
ELECTRIC VEHICLE SUBSIDIES IN INDIA: FOSTERING GREEN MOBILITY

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Introduction

Subsidies are crucial tools for governments worldwide to influence both energy producers and consumers. They impact the competitiveness of various energy technologies and signal national priorities, shaping investment choices and the energy mix. Consumers are affected as well, as subsidies can either make different energy types more or less affordable, thereby influencing consumption decisions and social outcomes.

Subsidies can drive positive changes, making modern energy accessible, reducing new technology costs, and encouraging investment in emerging markets. However, poorly designed subsidies may inadvertently promote negative effects, consuming valuable resources at significant opportunity costs and encouraging wasteful energy use. Notably, subsidies for fossil fuels increase consumption, leading to air pollution and higher carbon emissions, while hindering investments in renewables and energy efficiency. This is why 193 countries have committed to fossil fuel subsidy reform under Sustainable Development Goal (SDG)12, focusing on responsible consumption and production. Transparency regarding subsidy existence, costs, and impacts is essential for these reasons.

The fundamental drivers of global economic development and change are clearly the twin forces of decarbonization and the move towards new energy sources, along with the broad acceptance of digitalization. While the private sector has been instrumental in driving new developments in digitalization, it is crucial to acknowledge that the driving force behind decarbonization primarily resides in the proactive engagement of governments in guiding this transformative shift.

Electric Vehicle Subsidies

Up until 2015, manufacturers in India have been reluctant to introduce hybrid electric cars

(HEVs) and battery electric vehicles (BEVs) due to cost concerns. However, with the introduction of incentives aimed at increasing the penetration of these vehicles, this is set to change. The Central Government's **Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME)** project, which was introduced in April 2015, is the main initiative to advance hybrid and electric technology in India. When the FAME I plan was first launched in 2015, a capital expenditure of INR 2 7980 million was set aside to be paid out over the course of the following two years. The upfront subsidies for two-wheelers (2W), three-wheelers (3W), four-wheeler vehicles (4W-cars), and four-wheeler buses (4W-buses) were the main focus of this capital expenditure.

In the year 2019, the Indian government initiated the second phase of the **Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME II)** program with a budget of 10,000 crores, the primary objective of leveling the playing field between electric vehicles (EVs) and internal combustion engine (ICE) vehicles in terms of affordability. This strategic move was driven by the overarching goal of India to fulfil its climate commitments and meet the EV30@30 targets. The goal is to encourage the adoption of electric vehicles, with a target of promoting 1,562,000 of them. This includes one million two-wheelers, half a million three-wheelers, 55,000 cars, and 7,000 buses. To determine the subsidies, FAME II has set maximum subsidy limits based on the size of the vehicle's battery. For example, four-wheeler buses can receive a subsidy of up to 20,000 INR per kilowatt-hour of battery capacity, while other types of electric vehicles can get a maximum subsidy of 10,000 INR per kilowatt-hour. Because different electric vehicles have batteries of varying sizes, the program will provide different levels of support for each type of vehicle.

The Li-ion battery pack size of a two-wheeler is used to compute the incentives. The Indian government has made several modifications to the FAME II subsidies, and in accordance with the most recent regulations, EV customers would receive incentives worth Rs 10,000/kWh. Additionally, the maximum incentive amount set by the regulatory authorities is 15 percent of the entire value of the EV. Buyers who want to finance their new vehicle purchase via a loan can get tax benefits of up to Rs 1.5 lakhs. The State Government incentives to boost quicker EV adoption also includes concession on Road Tax and Registration costs of a new EV.

As of March 2023, out of the total allocated incentives amounting to INR 8,596 crore, a significant portion, approximately INR 4,458 crore (equivalent to 52%), has been effectively

utilized to support the adoption of nearly 9.8 lakh EVs. It's important to note that this program is scheduled to conclude in March 2024. Among these electric vehicles, electric two-wheelers (E-2Ws) have emerged as the category that has made the most extensive use of the financial assistance provided under FAME II.

Under the **EV30@30 programme**, India plans to increase the share of electric cars (EVs) in new car sales from 3.5% in the fiscal year 2018 to 30% by 2030 (Laan & Jain, 2019). All figures are preliminary. The National Electric Mobility Mission Plan (NEMMP) 2020 aims to achieve this goal. In line with the goals of the "Make in India" campaign, the 2018 draught of the National Auto Policy emphasises how this initiative supports sustainability as well as the expansion of the automotive sector in India (Ministry of Heavy Industries and Public Enterprise, 2018a). Furthermore, the National Mission on Transformative Mobility and Battery Storage (NMTMBS) will assist in the creation of multiple sizable facilities for the manufacture of integrated batteries and cells that are competitive in export markets.

