

Road to 2030: India pushes the pedal on building a sustainable EV future

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The country's e-mobility segment is poised for significant expansion, driven by the growing adoption of electric vehicles (EVs) and the rapid expansion of charging infrastructure. To achieve the target of 30 per cent EV penetration by 2030, ensuring a wide network of charging infrastructure that is reliable and easily accessible is crucial. To this end, the government has been undertaking a slew of initiatives. Recently, the Bureau of Energy Efficiency (BEE) revised the guidelines and standards for EV charging infrastructure with the aim of addressing the challenges and meeting the industry requirements pertaining to connection timelines, tariff structures, placement of charging stations, etc.

Owing to a conducive policy ecosystem, EV sales in the country have been growing at a fast pace. In 2023-24, EV sales stood at around 1.67 million, an increase of nearly 40 per cent over the past year. In the past five years, EV sales have grown at a compound annual growth rate of over 50 per cent. In 2023, EVs accounted for a share of 6.75 per cent of the total vehicle sales in the country. Considering the EV sales penetration targets set by NITI Aayog, that is, 30 per cent for private cars, 70 per cent for commercial cars, 70 per cent for buses and 100 per cent for two- and three-wheelers by 2030, it is expected that there will be around 90 million EVs on Indian roads by 2030. To support these EVs, around 444,000 public EV chargers would be required.

EV charging infrastructure – current scenario

India's EV charging infrastructure is growing rapidly, driven by the growing uptake of EVs. As of February 2024, there are approximately 12,146 public charging stations (PCS) in the country. State-wise, the top three states in terms of charging infrastructure are Maharashtra (3079), Delhi (1,886) and Karnataka (1,041). The public EV charging network in the country is growing with an increase in the deployment of both slow and fast EV chargers. According to BEE's data, 85 per cent of the operational EV chargers are slow chargers and the remaining are fast chargers.

Technology-wise, the majority of operational EV chargers in the country currently use plug-in conductive technology. Battery swapping services are gaining popularity, particularly in the two-wheeler and three-wheeler segments, to cater to specific market needs. Sector-wise, charging infrastructure is attracting investments from both the public and private sectors, with approximately 59 per cent of the charging stations installed by 43 private charge point operators (CPOs), while the remaining 41 per cent were installed by 26 public CPOs (as of October 2023).

Notably, oil marketing companies (OMCs) are emerging as prominent players in the EV charging space. OMCs are undertaking the installation of 22,000 EV charging stations across cities and on national highways in the country, with plans to complete installation by December 2024. Of these, Indian Oil Corporation Limited will install 10,000, Bharat Petroleum Corporation Limited 7,000 and Hindustan Petroleum Corporation Limited 5,000. The Ministry of Heavy Industries has sanctioned Rs 8 billion to the three OMCs for setting up 7,432 public fast charging stations across the country under the Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME) in India Phase II, while 148 charging stations have been sanctioned to other entities under the scheme.

Apart from this, the National Highways Authority of India is developing wayside amenities (WSAs) along highways and expressways. EV charging stations have been designated as a mandatory facility across all WSAs. Moreover, at the state/union territory (UT) level, steps are being taken to augment charging infrastructure. For instance, Delhi aims to install around 18,000 public and semi-public EV charging points by 2024; Kerala State Electricity Board plans to install 3,000 destination chargers at public/private/buildings; and Chandigarh aims to install 100 public EV charging stations across the city.

BEE's India EV Digest 2023 (released in March 2024) highlights some of the initiatives being taken by the private sector. These include Ather Energy, an EV manufacturer, which announced plans to install over 2,500 charging stations by the end of 2023; EV charging solutions provider Statiq unveiled a nationwide plan to install 20,000 EV charging stations across the country by financial year 2023; and Tata Power, which also announced plans to set up EV charging stations (25,000 EV charging points) nationwide.

EV charging infrastructure guidelines

Recently, BEE released the sixth revision of the Guidelines and Standards for EV Charging Infrastructure, initially issued on December 14, 2018. These updated guidelines reflect adjustments in tariffs, connection timelines, etc., to accommodate the evolving demands of the industry and the increasing adoption of EVs.

Connection timelines: In line with the Electricity (Rights of Consumers) Rules 2024, the new guidelines specify stricter timelines for providing electricity connections to charge point operators. In metropolitan areas, connections must be provided within three days of a complete application (which was previously seven days). For other municipal areas, this timeline extends to seven days (from 15 days previously), while in rural areas, it is 15 days. Exceptions apply to rural areas in states and UTs with hilly terrain, where the maximum timeline for new connections or modifications is 30 days after the application is complete.

Tariff: With regard to the tariff, the revised guidelines state that the electricity supplied to EV charging stations will follow a single-part tariff structure, capped at the average cost of supply (ACoS) until March 31, 2026. The distribution licensee will charge 0.7 times the ACoS during solar hours (9:00 a.m. to 4:00 p.m.) and 1.3 times the ACoS during non-solar hours (rest of the day). EV charging stations should have separate metering arrangements to accurately record and bill electricity consumption based on the applicable tariff for EV charging stations.

