

# Electric Vehicle: A path to India's Prosperity

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## **Abstract**

The growing inclination towards electric vehicle and harmful emission from the transport sector, and investment by various Original Equipment manufacturers (OEMs), concern in developing more and affordable electric vehicles in the coming years. Several factors such as technological advancement, reduction in the cost of a vehicle, Govt. policy support, vehicle purchasing incentives, parking benefit, and good public charging infrastructure facility could result in the uptake of the electric vehicles in India. This paper reviews the details of the electric vehicle revolution and availability of Government policy and emerging battery technology for energy storage in India.

## **I. Introduction**

In India, the utilization of renewable energy resources holds a unique place and also the use of electric vehicles (EVs). The wind Penetration in India is around 17%. With the increase in the solar PV installations and further achieving up by the addition of renewable power capacity that is clubbed with enticing business for electric vehicles in India, the rationale behind the "battery energy storage systems (BESS)" is certainly obvious to embellish and collect the momentum in the country. With the rapid increase in the Indian Automobile market, the EVs are becoming a promising channel towards improving the air quality, energy security and economic opportunity.

The government of India ultimately finds an urgency to view the solution by bringing into the practice the sustainable mobility to decrease the dependency on imported energy sources, reduced greenhouse gas emission and mitigate adverse impacts from transportation including global warming. Major endeavors have been taken for minimal use of fossil fuels for power generation, transport propulsion, reduction of energy consumption and protection of carbon sequestration. As the production of EVs is very low, the overall share of EVs in the Indian market

is negligible. EVs can be i) electric two wheeler (E2Ws) like electric bicycles and electric scooters, ii) three wheelers like E- rickshaws, while iii) four wheeler electric consists of electric cars. A scheme has been launched by the Government of India on "Faster Adoption and Manufacturing of Electric Vehicle (FAME II)" to encourage the rapid acceptance of an electric and hybrid vehicle. This scheme also encourages purchase of EVs by providing various incentives and setting up of charging infrastructures for it. In February 2019, cabinet cleared 10,000 crore for FAME II to be implemented from April 1<sup>st</sup> 2019 for a period of three years.

The EV manufacturer is eagerly waiting for this single policy scheme to be implemented for creating a roadmap of the EV ecosystem together with charging infrastructure and buying and manufacturing incentives. Similarly, the report of "NITI Aayog's transformative mobility" of 2017 has set a way to use pure electric vehicles following the development in the EVs technology and necessity to reduce energy demand in automobile sector. According to a research, it has been demonstrated that if India accepts and uses the "transformative solution of shared connected electric mobility", then 100% public transport vehicle

and 40% private vehicles can become all electric by 2030 [1].

The Society of Indian Automobile (SIAM) along with other automobile manufacturer aims in achieving selling of hundred percent pure EVs (electric battery and fuel cell vehicles) for intra-city public transport fleets by 2030. Under this scheme, i) forty percent of new electric vehicle sale is expected to put on the market by 2030 and ii) sixty percent of new electric vehicle sale to employ greener technology like hybrid and other alternative fuel by 2030. To ensure smooth functioning of the scheme, Government, Industry and various stakeholder should come forward to collaborate and invest in long term plan to make hundred percent electric vehicle regime. The sale of electric cars have become dormant at 2000 units per year since last 2 years [2]. But there is a vision for 100% electric vehicle by 2030 and will be grown at a compound annual growth rate of 28.12% over the period of 2017-2023 [3].

The introduction of the electric bus has been done by the “Bangalore Municipal Transport Corporation” on the dense corridor in the city. A survey was carried out in the city of Ludhiana which represented that 36% existing cars and two wheeler owners were enthusiastic to transfer to the electric vehicle [4]. Telangana Government is also encouraging the use of EVs in masses and announced that the EV owners will not be collected any road tax. In 2018, Telangana State Electricity Regulatory Commission (TSERC) approved a charging tariff of INR 6 for EVs. The TSERC also fixed the cost of service for the entire state at INR 6.04/kWh. Hyderabad metro rail have also signed partnership with Power Grid Corporation of India Ltd to provide EV charging facility at metro station. Hyderabad metro rail will be the first metro rail in the country to have EVs charging stations to be monitored and operated by power grid [5]. Hyderabad Government is also thinking of replacing diesel run public transport vehicle with electric vehicles. This year, the New Delhi Govt. got an approval for setting up 131 number of public charging station in the capital. In November 2018, the Delhi Govt. release a draft policy that is aiming to convert 25% of their vehicle to EVs by offering various incentives and by setting up charging

infrastructures in both residential and non residential area.

