International Journal of Scientific Research in Engineering and Management (IJSREM)
Special Edition - Volume 09 EVIS -2025 SJIF Rating: 8.586 ISSN: 2582-3930

EV Policy & Regulations in India: An Analytical Study

Rahul Kannur,
IIsem MBA Student, Adarsh AIMIT Chamarajpete, Bengaluru- 560018

Abstract
India's transition to electric mobility is being driven by an evolving policy ecosystem. This research paper analyses the current policy landscape focusing on government incentives, taxation reforms, charging infrastructure regulations, and battery recycling policies. The study references data from Indian government portals and global institutions, India is urbanising at very fast rate and consequently its mobility needs are growing exponentially. This prolific growth of automobile is increasing the fuel import bill as well as severely polluting the environment. A Shift to EV from Internal combustion Engine vehicles (ICE) is the way out of this problem. Accordingly, the Indian EV market is projected to grow at a CAGR of 94.4% from 2021 to 2030. In this paper we have made our analysis based on aspects includes a brief policy review and a comparison cost between EV and Internal Combustion Engine vehicles. In order to promote the sale of EVs in the Indian market, the government has launched the FAME (Faster Adoption and Manufacturing of Hybrid and Electric vehicles) scheme in India, as part of the National Electric Mobility Mission Plan (NEMMP) 2020, under which, the government will provide certain incentives to lower the purchasing cost of electric vehicles. The policy framework proposes both fiscal and non-fiscal measures to promote EVs in India. The EV sector in India faces infrastructural and financial challenges as well as shortages of raw materials for batteries. It is found that adoption of EVs in the 2-wheeler and 4-wheeler personalized vehicle segment can lead to substantial fuel cost, maintenance cost and CO2 emissions cost savings.
Keywords: Electric Vehicle, Taxation policy on EV Charging Infrastructure, Recycling policy.

1. Introduction

India is on the path to becoming one of the largest electric vehicle (EV) markets globally. This paper explores the policy framework facilitating this shift. India's target of achieving 30% electric mobility by 2030 hinges on effective policy execution, infrastructure readiness, and fiscal support mechanisms. It is being reported in various articles that the size of the Indian electric vehicle (EV) market is projected to reach US $ 152.21 billion by 2030, with a Compound Annual Growth Rate (CAGR) of 94.4% from 2021 to 2030 (Business Wire, 2021). Likewise, an independent study by CEEW Centre for Energy Finance (CEEW-CEF) also noted that the EV market in India will be US $ 206 billion by 2030. This would require a cumulative investment of over US $ 180 billion in vehicle production and charging infrastructure (Bhardwaj, 2022). All this data reflects that there is an emerging EV market in India and it will bring a major impact on multiple aspects, from environment to economy. In addition, to cater to a vast domestic market, reliance on the conventional modes of fuel intensive mobility will not be sustainable. Therefore, several policy initiatives have been taken by the government of India to promote "Shared, Connected, and Electric vehicles in the country.

The move to Electric Vehicles (EVs) in India has many benefits. India, however, lags considerably in terms of EV penetration, compared to other countries and much still needs to be done as far as the number of models, charging infrastructure, developing vendor ecosystem and providing financial incentives are concerned. The country has a minimal share in EVs, even though we are one of the largest 2W and 3W market globally and amongst the top five in commercial vehicles (CV) and passenger cars. Policy makers to scholars have noted the various benefits of EVs across the globe, for example, benefits of hybrid vehicles were analyzed in. USA by Aasness and Odeck (2015) as well as Beresteanu and Li (2011). Both the studies have concluded that income incentives can lead to an increased market share of hybrid vehicles in USA. Energy costs of small electric buses were compared with other fuel vehicles by Wang and Gonzalez (2013). They found that the energy cost of other fuel vehicles were eight times higher than that of EVs. EVs have low running cost due to low energy consumption and low power tariff. As a result of this total cost of ownership is lower in EVs, which compensates for the high price of EVs (Khurana, et. al. 2020).

