# India's Shift to Electric Vehicles

***This editorial is based on "Why India must drive the future with EVs" which was published in Hindustan Times on 08/07/2025.***The article highlights that India is swiftly shifting to electric vehicles (EVs) fueled by technological advancements and the potential for cost-effective EVs with renewable energy and local battery production.

**For Prelims: FAME, Production Linked Incentive (PLI) scheme, Lithium Iron Phosphate (LFP) batteries, GST, PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) Scheme, FAME II scheme, Scheme to Promote Manufacturing of Electric Passenger Cars (SPMEPCI), Green Bonds** .

**For Mains:** The Present Status and Policy Interventions for Adoption of **Electric Vehicles (EVs)** in India.

India, the world's **third-largest automobile market**, plays a pivotal role in the global automotive sector, contributing nearly **7%** to its GDP. The transition to **electric vehicles (EVs** is rapidly reshaping this landscape, as global trends push towards cleaner, greener transportation. In 2024, EVs accounted for **7.5%** of India's total vehicle sales, with electric two-wheelers leading the charge, comprising **60%** of total EV sales. With government initiatives like **FAME** and the **Production Linked Incentive (PLI) scheme**, coupled with technological breakthroughs in battery manufacturing, India aims to achieve ambitious EV adoption targets, transforming its mobility future.

## What is The Current Status of EV Adoption In India?

- **India's Growing EV Market:** India's EV market reached a 7.5% penetration in 2024–25, driven by increased consumer awareness and government incentives.
    - The EV market's growth is still lagging behind global leaders like China, which saw over 50% of new cars sold as electric in 2024.
- **Electric Two-Wheelers Lead the Charge:** Electric two-wheelers make up 60% of the EV market, reflecting their affordability and **urban mobility** appeal.
    - This segment has shown significant growth, especially as consumer preferences shift towards **cost-effective and eco-friendly** transportation.
- **EV Growth in Public Transport:** Public transport electrification is a key focus, with the government planning 14,000 e-buses by 2026.
    - Several states, including **Telangana and Karnataka**, are scaling up e-bus fleets, enhancing urban sustainability and reducing pollution.
- **Policy Support Driving EV Adoption:** The government's FAME II scheme with a **₹10,000 crore budget** has accelerated EV adoption across segments.
    - By incentivizing manufacturers and consumers, the policy has successfully boosted electric two- and three-wheeler sales.
- **Technological Advancements in Battery Manufacturing:** India is investing in domestic

battery manufacturing, particularly **Lithium Iron Phosphate (LFP) batteries**.
    - This move is essential for reducing reliance on imports and promoting energy security while driving down the cost of EVs.
- **Targeting 2030 Milestones:** India aims for **80%** EV adoption in two- and three-wheelers, **40%** in buses, and **30%** in private cars by 2030.
    - These ambitious targets are supported by initiatives like the PLI scheme, aiming to accelerate domestic manufacturing.