Selecting the Most Cost-Effective Subsidy Policy for Vehicle Segments¹

The central question revolves around which subsidy policy is the most cost-efficient for supporting specific vehicle segments. The goal is to opt for the least costly approach from the available options. In our case, we are primarily considering three types of subsidies, each of which encompasses a broad range of individual financial incentives²(Shrimali et al., 2017).

1. Capital Expenditure (CAPEX) Subsidy:

- These subsidies are one-time financial incentives, typically granted at the time of purchase.
- Variants of CAPEX subsidies include Income Tax Credit (ITC), which offers the subsidy as a tax credit, and Accelerated Depreciation (AD), which also provides the

¹ Gireesh Shrimali, Getting to India's electric vehicle targets cost-effectively: To subsidize or not, and how?, Energy Policy, Volume 156,2021,112384,ISSN 0301-4215,<https://doi.org/10.1016/j.enpol.2021.112384>. (<https://www.sciencedirect.com/science/article/pii/S0301421521002548>)

² Gireesh Shrimali, Sandhya Srinivasan, Shobhit Goel, David Nelson,The effectiveness of federal renewable policies in India,Renewable and Sustainable Energy Review,Volume 70,2017,Pages 538-550,ISSN 1364-0321, <https://doi.org/10.1016/j.rser.2016.10.075>.(<https://www.sciencedirect.com/science/article/pii/S1364032116307377>)

subsidy as a tax credit.

2. Operating Expenditure (OPEX) Subsidy:

- OPEX subsidies are annual incentives, usually expressed in terms of cost per kilometer (or mile) and calculated based on the expected annual mileage.
- Variants of OPEX subsidies comprise Feed in Tariff (FIT), Feed in Premium (FIP), Generation Base Subsidies (GBI), and Production Tax Credit (PTC). The first three are essentially per-unit subsidies under different names, while the last one is a per-unit subsidy provided as a tax credit.

3. Financing Expenditure (FINEX) Subsidy:

- FINEX subsidies are also annual incentives, calculated to lower the effective discount rate perceived by the consumer or borrower.
- The aim is to alleviate financing costs, including interest, whether explicit or implicit, derived from the appropriate cost of capital applied to CAPEX (i.e., the principal).
- Another term for this subsidy is the Interest Rate Subsidy (IRS), sometimes explicitly offered or provided implicitly as Low Interest Loans (LIL). The key distinction between IRS and LIL is that the principal is furnished by a private party in the former and by the public sector in the latter.

In this context, it's important to note that while these subsidies are disbursed at various points in an electric vehicle's lifetime, CAPEX subsidies are granted at the time of purchase, and OPEX and FINEX subsidies are provided annually. These can be compared using the net present value (NPV) metric, which aligns all costs to the time of purchase through appropriate discounting.

The fundamental concept for delivering cost-effective subsidies is as follows (Battke and Schmidt, 2015)³: With long-term goals and budget constraints, and considering factors such as

³ Gireesh Shrimali, Getting to India's electric vehicle targets cost-effectively: To subsidize or not, and how?, *Energy Policy*, Volume 156,2021,112384,ISSN 0301-4215,<https://doi.org/10.1016/j.enpol.2021.112384>. (<https://www.sciencedirect.com/science/article/pii/S0301421521002548>).

technological learning, particularly concerning batteries, the strategy is to first prioritize vehicle types that require fewer subsidies. For each vehicle in need of a subsidy, the focus then shifts to selecting the most cost-effective option, which may be drawn from CAPEX, OPEX, or FINEX subsidies.

State-wise EV subsidies in India

The FAME India scheme's incentives are complemented by additional subsidies provided at the state level, which vary in their extent depending on the state. These state-level incentives are predominantly applicable to electric two-wheelers and are typically determined based on the electric vehicle's battery capacity. However, there is no information regarding whether these state-level subsidies have been reduced following the recent reduction in incentives through the FAME II scheme by the central government.

