Strengthening Audit Oversight of Public Private Partnerships

EV Charging Infrastructure PPPs Model

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Overall EVCS PPP Model Experience in India with Jiobp Pulse

On EVCS PPP model, we have successful collaborations and partnerships with

- Government of Goa Smart City projects across 28 locations in Panaji,
- with Brihanmumbai Electric Supply & Transport (BEST) across 55 locations,
- Delhi Transco Limited (DTL) across 11 locations,
- West Bengal State Electricity Distribution Company Limited (WBSEDCL) across 11 locations,
- Bangalore Electricity Supply Company Limited (BESCOM) across 25+ locations,
- Kanpur Municipal Corp across 3 locations,
- Nagpur Municipal corporation 11 locations,
- Ongoing 30 + site projects with MCD along with BSES YPL and Rajdhani Power etc.
- 8+ AAI Airports,
- 15+ Central warehousing corporation limited across.

And many **more under execution.**

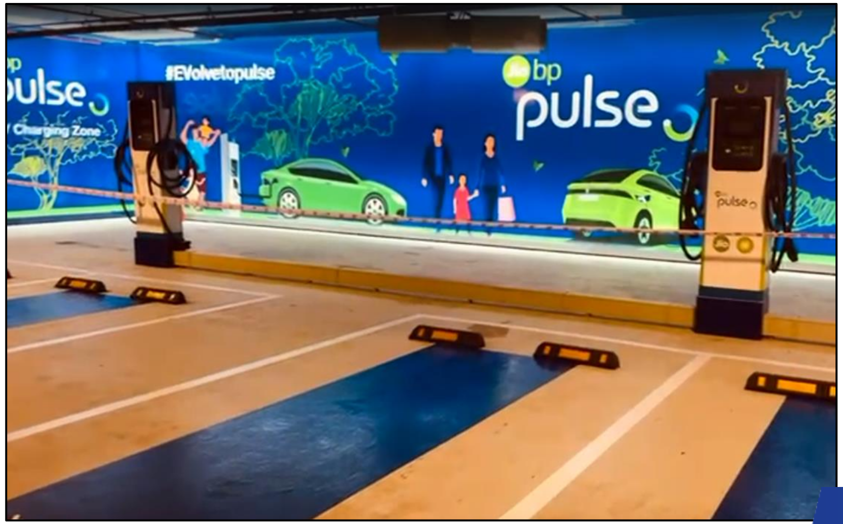
Jio-bp pulse Fleet Charging Hub-Open Hubs

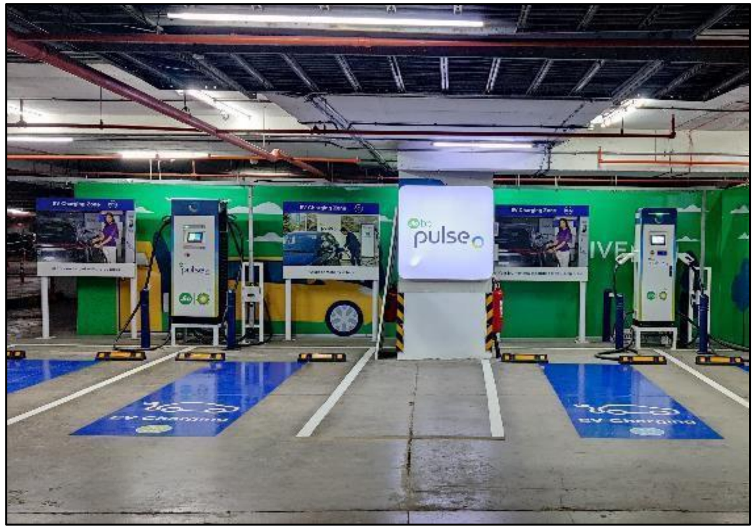
Jio-bp pulse Fleet Charging Hub- Indoor Hub

Jio-bp pulse Suncity Hub (Gurugram)

Jio-bp pulse Dwarka Hub (Delhi)

Jio-bp pulse Public Charging Network





#Various formats

Jio-bp pulse Charging Stations

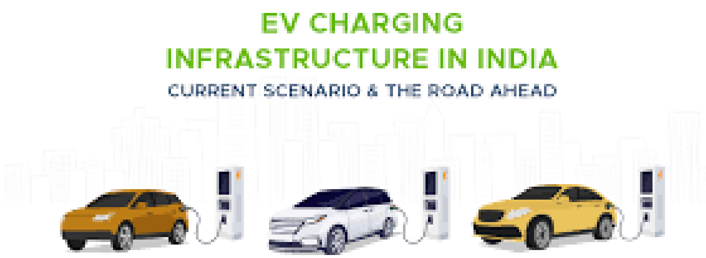
#Highway sites

Why EV Charging infrastructure is vital ?

