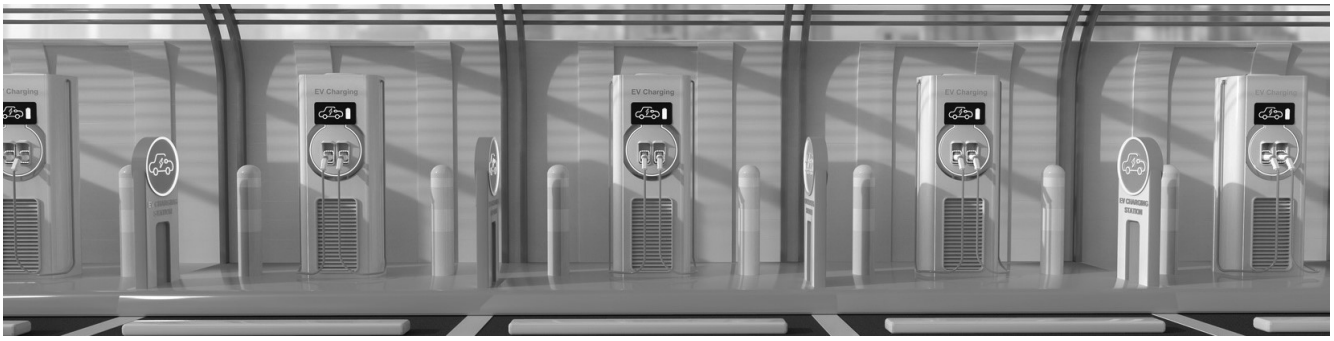
REVVING UP REVENUE: MAKING AFFORDABLE PUBLIC EV CHARGING VIABLE



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The electric vehicle (EV) segment in India has witnessed a phenomenal growth in the last few years. More than 1 million EVs were sold in FY23 alone, and this segment grew by a whopping 154% year-over-year. For this momentum to persist, the country's EV charging infrastructure needs to grow at a rapid pace.

In terms of running costs, electric four-wheelers (4Ws) and two-wheelers are around 7 and 10 times cheaper than conventional petrol vehicles, respectively. However, the lack of adequate public charging stations (PCSs) coupled with high charging fees risks eroding the inherent advantage of owning an electric 4W (Figure 1).

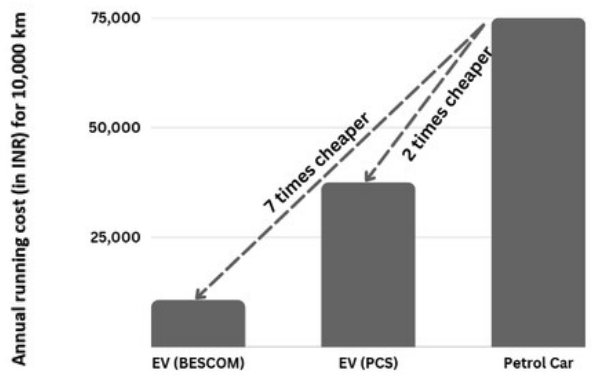

Figure 1: Comparison of the running costs of electric four-wheelers and petrol cars

Currently, most EV owners prefer charging their vehicles at home/office, but due to non-availability of dedicated EV parking spaces and lack of awareness amongst facility managers, access to charging is a hurdle for the vast majority of potential EV buyers. Therefore, PCSs serve as a better alternative till these issues are resolved.

Current charging scenario

With regards to PCSs, 'opportunity charging' or charging en-route is the preferred mode of availing charging services, wherein DC fast chargers (DCFC) are used to top-up EVs. In other words, for a typical daily driving distance of less than 50 km for most electric 4Ws, a top-up from a 25 kW DCFC would take less than 20 min. At present, Bengaluru has fewer than 100 public fast chargers to serve its fleet of more than 10,000 electric 4Ws. These DCFCs are managed by the Bangalore Electricity Supply Company Limited (BESCOM) and other privately owned PCS operators. However, there is a major variation in charging costs, with BESCOM being more than three times cheaper than the private players. The difference in charging costs can be better understood by looking at the annual running cost of a 4W under different scenarios (Table 1).

Table 1: Comparison of the refuelling/recharging costs of four-wheelers

Refuel/recharge type	Unit cost	Typical mileage	Running cost per 10,000 km
Petrol	INR 102/L	14 km/L	INR 73,000
Diesel	INR 88/L	17 km/L	INR 52,000
CNG	INR 88/kg	15 km/kg	INR 58,700
BESCOM PCS	INR 8.07/kWh	7 km/kWh	INR 11,500
Private PCS	INR 24/kWh	7 km/kWh	INR 34,000

CNG: Compressed natural gas; PCS: Public charging station

From the above table, it is evident that owing to the high charging cost of a private PCS, the overall running cost advantage of EVs is significantly diluted. Therefore, it is essential to understand the reason behind the difference in tariffs and how they could impact potential EV user behaviour.

Public vs BESCOM tariff structure for charging EVs

The efficiency of any asset is determined by the asset turnover ratio—a measure of the efficiency with which a business uses its assets to generate revenue. In case of an EV charging business, it is measured in terms of the charger utilisation over a 24-h period. We analysed the relationship between charger utilisation and the breakeven tariff for an adequate return on investment. The target internal rate of return was 15%, and the investment period was 5 years. Four different charger types were analysed, and two different input electricity tariffs were used (INR 5/kWh and 7/kWh).

