

EV Charging Guidebook for Shopping malls

A guidebook for shopping mall owners on planning, installing, and managing electric vehicle charging at shopping mall(s) in Delhi

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List of Abbreviations

2W: Two-wheeler
3W: Three-wheeler
4W: Four-wheeler
AC: Alternate current
Amp: Ampere (base unit of electric current)
AMC: Annual maintenance contract
BEVC: Bharat electric vehicle charger
BIS: Bureau of Indian Standards
CCS: Combined Charging System
CPO: Charge Point Operator
CSMS: Charging station management system
DC: Direct current
DDC: Dialogue and Development Commission of Delhi
DERC: Delhi Electricity Regulatory Commission
DISCOM: Distribution companies
EV: Electric vehicle
EVSE: Electric vehicle supply equipment
GNCTD: The Government of National Capital Territory of Delhi
GST: Goods and service tax
HT: High tension
ICE: Internal combustion engine
IEC: International Electrotechnical Council
IESA: India Energy Storage Alliance
INR: Indian national currency
KW: Kilowatt
LEV: Light electric vehicle
LT: Low tension
OCPP: Open Charge Point Protocol
OEM: Original equipment manufacturer or manufacturer
SLD: Service line development
V: Volt (unit of potential difference, voltage, and electromotive force)

1 Introduction



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The Government of the National Capital Territory of Delhi (GNCTD) announced the [Delhi Electric Vehicle Policy](#) in 2020, with a vision to promote the adoption of electric vehicles (EV)¹ in the city. The Policy aims to improve Delhi's air quality by driving rapid adoption of EVs with the goal of reaching 25% of all new vehicle sales by 2024.

Through this guidebook, GNCTD seeks to encourage shopping malls based out of Delhi, to join hands with the Delhi Government in promoting electric vehicles by adopting EV charging in the parking space of the shopping malls. In March 2021, the Delhi Government directed all commercial establishments and institutions having a parking capacity of 100 or more vehicles to reserve 5%² of their parking space for electric vehicles with suitable EV chargers with a minimum output of 3.3KW.

This document guides shopping mall owners in understanding the importance of EV charging, assessing the scope for EV charging, details the processes involved for effective decision-making and sets out the way forward for the planning and implementation of EV charging stations in the parking areas of the malls.

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1. EV is a vehicle that runs fully or partially on electricity. Unlike conventional vehicles that use fossil fuels, EVs use an electric motor that is powered by a fuel cell or batteries.
2. As per the amended Unified Building Byelaw (UBBL), 20% of all parking capacity of new constructions must provide charging infrastructure for EVs. Existing buildings which have a parking capacity of more than 100 vehicles are also directed to set aside 5% of the capacity for EVs. More details in Appendix C.

2 Need for EV charging facility at shopping malls



According to BloombergNEF's, Electric Vehicle Outlook 2021³, currently, there are over 12 million passenger electric vehicles globally, which means EVs are now 1% of all cars on the road globally. Creating an extensive network of EV charging is key to accelerating EV adoption as in the coming years, drivers' decisions will be greatly influenced by the availability of EV charging facilities. Therefore, shopping malls are advised not to base their decision of providing EV charging facility on the current number of EVs in the market, but also focus must be given to the future business case and potential of this market. Delhi, the capital of India, is witnessing a rapid transition to electric vehicles. Between September and November 2021, EVs accounted for 9% of the vehicles sales in Delhi, while the national average was 1.6%⁴. Electric vehicles are the future, and shopping malls must anticipate and prepare in advance to be a part of this growing market.

People are more likely to charge⁵ their electric vehicles in idle time. Apart from their home and office, people spend significant hours at malls which makes them a perfect avenue for EV charging. An EV charging station can provide a differentiator to a shopping mall and add another revenue stream for the mall owners, while also providing convenience to the EV owners. In the years to come, the availability of EV charging facilities can make or break a customer's decision to choose one shopping mall over the other.

Also, mall owners are one of the crucial stakeholders in the development of Delhi, and therefore, by setting up EV charging points, malls will be contributing towards ensuring a clean and pollution-free Delhi.

Here are the reasons why shopping malls should focus on EV charging facilities:

Benefit for mall owners and shop owners:

- EV charging facilities can result in additional footfall as customers may choose malls that provide EV charging facilities. Setting up EV chargers may also result in increased time spent by existing customers as customers may want to put their vehicle on charging for a specific time and may decide to shop for that time.
- EV charging facility has the potential to become an attractive revenue stream for mall owners. Please refer to *section 3.3* for more details.
- EV charging can provide an opportunity for mall owners to increase the utilisation of the parking assets after the mall is closed for the public. They can tie-up with delivery and shared mobility fleet operators to utilise the parking and charging facility to charge their vehicles overnight.

Page notes:

3. Download full report from this link- <https://about.bnef.com/electric-vehicle-outlook/>
4. Electric vehicles accounted for 9% of the total vehicle sales in Delhi during September–November six times higher than the national average. <https://energy.economictimes.indiatimes.com/news/power/electric-vehicle-sale-in-delhi-six-times-higher-than-national-average-delhi-govt/88289136>
5. EVs are charged using EV chargers, also known as Electric Vehicle Supply Equipment (EVSE). EVSE provides a power source for electric vehicles to recharge their batteries.

