

New Research Report

CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES

Requirements, Projections, Challenges and Industry Insights



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India Infrastructure Research

India's shift to electric vehicles (EVs) is inevitable, if not imminent. However, before the mobility revolution begins, India will need an ecosystem that can sustain EVs. In this regard, most worries hinge on the availability of adequate charging infrastructure and the formation of a supportive regulatory framework. Both the government and the industry are working on these fronts.

The Ministry of Power has recently finalised the guidelines for setting up charging infrastructure. Regulatory standards and tariffs for developing and using this infrastructure are still work in progress at both the central and state levels.

On the industry front, the entry of new players into the market and increased focus on customisation and innovation will drive growth in this space. From large automobile manufacturers to solar power developers and lithium-ion battery makers, everybody seems to have thrown their hats in the ring. Going forward, battery costs should come down, driven not just by India but also by global EV trends. There also seems to be a higher manufacturer readiness to support the growing demand for EVs.

However, several concerns remain. A more India-specific concern is that of the electricity grid. Can it handle this type of demand? In order to realise the government's target of 30 per cent EV penetration by 2030, utilities will need to significantly invest in grid upgradation and the development of publicly available fast-charging stations to support the planned EV growth. Utilities and power companies also need to factor in renewable energy for meeting the power demand of EVs since a key goal of using these vehicles is to reduce pollution.

1. EXECUTIVE SUMMARY

2. EV Market: Key Trends and Projections

- ❖ Market Potential
- ❖ Current Industry Structure
- ❖ Segment-wise Status
 - Electric Cars (Private Cars, Cab Aggregators, Car Rentals, Corporate Cabs, Government Fleet)
 - Electric Buses
 - Commercial Vehicles (SCVs, LCVs, HCVs)
 - E-Rickshaws
 - Two-Wheelers (Private, Commercial)
- ❖ Policy Direction and Programmes
 - Government's Vision and Targets
 - FAME I and its Impact
 - FAME II and the Way Forward
 - Other Policy Moves
- ❖ Key Features
- ❖ Likely Implications on Various Stakeholders
- ❖ EESL's Initiatives and Targets
- ❖ State-wise E-Mobility Targets and Subsidies
- ❖ EV Forecasts till 2030
 - Demand Projections by Type of Vehicle Segment

3. Charging Infrastructure Requirements

- ❖ Current Status
- ❖ Technology Landscape
- ❖ Recent Initiatives
 - By States
 - By Cities
 - By Private Players
 - By PSUs and CPSUs
 - By Technology Providers
 - Etc.
- ❖ Charging Infrastructure Forecasts till 2030
 - Power Demand Requirement
 - Projections for Number of Charging Stations
 - Battery Demand Forecasts (New and Replacement)

4. Regulatory Regime

- ❖ Key Features of EV Charging Station Guidelines
- ❖ Licensing Norms
- ❖ GST Rules
 - EVs
 - Batteries
 - Other Components of Charging Infrastructure
- ❖ Charging Infrastructure in Parking Complexes
 - Model Building Bye-Laws, 2016
 - Urban Regional Development Plan Formulation and Implementation Guidelines, 2014
- ❖ Financial Incentives
- ❖ Evolving Standards and Practices
 - Current Standards and Norms
 - Existing Gaps
 - Recent Initiatives

5. Existing/Potential Players and their Plans

- ❖ Charging Infrastructure Providers
- ❖ Battery Suppliers
- ❖ Project Installers/ Service Providers
- ❖ Financiers
- ❖ Auto OEMs
- ❖ Auto Vendor Ecosystem
- ❖ Oil Marketing Companies
- ❖ Testing & Certification Agencies

6. Emerging Tariff Trends and Competitive Fuel Analysis

- ❖ MoP's Tariff Guidelines
- ❖ State-wise Tariffs
 - Regulatory Orders
 - Timelines
 - Implementation Rules
- ❖ Competitive Fuel Analysis
 - CNG
 - Diesel
 - Petrol
 - Hybrids versus Pure-play EVs

7. Impact on Discoms

- ❖ Demand Side Impact
- ❖ Revenue Side Impact
- ❖ Impact on Voltage Profiles
- ❖ What Should be the Discoms' Approach?

8. Charging Technology Options

- ❖ Types of Technologies and their Use Cases
 - Home Charging
 - Fast Charging
 - Battery Swapping, etc.
- ❖ Cost Comparison
- ❖ Key Players
- ❖ Outlook

9. Viability and Economics of Charging

- ❖ Cost Trends
 - By Technology
 - By Scale/Size
- ❖ Payback Period
- ❖ ROI Projections

10. Issues and Challenges

- ❖ Nascent Market
- ❖ Underdeveloped Ecosystem
- ❖ Design Issues (High Upfront Cost of EVs and Batteries)
- ❖ Battery Performance vis-à-vis Conventional Fuels
- ❖ After Life Issues
- ❖ Upfront Need for Scaling up Charging Infrastructure

11. Pilots and Case Studies

This chapter will have 8-10 case studies of existing charging stations across India. These will include case studies of cities such as Lucknow, Nagpur, Pune and Delhi; initiatives by private players and PSUs; and projects of bus operators and cab aggregators such as Ola and Uber.

12. Upcoming Centres of Growth and Opportunities

- ❖ Current Regional Analysis
- ❖ Completed Tenders and their Results
- ❖ Ongoing and Upcoming Tenders
- ❖ State-wise Opportunities and Insights

13. Outlook and Opportunities for Various Stakeholders

- ❖ Charging Technology Providers
- ❖ Battery Manufacturers
- ❖ Investors
- ❖ Power Discoms
- ❖ Renewable Energy Players

Opinion and Insight

This section chapter will have opinions and views of senior representatives from government departments, regulatory agencies, private sector, and top consultancies on the following questions:

Q. What is the current policy direction for EV charging infrastructure?

Q. What are the potential opportunities for various stakeholders in the EV charging ecosystem and what are the associated challenges?

Q. What are the industry's technology, regulatory and pricing expectations for charging infrastructure?

Q. Which user segments will be the early adopters of EVs and why?

Q. What are the biggest challenges in promoting the growth of electric buses in India? How can these be resolved?

Q. What role can power utilities play in setting up charging infrastructure?

Q. How has the manufacturing ecosystem evolved over time? What are the likely price and technology trends?

Q. How should India secure the value chain in terms of materials, battery production, etc?

Q. Who should be responsible for creating charging infrastructure? What should be the business model?

Q. What are financiers' expectations from the stakeholders?

Q. What are the demand and supply expectations for EVs and the related charging infrastructure in the coming years?

ABOUT US

The report is being published by India Infrastructure Publishing, which has over two decades of experience in the Indian power sector. The group publishes *Power Line*, the flagship magazine of the power sector and has extensive reach among state-level departments, PSUs and the private sector companies. While the subject of EVs and charging infrastructure is nascent, the group has conducted a number of workshops in this area and has the relevant knowledge to deliver high value research and insights on this theme.

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