- Nation journey From 1,800 chargers (2022) **to 29,000+ (2025)**

Current Scale vs. Required Target

- The urgency is highlighted by a significant gap in infrastructure:
- **Current State**: As of end-2025, India has approximately 26,000–30,000 public charging stations, with an EV-to-public-charger ratio of roughly 135:1.
- **Future Need**: To support the projected 50–80 million EVs by 2030, India requires an estimated 1.32 million to 3.9 million charging stations.



Global Perspective : Overview of the China EVCS Market

- China is the largest electric vehicle (EV) market by 2024 mid **with every 3rd car sold being EV. This is expected to reach 50% market share by Mid of 2026.**
- It has > 95 Auto OEMs and 350+ EV Models.
- China's Public EV infrastructure consumed **35000 GWh electricity in CY 2023. (equivalent to Ireland). This crossed 1 lakh GWh in CY 2025.**
- China's **total capacity of EV charging infrastructure reached 20 million units** by the end of December 2025. It took 13 years to go from the first charging station in 2006 to 1 million units by June 2019. Reaching 10 million by June 2024 took another five years. However, the increase from 10 million to 20 million took just 18 months.
- Of 22 Lacs EVCS, 7.6 lacs charging stations have fast-charging capability.
  (85 percent of the world's public fast chargers)
- By end 2025, China has > 4.0 crore cars **(49% of total vehicles sold)** with majority cars supporting 250 KW+ charging since 2023.

Case study on China EV Charging – Key take aways

•World's largest EV charging network with about 12.8–16.7 million charging points by mid-2025, **roughly 1 charger for every 2–3 NEVs on road.**

•**7.27 million new chargers added in 2025 alone**, with rapid growth in private/home charging and strong year-on-year expansion. (1.11m Public and rest Private)

•Strong national policy push: EV charging is classified as "new infrastructure", with a **3-year plan targeting** around 28 million chargers by 2027 and ambitious vehicle-to-charger ratio goals.

•**Unified GB/T national standards** (connectors, communication, safety) ensure high interoperability, plus new mandatory safety standards for AC/DC and ultra-fast charging.

•**Fast innovation: roll-out of 1,000 kW ultra-fast stations** and large smart networks integrating real-time data, plug-and-charge, and app-based roaming across operators.

•Market led by **State Grid and large private CPOs; automakers and tech firms (e.g., Xiaomi, NIO, XPENG, BYD) deeply integrated into charging networks.**

1. Sector Context and PPP Rationale

Sector overview & evolution:-

- EV charging is a public service–oriented utility supporting EV adoption
- Early pilots by PSUs; scale-up led by private CPOs under PPPs
- Shift from grant-based pilots to commercial operations

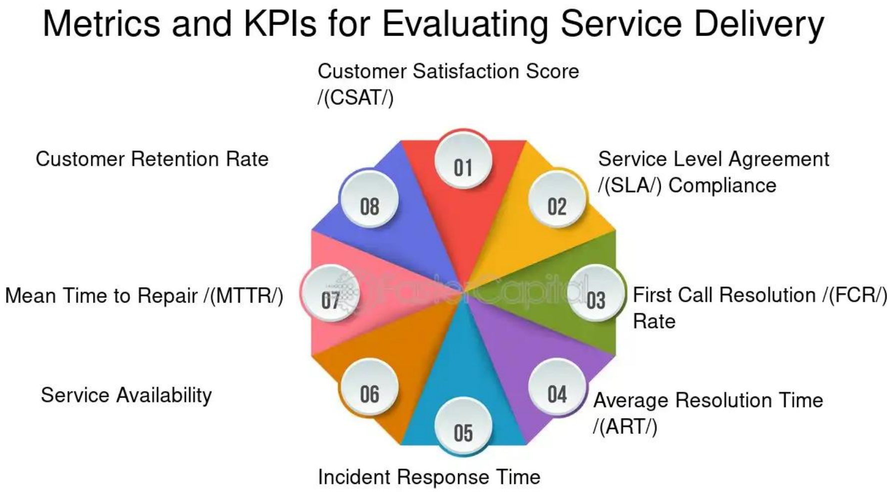
Why PPP over EPC/traditional procurement:-