- Setting up EV charging stations will increase the visibility of malls as the charging infrastructure will be discoverable on multiple platforms like Google Maps, EV charging apps, [Delhi Government's EV website](#) etc.
- Installing EV stations can boost a retailer's "green" image, and can also enhance business by attracting new customers, and increasing customer loyalty.
- Most shopping malls offer High Tension (HT) connections with large sanctioned load availability. This helps in radically reducing the costs associated with setting up charging stations, especially fast-charging stations.

Benefit for tenants and visitors:

- Availability of EV charging facility will encourage shop owners/tenants to adopt EVs and avail the cost savings in the form of lower maintenance cost of the vehicle.
- Retailers can build customer connections by developing loyalty programs catering to EV drivers. For instance, giving EV drivers special deals can bring them back to charge (and shop) even more often.

Benefit for retail customers:

- Long-distance travellers can utilise malls to add range to their EV while they halt for resting or a meal.
- It provides a good "opportunity charging⁶" facility to customers coming for shopping at the mall.
- Mall space can be utilised as a safe charging space by consumers who do not have space or resources to set up an EV charging facility at their homes.

Social benefits:

- The wide availability of EV charging facilities will accelerate the adoption of EVs in Delhi and benefit society by contributing to cleaner air and better health.

Page notes:

6. Opportunity charging is the act of charging a battery during break time, or any opportunity (short duration) that presents itself during the workday.

3 Steps to create an action plan and bring EV charging to your shopping mall



3.1 Understand your customer requirement and demand for charging

The first important step in the process of bringing EV charging to shopping malls is to understand the charging need of your customer. There are six types of potential customers, mall owners can target. Each of these customers will have different needs and behaviour with respect to EV charging. A shopping mall owner should consider below details when estimating the demand.

- **Retail customers:** Studies show that on average, a retail customer spends nearly 2 hours in a shopping mall. Hence, they may opt for either AC⁷ or DC⁷ charging based on their charging need and vehicle specifications. For example, customers spending lesser time may want to use fast charging, while customers visiting the mall to watch a movie may end up spending ~4 hours and may go for AC charging.
- **Fleet operators (cab aggregators, hotel/office fleet):** Mall owners may consider a tie-up with fleet operators to increase the utilisation rate of their chargers. Retail customers are more likely to use EV charging facilities during the second half of the day. Mall owners can tie-up with fleet operators to provide charging facilities during the night and first half of the day. If mall owners provide EV charging facility to fleet operators during the first half of the day, then a few EV parking slots with charging facility should be reserved for retail customers.
- **Employees of the corporate offices in the vicinity:** Mall owners may want to consider partnering with the corporate offices in the vicinity to provide EV charging service to their employees. Lending a few parking slots to corporate employees during the first half of the day may improve the utilisation rate of the EV chargers and hence generate more revenue. Such employees are more likely to use AC charging as they may park their vehicle for a long number of hours.
- **Residents of nearby societies:** Shopping mall owners may consider attracting EV owners from residential societies in the vicinity. Such residents may use the mall parking if there is no availability of residential EV charging infrastructure or a safe parking place.
- **Shop owners/tenants:** A shopping mall is a workplace for various shop owners/tenants. They may spend a substantial time in the mall and opt for AC charging.
- **Others:** Apart from the above potential customers, a shopping mall with EV charging facility may also attract long-distance travellers utilising malls to add range to their EV while they halt for resting or a meal.

Page notes:..

7. All batteries require DC power to charge. AC charger provides AC power from the grid to EV's onboard charger, which converts it to DC power and then feeds it into the EV battery. AC chargers are generally slow compared to DC chargers because their capacity is limited by the power-rating of onboard chargers. Unlike AC chargers, DC chargers have an AC to DC power converter inside the charger itself, which directly feeds DC power to the EV's battery. DC chargers are high-capacity chargers that are utilized for fast charging of the vehicle.

If the mall owner wants to target fleet operators or people stopping by for emergency/opportunity charging, they should provide basic amenities such as restroom and washrooms near the charging station so that these people do not need to enter the shopping area. The provision of these facilities may provide added advantage to the mall as EV drivers may choose the mall even when there are other EV chargers available nearby.

To estimate the demand for charging, Mall owners must detail out a few requirements like estimating the potential number of EVs in the vicinity, footfall of EV owners and the number of hours spent by them in their Mall. Several malls already track the category and type of vehicles entering their parking through various tracking software. Mall owners are also advised to engage in detailed conversation with fleet operators, corporates, nearby residential societies to understand potential demand for EV charging.

3.2 Determine the type, quantity and mix of chargers

Selecting the right type, quantity and mix of chargers is another important decision that needs to be taken care by the mall owners. Installing too many chargers will inflate the cost and installing fewer chargers will create scheduling issues. The number of installed EV charging stations should aim to serve existing EVs and provide for some additional demand in the future. We encourage mall owners to equip 20-25% of their parking space for EV charging by providing appropriate charging infrastructure.

Factors to be considered while making the decision are listed below:

- **Target segment:** The type and mix of chargers should be chosen based on your target customer segment (*as explained in section 3.1*).
- **EV models:** Different EV models and segments have different charging requirements. Malls that have a vehicle tracking mechanism to capture the details of the vehicle model, can assess the existing EV models used by their customers. Mall owners are recommended to have a good mix of charger types that can cater to existing and future EV models. (*Please see appendix-B for charging time taken by various vehicle segments and different vehicle categories catered by different EV chargers*).
- **Customer stay duration:** If the customers stay is for a short duration of time (less than 2 hours), mall owners should consider installing more DC chargers. If the mall hosts a movie theatre and customers stay for a longer duration, AC chargers may be considered. However, mall owners are advised to consult their EVSE manufacturer or charge point operator (CPO) to get a customised plan for their situation.
- **Cost:** AC chargers are less expensive and a cost-effective method for a trial-run, whereas DC chargers are expensive and should be considered if there is high demand and fast charging is required.