Concern for the environment and the willingness to mitigate the harmful effects on environment has also been found to influence consumers' adoption of EVs. Kahn (2007) in his study found that people who are concerned about the environment are more inclined to adopt EVs. Pierre, Jemelin and Louvet (2011) have supported the above argument in their study. A number of other studies, including Peters and Dutschke (2014) shown that environmental considerations have a positive influence on EV adoption. A study by Ernani F. Choma et. al. (2020) has shown that electric vehicles. lead to substantial air pollution health benefits in all the 53 metropolitan areas of the USA. Horton and Gao in their study found that widespread adoption of heavy-duty electric vehicles would reduce nitric oxide and fine particulate matter in the air resulting in fewer premature acute deaths than the non-electrified baseline scenario in China. However, these vehicles do not reduce CO2 emissions significantly. The light-duty electric vehicles on the other hand reduce CO2 emissions but not the other pollutants mentioned above, i.e. they affect the environment in just the opposite way to the heavy-duty vehicles. Within this broad context this paper made an attempt to critically review the existing EV policy as well as the different challenges for EV adoption in India

2. Government Incentives for EV Manufacturers

The Government of India has launched multiple incentive schemes to support EV production and adoption:

FAME-II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles):

The Government of India (GOI) launched Phase-II of FAME or FAME-II in March 2019 with ten times the financial resources of FAME-I. FAME-II had an overall budget of Rs. 10,000 crore allotted for demand incentives, charging infrastructure and IEC activities. FAME-II focused on demand incentive allocation like its predecessor but the logic behind the incentive differed. Unlike FAME-I, the subsidy in FAME-II was not based on the specific vehicle model but on the battery size. As EV prices are driven up by battery prices, FAME II offered an uniform incentive of Rs. 10,000 per kWh of battery for two, three and four wheelers. In this phase too, there is great emphasis on demand incentives, nearly 86% (TERI, 2019). Under FAME I, 2 and 3 wheelers with conventional lead-acid batteries were eligible for incentives. This has been discontinued with only "Advanced Batteries," made up of lithium-ion and other materials being eligible for incentives in FAME II. (TERI, 2019). Despite such change in scheme, it was noticed that target sale of one million electric vehicle as of March 2022 was not full filled. So the project was extended till March 31st 2024. As of July 2022, just about 4.75 lakh electric vehicles have been sold under the FAME scheme since its implementation in April 2015 including about 1.7 lakh electric two-wheelers. The government has announced that the country would shift to an entirely electric public transport along with 30% electric private vehicles by 2030, lending a further push towards the goal of electrification (Sasi, 2019; Kashyap, 2022).

Later, it was realized that electric mobility is a complex area with linkages across each segments of energy sector and transport value chain. Hence, in order to approach a multi-stakeholder scenario, various government ministries were roped in. NITI Aayog has been given the responsibility to anchor the EV policy roadmap for India. The five ministries involved in it includes, ministry of heavy industry, ministry of public enterprise, ministry of road and transport, ministry of power and ministry of housing and urban affairs. NITI Aayog proposed both fiscal and non-fiscal measures to encourage EV selling. Fiscal measures include, lowering of GST from 12 percent, exemption of State government GST and exemption of road tax for EVs for the first few years. The non-fiscal measures proposed include, changes in tariffs and exemption of state entry tax, full exemption of parking fees, permit cost and swapping/charging infrastructure charges, etc.

PLI (Production Linked Incentive) Scheme :