- High capex and uncertain utilization
- Fast-changing technology unsuitable for fixed EPC models
- PPP enables risk sharing and limits fiscal exposure
- Focus on service delivery, not asset creation alone

Typical PPP models:-

- DBFOM / concession-based models
- Revenue-sharing or license-based arrangements
- Hybrid models with limited public support and private O&M

2. KPIs for Service Delivery



- **Charger availability (%) –** uptime of charging stations
- **Energy dispensed (kWh) –** actual service delivered
- **Utilization rate (%) –** charger usage vs installed capacity
- **Transaction success rate (%) –** completed charging sessions
- **Mean time to repair (MTTR) –** fault resolution time
- **Compliance with technical standards –** adherence to notified norms
- **Customer grievance resolution time –** service responsiveness

3. Demand, Technology and Design Assumptions

IIM MUMBAI

Key demand / usage drivers:-

- Growth in EV population and fleet adoption
- Location type (urban, highway, fleet depots)
- Power tariff and charging price
- Vehicle mix (2W / 3W / cars / buses)

Technical & design assumptions:-

- Charger type mix (AC vs DC fast)
- Grid availability and sanctioned load
- Compliance with notified charging standards
- Software reliability and remote monitoring

Sensitivity of performance:-

- High sensitivity to utilization levels
- Technology upgrades impact capex and O&M
- Changes in standards may require retrofit or replacement/augmentation

4. Commercial and Technical Risk Drivers

Major technical risks

- Technology obsolescence and evolving standards
- Grid constraints and power quality issues
- Hardware–software interoperability failures
- Higher O&M due to usage variability

Commercial risks

- Low utilization impacting revenue
- Tariff sensitivity and price regulation risk
- Payment certainty and settlement timelines
- Limited indexation for O&M cost inflation

Risk allocation (typical PPP approach)

- Private partner: technology, O&M, utilization risk
- Public authority: land access, policy support, approvals
- Shared: demand risk in early adoption phase and revenue generation risk

5.A. Indian Best Practices

India has implemented several successful PPP models for EV charging infrastructure, with Delhi and Karnataka standing out as leading case studies. These partnerships address key challenges like land acquisition, high upfront costs, and grid integration while driving affordability and scale.

Practices that improved bankability and performance

- **Financial De-risking:**
  - Transition from high fixed land rentals to **Revenue-Sharing Models**.
  - Leverage **Viability Gap Funding (VGF)** via the PM E-DRIVE Scheme to offset high upfront capex.
  - Implement **Payment Security Mechanisms (PSM)** to protect private operators from public authority defaults.

- **Operational Excellence:**
  - Mandate **Interoperability** (OCPP/OCPI) to ensure chargers serve all vehicle brands, boosting utilization.
  - Adopt **Time-of-Day (ToD) Tariffs** to align charging with solar energy cycles and reduce grid costs.
  - Streamline deployment through **Single-Window Clearances** for power connections

- **Revenue Optimization:**
  - Enable **Non-Fuel Revenue** (cafés, retail) at charging hubs to diversify income streams.
  - Prioritize **Data Transparency** by integrating with centralized Government EV Portals to increase site visibility and user footfall.

5.B. Indian Best Practices

Case Study: The Delhi PPP Model (DDC & DISCOMs)

- **The Strategy:** A "Concessionaire" model led by the Delhi Dialogue and Development Commission (DDC) and state DISCOMs to deploy 100+ charging hubs via private partners.

Key Bankability Drivers:

- **The "Land as Equity" Approach:** The government provided prime land at **zero upfront cost** in exchange for a low, fixed-service fee, drastically lowering the private sector's entry barrier.
- **Aggregated Tendering:** By bundling 100+ sites into a single tender, Delhi achieved **economies of scale**, attracting top-tier Charge Point Operators (CPOs).
    - **Lowest Service Charge Wins:** Bidding was based on the lowest charging cost for the consumer, ensuring high **utilization rates**—the ultimate metric for bankability.
- **Operational Performance:**
- **Single-Window Power:** Guaranteed electrical connections within **15 days** through a unified portal, eliminating the primary cause of project delays.
    - **Strategic Location Mapping:** Sites were selected based on **grid capacity and traffic flow**, ensuring chargers were placed where demand was highest.
- **The Result:** Delhi now boasts one of India's highest charger densities, with over 4,500 charging points across the city, driven largely by private investment.