- **Sanctioned electricity load:** Most malls already have HT connection, high sanctioned load, and a dedicated transformer – hence they can accommodate EV chargers within the existing infrastructure. If an increase in sanctioned power load is required, mall owners are advised to check the feasibility from the DISCOM before taking the decision.

Shopping malls catering to fleet operators have been observed to have an AC/DC charger ratio of 2:1. Mall owners should consult their stakeholders to understand their charging requirements and decide on an optimal mix of AC and DC chargers. They can subsequently add more AC or DC chargers based on the actual demand observed.

For details on various EV chargers and typical charging time for different segments of vehicles, please refer to Appendix B.

3.3 Choose the right business model

An EV charging station can provide a differentiator to a shopping mall and add another revenue stream for the mall owners. Based on their risk appetite and experience, mall owners should carefully choose a business model keeping in mind capital investment and whether to involve a charge point operator (CPO)⁸. Below are the two business models that mall owners can explore:

- **Opex model:** This is the most popular business model currently used for setting-up an EV charging station in a shopping mall. EV charging is a new and emerging business in India and hence many malls prefer to partner with an experienced CPO. The mall owner provides the parking space (long-term) and electrical infrastructure, in return of which they are either provided a share in the revenue or a fixed rental.
 1. **Fixed rental:** This arrangement is usually entered into the cases where there is demand certainty. For instance, if the operator of the charging station ties up with a fleet operator with an assured number of vehicles to be served, paying a fixed rental may be a feasible business model. This is the safest business model for mall owners.
 2. **Revenue sharing (to distribute profits that result from the business alliance):** This model is usually adopted in case of pilot projects or where there is a lack of demand assurance. The CPO shares ~80% of the revenue (after deducting expenses) as they have invested capital and are also operating the charging station. The revenue sharing ratio will vary from case to case and should be decided in consultation with the CPO. This model has the potential of becoming a profitable business model when the demand for EV charging becomes substantial.

Page notes:

⁸ Charge point operators (CPOs) purchase EV chargers from EVSE vendors and ensure optimal ongoing EV charging operations. They provide the charging network infrastructure, managing the backend technologies as well the connection between the chargers, to deliver reliable and consistent EV charging.

An opex business model minimises the risk of the mall owner as the partners bring in experience and capital. However, this also means a lack of autonomy for the mall owner.

- **Capex model:** In this model, the mall operator invests capital to buy the EV chargers and install them. They may choose to either operate the chargers themselves or enter into a contract with a CPO to operate the chargers. If the mall owner decides to provide EV charging in a Capex model, they should consult a professional EVSE manufacturer (who can first assess the site and then help with cost estimation) and an electrical contractor for the installation purpose.
- **Battery swapping:** Shopping mall owners can also consider providing EV battery swapping facility, in which a depleted EV battery is removed from the vehicle and replaced with a fully charged battery. Electric 2Ws, 3Ws and few 4W models are likely to be the prime battery swapping customers for shopping malls. Battery swapping stations can be manual (primarily used by 2W and 3W) as well as autonomous (mainly used for 4W). An autonomous battery swapping station requires more space and investment.

For an overview of the cost components, please refer to page 17 of the Delhi Government's [Corporate charging Guidebook](#). There are several ways to mitigate your project costs using some of the best practices described in section 4 of this Guidebook.

3.4 Technical and infrastructure planning

Once the customer requirement is understood and an appropriate business model is chosen, the next important step is to analyse the technical and infrastructural feasibility of the project. Mall owners must contact an experienced EVSE OEM or a CPO for infrastructure planning. Listed below are some of the key factors:

- **Location planning:** The charging station location plays a major role in determining the costs and utilisation of the chargers. Four factors should be ensured while selecting the location:
 1. **Optimal distance:** The distance of the charging station should be around 50 meters from the main electrical panel. The closeness of the electrical panel is important to handle emergencies as well as manage the costs.
 2. **Visibility:** The EV charging space must be visible to EV drivers. A less visible space may become a potential hurdle in the utilisation of the charging station. It is recommended to have a designated space for EVs. Clear signages and green paint may be used to communicate the spaces designated for EVs.
 3. **Easy access:** The EV charging space must be safe and easily accessible to all drivers. EV drivers require additional space for manoeuvring around a parking space to connect and disconnect from the charger.