As the charger utilisation increases, the breakeven tariff for all fast chargers drops rapidly at first, followed by a slow decline at utilisation rates above 40% (Figure 2). As most private PCS players currently charge between INR 20 and 25 per kWh, the tariff charges being levied are possibly based on utilisation rates below 10%. Of note, this analysis used an input electricity cost of INR 5/kWh, which is a subsidised tariff (until 2025) by the government to promote EV adoption. Considering the likelihood that commercial rates will be restored (INR 9+ per kWh) in the future, the cost of charging is bound to increase. Therefore, keeping in mind the business viability of public charging, the most feasible path forward is to increase the utilisation rates to make public charging more affordable.

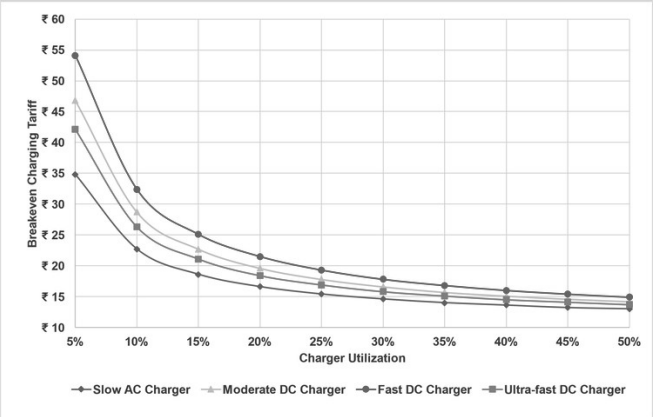

Figure 1: Comparison of the running costs of electric four-wheelers and petrol cars

Making EV charging greener

Although EVs offer zero tailpipe emissions, it is essential that the electricity for charging is obtained sustainably from renewable sources. As per the energy mix of BESCOM, 55% of the energy was derived from non-renewable sources in 2021. However, under the 'Open Access' Rules across India, any high-energy consumer (with more than 1,000-kW connected load) can opt to buy their electricity directly from an independent power producer. Now, with the 'Green Open Access Policy', the required connected load has been lowered to only 100 kW, enabling most PCSs to buy renewable energy directly from the open market. Therefore, we performed a similar analysis using Karnataka's prevailing open-access electricity rate for ground-mounted solar PVs of INR 7/kWh. As shown in Figure 3, owing to the slightly higher input electricity cost, the breakeven tariffs also increased accordingly. However, the added cost is balanced by the fact that any vehicle charging at these higher tariffs can claim completely zero emissions. This is especially useful for enterprises in the logistics and e-commerce domain that aim to create a difference in the eyes of their customers by switching to zero-emission operations.

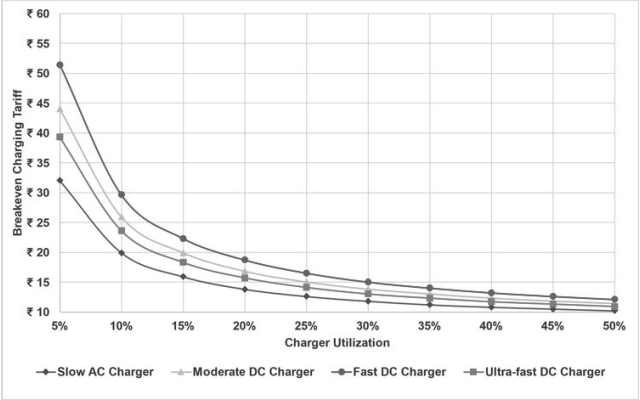

Figure 3. Breakeven charger fee vs charger utilisation (input electricity tariff = INR 7/kWh)

Strategies for improving the viability of the EV charging ecosystem

Now that we know how utilisation impacts the financial viability of EV charging, it is essential to explore how utilisation rates can be increased for the existing and planned charging infrastructure. Here, we suggest two different approaches.

First, a subscription model could be introduced, wherein current and potential EV owners can 'lock-in' a minimum monthly usage and pay upfront, like a pre-paid plan popular in the telecom industry. This would ensure that the chargers within the ecosystem have an assured utilisation of a certain amount and would incentivise PCS operators to provide lower tariffs to the subscribers. This would also ensure transparency for EV owners, as the more they use a PCS, the lower their tariff can be.

Second, an ecosystem-level change could be accomplished. Current PCS operators each have their own mobile applications, requiring EV users to create separate accounts and store money in the mobile wallets. When a user visits a charging station, they pay for the availed services through the app. However, this limits the EV customer base that can avail charging services from a particular PCS operator. Instead, the industry needs to offer an 'EV roaming' facility, which is akin to how telecom operators function. This would help any EV owner opt for charging services at any PCS via one app. PCS operators can formulate the pricing structure to ensure this interoperability. To facilitate this, the EV charging industry needs to collectively implement the required protocols (Open Clearing House Protocol or Open Charge Point Interface). This will help create a wider customer base for each PCS operator and ensure higher utilization levels.