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Current Scenario on Electric Vehicles in India

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Abstract

In present scenario, air pollution has become a serious concern for the India. According to recent global report, many cities in the India are most polluted cities. Major sectors contributing to the air pollution are industrial sector and transport sector. Among this 51% of air pollution is caused by the industrial sector and 27% by the transport sector. Air pollution contributes to the premature deaths of 2 million Indians every year. In order to minimize the air pollution, Electric Vehicle (EV) can act as blessing in lowering the GHG emission. Electric Vehicles offer numerous advantages such as decreasing the pollution level and reduction in oil import bills etc. Although there is considerable amount of threats in establishing the Electric Vehicles in India. This paper provides the brief literature review on the Electric Vehicles and compiles the advantages and threats in promoting EVs in India.

Keywords:Electric Vehicles, E Bike, E- Vehicle, EV

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1. Introduction

Air pollution is one of the greatest threats in the global context, and in a country comprising of world second largest population of almost a 130 million (equivalent to 17.7% of world's population), people are finding problematic to breath in most of the metropolitan cities. India is facing some serious air pollution issues since a decade and it is increasing at an alarming rate. The main cause of this exponential increase in the pollution levels is poor fuel quality, old vehicles, inadequate maintenance, congested traffic, poor road condition and old automotive technologies and traffic management system. The major pollutants emitted from the automobiles are hydrocarbons, nitrogen dioxide, lead, carbon monoxide, sulphur dioxide, and particulate matter. Reason behind large share of vehicular pollution is India's gigantic automotive industry i.e., 4th largest in the world. According to the Ref. [1], the population of electric vehicle in India is increasing at the rate of 37.5%. And the government is focusing the more concern towards the Electric Vehicles [2] and charging stations [3]. In reference [4], placement of charging station has been proposed to optimize the charging stations and provide the maximum power as per the requirement.

2. Working Principle of EV

In the working principle of electric car the e-motor gets energy from a controller which collects the power from a battery. The e-vehicle works on an electric principle. Battery pack provides the power to the electric motor. Therefore, e-motor uses the energy received from the rechargeable battery to rotate the transmission system, thereby, wheels rotate. Moreover, a potentiometer is hooked to the accelerator pedal of the car which signals the controller how much power is to be delivered to the electric motor.
In order to reduce air pollution, we need to move towards an alternate source of transport from convention ICE vehicles and EVs can act as an alternate source of transportation giving plenty of advantages to the consumers which are mentioned below:

A. EVs are environment friendly Compared to ICE vehicles EVs does not produce smoke resulting in no pollution. EVs don't even have an exhaust system, meaning they have zero emissions. And since gaspowered vehicles are large contributors to greenhouse-gas making the switch to an EVs can help in making the planet healthy.

B. Electricity is the cheaper than gasoline Per kilometer cost to EVs is cheaper compared to ICE vehicles. The fact cannot be denied that many EVs run at one-third of the cost, given that electricity is significantly less expensive than gasoline. And since consumer charge there EVs in garage most of the time, installing solar panels at home can save even more money.

C. Low maintenance Due to absence of internal combustion engine in EVs its maintenance requirement becomes less.

3. Challenges Ahead

Presently, there are many more challenges to establish the Electric Vehicle future. The major role to run the Electric Vehicle in India is power generation. Without electricity, we cannot imagine Electric Vehicle future. Therefore, responsibility of distribution network increases to supply the proper electric power without failure. Which can be possible by proper monitoring of the network. Phasor Measurement Unit (PMU) [6-10] measure the voltage and current in real time and protect the network from any failure. In reference [11], voltage stability problem has been discussed andresolve by using the PMU which is installed and the power system buses.

A. High Cost of buying EV is quite high when compared to that of an ICE vehicle i.e., the average cost of electric cars in India is around 13 Lakh (INR), which is much higher than the average INR 5 Lakh for economical cars run on traditional fuel. These are mainly due to the lithium import for battery making and since batteries make up to about 50% cost of the vehicle therefore EVs are costlier. Lithium is a rare metal which has its high reserves in countries like Chile, Australia, and Argentina.

B. Lack of charging infrastructure The main hindrance behind commercial viability of EVs in India is inadequate charging infrastructure. India only had 650 charging stations in 2018, whereas China had over 456K charging points in the same year. Other reason creating anxiety is charging time. Battery charger efficiency according to the present available technologies all over the world varies in percentage from low 70s to high 90s [12].

C. Range anxiety Range anxiety is one of the most significant roadblocks to EV adoption. EVs generally have shorter range which causes charging fear in consumers mind. At present longest range EV available is Tesla's model S which has a range of 370 miles per charge. But since Tesla is not entered the Indian market so Indians do not have reach to this high range vehicle. EVs available in India do not have range more than 500 km per charge. This is deeply associated to the lack of charging infrastructure in the country, and while conventional vehicles can be refueled at petrol stations, such is not the case when it comes to EVs.

