

KRYSALIS

E-VEHICLE 2 WHEELER REVOLUTION

Indian Market Outlook

Authors: Keshav Parthasarathi, Arun Ganesan

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1. Executive Summary

The race for electrification of future mobility has begun globally and in India as well. The growth and penetration of Electric vehicles in the conventional ICE segment is significant in recent years. Climate changes, rising fuel prices, stringent emission norms, and the need for cutting carbon emissions are fuelling the sector worldwide.

India's Electric Vehicle market is expected to grow at 90% CAGR and will touch \$150 Billion by 2030. In terms of penetration, EV has barely crossed 1.3% of the total sales in FY21. The sector is buzzing with around Rs. 25,000 Crore collective investment done by all stakeholders (2W/3W/4W/Components) during first half of 2021 & more in pipeline

Indian Roads are predominantly ruled by 2 wheelers, and the same is reflected in the two wheeler EV space. Most of the investments (VC/PE) have gone primarily to 2W currently and major penetration is expected to happen there in the coming years.

Recent Policy changes, Govt incentives (FAME II), State level initiatives, and increasing green awareness among end consumers have attracted many players (existing automakers & new entrants) to invest

heavily in the segment cementing the doubts about EV adoption by the masses in the future.

Battery being approx. 50% of the vehicle cost plays a key role in how the future is going to unfold for the sector. A lot of investments in R&D and local battery manufacturing are underway to make it cost-effective and affordable for the masses.



The challenge for India remains in establishing a robust supply chain of component makers, battery technology, establishing country-wide commercially viable charging infrastructure, attracting private investments, and accessibility to reasonable retail financing for end-Users of Electric Vehicle.

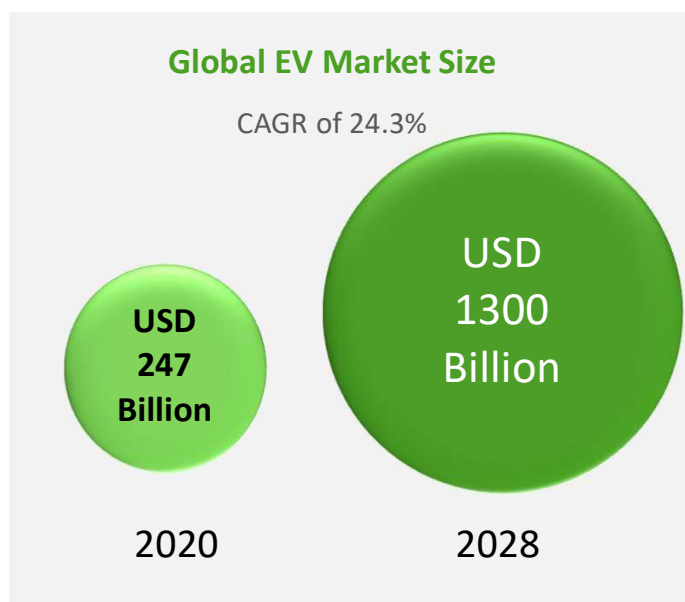
But looks like the industry is charged fully for a long drive ahead.

2. Global EV Scenario

To achieve the target of zero emissions by 2050, the evolution & growth of the Electric Vehicles (EV) market is going to play a key role in the coming years. EV ecosystem is buzzing with a lot of activities happening from manufacturers, component makers, policymakers, technology collaborators and end consumers. This is witnessed both in the global market and in India as well. Global meets on climate changes, the country's commitment to cut down carbon emissions, the impact of fossil fuel-based mobility has naturally paved the way for electrifying the mobility of the future.

Global EV Market

The global EV market is experiencing tremendous growth in recent years as many developed and developing countries are actively participating. The global EV market has grown 43% annually in the last 5 years. The market is expected to grow at a CAGR of 24.3% in the coming years.



Source: Fortune Business Insights

EVs share in the automobile market stood at 2.6% till 2019 and it is expected to explode in the coming years, thanks to the declining cost of batteries and charging infrastructure expanding.

Before the Pandemic, USD 300 Billion was earmarked for investment in EV globally for the next 5 to 10 years. 45% of this investment was budgeted to China with the rest going to Germany, the US, South Korea, Japan, and France.

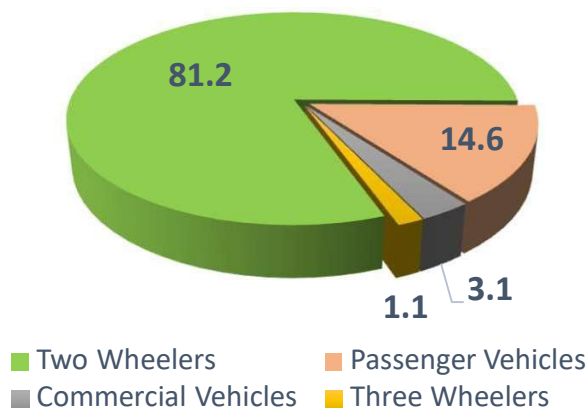
The 2022 – 25 period will be the most optimistic period for EVs - with a lot of govt. schemes, tax incentives, and support drives in India, both existing & new players are foraying into the space and launch of more new models expected in the coming years

3. Indian Auto Market

India is the 5th largest automobile market in the world and is expected to reach 3rd position by 2030. Two-wheelers dominate the Indian automotive market, where Hero MotoCorp is the leading manufacturer in India with a market share of 34.04% followed by Honda with 25.58% in the FY 2021.