With the objective taken to increase the security of national energy, the government of India has declared the “National Electric Mobility Mission Plan (NEMMP) 2020” for reducing the harmful impact of fossil fuel power vehicle on the environment and growth of domestic manufacturing capabilities (GoI, 2012). EV uptake is a priority for the government as the country battles severe air pollution. EVs make up only a meager 0.06% of new vehicle sales, compared to around 2% in China and up to 39% in Norway, according to the Ministry of Finance’s 2019 Economic Survey. The charging of an electric vehicle is shown in fig 1.



Fig1. Charging of an electric vehicle  
(Image may be subject to copyright)

The new budget places a clear focus on energy storage and EVs, according to India Energy Storage Alliance (IESA) president also emphasized the need to bring e-waste management under the highly successful national cleanliness drive the Swachh Bharat Mission. There should also be a particular focus on lithium-ion battery recycling. India Energy Storage Alliance (IESA) expects the Indian market for energy storage to grow to over 300 GWh by 2025. India is thinking to bring the electric vehicles on the roads of its cities by 2030 and so it is looking after the power supply and mile connectivity. India has huge potential and resources for providing electrical power to the vehicles to make them electric and remove the fuel. The problem lies in the distribution system. Harnessing the renewable energy sources for power generation is one

of the ways that the government can tackle for the energy distribution.

## II. Business Case for Battery Market in India

Energy Storage is the future. Over the last decade, the utilization of batteries has increased drastically and newer avenues are coming up. With new applications for storage solutions on the rise, nascent battery technologies are evolving rapidly to keep pace. There is a need to look into different technologies to support the growth of energy storage.

A large number of power generation technologies are available in the market. The conventional battery technology like the lead acid battery is still good for residential and industrial applications. The advantages in this type of battery is the low cost (\$ 100 – 200/kWh), it has no major safety issues and can deep discharge. The drawbacks, on the other hand, are a short life (300 – 1000 cycles i.e. 2-3 years of life), low specific energy (35 – 50 Wh/kg), limited depth of discharge (up to 50 percent), thermal runaway (performance and life degrades as battery heats up and as temperature changes) and disposal issues, as lead is toxic.

The Battery electric vehicle also termed as BEV that are fully electric vehicles. The BEV could not only reduce the carbon dioxide emission from light-duty vehicle fleet but also reduce the dependency on fossil fuelled vehicles [6]. The BEVs is said to hold the largest share in the Indian market contributing more than 70% trade in 2017 which is expected to grow in coming years. Though the BEVs dominated the sale over PHEV in many countries until 2014, there is a rapid growth of PHEV in the last two years and the sale has gone almost equal with the BEV. On the basis of types of batteries used in the Indian market, it can be classified as “Lead acid batteries, Nickel metal hydride batteries and Lithium ion batteries”.

## III. Key highlights

- “The government of India plans to add 100 GW of solar capacity in the country by 2022 needs storage for making large scale solar power installations completely grid interactive”.

- “40 GW of roof-top installations to be achieved until 2022 demands for small-scale solar PV installations be utilized round the clock”.
- “High adaptability of electric vehicles projected in India and changing dynamics of the transportation sector in the country with government planning to provide rebates of up to INR 2.5 lakh, bringing EV under the umbrella of priority sector lending and lowering interest rates on loans will help push battery market in India”.
- “Rising electricity demand in India with installed capacity likely to cross 600 GW by 2030 calls for better demand response which BESS can assure”.
- “Falling trajectory of battery prices globally and further fall expected in near term helping cost economics of adaptation of BESS in India”.
- “Solar PV Pairing Opportunity for both off-grid and utility scale with battery energy storage systems in India & outlook till 2024”.
- “Opportunity Sizing for BESS in solar roof-top projects in India with outlook till 2024”.
- “Opportunity track for Industrial peak shaving & outlook till 2024 for large consumers”.
- “Application-based opportunity track for BESS market in India till 2024 with specific sub-segment opportunity bundling for telecom industry and electric vehicles market in India”.

## IV. Conclusion

The EV market is likely to grow globally extensively in coming years and to exploit the full potential of the electric vehicle, flexible load smart charging strategies should be executed. The Government of India has also taken initiative to shift the fossil fuel powered car with renewable ones in the next few years.

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