Notably, the Delhi Government provides the most substantial subsidy, with buyers eligible to receive Rs 5,000 per kWh of battery capacity, and a maximum of Rs 30,000 if the battery capacity exceeds 5 kWh. Here is a compilation of the subsidies offered by different states for the purchase of electric two-wheelers, in addition to the benefits provided by the FAME India scheme:

State	Subsidy (per kWh)	Maximum subsidy	Road tax exemption
Maharashtra	Rs.5000	Rs.25,000	100%
Delhi	Rs.5000	Rs. 30,000	100%
Gujarat	Rs.10,000	Rs.20,000	50%
West Bengal	Rs.10,000	Rs.20,000	100%
Karnataka	-	-	100%
Tamil Nadu	-	-	100%

Uttar Pradesh	-	-	100%
Bihar*	Rs.10,000	Rs.20,000	100%
Punjab*	-	-	100%
Kerala	-	-	50%
Telangana	-	-	100%
Andhra Pradesh	-	-	100%
Madhya Pradesh	-	-	99%
Odisha	NA	Rs.5000	100%
Rajasthan	Rs.2500	Rs.10,000	NA
Assam	Rs.10,000	Rs.20,000	100%
Meghalaya	Rs.10,000	Rs.20,000	100%

*Policy yet to be approved in Bihar and Punjab

Similarly, electric cars and SUVs also receive subsidies through state EV policies, although the number of vehicles included in these policies is notably smaller. Electric cars come with larger batteries and consequently qualify for substantial subsidies. In most states, there is a limit of 10,000 units for the total number of electric cars eligible for these subsidies. Furthermore, the cost of eligible vehicles, as determined from the manufacturer's factory, is capped at Rs 15 lakh. In the realm of four-wheelers, Maharashtra is currently setting the pace. The fundamental incentive of Rs 5,000 per kWh mirrors that of electric two-wheelers, yet the highest allowable subsidy is limited to Rs 1.50 lakh. However, when factoring in the early bird incentive (potentially up to Rs 1 lakh), the total subsidy amount increases to Rs 2.50 lakh.

State	per kWh of battery capacity	Max subsidy	Road tax exemption
Maharashtra	Rs 5,000	Rs 2,50,000*	100%
Delhi#	Rs 10,000	Rs 1,50,000	100%
Gujarat	Rs 10,000	Rs 1,50,000	50%
Assam	Rs 10,000	Rs 1,50,000	100%
Bihar^	Rs 10,000	Rs 1,50,000	100%
West Bengal	Rs 10,000	Rs 1,50,000	100%
Odisha	NA	Rs 1,00,000	100%
Meghalaya	Rs 4,000	Rs 60,000	100%
Rajasthan	No	No	NA
Uttar Pradesh	No	No	75%
Kerala	No	No	50%
Karnataka	No	No	100%
Tamil Nadu	No	No	100%
Telangana	No	No	100%
Madhya Pradesh	No	No	99%
Andhra Pradesh	No	No	100%
Punjab^	No	No	100%

Impact of Subsidy Reduction on India's Electric Two-Wheeler Industry

Following a period of slowdown in the initial two years of the COVID-19 pandemic, India's renewable energy industry appears to be recuperating in terms of investments. However, recent research is shedding light on concerns regarding the overall growth trajectory of the sector, with financial challenges emerging as a significant hurdle. Lately, the electric two-wheeler industry in India has undergone a significant transformation with the government reducing subsidies under the FAME II scheme. These changes have raised concerns about the industry's growth and the ability of its players to adapt to the evolving landscape. The Indian electric two-wheeler sector has experienced a substantial shift in market dynamics, corporate partnerships,

and end-user experiences. In essence, the industry needs to prepare for a subsidy-free environment.

The subsidy reductions in this sector have posed significant challenges for manufacturers and the overall market. To navigate these hurdles and unlock the industry's vast potential, proactive measures are needed. Addressing affordability concerns, focusing on technological advancements, and expanding charging infrastructure are essential steps forward.

Subsidy Reduction as a Move Towards Self-Sustainability

Initially, the Indian government extended subsidies to boost the EV industry, but it has now shifted its strategy by reducing subsidies under the FAME II scheme. This change aims to promote self-sustainability, encourage innovation, and reduce reliance on government support. The government remains committed to fostering the growth of the EV two-wheeler industry through various key initiatives.

Balancing Upfront Costs and Consumer Adoption

Reduced subsidies have led to higher upfront costs for electric two-wheelers, which may deter cost-conscious consumers from adopting EVs. Investments in the supply chain can help reduce costs and mitigate the challenges arising from subsidy cuts.