India is also a prominent auto exporter and has strong growth expectations for the coming years. In this, two-wheelers contribute to approx. 74% of the total volume followed by passenger vehicles with approx. 15%.

Share of Each segment in Total Production Volume – FY21



Exports:

In FY21, India's automobile export reached nearly **4.13 million** vehicles, growing at a CAGR of **6.94%** during the period FY16-FY20.

Source: India Brand Equity Foundation

The auto sector is an essential pillar of the Indian economy as it contributes 7.1% of overall GDP and 49% of the manufacturing GDP. But recently due to the pandemic lockdown, the industry lost nearly INR 2,300 crore per day.

Post pandemic, the government looks to increase the GDP contribution from 7.1% to 12%. They already paved the path towards EV which has immense potential for rapid growth. This has reduced oil import demand saving INR 1,07,566 Cr in FY21 and it is expected that 30% of EV sales in the future will lead to a reduction of 31% reduction in oil imports saving INR 2,16,043 Cr in the coming years*.

EVs are the way forward for the Indian auto industry, attracting investments from established OEMs and startups like Ather and OLA into the space. The increasing popularity, better performance, and features like IoT connectivity attract the current generation to adopt Electric Vehicle.

*Source: Hindustan Times – Climate change

3.1 Indian EV Market

At present, the electric vehicle market in India is in its nascent stage but has the potential to emerge as the leading electric vehicle market in the world. The growing popularity and government EV policies in India are prompting the leading automotive manufacturers to launch various models of Electric vehicles in India.

While there is an ambitious vision for making the shift towards 100% electric vehicles by 2030, major penetration is expected to come from the light mobility segment – two & three-wheelers. The challenges for 4W segment include few product offerings, high price, unreliable battery performance, underdeveloped charging infrastructure that are going to test 4W segment in the coming years.

Segment wise analysis - EV Penetration			
Segment	Sub segment	EV Penetration %	
		2025	2030
2W	Scooters	15 - 25%	50 - 70%
	- B2B	40 - 60%	60 - 80%
	- B2C	13 - 18%	40 - 60%
	Motorcycles	1 - 2%	10 - 20%
	Overall	7 - 10%	25 - 35%
3W	Overall	35 - 45%	65 - 75%
4W - PV	Personal	1-3%	10-15%
	Commercial	5-10%	20-30%
Buses	STUs	15%-25%	25%-40%

Source: The Economic Times

India's electric vehicle market size is found to be approx. 2,40,000 units in 2021 and expected to grow around 63,00,000 units of sales by 2027*.

As there are rising levels of vehicular emissions observed in India, there is a shift in government regulations which will make the EV market size reach USD 150 billion or more by 2030. The market is expected to grow at a CAGR of 94.4% from 2021 to 2030.

*Source: The Economic Times

Though there are various factors favoring Electric Vehicle growth, India needs to do serious interventions for achieving that leap growth in the next 10 years. This includes

- (1) Govt. policies & regulations attracting foreign investments
- (2) Development of component supply chain
- (3) Battery manufacturing & recycling
- (4) Establishing country-wide Charging infrastructure
- (5) Robust Financing ecosystem

3.2 India's Evolution - 2W



1960-1969
Production of automobiles was licensed in India



1980-1990
Started foreign collaborations for technology advantage



2000-2010
Tends to be the 2nd Largest producer in the world.



2021 (Till date) - 2030
The era of electric vehicles has started in India



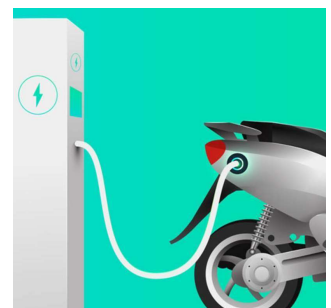
1970-1980
The growth of conventional two wheeler industry is observed.



1991-1999
Tremendous growth observed in the Indian 2 wheeler history.



