

ELECTRIC VEHICLE POLICIES IN INDIA

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Abstract— Electric vehicle and its policies framework is the necessary corner stone for the rollout of electric vehicles and its charging infrastructure in India. The Indian mobility sector contributes a noteworthy quantity of carbon emissions and noxious pollutants to the environment and is causing major concern for urban cities with an increasing population every year. The best option can be the implementation of electric vehicles (EVs) at a mass level. Electric mobility has a significant potential not only to reduce carbon emissions but also to provide desirable energy storage to put into the implementation of distributed renewable generation. The initiative can be well understood when a quantity number of Indian states have shown their interest and issued electric vehicle policies and electricity tariffs for EV charging. This paper reflects and provides an insight into a present scenario of EV policies and electricity tariffs for EV charging in different states and gives a brief idea of what other countries presents or brings forward EV promotion initiatives. Through this paper, it is tried to bring forward a certain vital suggestion and for easy adaptation in India. It's the urge of the time that India should adopt such policies with immediate effect and cross-check the implementation of such policies on ground level adaptability for every segment of a diverse society.

Keywords— Battery, Charging, EV electric vehicle, EVSE, RE Renewable Energy, Mobility

I. INTRODUCTION

India, being on the threshold of evolution with the urge and motivation to be a developed nation from the developing one. It is been forecasted that GDP growth pace will be more than 8 % in the next upcoming five years. This scaling growth rate will consequently go in front to attract more consumption of conventional mobility fuel. This can make India get more dependent on the import of such resources. While the mobility

sector is one of the biggest consumers of oil, this increased use of such fuel, in turn, will increase GHG emission and this mammoth consumption of fuel may cause an immense burden or impact on the energy security situation of India. Therefore, it is high time that the mobility sector in India desires to endure a vital alteration from oil-based structure to more eco friendly based fuel like electricity-based system. With much improved, overall power supply position across various states has urged to look for electricity based mobility and the prime reason for such an improved supply position is due to the major contribution of renewable generation. This surplus renewable generation has already answered the quest for demand and supply deficit. So renewable generation will be the major contributor to fulfill the electrical demand of EVs. Taking into consideration this, the Government of India launched the National Electric Mobility Mission Plan (NEMMP) 2020 which envisages the introduction of about 6-7 million electric/hybrid vehicles in India by the year 2020. Under this NEMMP, Faster Adoption and Manufacturing of Electric Vehicles (FAME) India scheme was introduced in 2015, with the objective to support hybrid/electric vehicles market development and Manufacturing eco-system. Recently under the FAME-2 scheme, the total expenditure allocated by the government was INR 100 billion. With this great financial initiative has urged eight states to release a draft of electric vehicle (EV) policies for their respective states; while many other states are motivated to upgrade their state and are working on their EV³ policies as per their city plan implementation along with other available resources as per geographical conditions. Among these eight states, few states have also introduced separate electricity tariff for charging of EVs. This paper aims to provide a comparison of the EV policies in different states and select global EV promotion initiatives.

II. POLICES STATUS: VARIOUS STATE

Andhra Pradesh, Delhi, Karnataka, Kerala, Maharashtra, Telangana, Uttarakhand, and Uttar Pradesh are the eight states out of 29 states, their efforts are noteworthy because these were the states where the major population has a dependency on local transport as it is a basic mode of traveling in intrastate or interstate. These states have drafted their individual final electric vehicle policies still June 2019 which has a main focus on the manufacturing sector along promoting self-independent local manufacturing and deployment of electric vehicles in their respective states.

While twelve SERCs have also issued tariffs for various levels of EV charging along with the all prescribed specification in various tariffs structure. These are Andhra Pradesh, Chhattisgarh, Delhi, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Telangana, and Uttar Pradesh.

In this paper, it was best tried to bring out all possible ways to take into account the key procedures adopted by the states in their individual policies.

III. STATE EV POLICIES

Even though a national mission one-mobility has been launched already with ease of doing business, technology development, Made in India, and other various start-up schemes. India has hitherto issue a national level EV policy which is the most important of all to make the effective rollout of EVs adaptability in India. This national-level policy will be well threaded along with other state policies. If we make a note to comprehend the reason of why only eight states have designed individual state-level EV policies it's so because they have well addressed their individual requirements based on available resources of renewable resources, on-ground implementations and advanced future trends development of charging systems for battery electric vehicle for local transport and other requisite requirements for such transport for future.

