scooters, have a complex production process and China and some other countries have scale advantages in motor production. Now some Indian startups have started to make motors in India.

LED lights and plastic molds are also being imported from China as they are cheaper. Besides these components most of the other components like battery packs, chargers, controllers, and mechanical parts like chassis, rim, etc. are now being made in India. in software development for EVs, India has an advantageous position.

To encourage the domestic production certain protection barriers, must be set up by the government. Import of components should be allowed till local manufacturing develops and import of assembled vehicles should be completely restricted.

Investment, innovation, research, and development across right technologies will play a key role in helping to attain the Atamnirbhir Bharat goals.

The intent of the government is to gradually localize and manufacture in India, and the EV industry has a tremendous potential to create jobs in India. Most of the EV manufacturers have shown considerable improvement in terms of localization compared to the past, the movement is in the right direction and with time the import dependence in the EV sector will reduce.

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