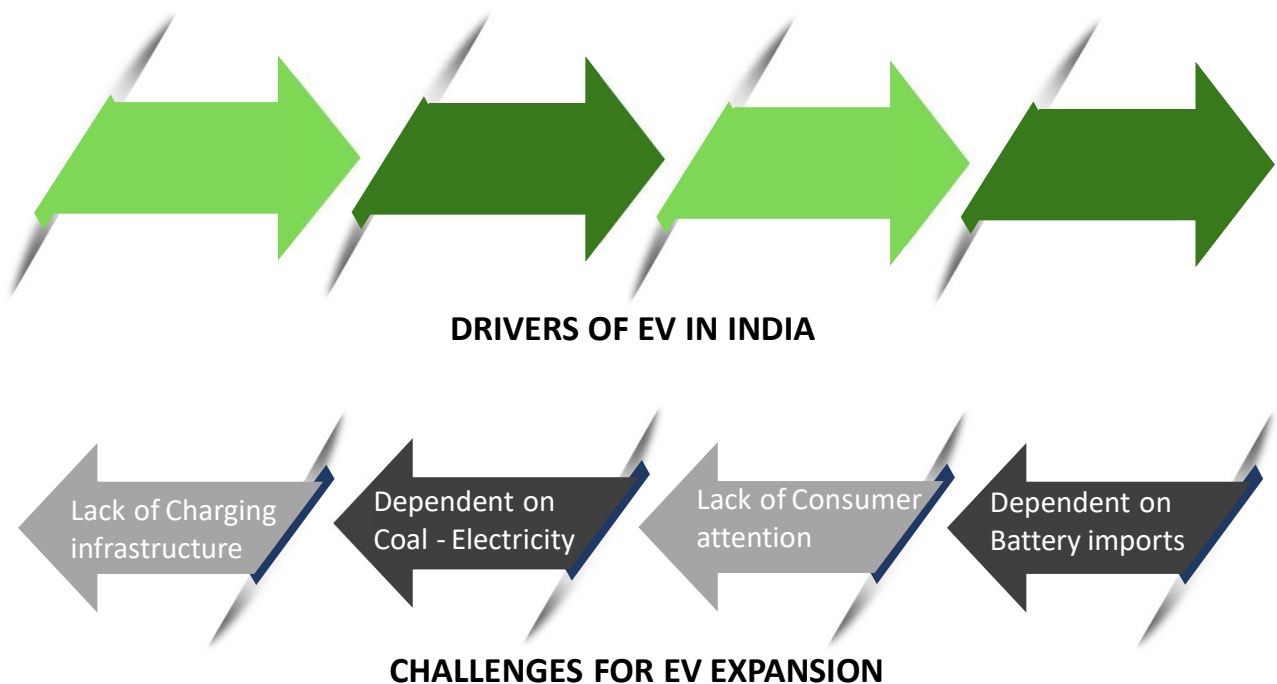
2011-2020
The rise of electric vehicles in India



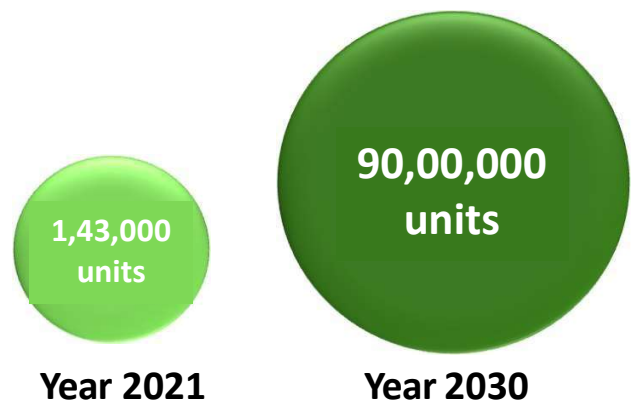
3.3 India's 2W E-Vehicles

The two-wheelers have seen a massive drive in the last few months. The Electric Vehicle two-wheeler sales have grown from 25000 units (FY17) to 143000 (FY21) units despite the Covid outbreak. The sales are expected to grow to 90 Lakh units by 2030.

With the drop in battery prices and low operating costs, electric vehicle prices will be comparable with the petrol counterparts in the coming months. As we know India is known for the world's largest number of two-wheeler buyers, there is a potential platform available for the Electric two-wheeler market.



The growth of the Electric two-wheelers market in India will be fueled by various drivers like strong governmental push, OEMs investments, affordability, and charging infrastructure. (Example - FAME II scheme of the Govt. has decreased the cost and the price gap between the conventional and EV is not as big as in past).



Source: Statista -Transportation & Logistics

4. EV- Govt Policies & Plans

The electric two-wheelers industry is likely to witness growth in sales in the FY2022 if there is a consistent drive from central and state governments for the transition towards greener and cleaner India.