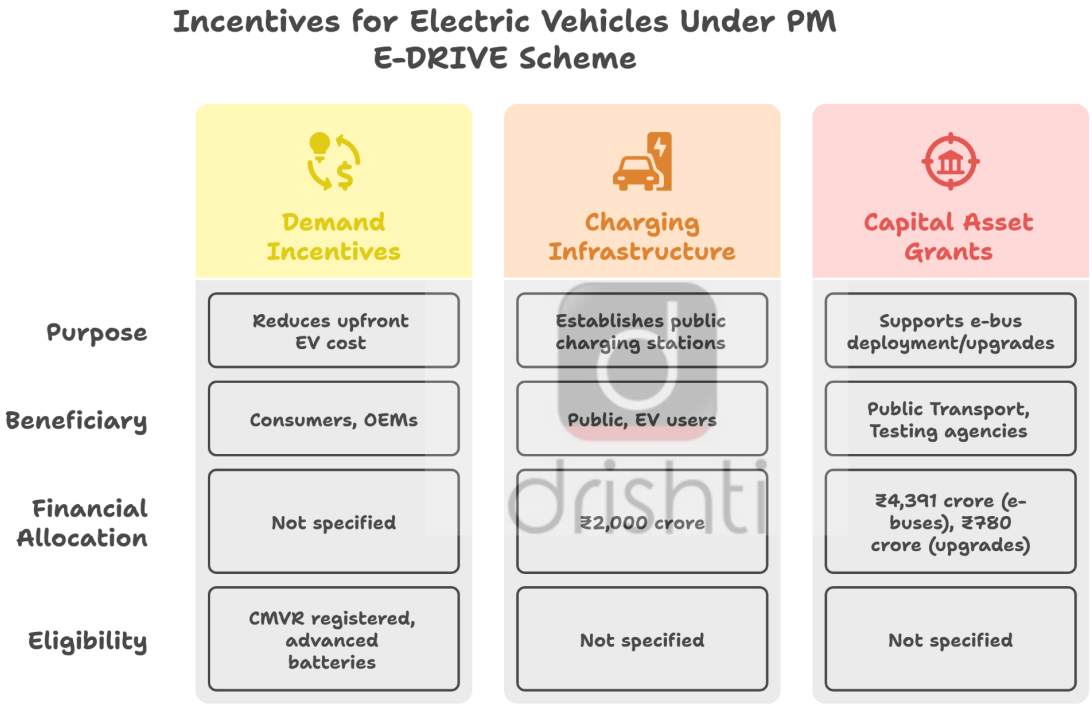
## What are The Challenges Hindering EV Adoption In India?

- **High Initial Cost of EVs:** The **high upfront cost** of EVs, typically 20-30% more than **Internal Combustion Engine (ICE) vehicles**, remains a significant barrier.
    - Government subsidies and **GST** reductions have not been sufficient to make EVs affordable for lower-income groups.
    - Also, the variety of EV models in the **affordable segment** is limited compared to ICE vehicles
- **Insufficient Charging Stations:** India has only **one public charging station per 135 EVs**, significantly lower than the global average of one station for every 6-20 EVs.
    - To meet the target of 3.9 million charging stations by 2030, urgent expansion of infrastructure is required.
    - Also, building EV charging stations is **capital-intensive**, posing a challenge for rapid infrastructure expansion.
    - The **reliability of the electrical grid** in some regions remains a challenge for efficient charging station operation.
    - Additionally, there is a lack of standardization, with fragmented charging standards and connectors across different manufacturers, further complicating the seamless adoption of EV infrastructure.
- **Dependence on Imported Batteries:** India **imports over 90%** of its lithium-ion batteries, making the EV sector vulnerable to global supply chain disruptions.
    - Efforts to establish local battery manufacturing are ongoing but have not yet significantly reduced this dependency.
- **Regulatory and Policy Uncertainty:** Shifting policies, such as import **duty exemptions** and changes in tax regimes, create uncertainty for both manufacturers and consumers.
    - A stable, long-term policy framework is crucial for fostering confidence in the EV market.
        - Shifting policies, like the recent shift from FAME II to PM eDrive, create uncertainty for manufacturers and consumers, highlighting the need for a stable, long-term EV policy framework.
- **Range Anxiety and Battery Life:** Consumers are concerned about the limited range of EVs, which leads to '**range anxiety'**.
    - While battery technologies have improved, fast-charging solutions remain scarce, further deterring potential buyers.
- **Low Consumer Awareness and Financial Barriers:** Low consumer awareness about EV benefits and technology hampers widespread adoption.
    - Additionally, limited financing options and poor resale value deter potential buyers.