5.C. Indian Best Practices

Differences between Indian PPPs and global models

The Indian (PPP) model for EV charging infrastructure is characterized by its **high level of government support for operational costs** and its focus on making charging as affordable as possible, often contrasting with global models that are more purely market-driven or utility-led

Feature	Indian PPP Model (e.g., Delhi/Maharashtra)	Global PPP Models (US, EU, China)
Land Provision	Government provides land on a revenue-sharing basis (e.g., ₹0.70/kWh) instead of a fixed lease.	Often involves competitive bidding for commercial leases or utility-owned land.
Infrastructure Costs	State agencies often cover 100% of electrical upstream costs (cables, transformers).	Costs are typically borne by the private operator or shared via tax credits.
Tariff Control	Government-mandated price caps to ensure low rates (e.g., ₹2/kWh in Delhi).	Market-driven pricing; some EU models focus on roaming interoperability over price caps.
Vehicle Focus	Heavily weighted toward 2-wheelers and 3-wheelers (last-mile mobility).	Focused on 4-wheeler passenger cars and heavy-duty logistics.
Incentive Structure	Direct subsidies via schemes like FAME II and PM E-DRIVE (₹20 billion allocated).	Focus on carbon credits, green bonds, and "walled garden" automaker networks (e.g., Tesla).

5.D. International : Largest EV market : China Model

- **China leads globally in EV charging scale** through state-orchestrated PPPs emphasizing subsidies, grid dominance, and digital integration, **deploying over 10 million chargers by 2025**.

Key Success Factors

- **Strong Government Subsidies**: National Five-Year Plans and "Dual Carbon" goals fund capex/revenue gaps; Anqing Project exemplifies risk-shared deployment of 1,800 piles via govt-private matching funds.
- **State Grid Leadership**: SOEs like State Grid handle infrastructure backbone ("10-longitudinal, 10-transverse" expressway network), partnering with private CPOs (TELD, Star Charge) for ops and IoT.
- **Digital & Standards Ecosystem**: GB/T uniformity, WeChat/Alipay payments, cloud/AI for load balancing/V2G; renewables co-location ensures high utilization.

Factor	Example	Impact
Subsidies	Anqing PPP pilot	Rapid 1,800-pile rollout
Grid + Private Ops	State Grid + CPOs	Nationwide coverage
Smart Tech	IoT/cloud platforms	Peak demand management

5.E. International: European Leader in EV EVCS : Netherlands

The Netherlands leads Europe with the highest charger-to-EV ratio (1:10) through demand-driven PPPs, achieving over 100,000 public points by 2026.

Key Success Factors for EV Charging PPPs in Netherlands

- "Right to Charge" Policy: Municipalities must install public chargers within 250m of homes upon EV owner request, validated by CPOs like Allego/Fastned; ensures demand-led rollout.
- Area-Wide Concessions: Joint tenders (e.g., Rotterdam's 10-year deal with 17 cities) specify standards (100% renewables, €0.26/kWh cap), yielding €500/point revenue for reinvestment.
- Stakeholder Collaboration: Municipalities + DSOs (Liander) + CPOs integrate grid data, open protocols, and smart charging; National Agenda boosts interoperability.

Factor	Example	Impact
Demand-Driven	Right to charge rule	No "charging deserts"
Tenders	Rotterdam concession	2,850+ points since 2016
Interoperability	Open apps/standards	85%+ urban utilization

6. Design, Technology, and Innovation Aspects

- Remote monitoring improves **uptime and fault response**
- Smart charging enables **load management and efficiency**
- Digital payments support **transparent billing and reporting**

Role of technology

- Outcome-based specifications allow **technology upgrades**
- Modular design enables **scalable capacity addition**
- Provision for **mid-term tech refresh** improves longevity

Contract flexibility

- Faster **technology obsolescence**
- Higher lifecycle costs due to forced retrofits