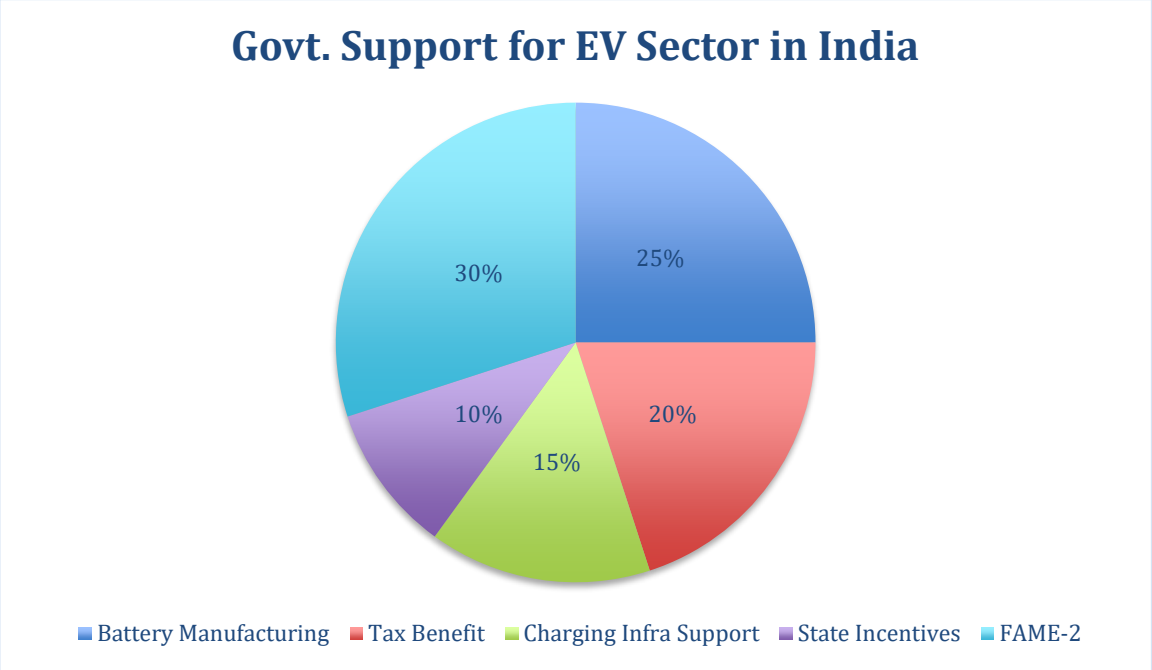
In addition, the Government of India made an allotment for 50 GWh of battery capacity as an incentive under the Production Linked Incentives (PLI) Scheme for Advanced Chemistry. Cell (ACC) Battery Storage, announced in 2021. Under this scheme, the manufacturing facility is to be set up within a period of two years. Incentive to be disbursed on sale of batteries manufactured in India with emphasis on greater domestic value addition. Under this project, direct investment of around rupees 45,000 crore in ACC Battery storage manufacturing projects is made. It will save Indian rupees 2,00,000 crore to rupees 2,50,000 crore on account of the oil import bill during the period od of this programme due to EV adoption. Such an incentive structure is given to industry to promote fresh investments in the indigenous supply chain/deep localization for battery manufacturing in the country. This PLI Scheme for the

automotive sector, along with the already launched PLI scheme for Advanced Chemistry Cell (ACC) and Faster Adaption of Manufacturing of Electric Vehicles (FAME), will enable the country to leapfrog from traditional fossil fuel-based automobile transportation system to environmentally cleaner, sustainable, advanced and more efficient Electric Vehicles (EV) based system.

Table 1: Major Government Incentive Schemes

Scheme Name	Launched Year	Key Features
FAME-II	2019	Subsidies on EVs, charging infra support
PLI Scheme	2021	Incentives for battery cell manufacturing

3. *Source: Ministry of Heavy Industries, Government of India



*Source: FAME-II Scheme – Ministry of Heavy Industries (https://heavyindustries.gov.in)
PLI Scheme for ACC Batteries – NITI Aayog & Ministry of Heavy Industries (https://niti.gov.in)
GST and Tax Policies – Ministry of Finance, Government of India (https://finmin.nic.in)
Charging Infrastructure Guidelines – Ministry of Power & Bureau of Energy Efficiency (https://powermin.gov.in, https://beeindia.gov.in)

3.Taxation Policies for EVs in India:

The Indian government has provided several tax benefits to promote the adoption of electric vehicles. India has been actively promoting electric vehicles (EVs) as a solution to reduce carbon emissions, dependence on fossil fuels, and urban air pollution. To incentivize adoption, the Government of India has implemented several tax benefits under the Goods and Services Tax (GST) regime, income tax exemptions, and state-level tax waivers. These include:

• GST reduction from 12% to 5% for EVs (2019)
• Income tax deductions up to ₹1.5 lakh on EV loan interest (Section 80EEB)
• State-level road tax and registration fee waivers in states like Delhi, Maharashtra, and Karnataka

Table 2: Goods and Service Tax on EVs in India:

Item	GST Rate	Remark
Electric Vehicles	5%	Reduced from 12% to 5% in August 2019
EV Chargers & Charging Equipment	5%	Reduced from 18% to 5%
Hybrid Vechiles	28%+Cess(15%)	Treated like normal vehicles

Table 3: Taxation Measures Supporting EVs

Measure	Policy	Remarks
GST Reduction	5% on EVs	Effective from Aug 2019
Income Tax	Section 80EEB	₹1.5 lakh deduction on EV loan interest
Road Tax	Waived in several states	Delhi, Maharashtra, Karnataka, etc.

