

# Potential and Impact of EVs in India

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## **Abstract**

This paper discusses about the potential need of EVs and charging station infrastructure development and challenges for Indian scenario. India being in the top ten automotive markets globally with steady growth in middle class population and buying potential with economic growth. However, lack of alternative sources of crude oil for transportation pose a critical challenge in our growth. This can, to a major extent, be nullified when using EVs. To this end, the paper has listed out the challenges and opportunities for EV in India. In the end, the role of government and other stakeholders in improving EV scenario has been explored.

Keywords: EVs, India, Market Leaders, Growth, Competition, Demand, Improvement

## **1. Introduction**

Global trend such as urbanization and advances in the mobility over the past centuries which is transforming the lives of the people as well as country and it is expected that by 2050 the people residing in the cities would be doubled as the expected population of the world is 9 billion and the number of cars on the road is expected to get doubled from 1 million to about 2 million. As of now the transport facilities consumption of world energy is one fifth and has one fourth contribution in the total co2 emission which emphasis us in improving the air quality by reducing the emission both local and cities co2 emission which contribute to great extent in the air pollution which leads to climate change. So there is no hesitation and surprise in switching from conventionally powered vehicle to the hybrid new generation vehicles.

Electric Vehicles – The vehicle of new generation or the evolution from the traditional fuel vehicles to the new generation vehicles and still many of us are watching the evolution and seeking more information before switching to the electric vehicle but what we think with the better innovation and continuous environment awareness the electrical vehicle could be a great contribution to all.

## **2. Literature Review**

### **Energy Scenario India**

Energy is universally considered as one of the most important input of the human growth and economic development of any nation, however there no straightforward relationship between economic growth and

increase in energy demand. When one discusses about the developing countries energy sector has a critical importance in view of increasing demands of the energy which requires huge financial and technological investment to meet the demand. The below tables show the trend which India has shown in the availability of primary source of energy from year 2007-08 to 2016-17 and from the table below we can infer that there has been constant growth from year to year.

### **Consumption Pattern of Energy India**

Energy is universally accepted as the important input for human development and energy consumption and development has two way relationships as it is observed that development is depended on energy demand.

When we talk about the energy consumption of India, per capita energy consumptions is less than one tenth of the developed countries with major dependence on coal which contribute 55% of primary energy production large import of oil and gas. Broadly energy can be classified as commercial and non commercial. Commercial energy constitute coal, gas, oil and electricity which are traded in the market and it constitute 65% of Indian energy mix and non commercial energy mix which constitute 35% of the energy mix mostly used by rural communities and when it comes to transport sector light vehicles primarily uses motor gasoline and diesel is primarily used by heavy vehicles.

Globally energy demand is expected to rise by 30% with natural gas consumption faster than either coal or oil, expanding at the rate of 1.6% per year by 2035 and Energy consumption in India is expected to grow faster than that of all major economics in the world at 4.35% by 2035(BP Energy Outlook). India being the second largest energy consumer since a decade and second largest oil consumer oil in Asian continent after China and third largest oil consumer after USA and China and it had overtaken Japan in 2015. The table below shows the trends of energy consumption for various years i.e. from year 2011-12 to 2016-17 and it can be inferred from the table that there has been constant growth of energy consumption in these various years

### **Modes of energy (Or Fuels) used for Vehicle:**

India is country where about 7.33% of total energy is consumed for transporting people and goods from one place to another.

Different types of energy or fuel used for vehicles in India are as follows

- Petroleum Products (Fuel): diesel fuel, Petrol fuel jet fuel, residual fuel oil, and propane.
- Biofuels: Ethanol and biodiesel.
- Natural Gas
- Electricity

And among these petroleum is the major source of fuel or energy which is used for the transportation in India.

### **Transport Scenario in India**

With 6.4% contribution in the GDP transport sector is growing rapidly it plays important role in economy with significant contribution in our economy. This sector largely depends on oil and contributes about 12% of country energy related CO<sub>2</sub> emission. With steady increase in crude oil import and globally making India 3rd largest importer and of crude and raising the obstacles for national energy security. In India intercity

connection mainly met by road (88%), rail (11%) and limited share of air transport with dominance of road transport in urban areas. With huge and extensive network of railway it dominated the transport sector but issues like poor infrastructure and high competition of road transport railway share dropped from 40% in 1970 to 11% in 2010. India is in unique period of growth and witnessing economic growth, population growth, GDP growth and growing urbanization accommodating about one third of the country population and it is expected by 2050 half of population will reside in the urban areas with 4.3 times higher demand of intercity travel and transport. With healthy growth in population, urbanization and income it may derive the vehicle ownership with travel and transport demand resulting in high energy demand and green house gases emission.

### **Need For Electric Vehicle**

The electric vehicles has less moving parts than conventional vehicles which require no oil changes contributing to low maintenance cost and with no emission of green house gases and with amazing torque of 100% at zero RPM it is better and clean alternative of conventional vehicles With premium features like immediate torque silent ride with premium performance Electric Vehicles have lower fuel and maintenance cost which makes electric vehicles consumer collect social pride and responsibility in contribution towards creating clean and healthy environment and these being the reason for electric vehicles attention. it could also contribute to the domestic energy independence as the electric energy that provide the power to the electrical vehicle battery comes from various sources like natural gas, solar energy, wind energy and nuclear power which could reduce the emission to great extent and also reduce the energy dependency as India is crude importing country and import about 70% of crude from foreign country.

