

EV Charging Station Demand Analysis - India (2025)

1. Objective

The aim of this project is to analyze the electric vehicle (EV) growth patterns across Indian states and identify areas with insufficient charging infrastructure. The findings will support data-driven decisions for prioritizing future EV charging station installations.

2. Tools Used

- **PostgreSQL:** Data storage and analysis
 - **Python (Pandas):** Data preprocessing and merging
 - **Tableau Public:** Interactive dashboards and visual analysis
-

3. Data Sources

- EV Registration Data by State and Vehicle Type
 - Indian Population Data by State
 - EV Charging Station Locations (Latitude, Longitude, Type, City)
-

4. Key Metrics Calculated

- **EV per 1000 People:** Indicates EV penetration in each state
 - **EVs per Charging Station:** Measures infrastructure load
 - **Vehicle Type Distribution:** Identifies dominant EV categories
-

5. Insights & Visualizations

A. EV per 1000 People by State

- States like **Delhi, Goa, and Karnataka** show the highest EV penetration.
- Northeastern states like **Nagaland and Manipur** have low EV counts but could be strategic for early adoption.

B. EV vs Charging Station Count

- States like **Uttar Pradesh and Bihar** show high EV counts but lag behind in charging infrastructure.
- **Gujarat and Maharashtra** maintain a better balance between EV demand and supply.

C. States with EVs but No Charging Stations

- States such as **Arunachal Pradesh, Nagaland, and Meghalaya** have no recorded charging stations despite having EVs registered.

D. Top Cities with Charging Stations

- **Delhi, Mumbai, Bangalore, and Hyderabad** top the list.
- **Noida and Ahmedabad** also show significant infrastructure presence.

E. EV Types Distribution

- Majority are **2W Personal** and **3W Shared** vehicles.
 - Institutional buses and goods carriers have minimal share.
-

6. Recommendations

- Prioritize installation in **high EV, low station** states like Uttar Pradesh, Bihar, and Rajasthan.
- Expand infrastructure in **strategic tier-2 cities** to prepare for upcoming EV adoption.
- Monitor growth in vehicle types to adjust station capacity and charging types.

7. Conclusion

This project bridges the gap between EV adoption and charging infrastructure across India. By leveraging SQL, Python, and Tableau, the analysis identifies critical locations for future expansion, helping policymakers and private stakeholders make informed decisions.

8. Future Work

- Integrate road network and traffic density data for route-based placement
- Incorporate real-time station usage data (IoT)
- Predictive modeling for 2026-2030 growth trends

