

Charging ahead: How India's expanding EV infrastructure is driving E2W & E3W growth

India's EV ecosystem has hit an inflection point. In 2025, more than 5 million EVs are active on the road while over 2 million were sold in 2024. These are clear indications of an accelerating growth curve. EVs now account for 7.8 percent of all vehicle sales, up from 7.1 percent in FY24. Interestingly, the two segments spearheading this transformation and redefining mobility for the masses are electric two-wheelers (E2W) and three-wheelers (E3W).

However, a critical question emerges: Is the charging infrastructure growing fast enough to support this rapid EV adoption?

The state of public charging

India's public charging infrastructure has expanded from 1,800 stations in 2022 to over 16,000 by 2024. While this nine-fold increase is impressive, it remains insufficient compared to the pace of EV adoption. Currently, India has just one public charger for every 135 EVs, a statistic far below the global benchmark of one charger per 6 to 20 vehicles.

Karnataka leads with 5,765 public chargers and plans for 2,500 more through public-private partnerships. As of December 2024, India has 25,202 public EV charging stations nationwide. However, this growth is unevenly distributed, with major urban centers like Bangalore and Mumbai significantly ahead while rural and Tier II regions lag. This infrastructure gap is becoming a bottleneck for further EV adoption.

Infrastructure gap slowing EV growth

The demand for EVs is now outpacing the growth of charging infrastructure. According to Fortune Business Insights, India's EV market is expected to grow from USD 23.38 billion in 2024 to nearly USD 118 billion by 2032. NITI Aayog and the Rocky Mountain Institute project EV financing alone is set to hit 3.7 lakh crore rupees by 2030.

Despite this projected growth, the insufficient charging infrastructure is already hampering EV adoption rates. Uttar Pradesh, which accounts for 19 percent of the country's EVs, has just 582 public charging stations for over 11 lakh vehicles, which translates to approximately one station for every 230 EVs. This severe shortage creates range anxiety among potential buyers and directly impacts purchase decisions, especially in the mass-market two-wheeler and three-wheeler segments.

The economic viability challenge

A critical factor hindering charging infrastructure development is economic viability. It is a persistent challenge that manifests differently across urban and rural areas:

- **Urban areas:** High real estate costs in metropolitan regions significantly impact the ROI for charging station operators. With land prices at a premium, setting up charging stations in dense urban areas becomes financially challenging, limiting expansion precisely where demand is highest.
- **Rural areas:** Rural regions face a contrasting problem, namely, the insufficient EV density to achieve economies of scale. Low utilization rates mean charging stations operate below capacity, making it difficult to recover capital investments despite lower setup costs.

This economic conundrum presents a circular challenge: limited charging infrastructure slows down EV adoption, while low adoption levels make infrastructure investments financially unviable for private players.

Policy push - A turning point for charging infrastructure

The policy landscape for EV charging infrastructure is evolving significantly. While FAME I and II focused primarily on vehicle subsidies, the new PM E-Drive Scheme has an allocation of Rs. 2000 crore towards charging infrastructure, which marks a crucial shift. For the first time, there

is a dedicated budget allocation specifically for charging infrastructure development which addresses the gap in previous subsidy programs.

The PM E-Drive Scheme aims to support 2.47 million electric two-wheeler sales, convert more than 3 lakh three-wheelers, and deploy over 14,000 electric buses. Importantly, it includes provisions for charging infrastructure deployment, recognizing its role as a critical enabler for the EV ecosystem.

Under FAME Phase II, nearly 2,900 public charging stations were sanctioned across 68 cities and major highways. However, policy consistency remains essential. When the Delhi government withdrew road tax waivers for EVs in August 2024, electric two-wheeler sales dropped by 18 percent, following a 34 percent decline in July. This demonstrates how policy shifts can directly impact market dynamics.

Solar power: A solution for rural EV infrastructure

Solar-powered charging stations present a viable solution, particularly for rural areas facing grid reliability challenges. India's solar energy potential is substantial, with 89.43 gigawatts of installed capacity and an estimated potential of 748 gigawatts peak.

Solar-powered charging infrastructure reduces grid dependence, cuts carbon emissions, and offers energy independence for remote communities. Additionally, it can improve the economic viability of rural charging stations by reducing operational costs, helping address the challenges of scale these locations face.

The road ahead: Breaking the infrastructure impasse

To meet its 2030 target of 1.32 million public charging stations, India must add over 400,000 chargers annually. This ambitious goal requires:

- **Sustained government intervention:** The dedicated budget for charging infrastructure under PM E-Drive is a positive step, but further measures are needed to address the economic viability gap through subsidies, tax incentives, and public-private partnerships.
- **Innovative business models:** Exploring alternatives like battery swapping stations, particularly for two-wheelers and three-wheelers, could reduce infrastructure costs while addressing range anxiety.
- **Grid modernization:** Distribution companies must upgrade networks to handle increased demand from EV charging, incorporating smart grid technologies to manage load balancing.
- **Integration of renewable energy:** Expanding solar-powered charging stations, especially in rural areas, to overcome grid limitations and improve economic viability.

India's EV movement is no longer a future prospect. It's unfolding now across urban centers and gradually penetrating smaller towns. The infrastructure challenge represents both the largest barrier and the greatest opportunity for accelerating this transition. With targeted policies addressing the economic viability challenge and coordinated efforts between government and private stakeholders, India can build the robust charging network needed to support its electric mobility ambitions.



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