4. **Connectivity:** All EV chargers would need to be connected with a backend system that helps in the operation of these chargers. If required, Wi-Fi boosters can be installed to maintain connectivity to ensure that there is no interference. Most customers will access these chargers through their mobile apps; hence the chargers should be placed at a location where there is good 4G connectivity.
- **Safety planning:** Although rare, Lithium-ion batteries do tend to catch fire, due to their chemical composition. It is advised that mall owners should carefully plan the safety and emergency handling procedures of the charging station. The charging station's attendant(s) should know all the procedures and must be trained to handle emergencies. Similarly, special attention should be paid to the earthing of the chargers to avoid damages, in case of any fault. It is recommended to have at least one earth-pit for every 2-3 chargers.
 - **Electrical layout:** A very critical decision for mall owners is to design the electrical layout, i.e., how the electrical connection will come to the chargers. Mall owners should start with an energy audit to check if the power consumption required for EV chargers can be accommodated in the existing sanctioned load. Since most of the malls have HT connection with huge sanctioned loads, they can easily install EV chargers by taking an EV sub-meter. If there is a requirement of additional load, then a separate EV connection should be taken, or augmentation of the existing sanctioned load (and an EV sub-meter) should be requested. It is critical to ensure that the electrical infrastructure can handle the additional load, peak hours consumption and variation in usage. Please refer to [this link](#) for a detailed checklist of activities to be performed by the charging station owner/operator, how to get an EV connection, technical evaluation report for EV charging station etc. We advise mall owners to connect with their respective DISCOMS for more details.
 - **Basic amenities planning:** It is important to note that basic amenities like restrooms, drinking water must be easily accessible to the retail customers. For EV fleet drivers and people stopping by for opportunity charging, mall owners are advised to provide basic amenities that are close to the charging station like restrooms, drinking water etc.
 - **Marketing and customer awareness planning:** EVs and EV charging facility is an emerging market in India and hence it is critical to create proper awareness among users. Mall owners must tie-up with different EV charging apps that show the details of your mall when EV drivers search for charging services in the vicinity. Mall owners are also advised to run a social media campaign to make people aware of the charging facility at their mall. Placing banners, signboards etc. within the mall premises will also increase the awareness among the visitors of the mall. Installing the charging station at a prime location, like near the mall entrance, may bolster a company's green image and encourage EV uptake.

3.5 Install the EV chargers and devise usage policies

Under the Capex model, mall owners must contact an experienced OEM for the installation of the chargers. Whereas, under the Opex model, the CPO will get the chargers installed by connecting with an experienced OEM. Once the chargers are installed, mall owners must create clear policies and procedures to ensure optimal charging without the need for incurring unnecessary costs to install additional stations.

- **Parking usage etiquette:** Mall owners should reserve parking for electric vehicles. These parking spaces should be demarcated by using colour codes and signboards. Penalties for non-EVs being parked in EV parking space may be considered.
- **Access priority:** Access priority should be clearly defined. Various methods can be used – first come–first serve, reservation system, priority for EVs with low charging level etc. The mall owners should ensure that the EV owners must be able to make a reservation for charging in the parking space through the mobile app. The app should provide information on the availability of chargers, type of charger and the option to reserve the chargers.
- **Moving charged vehicles:** During the initial phases of installing the EV chargers, the utilisation or occupancy of the chargers may not be very high and hence it may be feasible to allow the vehicle to remain parked even when the charging is complete. However, when the utilisation rate of the chargers increases, mall owners should set up clear policies around charging time limits (number of hours), moving and parking of fully charged vehicles or may consider a valet facility as customers may not want to come to the parking area to remove their charged vehicle.
- **Charging etiquette:** The CPO/Mall owner should clearly define the charging etiquette and consequences if any damage to the property (charging gun or EVSE) happens. It is a good idea to have an attendant to guide the customers, especially those who are new to EV charging.
- **Payment options for using charging stations:** Mall owner/charging operator may choose from various payment options – Pay for time, pay for energy consumed or on a membership basis. However, Pay for energy consumed is the most preferable and popular method. Most EV chargers come with integrated payment solutions using RFID cards, mobile wallets etc. Some chargers can easily connect to external payment applications to facilitate payment. For the convenience of the users, various payment settlement options such as prepaid cards, credit/debit cards, cell phone credits, cash options, mobile wallets, reward points etc. can be considered. Mall owners can also design charging tariff plan to encourage footfall during lean hours. Mall owners can also consider free EV charging supported by advertisement. This model is being explored in the United States⁹; however, this is presently not being practised in India. In this business model, free EV charging stations are supported by advertising which is displayed on a large digital screen on each unit. This may be a feasible business model in the future for highly visited shopping malls and grocery stores where they can display advertising messages on the built-in screen while providing free charging.

Page notes..

⁹ Please click the following link for details
<https://pluginsites.org/free-ev-charging-stations-coming-to-the-mall-in-columbia/>

3.6 Ongoing maintenance of EVSE

In the case of the Capex business model, mall owners can choose to maintain and operate their chargers themselves or avail a maintenance contract from their vendor. Most EVSE vendors provide ongoing maintenance contracts for the EVSEs installed by them. In the Opex business model, the onus of maintenance of EV chargers usually lies with the CPO.

Some of the points that should be kept in mind before selecting an EVSE maintenance contract:

- EV chargers purchased and installed through Delhi Government's single window process (*more details in section 5*) cover annual maintenance costs for 3 years. If an EV charger is purchased from any other channel, the terms of the maintenance contract may vary depending upon the charger brand, charger type and vendor. Mall owners are advised to work with their vendors to establish a warranty and service plan that fits their goals.
- A networked charging station provides notifications of system faults or issues that should be promptly addressed, while non-networked stations must be manually inspected regularly to ensure they are working properly.
- DC fast chargers require more maintenance because they have cooling systems, filters, and other components. Hence maintenance cost of DC chargers is usually more than that of AC chargers.