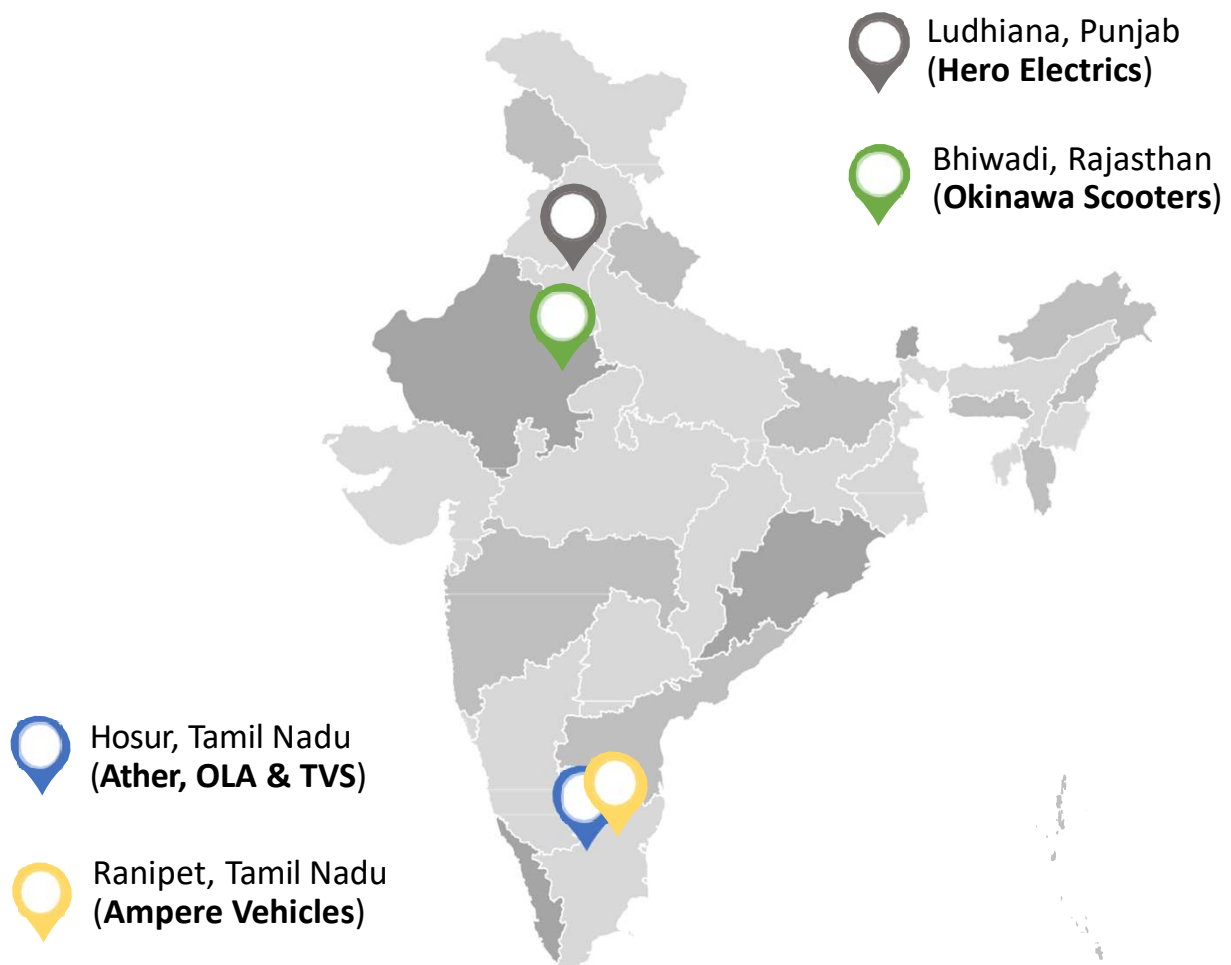
- EVs in India have a lower Goods and Service Tax (GST) of 5% reduced from 12% in 2019, whereas the ICE vehicles have around 30% - 40% of tax.
- Several state governments have introduced their own policies to attract investments. States like Karnataka, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, and Gujarat offer many incentives like **No registration fee & road tax rebate of up to 25% to encourage the EV era.**
- In order to promote the sale of electric vehicles in India, the government launched the **FAME-II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles)** scheme which is a part of NEMMP. This helps in getting certain incentives to lower the manufacturing and purchasing cost of electric vehicles.
- The **Phased Manufacturing Programme (PMP)** is notified in developing the domestic manufacturing of electric vehicles including its assemblies/sub-assemblies and parts/subparts. This helps in improving the manufacturing ecosystem and creates employment opportunities.



Limitations in Policy:

- Even though the FAME II supports on driving the EV era, there are some eligibility criteria for vehicle manufacturers to access the incentives. All EVs must be locally manufactured in India and have at least 50% of components sourced locally.
- Most EVs are required to have an advanced battery and electric regenerative braking system. But most of the local manufacturers currently do not make lithium-ion batteries, electric motors, and other specific parts required for EV manufacturing. Hence, these complex certification procedures make the path looks hard for manufacturers to use the government incentives.
- The Society of Manufacturers of Electric Vehicle (SMEV) had gone to the extent of saying that the second phase of the government scheme which was expected to support the thrust of the EV segment had failed in the two-wheeler segment.

5. EV Manufacturers in India



Favourite destinations for EV manufacturing seem to be Hosur, Tamil Nadu followed by Ludhiana. Hosur is an industrial town present in Tamil Nadu right at the border of Karnataka.

Manufacturing plants of TVS, Ather, and OLA are concentrated around Hosur and this chain is expected to have more action towards the ecosystem of EV than any other place in India for now.

Research & Development along Bangalore has various benefits like development centres of auto suppliers like Bosch, Continental, General Motors, and Daimler. It will be an added advantage to have close partnerships between OEMs and suppliers right from the start.

6. Established Players

EVs attaining prices compared to conventional vehicles due to low running costs, fall in battery prices and rise in fuel prices motivate the customers to **Go Green**.

The tremendous opportunities for growth in the EV sector drive the traditional two-wheeler manufacturers like Hero, Bajaj, and TVS to stay heavily invested in the segment. While on the other hand, there are many new entrants into the segment.

With the increasing understanding of consumer behavior, their needs, and challenges, top manufacturers are rolling out products with more and more features. Here we can look at the top three players in the two-wheeler EV market:



Hero Electric



Okinawa Scooters



Ampere Vehicles

Though COVID has impacted these players, post lockdown sales were positive and encouraging and major expansion plans are announced to happen in the coming months.