Out of eight states namely four states Karnataka, Telangana, Uttar Pradesh, Andhra Pradesh, Kerala, and Delhi have set a lucid target for requisites number of local transport bus with scaling involvement of EVs in all government-owned vehicle along with charging stations/battery swapping stations compliance with other states. The state of Karnataka and Telangana has

dedicated to transforming their existing mobility transport into 100% e-mobility by 2030. Whereas Uttar Pradesh which shares the maximum number of borders with other states has shown strong-willed initiative for battery swapping station and more involvement or interest in hybrid EVs (HEV) till their change over-phase up to 2022. The reason for such priority for HEV is the reliability factor more on HEV than EV. Andhra Pradesh has noted to take accountability of advanced technology for power supply in EV with the incorporation of hydrogen-based fuel cell battery pack with efficient design along with other various powers supplied based fuels technology for their e-mobility plan. Similarly, Delhi been the capital of India has taken a bigger leap as the pollution level has been escalating every year and the pollution from vehicles is the major contributor. Therefore, to addresses this serious concern they planned to promote 25% of all newly registered vehicles to be EVs. The most important focal point in most states is on public transport, followed by government vehicles, private transport and subsequently goods transport vehicles. In provisions of charging station and battery swapping station deployment, virtually each and every one of the states have promised to hold up charging infrastructure along highways, government offices, shopping complexes, malls, parking places, etc. Karnataka and Uttar Pradesh have planned to build 5000 MWh and 2000 MWh battery manufacturing/assembling capacity throughout the policy phase, which would be a great opportunity for local manufacturing and local use in India itself. With much ahead, the involvement of other various newer technology Hydrogen-powered fuel cells is now looked upon for mass production as its life is better and no problem of disposing of as compared to lithium and other batteries technology, solar-powered cells manufacturing are also included in Uttar Pradesh's objective. Maharashtra has affirmed its objective to devote INR 250 billion in EV and its components manufacturing/assembling. The states encompass an array of supply-side in addition to demand-side incentives to attract investors, EV and component manufacturers/assemblers and EV charging station owners, and all the other existing mobility market players for the initial mass penetration of the electrical vehicle. This incentive methodology is well adopted from other countries that adopted a plan for their rollout plan of EV.

IV. STATES ELECTRICITY TARIFF

In the year 2017, Delhi took an initiative to design a separate tariff structure for EV. The tariff issued was Rs. 6-7/kWh which made this tariff structure unappreciable as the prices of EV tariff were higher than the domestic tariff structure. No incorporation of ToD was taken while deciding the tariff if this would have been taken then the prices of such tariff structure would have been decreased with ease of attraction. Andhra Pradesh was the next state to follow, proposing a power tariff of INR 6.95/kWh for EVs as part of their Annual Revenue Requirement for the FY 2018-19. Till July 2019, majorly twelve states and one union territory of India have finally issued their respective electricity tariffs for EV charging.

There are few states which do not favor to add the fixed charge component to their EV tariffs whereas they had an only variable part which would be purely chargeable cost as per the use, namely those states are Delhi, Punjab, Andhra Pradesh, Uttar Pradesh, Telangana, Chhattisgarh, and Madhya Pradesh. Whereas some of the states as per their power supply position have included both components of charges i.e. fixed and variable and namely those states are Maharashtra, Jharkhand, Haryana, Karnataka, Gujarat, and Chandigarh. The more refinement in tariff was noticed when Delhi, Maharashtra, Uttar Pradesh, and Telangana have functional "Time-of-Day" (ToD) as part of their EV tariffs as a means to influence EV charging behavior and its use as per the prices as this can be a challenging issue to maintain the linear demand-supply curve with greater flexibility and reliability of the existing system. It's imperative to understand the examples of other developed countries in policies front because their implementation can be synchronized for such implementation in India. EV infrastructure development through such policies can promote consumer and can enhance the ease of capturing market penetration.

V. GLOBAL POLICIES OVERVIEW

Mostly the developed countries are the role model, which can initiate and promote mass implementation in the developing countries. Self an effort for EV mass implementation can be made efficient while looking into the present scenario of developed countries like France, the United Kingdom, Norway, and Japan. Some of the important prospects of such policy

measures and incentives in the developed countries are summarized below.