4 Best practices for minimising charging station costs



Image credit: Canva

EVSE Unit

- Carefully evaluate EVSE financial incentives offered by GNCTD (*details in Appendix A*).
- Choose the EVSE unit with the minimum level of features needed. Additional features that are not required may just add to the upfront and maintenance costs.
- A wall mounted EVSE minimises drilling of holes through building structures for routing of electrical conduit and wiring.
- Choose a dual/multi-gun EVSE to minimise installation costs per charge port.
- Smart charging approach can allow installation of more EVSE without need for connection/ sanctioned load upgradation. Coordinated charging of EVs will allow accommodating more EVs to be charged by a given number of EVSE.
- Purchase price, installation cost and maintenance cost of AC chargers is less as compared to DC chargers. Hence, mall owners should carefully assess the charging requirements of their stakeholders and select an optimal mix of AC and DC chargers to optimise the overall cost of the project.

Electric Infrastructure

- Mall owners should try to accommodate the EV chargers in the existing sanctioned load. Additional power load or a new connection can increase the project cost.
- It is critical to apply for a separate EV meter to avail subsidised tariff for EV charging. Operating on commercial tariff increases the operating cost and reduces profitability.

Long Term Planning

- Contact the site's utility early in the planning stages to discuss electricity consumption and demand charges as well as electrical service needs.
- Plan for existing quantity and location of EVSE, keeping in mind expansion plan over the next few years.
- When upgrading existing facility for electrical service, also provide infrastructure for future EVSE installations. This will minimise the cost of installing future units.
- If building a new facility, consider the future requirement of electricity infrastructure (panels and conduit) during initial construction than modifying the site later.
- Malls that are under construction should account for EV charging requirements at the time of construction and apply for electric connection accordingly.

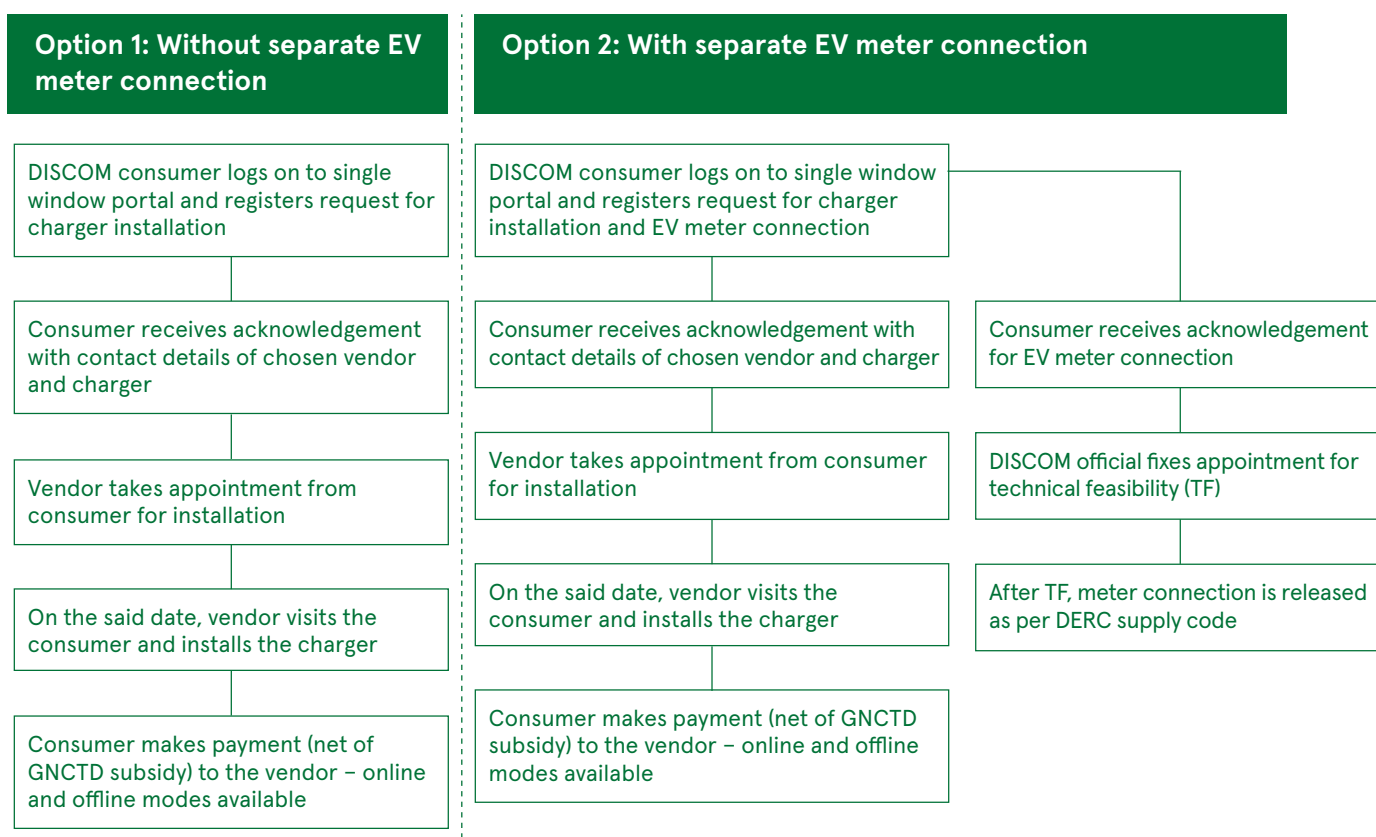
5 Purchase and installation of EV chargers through Delhi Government's single window process



Delhi Government has taken an important and progressive step to create a single-window process for the installation of slow and fast EV chargers in the city. Various private and semi-public spaces, including corporate offices, can use this single-window facility for a hassle-free installation of EV chargers on their premises.