## What Steps Have Been Taken to Promote EV Adoption in India?

- **PM E-Drive Scheme: The PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) Scheme,** aims to provide impetus to green mobility and the development of the EV ecosystem in India, with an outlay of **₹10,900 crore** over two years(2024-2026).
- **Investment in Charging Infrastructure:** India is accelerating the development of its EV charging infrastructure under the **PM E-Drive Scheme**, with a ₹2,000 crore allocation to establish **72,000** charging stations nationwide.
    - These stations will be strategically placed along key cities, highways, airports, and industrial corridors to ensure widespread access.
    - **Bharat Heavy Electricals Limited (BHEL)** will serve as the nodal agency for demand aggregation and the development of a unified EV super app to support this nationwide

initiative.
    - Also, the government has been addressing the gap in charging infrastructure by sanctioning over 7,000 public charging stations under **FAME II**.
- **E- Vehicle Policy:** The Union Government has approved a **new policy (2024)** to promote India as a manufacturing destination for **electric vehicles (EVs)**, with a minimum investment requirement of **₹4,150 crore** and no cap on maximum investment.
    - The policy sets a **3-year timeline** for setting up manufacturing facilities and starting commercial production, with a goal of **achieving 50% domestic value addition within 5 years**, while also allowing limited imports of EVs at a lower customs duty for manufacturers meeting the investment criteria.
- **State-Level Initiatives:** States like **Telangana, Karnataka and UT Delhi (Switch Delhi campaign)** are expanding their electric bus fleets as part of the PM E-DRIVE scheme.
    - These state-led initiatives contribute to the nationwide push towards sustainable public transport.
    - The integration of various initiatives is expected to create a seamless EV mobility experience while generating green jobs and reducing carbon emissions.
- **Government Incentives:** The government had launched key initiatives like the **FAME II scheme** with a ₹10,000 crore budget to incentivize EV adoption.
    - These schemes have played a crucial role in boosting the adoption of electric two-wheelers, three-wheelers, and buses.
- **Support for Domestic Battery Manufacturing:** Through the **PLI scheme**, the government is promoting domestic battery manufacturing, with ₹18,100 crore allocated for **Advanced Chemistry Cells (ACC)**.
    - This effort aims to reduce dependence on imported batteries and lower EV costs.
- **Policy Reforms for Local Manufacturing:** The **Scheme to Promote Manufacturing of Electric Passenger Cars (SPMEPCI)** offers reduced import duties and encourages global EV manufacturers to set up production in India.
    - This scheme aims to strengthen India's domestic manufacturing capacity, create jobs, and build a sustainable EV ecosystem.
- **Other Initiatives:**
    - **Electric Mobility Promotion Scheme:** The scheme aims to promote electric vehicles (EVs) by offering incentives for their adoption and manufacturing.
        - It focuses on reducing carbon emissions, enhancing air quality, and supporting India's transition to sustainable mobility.
    - **GST on EVs and Charging Equipment Reduced to 5%:** The reduction of Goods and Services Tax (GST) to 5% on EVs and charging equipment is designed to make EVs more affordable for consumers.
        - This move incentivizes the adoption of cleaner, greener vehicles by lowering the overall cost.
- **PM e-Bus Sewa Scheme for Public Transport:** launched by the **Ministry of Housing and Urban Affairs**, seeks to deploy 10,000 e-buses on a PPP model, offering central assistance for infrastructure development at varying levels based on state and city types.
- **EV Mitra Scheme:** The EV Mitra Scheme simplifies the process for EV owners to claim subsidies and incentivizes awareness about the benefits of electric vehicles.
    - It aims to create a more accessible, transparent platform for users to access government subsidies and incentives for EV adoption.




