

# **Incidence of Electric Bus Charging on DISCOMs' Network and Scope for Optimal Power Purchase**

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## Executive Summary

The Government of India has been actively promoting the transition to electric mobility through policy and financial interventions such as the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, Production Linked Incentives (PLI) for Electric Vehicle and battery manufacturing, and capital subsidies for the development of public charging infrastructure. These efforts are aimed at enabling India to achieve its target of 30% EV market share by 2030 (EV30@30).

According to the Central Electricity Authority (CEA), nearly 491 lakh EVs are expected to be on the road by FY 2031-32, translating into an additional annual electricity demand of 27,000 MU and a peak demand of 5,000 MW. Within this shift, electric buses (E-buses) represent a critical segment, both for their environmental benefits and for the challenges they pose to the electricity distribution system.



While the operation of E-buses compared to conventional Internal Combustion Engine (ICE) based buses offers significant reductions in urban pollution, their charging demand is highly intermittent and often coincides with peak electricity requirements. In Delhi, this overlap has compelled distribution companies (DISCOMs) to rely on expensive short-term power purchases to meet the additional load, placing a direct financial burden on utilities and, ultimately, on consumers. Simultaneously, the rapid growth in E-bus fleets has triggered a surge in applications for new electricity connections for E-bus depots. DISCOMs are, therefore, required to invest in distribution network upgrades, while also supplying power at regulated cross-subsidised tariffs, further intensifying the pressure on their financial viability.

This study, undertaken jointly by Power Foundation of India (PFI) and Delhi's three DISCOMs - BSES Rajdhani Power Limited (BRPL), BSES Yamuna Power Limited (BYPL), and Tata Power Delhi Distribution Limited (TPDDL) - is the first of its kind to analyse the impact of E-bus charging on peak demand of Delhi using actual half-hourly operational data. The analysis draws upon detailed feeder-level consumption patterns at E-bus depots, Power Purchase cost data across short, medium and long-term contracts, and demand profiles across consumer categories.

Extensive consultations with DISCOM officials, site visits to multiple E-bus depots, and discussions with stakeholders, including the Delhi Transport Corporation (DTC) and bus aggregators such as Tata Motors, enriched the study with practical insights into operational models and stakeholder responsibilities.

The findings clearly establish that **the major portion of E-bus charging demand coincides with the system peak of Delhi's DISCOMs**, resulting in the additional procurement of short-term power at an average cost of approximately Rs. 8.50/kWh. However, the analysis also reveals a significant opportunity for optimisation. Since E-buses typically remain at depots longer than their actual charging time, shifting charging schedules to align with the availability of cheaper long-term power can reduce peak load pressures without requiring additional capital expenditure. Such optimisation measures alone could result in cumulative savings of approximately Rs. 638 crore by FY 2030 for Delhi's targeted E-bus charging load of 500 MW.

The study also highlights the role of Battery Energy Storage Systems (BESS) as an enabler of cost optimisation and peak shaving. The deployment of double-cycle BESS at strategic locations can address both afternoon and nighttime peaks, offering combined network and Power Purchase cost savings. Depending on the funding mechanism, the projected savings by FY 2030 range from Rs. 751 crore (without Power System Development Fund (PSDF) support) to over Rs. 1,366 crore (with PSDF support). Even under a single-cycle peak-demand use case, BESS delivers substantial financial benefits, with savings exceeding Rs. 1,700 crore in scenarios where PSDF funding is available.

## Key Recommendations

To translate these opportunities into actionable measures, the Report recommends:

a) **Optimisation of Charging Schedules:** Aligning E-bus charging slots with long-term power availability to minimise short-term power purchases and reduce DISCOMs' overall Power Purchase Costs.

**b) Strategic Deployment of BESS:** Installing short-duration storage at depots, with DTC providing land at zero cost and funding drawn from the Power System Development Fund (PSDF) to avoid consumer burden.

**c) Tariff and Regulatory Support:** Tariff for EV Charging Station and its Time-of-Day (ToD) pricing framework by Delhi Electricity Regulatory Commission (DERC) should align with the guidelines issued by Ministry of Power.

**d) Stakeholder Coordination:** Mandating aggregators to share future load projections with DISCOMs and requiring DTC to adopt revised charging schedules to optimise system costs.

The evidence shows that adopting these measures can deliver substantial financial savings, enhance system reliability, and lower the Average Cost of Supply (ACoS) for consumers. Moreover, the approach developed in Delhi provides a replicable framework for other Indian cities as they expand their E-bus fleets.

With coordinated policy, regulatory, and operational interventions, India can achieve its EV adoption goals while ensuring that the power sector remains cost-effective and resilient.