Under the single window process, a consumer can submit a request for new electricity connection (if required) and EV charger installation on the DISCOM's portal. After receiving the request, DISCOM assesses if there is load availability on the premises. If the load is available, both the request for the charger and the request for the new connection gets approved. If not, the consumer is informed that load enhancement is required, and the tentative cost of load enhancement is shared with the consumer. Consumer shall make the payment for EV charger once the request is approved. Post payment, DISCOM will install EV connection and EV meter at consumer's premises and EV charger vendor will install the EV charger(s). The installation and operationalisation of these EV chargers would be completed within seven working days of submitting the request.

Image 2: Detailed process flow for installation of chargers through single window portal



Note:

Installation of EV charger is done within 7 days of registration, subject to appointment confirmation. Meter connection will be done in 7-15 days as per site condition.

Key highlights and benefits provided under the single window process for installation of EV chargers:

- The single window process will be available for installation of AC 001, LEV AC and DC 001 chargers. However, mall owners are free to purchase Type 2 AC chargers and CCS2/CHAdemo chargers directly from the vendors.
- For the first 30,000 charging points, a 100% subsidy of up to INR 6,000 will be provided on installation of AC 001 and LEV AC chargers. The consumer will pay the charger price after adjusting the subsidy and vendor of the charger will receive the subsidy amount from Delhi Government. The subsidy shall be restricted to a maximum of 20 EV charging points or 20% of total parking slots whichever is lesser. If a consumer plans to install more chargers than the given limit, the consumer will have to pay the full price for the additional EV chargers.
- Consumers would have two payment options to choose from:
 1. **Capex model:** In this model, the consumer makes the complete payment upfront to the EV charger vendor. The payment would include cost of charger (net of subsidy and inclusive of GST), charger installation cost (including cost of wiring up to 5 meters), and annual maintenance contract (AMC) for 3 years.
 2. **Subscription model:** In this model, the total cost to the vendor would be paid by the consumer as equal monthly installments (subscription fee) over 3 years. The payment made to the vendor would include the cost of the EV charger (net of subsidy and charges), installation cost (including cost of wiring up to 5 meters), operational cost and maintenance cost for 3 years. After the full payment of monthly installments, the ownership of the charger will transfer to the customer.

Below are the EV charger prices under the two payment models:

Table 1: EV charger prices under Capex Model

S. No	Type of charger	Charger price (INR)	Subsidy as per EV policy (INR)	Final Cost to consumers with three-year warranty (INR)
1	LEVAC	8,495 to 10,530	6,000	2,495 to 4,530
2	AC001	50,530 to 62,107	18,000	32,530 to 44,107
3	DC001	2,32,184 to 2,89,030	0	2,32,184 to 2,89,030

Table 2: EV charger prices under Subscription Model

S. No	Type of charger	Charger price (INR)	Subscription price per month after subsidy (INR)
1	LEVAC	8,495 to 10,530	132 to 337
2	AC001	50,530 to 62,107	1,180 to 4,200
3	DC001	2,32,184 to 2,89,030	7,472 to 14,680

A consumer can avail the single window facility by either going to the respective DISCOM's portal or calling the following numbers: 7011931880 or 19123 (option 9) for BRPL; 19124 (option 9) for TPDDL; and 01135999808 for BYPL. Below are the links to DISCOM's portals.

BRPL: <http://bsesbrpl.com/SwitchDelhi/>

TPDDL: <http://www.tatapower-ddl.com/switchdelhi/>

BYPL: <https://byplws1.bsesselhi.com/switchdelhi>

6 Solar-powered charging station for electric vehicles



Malls may choose to meet the energy requirements of their EV charging station partly or fully through renewable energy sources (typically solar). If the on-site electricity generation through renewable energy source can meet the power demand only partly, the mall owners should arrange for a secondary electricity supply source. However, the feasibility of this option needs to be assessed on a case-by-case basis.

Advantages of solar-powered charging stations

- Integration of renewable energy can result in greening the entire EV usage cycle to a large extent
- Solar-powered charging stations reduces the burden on the power utility grid
- A solar-powered charging station acts as a power generating station that could supply energy to a power utility grid. They generate electricity, store in a battery, and can be supplied to the grid during peak hours for load shaving. This benefit can be achieved through net-metering (described below)
- Integration of renewable energy sources can also help in achieving better financial viability

Before installing solar panels, it is crucial to do a pre-installation evaluation to check feasibility and profitability of installing solar panels at that site. Employers can consult a solar EPC Company that can manage everything from site survey, financing, solar installation, and service support. As per the DERC guidelines, maximum solar plant capacity should be the Sanctioned Load of the connection. If a consumer wants to install a plant beyond this capacity, he/she needs to pay the additional service line development (SLD) charges as per DERC Guidelines. About 10 square meter area is required to set up 1 kW grid connected rooftop solar system. The average cost of grid connected rooftop solar systems is about INR 55 per watt¹⁰. For detailed regulations on the installation and safety of solar panels, please visit DERC (Supply Code and Performance Standards) Regulations, 2017. Once the solar panels are installed, employers can apply for net metering.

Net metering or net billing enables the deduction of electricity produced on-site using renewable energy from the total electricity consumed in a billing period. This helps lower the electricity bill. The employer would either need to pay for the difference in units or would get paid by DISCOM for extra units at the end of the billing cycle.