## What is The Way Forward For India's EV Sector?

- **Accelerating Battery Production:** India must focus on scaling up **domestic battery production** to meet the growing demand for EVs.
    - Investment in research and development of new battery technologies, such as solid-state batteries, will be key to enhancing efficiency and reducing costs.
    - Leveraging India's **National Critical Mineral Mission** to enhance **domestic lithium exploration.**
- **Expanding Charging Infrastructure:** Expanding the charging infrastructure is critical for accelerating EV adoption.
    - The government should focus on building a **more extensive and accessible network** of charging stations, especially in rural and semi-urban areas.
    - Implement interoperable charging standards and promote **battery swapping and Battery-as-a-Service (BaaS) models.**
    - A successful EV transition requires collaboration between the **government**, **private investors**, and technology **innovators**.
    - A well-defined and scalable charging ecosystem is necessary to ensure **accessibility, affordability, and long-term sustainability.**
- **Learning from Global Best Practices:** India can learn from global EV leaders like **California, the UK, and Singapore**, who have successfully implemented incentive-driven models and **public-private partnerships (PPPs)**.
    - Adopting similar approaches, such as streamlining **permits, land acquisition, and interoperability standards**, could strengthen India’s charging network.
    - Learning from **Germany's ELISA (Electrified Innovative Heavy Traffic on the Autobahn)** project which has successfully demonstrated the viability of electrified highways, where hybrid trucks are powered via overhead catenary lines, reducing fuel costs and emissions.
- **Hybrid Financing Models**: To address the capital-intensive nature of building charging stations, India could explore **innovative financing models** such as **green bonds**, **loans with low-interest rates**, and international collaborations.
    - Establish clear government-backed financial incentives, ensuring private investors are encouraged to contribute to the expansion of charging infrastructure.
- **Harmonize Center And State Level Policies:** A stable, **long-term policy** framework is needed

to guide the growth of India's EV sector.
    - Continued support for **local manufacturers**, along with measures to foster innovation, will be crucial to achieving India's EV goals.
    - Also, the government should streamline the **land acquisition** process for charging stations by offering incentives for the use of government-owned land or simplifying the permissions process.
    - Resolve GST disparities between finished EVs and raw materials to lower costs and improve sector competitiveness.
- **Focus on Research and Development:** India must invest in **R&D** to overcome the current limitations of EV technologies.
    - By fostering innovation in **battery efficiency, vehicle range, and charging speed**, India can enhance the competitiveness of its EV sector.
    - For example, investing in advanced battery chemistries (e.g., solid-state, sodium-ion) to improve range.
- **Collaboration with International Markets:** India should seek strategic collaborations with global EV manufacturers to gain access to cutting-edge technologies.
    - This will not only boost domestic manufacturing but also help India establish itself as a key player in the global EV market.
    - Also, India should seek strategic collaborations with **Argentina**, a major lithium producer, to secure access to its abundant lithium reserves
- **Hydrogen Fuel Cell Electric Vehicles:** Integrating the **National Green Hydrogen Mission** can catalyze the creation of a sustainable hydrogen ecosystem in India, focusing on increasing green hydrogen production and expanding refueling infrastructure.
    - Additionally, incentivizing fuel cell technology will facilitate the transition to zero-emission **hydrogen fuel cell electric vehicles**.
- **Focus on Market Segments and Use Cases:** Electrifying **public and commercial fleets** by prioritizing buses, taxis, and last-mile delivery vehicles is crucial, as they have high utilization rates and a significant impact on emissions.
    - **Promoting two- and three-wheelers** by continuing incentives is essential, as these segments dominate India's vehicle market and are key to accelerating EV adoption.

## Conclusion

India's EV journey, driven by innovative policies, technological advancements, and growing consumer awareness, is set to reshape its automotive landscape. With continued focus on infrastructure development, domestic battery manufacturing, and strong policy support, India is poised to meet its ambitious EV adoption targets. This transition will **foster sustainable growth**, **enhance energy security**, and contribute significantly to global climate goals.

***Drishti Mains Question:***

Assess the potential of the PM E-Drive scheme to catalyze India's electric vehicle manufacturing ecosystem under the Make in India initiative

### UPSC Civil Services Examination, Previous Year Question (PYQ)

***Mains***

**Q.** How is efficient and affordable urban mass transport key to the rapid economic development in India? (2019)