### **India Electric Vehicle Market Scenario**

The Indian electric vehicle market is at initial stage with huge future potential comprising only 1% of the total automobile sales and about 95% of the total electric vehicle market is dominated by two or three wheels vehicles. By the end of year 2016-17, total electric vehicle market was around 25000 units and according to Society of Manufactures of Electric Vehicles total sales of electric car. The sale of four wheelers vehicles was less than 8% of the total mix.

According to the study the highest selling states for electric vehicles in India are Gujarat, Uttar Pradesh, West Bengal and Rajasthan with 4330,2846,2467 and 2388 units of Electric vehicles sold respectively for the year 2016-17.

The EV market in India is expected to flourish with the entry of new players from both foreign origin and Indian origin and some of the foreign i.e. BYD Auto Co. Ltd. is expected to supply electric busses to state transportation firms.

Indian origin firm like Mahindra plans to make around 60,000 EV units by 2020 in four wheeler segment and the Indian unit of South Korean Hyundai Motors Co. is expecting to launch EV by the end of the year and by 2020 Maruti Suzuki is expected to enter the EV market.

Tata Motors have launched their Electric Vehicle Tata Tigor in 2018.

And various other models of EVs like Nissan Leaf with function like fast charging and generous range in one charge i.e. 270 km and new model is expected to deliver about 350 km in one charge, south Korean car manufacturing has announced the launch of Hyundai Kona a SUV model in top 10 metro cites and Audi has

planned to launch its luxury SUV with extraordinary features like 100km/h acceleration in 3.5 sec with generous range of 400 km and these all are to be launched by the end of year.

In 2012-13, the FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) implemented under National Electric Mobility Mission Plan (NEMMP) was established which offers subsidy on electric vehicle and it was launched in year 2015 for electric vehicles cost reduction and market penetration.

Incentive scheme Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) subsidy ranges from ₹11,000 – ₹24,000, ₹59,000 – ₹71,000 and ₹60,000 – ₹1,34,000 for mild hybrid, strong hybrids and electric vehicles respectively and subsidies are even available for two and three wheelers vehicles.

#### **Mahindra**

Despite the policy flip flop (FAME II) Indian origin firm Mahindra Electric, India's one of the leading EVs manufacturer showed its commitment to green and clean vehicles by planning an investment of \$130 - \$140 million in the next three coming year. The funds are planned to be used for expansion of Bengaluru plant, setting up of Research and development centers of EVs and setting up of battery manufacturing station at Chakan with 2-3 folds of jump in its volume in three and four wheelers with 10000 to 12000 unit per annum. Mahindra have also planned for the capacity of 70000 by 2020.

As the EVs market continues to gather steam in India Mahindra has reportedly announced the launch of two electric vehicles by 2019 for Indian market and Mahindra KUV is expected to go on sale from Feb, 2019 for Indian market.

#### **Tata**

While the most of automakers have announced their plans to add their electric vehicles in their portfolio in India Tata Motors have taken a step ahead, instead of launching EV product they are working with its sister entities to develop a complete ecosystem of EV in the country. After the revealing the EV model of Tigo & Tigor and the launch to Tata Tigor in 2018 Tata has planned to launch the Tata Tigo by July, 2019 it continues to introduce the new models and the Tata latest electrification attempt is the new Altroz-based electric hatchback with range of 250 to 300 km in one charge and battery will charge 80% in 60 minutes

#### **Challenges for Electric Vehicles**

For the coming next five years India is targeting to have at least 15% of total vehicles on road to be electric which could be a step taken to keep eye on oil import and reduction of the pollution and as per the result of a survey in Bengaluru are willing to adopt EV but have concern on cost and maintenance of the vehicle.

India has complete import dependency of critical mineral which is required for battery manufacturing. Also, the battery components are eco-logical contaminants and their disposal requires careful and coordinated handling efforts.

#### **Lacks infrastructure for charging station**

consumers are concerned for the range of EV vehicles and this is one of the key reasons for the failure behind EV embedment and this can be curbed by enough number of charging infrastructure development.

According to research India has 350 public renewable EV chargers and 57000 petrol pump station where as china installed about 215,000 charging station by 2016 and delaying in development of charging station can delay the India mission of EV.

To solve this key problem Govt. has already taken step and Energy Efficiency Services Ltd (EESL), released request for proposal for 10,000 EV, 1000 fast charging station and 3000 slow charging station and these stations can be used publicly

### **Expensive and Variety**

when compared to conventional vehicles EVs are still expensive and it offers less option for consumer to choose from and these makes important for Govt. to promote the usage of EVs through incentive and scheme for both consumer and manufactures.

### **Conclusion**

Decent no of Indian metro cities and cities ahs got severe health and environment issues and our capital Delhi being the prime example of the same and day is not far when these problem will become unmanageable if we don't take any step cutting these issues. Some of the major cities of country are already were listed in the top polluted cities of planet in 2016. And according to the medical journal Lancet about 2.5million people in India dies every year due to poisonous air

With expansive landscape and population over 1.2 billion and booming every year mobility remains one of the major challenge of the country and it is expected to rise in the number of vehicles to 550 million units by 2030 form 160 million now.

Greening the transport sector holds huge potential for future use in enhancing the energy security and tackling the issues of pollution by reducing the green house gases, there are still several challenges that must be overcome before their widespread and utilitarian use. A primary challenge that is yet to re-solved is the waste disposal challenge of batteries used in the EV. The need of the hour is that the government comes up with a set of guidelines to ensure that waste disposal is not a concern for either the user (economic) or for the society (environmental). Needless to say, EVs will be success only when the government and the industry together with the user base work in unison

Electrification in the mobility has emerged as most convincing and it offers sustainable progress in future and healthy environment for the future inhabitants of the planet.

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