For detailed regulations on net metering connection, please visit [Guidelines under DERC \(Net Metering for Renewable Energy\) Regulations, 2014](#) and Delhi Electricity Regulatory Commission's (DERC) [website](#) for details.

Page notes:..

10. For more details please visit this [link](#).

Image 3: Illustration of functioning of net metering

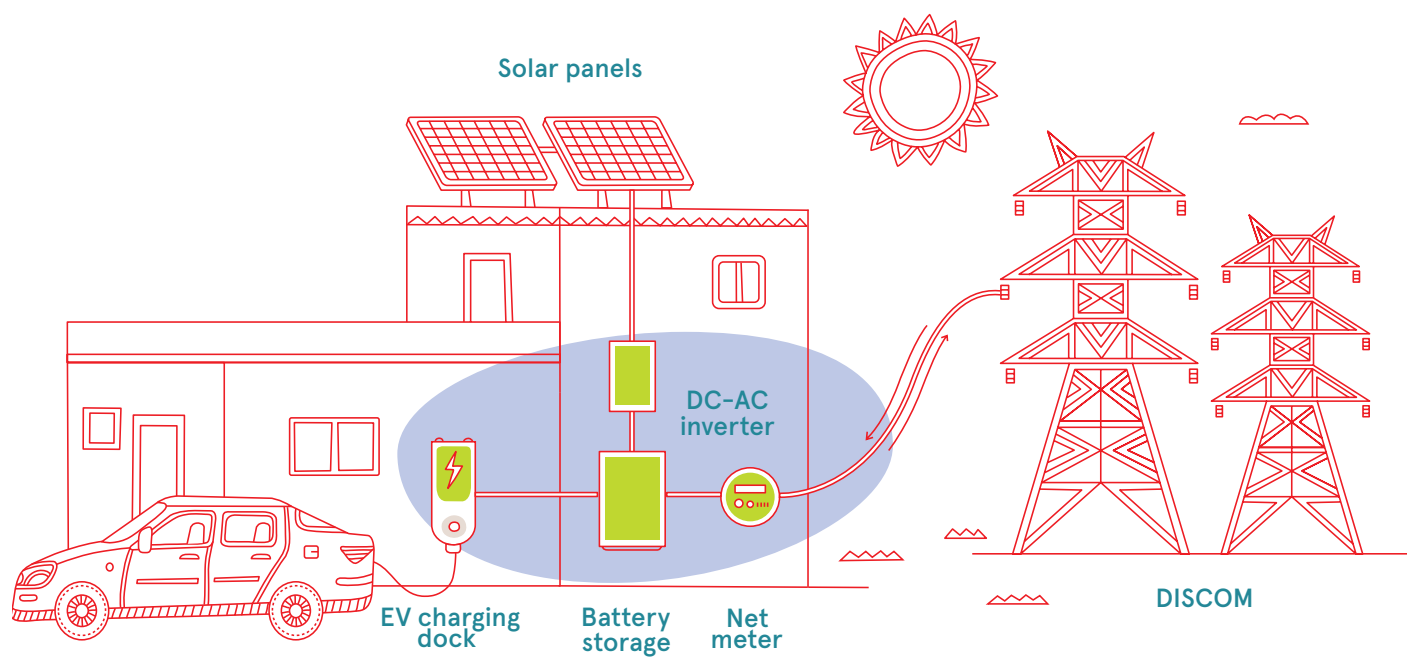


Image credit: Handbook of electric vehicle charging infrastructure implementation

A

Appendix A – Incentives on electric vehicles and EVSE

Below are the highlights of the various incentives provided by GNCTD under Delhi EV Policy. For details, please visit [Delhi EV Policy](#).

■ Purchase incentives¹¹:

1. 2W – INR 5,000 per kWh of battery capacity per vehicle subject to a maximum of INR 30,000 per vehicle
2. E-carriers– A purchase incentive of INR 30,000 to the first 10,000 e-Carriers
3. E-auto/e-carts – A purchase incentive of INR 30,000 per vehicle

■ Scrapping incentive of up-to INR 5,000 and INR 7,500 shall be provided to registered owners of electric 2W and e-carriers/e-autos respectively.

■ Road Tax and registration fees shall be waived for all Battery Electric Vehicles (BEVs) during the period of this policy.

■ Interest rate subvention: GNCTD shall provide an interest rate subvention of 5% on loans to purchase e-autos/e-carts/e-carriers.

■ Incentives provided by Delhi Government on charging equipment:

GNCTD shall provide a grant of 100% for the purchase of charging equipment up to INR 6000 per charging point for the first 30,000 charging points. Grants shall be available on purchasing AC 001 chargers and LEV AC chargers through Delhi government.

■ Special electricity tariff:

Special tariff concession is available to all Private Charging Points that are BEVC-AC001 compliant and are connected to the Central Management System (CMS) of the relevant DISCOM.

■ Lower GST:

In July 2019, GST Council slashed GST on electric vehicles (EVs) to 5% from 12%. It also reduced the GST on EV chargers from 18% to 5%.

All the subsidies provided by GNCTD shall be in addition to the incentives provided under FAME– II policy.

Page notes:.