How Subsidy Reduction Affects Sales and Market Expansion

The subsidy reduction has directly impacted electric two-wheeler sales and demand. Financial incentives played a crucial role in convincing consumers to choose EVs, but the growth trajectory has been affected, with manufacturers struggling to achieve sales targets.

Competitiveness Challenges:

The higher upfront costs due to reduced subsidies have put EVs at a disadvantage compared to conventional two-wheelers. Manufacturers must reposition their offerings to maintain market share and attract price-sensitive customers.

R&D and Technological Advancements in a Subsidy-Cut Environment

Subsidies previously accelerated R&D in the EV industry, fostering technological

advancements. However, with reduced financial support, manufacturers may face constraints in allocating resources to R&D activities, affecting the sector's ability to develop advanced technology.

Implications for Expansion and Adoption

A robust charging infrastructure is crucial for EV adoption, including two-wheelers. Subsidy cuts have raised concerns about infrastructure expansion, potentially deterring investments. Increased government support for charging infrastructure development could substantially reduce the overall cost of operating in the EV sector.

Several studies indicate that the renewable energy sector is grappling with a reduction in subsidies, heightened taxation, and constraints on the import of equipment necessary for solar and wind energy initiatives. One noteworthy study, conducted jointly by the Council on Energy Environment and Water (CEEW) and the International Institute of Sustainable Development (IISD), highlights a substantial 59% decrease in subsidies for the renewable energy sector since 2017. Furthermore, the study emphasizes that public financial institutions' funding for renewable energy projects in the country is not aligned with the nation's energy targets.

"Mapping India's Energy Policy 2022" by CEEW revealed that in 2017, the subsidy allocated to the renewable energy sector amounted to Rs16,312 crore. However, in the most recent fiscal year (2021-22), this figure decreased significantly to Rs6,767 crore. In stark contrast, subsidies for electric vehicles experienced nearly a threefold increase during the same period. The report underscored that the primary backing for clean energy initiatives in the nation primarily came from non-banking financial companies (NBFCs) and specific private banks, whereas public sector financial institutions directed their investments more towards fossil-fuel-based energy projects.

Conclusion

The subsidy reductions in the FAME II scheme have prompted active responses from industry stakeholders, who are implementing strategic measures to address challenges and leverage emerging opportunities. Electric vehicle (EV) manufacturers are concentrating on cost-efficiency, operational streamlining, and exploring partnerships to benefit from economies of scale. They are also investing in localized manufacturing and enhancing their supply chain

capabilities to reduce expenses and bolster competitiveness. Furthermore, these manufacturers are placing a strong emphasis on customer education and awareness campaigns to highlight the long-term advantages of EV adoption. In essence, industry players are recognizing the need to align resources and prepare for the post-subsidy era.

The subsidy cuts within the FAME II scheme have indeed posed substantial challenges for India's two-wheeler EV sector. Issues related to affordability, decreased demand, competitiveness, innovation constraints, charging infrastructure limitations, and other obstacles have become prominent concerns for industry stakeholders. Nevertheless, the proactive responses adopted by these stakeholders, which include cost-cutting measures, strategic collaborations, and educational initiatives for consumers, offer pathways for adaptation and growth. The government's decision to reduce incentives signals a shift toward the independent growth of the EV industry. By effectively addressing these challenges, the industry can harness the potential of the evolving market and secure a sustainable future for two-wheeler EVs in India.

The absence of clear sectoral data within public sector banks (PSBs), which hold a diverse range of assets, poses a challenge in evaluating the flow of financing for renewable energy. This underscores the need for regulatory intervention from bodies like the Reserve Bank of India (RBI) to enhance transparency through mandates and advocate for supportive policies that encourage private finance initiatives (PFIs) to contribute more to renewable energy financing.

In India, public sector undertakings (PSUs) wield significant influence over crucial energy resources, including coal, oil, natural gas, and clean energy. The study calls for a well-defined roadmap to guide these PSUs in their transition towards decarbonization and in ensuring a sustainable energy mix for the nation. PSUs should begin by identifying opportunities for diversification in clean energy that align with their current business practices. Subsequently, they should set clear investment targets and periodically raise their ambitions in this regard. Such strategic planning is vital not only for exploring diversification pathways but also for determining capital allocation strategies and the types of strategic acquisitions that can be financed using their existing financial resources.