Players	Market Share	Current Annual Capacity	No of plants
Hero Electrics	36%	1,00,000	1
Okinawa	17%	90,000	1
Ampere Vehicles	14%	60,000	2

Capacity and Share details during the period FY20-21 (Source: Electric Vehicle Info)

The recent policy changes have significantly brought down the prices - encouraging the adoption and transition towards EV, pushing up the demand, and creating awareness towards the electrification segment in India.

6.1 Comparison of Top Players

Product offering by the top players

Description	Hero Electrics	Okinawa	Ampere Vehicles
Speed Range	25 – 50 km/hr	30 – 70 km/hr	25 – 55 km/hr
No of Models on road	5	5	7
Battery	Lithium-ion Batteries	Lithium-ion Batteries	Lithium-ion & Lead Acid Batteries
Charging Time	3-4 hrs	2-4 hrs	5-8 hrs
Battery Life	4-5 Yrs.	3-4 Yrs.	3-4 Yrs.
Motor Life	4-5 Yrs.	3-4 Yrs.	3-4 Yrs.
Distance Coverage per Charge	80 - 110 kms	60 - 125 kms	60-85 kms

(Source : Primary research thro Dealers interaction)

1. Hero Electric:

Hero Electrics is the leading two-wheeler Electric Vehicle manufacturer in India and is ramping up its production capacity in its Ludhiana plant. It is anticipated that the demand in volume will grow to millions in the coming years and hence the plan is to increase capacity around **5 lakh units*** every year. And also in the coming years, Hero electrics is planning to have 2 or more facilities across the country to meet the demand.

The main challenge is to level up the localization of component manufacturers and reduce the

dependency on importing the critical power train components like batteries and motors from other countries. India's shift is being hampered by high import prices, inadequate charging infrastructure, and inadequate localised component makers.



*Source: TECH2 News - Auto

6.1 Comparison of Top Players

2. Okinawa Scooters:

Second largest manufacturer in the two-wheeler EV market with more than 90,000 scooters on road.



Their capacity is also expanding with a new manufacturing plant in Bhiwadi, Rajasthan. Okinawa is also facing stiff competition from emerging new players like OLA, Ather, and others. To meet the growing demand, the company is working rigorously with its suppliers to fill in the gaps in production capacity, range, and high cost.

At present Okinawa has **92% localized*** its suppliers and aiming for 100% by the end of FY22. This push from OEMs will encourage the local component manufacturers to set the domestic supply chain and strengthen the EV segment resulting in a significant cost advantage.

3. Ampere Vehicles:

They have registered sales of 5,903 units in the year FY21 which is twice the FY20 sale. Low range vehicles with a top speed of less than 25kmph are the major contributor to their growth.

On scaling up for the upcoming demand, Ampere Electric, owned by a subsidiary of Greaves Cotton Ltd has expanded its manufacturing facilities in Ranipet recently proposing a potential capacity of **1 million*** units per annum.

They believe that “the future electric growth story depends on capable suppliers, good talents towards electrification and a peaceful workforce”. For an effective business model and to run on the long term, localization of

components will be more cost-effective and can look at just-in-time inventory as compared to 4-6 weeks lead time.



**Source: The Economic Times*

6.2 Emerging Players

4. Ather:

In recent times, Ather has had the fastest acceleration among all scooters on road in India. They have spent INR 130-Cr to set up a new manufacturing plant at Hosur which implies sales of **2,000 units*** per month.

For instance, Ather 450X got 300 parts that are sourced from 76 suppliers at present. Many assembly parts are shipped as a single part – ready for fitment during assembly.

Factors such as high pricing, lack of a robust domestic supply chain and low awareness are accentuated by the absence of an effective ecosystem. Ather

can be great for city riding but the question is “How to be cost competitive and offer high value for consumers in this extremely price-sensitive market?”



5. Ola Electric Scooter

It is expected that OLA will have a deep impact on the overall EV scooter industry in India. The shift from ICE vehicles is pictured with high prices, range anxiety, and charging concerns. OLA has taken serious measures to overcome these challenges. Their production line which is capable of 80,000 units* monthly has become operational in recent times.

OLA does its own design and assembly of core components (Battery pack, motor, and control units) in-house.

The development of local parts manufacturers is the key in supporting all the required functionalities that OLA was trying to build.

Hence, OLA is looking at sourcing of parts to the required scale.



**Source: The Economic Times*

7. Understanding EV - Components

Removed Components	Modified Components	Newly Added
<ul style="list-style-type: none"> - Engine Parts - Radiators - Fuel Tank - Oil pump & sump - Exhaust system 	<ul style="list-style-type: none"> - Steering systems - Brake system - Seats and body frames - Shock absorbers - Clutches & Gears - Cooling system 	<ul style="list-style-type: none"> - Batteries - Electric Motors - Wiring Harness - Inverters & Convertors - Microprocessors - Internet of Things

Expected Scenario of Components in the EV Revolution

As automakers are gradually gearing up from conventional to electric vehicles, the risk of wiping out various ICE components and their manufacturers looks inevitable in the coming years.