*Source: Central Board of Indirect Taxes and Customs (CBIC), Ministry of Finance

4. Charging Infrastructure Development Regulations

Charging infrastructure is crucial for EV adoption. The Ministry of Power and NITI Aayog have published several guidelines:

- Guidelines and Standards for Charging Infrastructure (2022 revision)
- Public charging stations every 3km in cities, every 25km on highways
- DISCOMs and private players can set up stations without license
- State governments encouraged to adopt ease-of-installation policies

*Source: Ministry of Power, NITI Aayog

Existing Infrastructural Challenges for EVs in India

It is considered that EVs are a potential solution to many problems including reduction of crude oil imports and pollution levels. The electric mobility sector in India, though growing rapidly, is still in its primary stage. It is found that the primary hindrance towards mass adoption of EVs is the lack of reliable, accessible and affordable infrastructure associated with EVs. However, policy makers and experts categorize the barriers of EVs in India into three major heads namely, technical barriers, policy problem and lack of infrastructure. High capital cost and lack of raw material for EV batteries are some of the major challenges related to selling and production of the EVs. Raw materials for EV batteries are mainly rare earth materials which are scarce in supply. The catalyzers for combustion automobiles need platinum, rhodium and palladium to filter toxic gases, especially in hybrid electric vehicles. So these materials may not be available enough for production of batteries. Likewise, EV batteries are supposed to prepare for a long life but most manufacturers are offering only eight years/ 100,000 mile warranty for their batteries (Goel, Sharma & Rathore, 2021). In addition, the smaller driving range of EVs is recognized as a significant barrier compared to ICE vehicles. It is seen that a Battery Electric Vehicle (BEV) provides a driving range of less than 250 km per recharge. However, few models can offer up to 400 km. Plug-in hybrid electric vehicle offers a range of 500 km or more due to availability of gasoline and electricity (Miwa, Sato & Morikawa, 2017).

Apart from the battery technology, lack of accessible and affordable charging infrastructure is one of the major issues in India. In 2017, the total installed publicly accessible chargers in India stood at 2228. Table-1 shows the number of Public Charging Stations (PCS) installed by Energy Efficiency Services Limited (EESL), National Thermal Power Corporation

(NTPC) and Power Grid Corporation Ltd. (PGCIL) till July 2021. Apart from these three organizations there are other organizations building Public Charging Stations across the country.

Table 4:Public Charging Stations in Some selected states

States	PCS			States	PCS		
	EESL	NTPC	PGCIL		EESL	NTPC	PGCIL
Maharashtra	2	-	-	Uttar Pradesh	-	16	-
Karnataka	1	8	2	Andhra Pradesh	-	2	-
Madhya Pradesh	-	12	-	Delhi	73	42	4
Kerala	7	2	2	West Bengal	18	-	-
Telengana	-	2	6	Tamil Nadu	20	8	-
Gujarat	0	4	2	Haryana	2	4	1

Source: Ministry of Heavy Industries, Govt. of India, 2021, https://www.pib.gov.in/PressReleasePage.aspx?PRID=1744069

From an overview of Table 4, it is apparent that there inadequate number of public charging stations in the States. In addition, these states encounter lack of different charger types for EVs. Therefore, it is one of the crucial infrastructural issues with respect to adoption of on road EVs, Policy experts believe that home charging is supposed to emerge as a prime option mainly because of lack of public charging facilities. It is believed that the share of public charging will grow, but home charging would continue to be the main source with a share of nearly 70 percent in 2030 (Ernst & Young, 2019).

5. Recycling Policies for EV Batteries

Battery disposal is a growing concern. The Indian government introduced the Battery Waste Management Rules, 2022, to address this:

• Extended Producer Responsibility (EPR) for EV battery manufacturers
• Targets for battery reuse, recycling, and material recovery
• Mandatory tracking and environmental compliance by OEMs
• Promotion of second-life applications for used batteries
*Source: Ministry of Environment, Forest and Climate Change

6. Research Methodology

This research adopts a secondary data-based analytical approach, focusing on the review and analysis of existing literature, government publications, policy documents, industry reports, and reliable digital databases. The study is descriptive and qualitative in nature, aiming to provide an in-depth understanding of electric vehicle (EV) policy and regulatory frameworks in India.

Data has been sourced from secondary materials such as:

- Official government portals (e.g., Ministry of Heavy Industries, Ministry of Power, NITI Aayog, GST Council, etc.)
- Published policy documents and white papers (e.g., FAME-II, PLI Scheme, Battery Waste Management Rules)
- Reports and statistical data from credible institutions like NITI Aayog, BEE, and CPCB, Peer-reviewed academic journals, articles, and publications.
- News outlets and verified web sources for recent developments

Data analysis involves qualitative content analysis and graphical interpretation using pie charts, tables, and visual representations to highlight government efforts and the impact of policies on the EV ecosystem.

No primary data collection such as surveys or interviews has been conducted in this study. Instead, this paper emphasizes a systematic review of documented facts and strategic policy evaluation.