Risks of rigid specifications

7. Common Failure Points in PPP Structuring

Weak DRPs / Feasibility	Overoptimistic projections / unclear scope	Contract v/s ground reality mismatch
• Inadequate demand assessment • Limited site-level power and land analysis • Insufficient O&M cost estimation	• Inflated utilization assumptions • Underestimation of grid and upgrade costs • Ambiguity in service-level obligations	• Rigid technical specifications • Delays in approvals and power connections • Misaligned risk allocation

8. Regulatory and Policy Bottlenecks

Policy uncertainty

- Frequent changes in EV policy and incentives
- Variation across state-level regulations
- Limited long-term visibility on tariff frameworks

Approvals & clearances

- Delays in power connections and load sanctioning
- Multiple agency approvals for land and civil works
- Non-uniform processes across jurisdictions

Impact on project viability

- Increased time and cost overruns
- Lower private sector participation
- Deferred breakeven and utilization ramp-up

9. Data, Monitoring, and Performance Metrics

Availability & reliability of data

- Charger uptime, energy dispensed, transactions captured digitally
- Data quality varies across operators and locations
- Dependence on network connectivity and system integration

Monitoring & reporting mechanisms

- Centralised dashboards enable real-time monitoring
- Periodic performance reports linked to SLAs
- Limited standardisation in reporting formats

Issues in certification / verification / MIS

- Inconsistent third-party verification practices
- Gaps between system data and field conditions
- Limited audit access to raw transactional data

10. Relevance for Audit and Oversight

Ensuring Integrity, Resilience, and Compliance : As India accelerates toward its 2030 EV targets, the success of the PPP model hinges not just on physical deployment, but on the **transparency of the 'invisible' infrastructure**: the data, documentation, and grid-resilience that turn under-performing assets into profitable, public-utility hubs

Focus Area	Typical Audit Weaknesses	Indicators of Stress	Importance of Documentation	Key Performance Indicators (KPIs)
Regulatory & Contractual	🔴 Non-compliance with MoP Spacing Guidelines.	🟠 Disputes over land lease terms.	Essential for VGF verification and subsidy disbursement cycles.	Coverage Ratio: (Target: 100% compliance)
Technical & Standards	🔴 Deployment of proprietary/outdated connectors.	🔴 High equipment downtime (>10%).	Proof of compliance with BIS Safety Standards.	System Availability: (Target: >98%)
Operational & Financial	🟠 Discrepancies in revenue sharing or FAME-II subsidy utilization.	🔴 Low Utilisation Rates (~5%).	Records of real-time usage for Performance-Linked Incentives.	Utilisation Factor: (Target: 12%+ for break-even)
Grid & Connectivity	🟠 Delayed transformer/load approvals from State DISCOMs.	🟠 High energy loss or frequent circuit trips.	Crucial for Energy Audits and verifying DISCOM billing accuracy.	Average Charging Time: (Target: Minimized time)

11. Recommendations for Future PPPs

Goal: To build a resilient, scalable, and audit-ready EV ecosystem through enhanced governance and private sector synergy. The shift from **"Creation of Assets"** to **"Quality of Service"**

Feature Category	Legacy Models (Early PPPs)	Proposed Recommendations (Audit-Ready)
1. Project Structuring	Isolated Sites: Tenders focused on single high-traffic spots, ignoring rural gaps.	Strategic Bundling: Pairs high-revenue "prime" sites with "non-prime" locations for geographic equity.
2. Technical Specs	Proprietary Standards: Fragmentation led to non-interoperable Bharat-001/002 connectors.	BIS Standardization: Mandates interoperable standards (e.g., CCS2, Type 2 AC) to ensure asset longevity.
3. Revenue Design	Fixed Lease/Rent: Government received a flat fee regardless of charger success.	Revenue Sharing: Models aligned with CPO earnings (per kWh) to maximize public sector upside.
4. Risk Sharing	Private-Heavy Risk: CPOs bore all demand and grid-upgradation costs.	Viability Gap Funding (VGF): Government subsidizes up to 80% of upstream costs (transformers/grid).
5. Incentives	Installation-Based: Subsidies given upon station setup, regardless of function.	Performance-Linked: Rewards tied to 99% uptime guarantees and verified service quality.
6. Audit & Transparency	Manual/Static: Audits relied on self-reported logs and annual financial statements.	Digital Oversight: Real-time data integration with the National EV Apps for automated auditing.

Thank You