The tariff applicable for domestic consumption will be applicable for domestic charging. The tariff chargeable by group houses societies for community charging of EVs will be as per the provisions stipulated by the distribution licensee. For workplace EV charging stations, owners can charge their EVs at their office premises using existing electricity connections and may apply for enhanced power loads, if required, to set up requisite charging stations at their office premises.

Others: Regarding the location of PCSs, the guidelines state that within urban areas, there will be at least one charging station within every 1 km x 1 km grid. Alongside highways, expressways and major roads, charging stations will be positioned at intervals of approximately 20 km on both sides of the road. To cater to the needs of long-range and heavy-duty EVs such as buses and trucks, specialised fast charging stations will be established approximately every 100 km along highways and expressways. The guidelines require charging station operators to enter into an agreement with at least one online network service provider, enabling EV owners to remotely book charging slots, optionally. This partnership will provide online access to essential information such as charger locations, types (AC/DC, slow/fast), kW capacity, rates, service charges and other details specified by the central nodal agency.

Future outlook

A report by the Confederation of Indian Industry on "Charging Infrastructure for EVs" states that the firm push by governments at the central and state levels for EVs has increased consumer choice. Even in a business-as-usual scenario of 40 per cent year-on-year growth, about 106 million EVs will be sold every year by 2030. To achieve a ratio of 1:40 charging infrastructure to EVs, India must install over 400,000 chargers annually with a total of 1.32 million chargers till 2030. Moreover, as per the action plan for nine major cities prepared by BEE for the installation of PCSs, a total of 46,397 PCSs are being targeted in these cities by 2030.

While various measures have been taken to promote the EV charging infrastructure in the country, the current public charging network is limited compared to the projected growth in EV adoption. Several issues and challenges facing the segment need to be addressed. Moreover, the sector requires a favourable policy ecosystem to enable the development of cost-efficient and sustainable EV charging infrastructure.

Firstly, in order to effectively leverage the FAME scheme and overcome barriers hindering the adoption of EV charging stations, standardising processes and technologies is essential. Establishing clear, predefined limits on costs associated with obtaining electricity connections for EV charging stations is crucial. Harmonising the procedures for obtaining these connections across states eliminates the current disparities in cost and complexity. Further, simplified land use policies are needed to facilitate the establishment of charging stations, especially in urban and semi-urban areas.

Secondly, a significant challenge in setting up public EV chargers is the lack of adequate financing. To address this, encouraging public sector banks and financial institutions to prioritise lending to the EV charging infrastructure sector through favourable interest rates and specialised loan products tailored to meet the unique needs of such projects will be useful. Furthermore, permitting the utilisation of corporate social responsibility funds for the development of PCS will significantly enhance funding opportunities.

Thirdly, while expanding the EV charging infrastructure, there is a need to integrate renewable energy sources into charging stations. Renewable energy-based EV charging infrastructure is not only a sustainable solution but also lowers operating costs in the long run. On-site solar power integration into the EV charging network represents a shift towards decentralisation, reducing the strain on the grid and enhancing network stability. Moreover, integrating vehicle-to-grid (V2G) technology enables the bidirectional flow of electricity, which allows EV batteries to serve as grid storage resources, contributing to grid stability and efficiency. V2G holds potential benefits for both EV owners and the grid infrastructure, supporting renewable energy integration and optimising electricity usage during peak demand periods.

Lastly, there is a need to integrate EV charging infrastructure with internet of things (IoT) and artificial intelligence (AI) for creating a reliable, efficient and user-friendly ecosystem. AI, IoT and machine learning-based solutions optimise charging management, enhance user experience, enable predictive maintenance and facilitate grid integration and demand response. As India's EV market evolves, fostering private sector collaboration with government bodies, discoms and other stakeholders becomes paramount in establishing a robust and efficient EV charging ecosystem.

In conclusion, India is experiencing a rapid evolution in its EV market, driven by supportive government policies and growing consumer demand. As the country moves towards a sustainable and electrified mobility future, collaboration across industry stakeholders, deployment of innovative solutions and focus on the greater uptake of renewable energy in EV charging will be critical to overcome the challenges facing the segment and realise the full potential of EV adoption and infrastructure development nationwide. These measures are essential for achieving the country's energy transition goals and net zero target.

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State-wise operational PCSs (as of February 2024)	
State/UT	No. of operational PCSs
Andaman & Nicobar	3
Andhra Pradesh	327
Arunachal Pradesh	9
Assam	86
Bihar	124
Chandigarh	12
Chhattisgarh	149
D&D and DNH	1
Delhi	1,886
Goa	113
Gujarat	476
Haryana	377
Himachal Pradesh	44
Jammu & Kashmir	47
Jharkhand	135
Karnataka	1,041
Kerala	852
Lakshadweep	1
Madhya Pradesh	341
Maharashtra	3,079
Manipur	17
Meghalaya	21
Nagaland	6
Odisha	198
Puducherry	23
Punjab	158
Rajasthan	500
Sikkim	2
Tamil Nadu	643
Telangana	481
Tripura	18
Uttar Pradesh	582
Uttarakhand	76
West Bengal	318
Total	12,146

Source: Ministry of Heavy Industries