7.Conclusion

India's EV policy framework is robust and evolving, aligning well with the nation's sustainable development and decarbonization goals. With schemes like FAME II, PLI, reduced GST rates, and progressive state-level EV policies, the government is laying a strong foundation for EV adoption. However, the journey towards complete electrification is not without challenges. Key issues include inadequate charging infrastructure in rural and semi-urban regions, delays in incentive disbursal, low penetration of recycling facilities, and the need for standardized battery swapping norms.

8.Findings

From the above research and study the following finding are put forth below:

1. Consumers are aware about the tax deductions:

About three fourth percent of the respondents are aware of the tax deductions provided on the interest paid towards the loan obtained for the purchase of the E vehicles and it's proved that providing tax deductions will lead to more purchase of the electric vehicles.

2. No proper awareness on FAME Scheme:

The FAME scheme which was introduced by the government has not reached the public at large and most of the people have no idea on how to avail the benefits given under that particular scheme. This might be due to the COVID 19 pandemic which was hit during the late 2019 to early 2020 where the people were only concerned about their health and well-being which inturn made them give a blind eye to the other schemes like these introduced by the government and hence are not aware of it's effectiveness too.

3. Does not affect GDP:

The Tax deductions that are provided for the purchase of electric vehicles will not affect the GDP of our nation since they reduce dependence on fossil fuels for transportation, helping to enhance energy security and reduce reliance on imported crude oil. This can have geopolitical benefits by reducing exposure to volatile oil markets and geopolitical tensions associated with oil-producing regions.

4. Contribute towards economic growth:

The growth of the EV industry supported by tax deductions can create jobs in manufacturing, research and development, sales, and maintenance of electric vehicles and related infrastructure. This can contribute to economic growth and the transition to a more sustainable, low-carbon economy.

5. Aids in development of infrastructure:

The increased adoption of EVs supported by tax deductions can drive investment in charging infrastructure, including public charging stations and home charging systems. This infrastructure development is essential for the widespread adoption of EVs and can support the growth of the electric vehicle market.

6. Reduction in GHEs:

By encouraging the use of EVs through tax deductions, governments can help reduce greenhouse gas emissions and air pollution. EVs produce zero tailpipe emissions, which can significantly improve local air quality and contribute to global efforts to mitigate climate change which is one of the main Sustainable Development Goals that is supposed to be achieved by 2030.

9. Suggestions

1.Create awareness:

The government should create an awareness on the tax deductions provided for the electric vehicles since the consumers at large are not aware of it's benefits yet.

2. Adoption of EVs for public transportation:

Since India is a country where there are more population and the majority of the population depend on public transport for commuting, the government must adopt electric vehicles for public transportation also.

3. Give the deductions for companies:

The Companies must be encouraged to adopt electric vehicles and the tax deductions for the same must be given to them. This will further enhance the adoption of electric vehicles.

4. Invest in R&D:

The government should also invest in the research and development of the charging infrastructure as well as battery technologies to make the adoption of electric vehicles easier.

5. Made accessible to all income levels:

The electric vehicles must be accessible to all people irrespective of their income levels and the tax deductions must be given accordingly.

10.REFERENCES

1. Deepak Rajagopal, Implications of the energy transition for government revenues, energy imports and employment: The case of electric vehicles in India Volume 175, 2023,113466,ISSN 0301-4215

2. Deep Mehta (2021), The E- Vehicle Industry in India: A Policy Analysis, volume 13. ISSN 2277-8411

3. Zhang, J.; Xu, S.; He. Z.; Li, C.; Meng, X. Factors Influencing Adoption Intention for Electric Vehicles under a Subsidy Deduction: From Different City-Level Perspectives. Sustainability 2022, 14,5777

4.International Energy Agency (IEA). (2024). Global EV Outlook 2024. https://www.iea.org/reports/global-ev-outlook-2024

5.Ministry of Heavy Industries, Government of India. (2023) https://heavyindustries.gov.in

6.U.S. Department of Energy (DoE). (2023) https://www.energy.gov European Commission. (2023).
EU Battery Regulation and AFIR. https://ec.europa.eu

7.NITI Aayog. (2023). India EV and Battery Management Reports. https://niti.gov.in

8.BloombergNEF. (2024). EV Market Outlook. https://about.bnef.com

9.World Economic Forum (WEF). (2023). Clean Mobility Insights. https://www.weforum.org

10.Ministry of Power, Government of India. (2023). EV Charging Infrastructure Guidelines. https://powermin.gov.in