France

- The instant bonus amount is handed to customer up to 6,000 Euros for the first purchase of EV.
- A good amount of incentive is offered for old diesel cars up to 3,000 Euros 30% purchase financial assistance on low-emission vehicles, e- mopeds ore-bikes.
- 18% of financial support for diesel/gasoline existing vehicle exchange with EV, which is quite attractive as major cities like Paris has nearly 60% of the existing vehicle as EV.
- No cost for parking in a public place.
- Weekday ban on vehicles causing high pollution.
- High tax incentives are provided for charging station installation with the provision of no charge of renewal of charging station licensees for consecutive five years and this adds more private players to develop efficient charging stations with other amenities.
- Grants and loans for private charging infrastructure installation which promote jobs, income as an upcoming trend for a new business idea.
- The target of converting the entire bus fleet in Paris and all the major cities to be equipped with EV buses and deployment of more public charging stations across the cities.
- Well framed e-mobility programs are implemented in renting a personal cab.

United Kingdom

- EVs are exempted from congestion charges.
- All public buses are converted into EV buses.
- They have promoted the sale and renting of electric bicycles all across their major cities.
- They have the dedicated track for bicycles which promotes safe involvement of electric bicycle, small electric scooter for all age of a person.
- They have converted the charging station area into a well-defined amusement park with various amenities for children, and adults.
- All public buses are converted to electric buses.
- Ease of permission and grants for home chargers are provided instantaneously through the internet application portal.
- No cost for parking in a public place for EVs.

Norway

One of the best examples of EV implementation in Norway. This country has proved to be one of the pioneered examples of the EV revolution, across the world. In order to smooth the progress some lucrative and policies to accomplish their set for advance expansion. This country has framed its incentives structure in such a way that it includes free toll tax, preferential, and prioritize parking benefits in all the public places in the country. They have a surplus generation of electricity because they have adopted all forms of energy-efficient standards in every walk of life. In addition to this nearly their maximum electricity generation is through renewable energy sources so this surplus generation has made the people facilitate themselves with a free charging cost at the maximum number of EVSE stations. The government in addition has invested large funds for enabling charging infrastructure on highways.

- Particularly this country is the global benchmark example in terms of electric vehicle market penetration. And the result of such great imitative they are able to achieve the reduction in GHG emissions by 60% for the next coming year and this is a phenomenal effort in terms of saving the environment.
- To show the effectiveness of their concern for the environment this country has restricted the plying of various passenger means from other neighboring. This in turn compels the tourist to avail the local mobility means as per their standards.
- Import duties and purchase tax on EVs, are reduced to negligible value and complete removal of taxes on toll.
- Public and private charging infrastructure installation and EV research is their highest priority, through collaboration with private sector companies and various research organizations.
- EVs are subject to the final reduced on-road price of vehicle because they are exempted from road tax, VAT and other charges like registration fees.
- The overall tax burden of EVs is 50 percent lower than conventional fuel-based cars.
- No cost for parking in a public place with first priority for EVs.
- EVs have been prioritizing to the highest level because they have dedicated fast-moving lanes for public transport, which is well maintained by the government in terms of infrastructure.
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public transport, which is well maintained by the government in terms of infrastructure.

- With enthusiastic imitative by government publicly charging stations are increased every year which allows EV users to charge their cars for free.

Japan

- CHAdeMO one of the world's best fast-charging systems was developed by Japan.
- The overall tax burden of EVs is 40 percent lower than conventional fuel-based cars.
- Purchase subsidies for EVs are subject to the final reduced on-road price of vehicle because they are exempted from road tax, VAT and other charges like registration fees.
- High tax incentives are provided for charging station installation with the provision of no charge of renewal tax of charging station.
- The government has also set an ambitious goal of making all Japanese vehicles sold around the world at least partly powered by electricity by 2050.

VI. ABBREVIATIONS AND ACRONYMS

CHAdeMO	Charge de Move
EV	Electrical Vehicle
EVSE	Electric Vehicle Supply Equipment
GDP	Gross Domestic Product
GHG	Green House Gas
HEV	Hybrid Electric Vehicle
INR	The Indian Rupee
SERC	State Electricity Regulatory Commissions
ToD	Time of Day
VAT	Value-Added Tax

VII. CONCLUSIONS

An effective policy framework is an important factor for India's mass implantation of EV rollout. The policies are the foundation stone for customers, manufactures, and the other entire initiative reformer. The collective path towards operationalizing EVs across India is yet to be found. This would provide practical recommendations for industry manufacturers and insights for policy-makers. Further research could focus on evaluating the impact of policy measures across the globe and to find out what best can be offered for India in terms of recommendations. There

are specific challenges in operationalizing electric mobility in India that require further investigation.

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