The EV adoption is a classic case of technology disruption where manufacturers are facing challenges from multiple dimensions – R&D, components supplier ecosystem, investments, charging infrastructure, features, product performance, etc.,

But there is a high demand for electronic components coming from automotive manufacturers around the world. The supply chain of EV components is not geared up to meet this growing demand resulting in delays.

Specifically, delays in electronic components such as import of batteries, and hardware has affected

the supply chain and become a bottleneck at manufacturers' end. 70% to 80% of EV models would be same as conventional vehicles and the remaining will have new design and development to support the powertrain of electric vehicles. Electrification beyond the battery, motor, and power electronics won't really change the final assembly.

The issue is not necessarily with the manufacturing process, which is much simpler owing to the reduced number of parts in an EV. The main challenge is with the component ecosystem who must support the OEMs with quality, cost, and timely deliveries.

The problem is that globally, the supply chain has not been scaled for a steep increase in volumes and there will be a wait for the ecosystem to get matured.

7.1 Main Powertrain Components

Electric Motor:

The electric motors mostly depend on speed range of E-scooters. The scooters which have a maximum speed of 25 kmph, mostly use a 250 W Brushless DC motor. The scooters with maximum speed ranging from 50 – 80 kmph has power levels ranging from 500-750 W.

Battery Pack:

The fast growth of EV market impacts the supply of batteries against the demand. The market which was ruled by lead-acid has been taken over by lithium-ion in this case. Lithium batteries are mostly imported from China and other nearby countries to meet the growing demand.

On-Board Charger (OBC):

On-Board chargers come in many different power levels and higher the power level, shorter the charging time. The manufacturer defines the charger power levels based on the vehicle requirements. Based on the models of electric scooters, it is likely to expect different design and construction of OBC in the coming days.

DC-AC Converter:

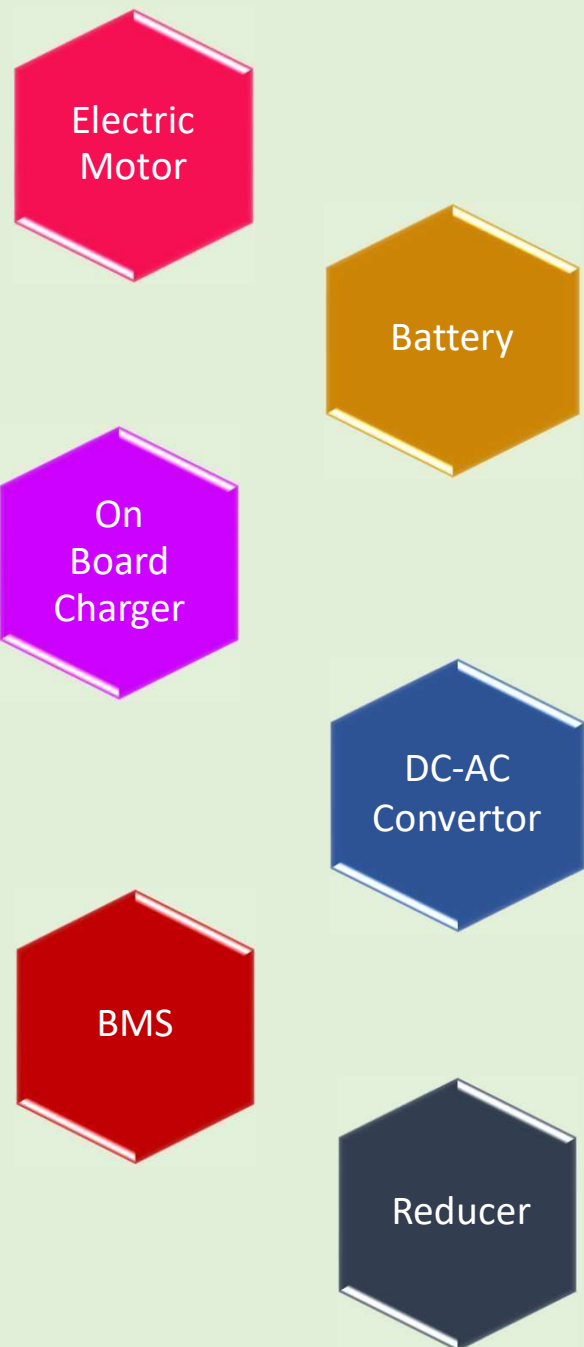
The high current DC electricity which comes from the battery will be converted to AC to transfer energy for the motor. This helps in controlling the motor speed and is responsible for the acceleration and deceleration of the vehicle.

Battery Management System (BMS):

BMS is used to monitor all the electrical parameters in the vehicle - controls or displays in time of any failures. It helps in optimizing the battery's durability and performance.

Reducer:

It is also one of the transmission systems used in EV to effectively monitor and control the RPM from the motor to the appropriate level as it has high RPM than ICE. This helps in resulting in high torque in the powertrain.