4.Opportunities Ahead

The electric vehicle market is set to expand owing to the ambitious plans and initiatives of the government. The government has taken a number of steps to incentivize and promote the deployment of electric vehicles and public charging infrastructure to achieve significant electrification by 2030. India is targeting to reduce its excessive oil imports and curb pollution levels across cities in the coming years. Electric vehicles will play an important role in achieving this target.

5.India's Policy on EV

In 2012, the National Electric Mobility Mission Plan (NEMMP) 2020 was established, under which an incentive scheme, Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME), was launched in 2015 to reduce the cost of hybrid and electric vehicles and to encourage their penetration in the market. The FAME scheme offers a subsidy on the retail price of passenger cars. These subsidies range from INR 11,000 – 24,000 for mild hybrids, from INR 59,000 – 71,000 for strong hybrids; and from INR 60,000 – 1, 34,000 for electric vehicles. Subsidies are also available for two-wheelers, three-wheelers, light-commercial vehicles and buses. The subsidy from the FAME scheme is not the only incentive mechanism that impacts the market for hybrid and electric vehicles in India. The Central Government of India and some state governments, such as the Government of National Capital Territory of Delhi (NCT of Delhi), provide tax incentives that treat hybrid and electric vehicles preferentially over conventional technologies. As per the recent announcements made by finance minister NirmalaSitharaman, during the union budget 2020 presentation, the government has increased

the import duty on electric vehicles to promote make in India.

6.Lithium ReservesRevolutionary EV Sector in India

Reserves of lithium, a rare metal critical to build batteries for electric vehicles, have been discovered in Mandya, 100 km from the Bangalore. This will be the breakthrough in local manufacturing of EV batteries. Researchers at the Atomic Minerals Directorate, a unit of India's Atomic Energy Commission, have estimated lithium reserves of 14,100 tonnes in a small patch of land surveyed in the Southern Karnataka district. Among the other countries, Chile is estimated to have lithium reserves of up to 8 million tonnes while 2.8 million tonnes have been found in Australia. Argentina is reported to have lithium reserves of up to 1.7 million tonnes. According to the data, Portugal also has 60,000 tonnes of lithium reserves, which are substantially higher in number when compared to the lithium reserves in India. The details of lithium ion battery have been given in [13].

7.Conclusion

High cost is one of the reason which diverting the customers from purchasing the EVs. To work upon this government has pushed for a wider EV adoption by offering subsidies to commercial vehicles. But electric cars still remain costlier by at least 30%, mainly due to imported batteries. The Centre's Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme of 2015 rolled out subsidies for electric commercial vehicles. Experts say the main challenges facing the EV industry are inadequate charging infrastructure and reliance on imported components and batteries. But 2020 could change all that. Cost of battery imports will come surely come down due to the discovery of lithium reserves in Bangalore. Over the last quarter, manufacturers have announced several new EV models that promise a higher range — some substantially more than the 80-90 km an EV gives now. Even at this year's Auto Expo at Greater Noida, electric vehicles are clearly the show-stoppers. Among the EVs that have caught everybody's attention at the expo are Maruti Suzuki's Futuro-e and Tata Motors' Nexon EV and Altroz EV. China's Great Wall Motors stole the show with the Ora R1. Another major challenge faced by EVs in India is inadequate charging infrastructure. The charging infrastructure needs urgent focus as India has only 2,636 charging stations. There is no shortage of electricitygeneration capacity in India to fuel these cars, says Rishabh Jain, manager, CEEW, Centre for Energy Finance, a public policy think tank. Analysis suggests that four-wheeler passenger and commercial vehicles consumed 21.3 million tones of petrol and diesel in 2017-18. If the distance travelled by these vehicles are covered by equivalent EV-km, it isestimated that nearly 50 billion units of electricity would have been required to charge the EVs. This translates to 3.2% of the electricity that was generated in the same financial year. India's installed solar power generation capacity is 31 GW, according to the Central Electricity Authority. This means there is sufficient electricity available for EVs. However we just need a policy making for the installation of charging points and for that Power distribution companies, for example, would have to upgrade their transmission infrastructure to meet EVs' demand. Experts point to the business prospect in this segment. There are several opportunities for power and battery players. Even EV charging stations provide smallscale entrepreneurial opportunities. This could boost make in India initiative and could give opportunities to Indian Enterprises. By developing these segments, India can reduce its reliance on imported oil and gas. Another good opportunity which can be availed is through storing surplus solar power in EV batteries which can be sold back to the grid.

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