11. Mall owners are encouraged to create awareness among their employees and tenants about the purchase subsidies provided by GNCTD

B

Appendix B – Types of chargers and charging time

Table 3: AC and DC chargers and their features

EV charger name	Output type	Power output	Input voltage	No. of guns	Connector type	Compatible with EV
LEV AC	AC charger	3.3 KW	230 V AC, Single Phase, 50 Hz	1	EC 60309-1:2002	2W, 3W, legacy/first era 4W (Tata Tigor, Mahindra e-Verito, Mahindra e20) and advanced 4W models (using portable charger provided by OEMs)
Bharat AC001	AC charger	3*3.3 KW	415V, three phase AC	3	IEC 60309	2W, 3W, legacy/first era 4W and advanced 4W models (using portable charger provided by OEMs)
Type 2 AC	AC charger	7.4 and 22KW	7.4 KW – 230V, single phase AC 22 KW – 415V, three phase AC	1	IEC 62196	2W ¹² , 3W and 4W Capable of charging legacy 4W as well as most of the existing and future EV models 7.4 KW charger is enough for all existing and upcoming car models 22KW charger is not compatible with car types currently available in Indian market ¹³ . However, they will be useful when cars with higher on-board capacity are available in India in future
Bharat DC 001	DC charger	10KW/15KW	415V, three phase AC	1 or 2	GB/T 20234	2W, 3W, 4W (with a charger of voltage output 72V or higher) Capable of charging Tata Tigor EV, Mahindra e-Verito, small buses and vans
CCS ¹⁴	DC charger	25-150KW	415V, three phase AC	1	CCS connector	Tata Nexon, Hyundai Kona, MG ZS EV Used by several manufacturers – Hyundai, Kia, BMW, Audi, Mercedes, MG, Jaguar, Mini, Peugeot, Vauxhall / Opel, Citroen, Nissan, and VW Vehicles with CCS2 connectors can be charged using Type 2 AC connectors as well
CHAdEMO ¹⁴	DC charger	25-150KW	415V, three phase AC	1	CHAdEMO connector	Used by Japanese manufacturers Vehicles with CHAdEMO sockets, always have another charging socket next to it, which mostly is Type 2 AC

Page notes:

12. Type-2 AC is capable of charging e-2W/3W with the provision of an adapter. CCCS and CHAdEMO are available as individual machines as well as in combination. Some manufacturers also customise the chargers as per the requirement of the charging station operations.
13. Most EVs have an on-board charger that converts AC current to DC current as all batteries require DC power to charge. None of the existing and upcoming models in India have an on-board charger that has capacity to utilize a 22 KW AC charging.
14. CCCS and CHAdEMO are available as individual machines as well as in combination. Some manufacturers also customize the chargers as per the requirement of the charging station operations.

Table 4: Electric vehicle segment and their charging time

Vehicle segment	Battery capacity	Battery voltage	Approx. charging time
E-2W	1.2-4.0 kWh	48-72V	Fast charge: ~1 hour (not applicable for all 2W) Slow charge: ~5 hours
E-3W	3.6-8 kWh	48-60 V	4-5 hours
E-Cars (1 st generation)	11 - 21 kWh	48-72 V	Fast charging: 1- 2 hours Slow charging: 5 - 8 hours
E-Cars (2 nd generation)	30-80 kWh	350-500 V	Fast charging: 1 hour Slow charging: 6-8 hours

C Appendix C – Unified building bye-laws: Charging infrastructure for electric vehicles

GOVERNMENT OF NCT OF DELHI
URBAN DEVELOPMENT DEPARTMENT
LOCAL BODY BRANCH, 10TH LEVEL, DELHI SECRETARIAT
I.P. ESTATE NEW DELHI

F. No. 7(136)/DDL B-I/2021/CDNo.-000636272/1433-37 Dated:- 05/02/2021

The Chairman New Delhi Municipal Council Palika Kendra, New Delhi-01	The Commissioner South DMC Dr SPM Civic Centre, Delhi-02	The Commissioner North DMC Dr SPM Civic Centre, Delhi-02
The Commissioner East DMC Udyog Sadan, Patparganj Industrial Area, Delhi-92	The CEO Delhi Cantonment Board Delhi Cantt Delhi-10	

Subject:- Regarding providing of Charging Infrastructures for Electric Vehicles as per Unified Building Bye-Laws (UBBL), 2016

Sir,

Please refer to the minutes of the meeting dated 22.01.2021 (copy enclosed) on the subject cited above, which was held on 21.01.2021 under the Chairmanship of the Hon'ble Minister (Power), vide which the following directions as are relevant to the ULBs/DMCs for setting up of Infrastructure for EV Charging relating to all ULBs/DMCs have been issued by the Hon'ble Minister.

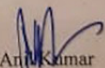
i) In terms of UBBL for Delhi, 2016, in all the new constructions, charging infrastructure shall be provided for Electric Vehicles in 20% of all vehicles holding capacity /parking capacity at the premises covered under UBBL.

ii) Semi-public spaces like existing commercial and institutional buildings including malls, shopping complexes, cinema halls/ multiplexes, office spaces, hotels , restaurants , hospitals etc., having a parking capacity of more than 100 vehicles be mandated to set aside at least 5% of the total vehicle capacity for EVs fitted with suitable EV chargers at the minimum slow chargers with 3.3 KW output.

In view of the above, directions are issued to all ULBs/DMCs for implementation of the decisions taken in the minutes of the meeting.

This may be accorded TOP PRIORITY Please.

Encl: As above

Yours faithfully,

Anil Kumar
Dy. Director (LB-I)

EV Charging Guidebook for Shopping malls