7.2 Scenario in Component Manufacturing

Component	Current Status	Major players India	Action taken by government
Battery	Made of many microcells. These cells are imported and bundled locally. We are completely dependent on China.	LG Chem, Panasonic, Okaya Battery	Set to announce a production linked incentive scheme to the tune of USD 4 Billion.
Electric Motor	Even though we manufacture motors, due to higher specifications & lack of volume, imports are done from China. The imports are cheaper than the local offering.	Robert Bosch, Rizel Automotive & many small players	Production Linked Incentive (PLI) Scheme on Advanced Chemistry Cell (ACC) (Incentives worth INR 18,100 Crore) & 100% FDI is allowed under the automatic route
Drive train	The Drive train includes an Inverter, Vehicle controller unit, Transmission, on board charger that are made of numerous electronic parts. These are imported from China & Taiwan.	Electra EV, Napino, Robert Bosch & many small local players are present	
Charging Infrastructure	Electronics are imported and assembled locally. There are cases of complete Imports of entire solutions as well.	Tata Power, Charzer, Delta Electronics India & ABB	PLI to support production & Ministry of Power has clarified that charging EVs is considered as a service, which means that operating EV charging stations will not require a license.

In low-speed E scooters sold currently, 80% of the parts are imported from China or Taiwan. Traditional Indian Auto giants were slow in joining the EV race and have not onboarded their existing Tier 1 on time to establish the needed supply chain. *(Check Annexure for Early Players)*

The government has outlaid specific policies to support the production of EV & its components with states like Karnataka, TN & AP devising a specific policy to promote R&D and production. It will require another 3-5 years to reduce our dependency on imports, based on the current actions initiated but the journey is longer.

8. Charging Infrastructure

The charging infrastructure is the backbone for electric mobility in India. It is also expected to grow in the coming years as per the demand. The government schemes like FAME II have a major focus on improving the charging infrastructure.

Currently, there are only **427 installed charging stations*** across the country of which 77 are there on national highways and the remaining 350 are situated across different states in the country. The government is also pushing to build the infrastructure by sanctioning **2,900 more stations*** across the country which is expected to be installed in the coming months.

TYPES OF CHARGING

Battery Swapping

This swapping option allows a discharged battery to swap with fully charged one. In present scenario, it is only suitable for Electric 2 wheelers and 3 wheelers.

Slow AC charging

It is just like charging portable devices like phones and power banks. These charging method can be used in parking lots where vehicles can stay for longer time.

Fast DC charging

The fastest mode of charging the vehicle in which the power is converted to DC before it starts charging. These type of chargers are mostly found in highways as it allows faster charging during long trips.

BASED ON END-USE

Home Charging

The single phase 230V – plug in charger which can be consumed from home metering. Mostly the 2 & 3 wheeler -EV scooters is being charged in this method.

Public Charging

This is known to be the outside home charging unit also known as Public Charging Stations. Stations that can be set in petrol pumps, parking lots and malls. For high population dense country like India, public charging network is mandatory.

Commercial Charging

The charging stations which are set in corporate premises and not for public domains.



CHALLENGES FACED:

Factors like high operating costs and uncertainty in utilization rates of charging stations tend to hold back the expansion of the Electric Vehicle market. While EV manufacturers are upbeat about growth, the ecosystem supporting it - Battery, charging infrastructure and components are holding things back.

**Source: NDTV - Business*

9. Consumer Insights

Electric vehicles can generally suit Indian driving conditions and to achieve widespread EV adoption, manufacturers are trying to address various concerns and expectations of consumers in the coming months.

Electric Vehicles need to match conventional vehicles in terms of user experience.

CHARGE RANGE:

When the biggest concern about EV is said to be the charge range, 75% of Indian commuters travel less than 1,000 km a month (or roughly less than 35 km a day), and hence, this issue won't be a big hindrance as expected.

UPFRONT COST:

Buyers are uncertain about the TCO (total cost of ownership) of EVs – for example, frequency of battery replacement, the costs of charging and maintenance, etc. Consumers need to use the available online tools to understand the cost of owning EV with current travel habits before getting one.

FAST CHARGING:

The usage of two-wheelers is heavier among professional drivers on daily basis. Hence, when the adoption rate increases, there must be a ready market solution for fast charging.

CHOICE OF BRANDS:

Based on TERIs survey on consumer perception, nearly 48% of consumers prefer established brands but 52% show willingness towards new entrants provided there is adequate service and support.

SAFETY CONCERN:

- Batteries fitted in EV are said to play well in cold atmospheres but their performance in India's climatic conditions is yet to unfold.
- For low-speed scooters, buyers choose to go without the insurance which raises the question that, in absence of third-party insurance, how any legal or medical cost will be covered?

The user experience depends on the whole ecosystem coming together to address the expectations and concerns for mass adoption of electric-2 wheelers. Especially among middle-class consumers, the major impact will be from financial and technical attributes, government incentives and tax reduction.



In the current scenario, consumers know very little or nothing about electric driven technology which might make their choices and preferences clouded.

10. Road Ahead for India



Electric mobility is the future of transportation worldwide and India has its own set of challenges to overcome if it aims to become a prominent player by 2030. Some of the key challenges in front of the country include



1. Inadequate Fund Infusion

Investment in the sector is minimal compared to its global peers. Investors have restricted their interest only to 2W at this moment. Govt. needs to relook into its policy, schemes, and regulation frameworks for attracting private investments in the sector.



2. Dependency on Imports

Key components including batteries, motors, and controllers are primarily imported. Technology and high costs are the constraints. Local developments are happening but on a small scale.



3. Poor ROI from Charging Infrastructure

Initial Investment, Utilization, Cost per unit, and ROI are quite tricky today in running charging stations. This poor economies of scale in establishing charging infrastructure needs to be overcome. The issue remains the same in quite a few countries globally.



4. Hurdles in Retail Financing

Though the organized EV finance is estimated to be around 3.7 lakhs by 2030 many banks and NBFCs are not ready for EV financing yet impacting its sales. This was (a) due to poor repayment owing to poor vehicle quality (b) due to difficulty in assessing the value of used EV vehicles.



5. Domestic Battery Manufacturing – Late Entry

Battery forming close to 50% of the Vehicle price, it's important to establish a strong domestic manufacturing base for battery backed up by govt. support and India has a delayed start and its PLI Scheme has too many loose ends.



6. Will Foregoing Oil Revenues Possible

Will the govt. be ready to forego the oil revenue it earns today which is to the tune of 9 lakh crore per annum. Will it be too costly for the exchequer to delay its EV plans?

11. Key topics of discussion in EV

Q Towards the transition of ICE to EV, what will be the major difficulties for the existing manufacturers of EV to overcome?

Manufacturers need to be able to understand the impact of any changes before they happen. The biggest challenge is scaling up manufacturing from few thousand to bigger numbers – 2,50,000 to 3,00,000 units per year. And many components required for EVs are still imported, which affects the cost of vehicles.

Q Will there be any major change in the Automotive manufacturing followed by OEMs after this transition?

It is expected that there won't be any complicated practices happening at OEMs, as most of the components (EV powertrain parts) are outsourced and it will be mostly the assembly process in-house. Quite a few are planning for in-house battery production.

Q What will be the impact on component suppliers to this dramatic change of electrification?

Electrification will significantly impact all the auto component manufacturers in India. It is expected that large players are likely to adapt to the changes, however, the small firms could get hit the hardest by this transition. As EV is relatively simpler to build with only 20 moving parts as against 2,000+ in an ICE vehicle will disrupt their ecosystem.

11. Key topics of discussion in EV

Q In Electric Vehicles era in India, firstly will the BEV picks up or the hybrid does?

In the electrification of vehicles in India, jumping straightway from petrol to EV will impact the ecosystem of automakers and consumers. At present, conventional vehicles have a large base in the Indian market and consumers' expectations come along. Hence, the hybrids (usage of ICE and Battery) before Battery electric vehicles could be a start.

Q What will be the challenges for consumers in India towards EV?

Consumers expect that the electric vehicle should have all the facilities and comforts that are available in conventional vehicles. The challenges that the EV industry faces are

- Lack of Charging Infrastructure
- Speed and Range anxiety
- Financial Challenges like limited financing options, limited EMI, and loan opportunities.

12. Abbreviations

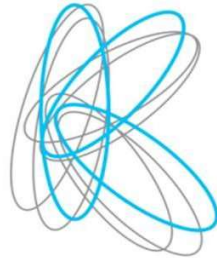
B2B	BUSINESS-TO-BUSINESS
B2C	BUSINESS-TO-CONSUMER
BEV	Battery Electric Vehicle
CAGR	COMPOUND ANNUAL GROWTH RATE
EMI	Equated Monthly Instalments
EV	ELECTRIC VEHICLE
FAME	FASTER ADOPTION AND MANUFACTURING OF (HYBRID &) ELECTRIC VEHICLES
FDI	FOREIGN DIRECT INVESTMENT
GDP	GROSS DOMESTIC PRODUCT
GST	GOODS AND SERVICES TAX
ICE	INTERNAL COMBUSTION ENGINE
IOT	INTERNET OF THINGS
NEMMP	NATIONAL ELECTRIC MOBILITY MISSION PLAN
OEM	ORIGINAL EQUIPMENT MANUFACTURER
PMP	PHASED MANUFACTURING PROGRAMME
SMEV	SOCIETY OF MANUFACTURERS OF ELECTRIC VEHICLES
TERI	THE ENERGY AND RESOURCE INSTITUTE

13. Annexure

List of Few Early Entrants in Components Making in India

S No	Manufacturer	Component	Place
1	Bharat Power Solutions	Battery	Utter Pradesh
2	Fiem Industry	Electric Components	Haryana
3	Trontek	Battery	New Delhi
4	Compage automation	Motor	Haryana
5	Karacus Energy	Battery	New Delhi
6	EV Battery Solution	Battery	Bangalore
7	Rizel Automotive Pvt Ltd	Motor	Madhya Pradesh
8	Auto Die Cast	Structure & Body	New Delhi
9	Exicom Power Solutions	Battery & BMS	Haryana
10	Elecново	Motor & Controllers	Bangalore
11	Electra EV	Power Train Components	Pune Coimbatore
12	Napino	Power Train Components	Haryana
13	Jayem Automotives	Power Train Components	Coimbatore
14	Okaya Battery	Battery	New Delhi
15	Greenfuel Energy	Power Train Components	Haryana
16	GoGoA1	All components	Mumbai
17	Amara Raja Batteries	Battery	Chittoor, AP
18	Minda Industry	Electric Components	Multiple Locations
19	Exide Industries Limited	Battery	Multiple Locations

14. Contact Us



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