WHITE PAPER ON

SET UP OF EV CHARGING STATIONS IN BUILDINGS IN TELANGANA

STAKEHOLDER CONSULTATIONS AND RECOMMENDATIONS TOWARDS DEVELOPING GUIDELINES FOR SET UP OF EVCS IN BUILDINGS

Under Right to Charge Campaign

asci
Leadership through Learning

International Copper Association India
Copper Alliance

ACKNOWLEDGEMENT

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We thank Shri Sunil Sharma (IAS), Special Chief Secretary, Energy Department, Govt of Telangana; Shri Arvind Kumar (IAS), Special Chief Secretary, MA&UD & Director General (NIUM); Shri Raghuma Reddy, Chairman and Managing Director, TSSPDCL; Shri Swamy Reddy, Director (IPC & RAC), TSSPDCL; Shri Krishna Naidu, CGM, IPC; Shri Vidyadhar, Director (Planning), HMDA (then Director, DTCP); Shri Devender Reddy, Director, DTCP (then Chief City Planner, GHMC); Shri Gopalakrishnan VC, Director - Automotive and EV, Govt of Telangana; Shri Srinivas Rao, Chief Electrical Inspector to the Government, CEIG; Shri Y. Sathish Reddy, Chairman, TSREDCO; Shri N. Janaiah, Vice Chairman and Managing Director, TSREDCO; Shri D.V. Rama Krishna, Project Director (EV), TSREDCO; Shri N. Linga Reddy, Chief Engineer, Roads & Buildings (then Executive Engineer (Electrical), Roads & Buildings); Shri Rajendra Nayak, Director, Planning, GHMC; Shri Tulasiram, Deputy City Planner, GHMC; Shri Jagan Mohan, Deputy Director, DTCP; Shri Eshwar Das, DE, IPC; Smt N. Malathi, ADE (IPC), TSSPDCL; Shri Rajesh, Deputy Electrical Inspector to the Government (DEIG), Medak; Shri Papaiah, Regional Fire Officer, Fire Department; Shri Kishore, Deputy Fire Officer; Mr. Anil, Development Officer, TSREDCO; Mr. Nikhil, Consultant, TSREDCO; Mr. Lukesh, Field Officer, TSREDCO; for their valuable support and advise throughout.

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Cu International Copper Association India
Copper Alliance

A member of Copper Alliance, the International Copper Association India (ICA India) works as the Indian arm of the International Copper Association Limited (ICA), the leading not-for-profit organisation for the promotion of copper worldwide. ICA was set up in 1959 and has been working with the objective to grow the markets for copper based on its superior technical properties.

Right to Charge campaign was set up by ICA India and the Administrative Staff College of India (ASCI) to develop a Public-Private Partnership (PPP) between the state government/ local municipal authorities and private entities to set up EVCS in public and private parking spaces in buildings so as to encourage and influence accelerated adoption of e-mobility. The campaign aims to ensure faster deployment of EVCI in public parking lots, municipal buildings, and urban housing societies. The campaign have already committed to the Government of India's Go Electric campaign and state-based intended targets towards developing a low-carbon transportation network. This campaign will primarily provide facilitation between the identified stakeholders to participate in the necessary development of a framework for the installation of the EVCI in the above-identified parking spaces.

Administrative Staff College of India
Leadership through Learning

ASCI is an institution of national importance established in Hyderabad in the year 1956, by the Government of India and Indian industry. ASCI has pioneered post-experience management training in India. With its synergistic blend of Management, Development, Consultancy and Research, ASCI made a significant contribution towards professionalizing Indian management. Over the years, ASCI has carved a niche for itself on the strength of its domain expertise for management development, policy advice to governments and technical assistance to government organizations, institutions and industry.

The Centre for Energy Studies (formerly Energy Area) at ASCI has contributed to various national building measures starting from the drafting of the Electricity Regulatory Act, regulatory and tariff analysis in the power sector, reforms for various states in the power sector, implementation of the mandatory ECBC compliance framework in the states of Telangana and Andhra Pradesh, various policy impact assessment studies for central government ministries as well as a host of other capacity building programs for government officials and private sector professionals. CES has also worked for power systems planning, distribution management, corporate planning of power sector companies, environmental issues in the power sector, benchmarking of distribution capital costs, benchmarking capital costs of NTPC, etc.., In the past two decades, CES provided support to various governments and institutions in India and abroad on reforms and restructuring, tariff analysis and regulations, developing power markets, electricity distribution management, rural electrification, energy efficiency, and energy conservation, etc.

PROJECT TEAM

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ABBREVIATIONS

ASCI	:	Administrative Staff College of India
BSS	:	Battery Swapping Station
CCS	:	Captive Charging Station
CEA	:	Central Electricity Authority
CEIG	:	Chief Electrical Inspectorate to Government
CPO	:	Charge Point Operator
EV	:	Electric Vehicles
EVCI	:	Electrical Vehicle Charging Infrastructure
EVCS	:	Electric Vehicle Charging Station
EVSE	:	Electric Vehicle Supply Equipment
EV PCS	:	Electric Vehicle Public Charging Stations
GO	:	Government Order
HCS	:	Home Charging Station
ICA	:	International Copper Association
MoHUA	:	Ministry of Housing and Urban Affairs
MoP	:	Ministry of Power
NOC	:	No Objection Certificate
NRDC	:	Natural Resources Defense Council
PCS	:	Public Charging Station
PV	:	Personal Vehicle
SCIC	:	State Level Standing Charging Infrastructure Committee
TSREDCO	:	Telangana State Renewable Energy Development Corporation

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INTRODUCTION AND BACKGROUND

1 INTRODUCTION AND BACKGROUND

The state of Telangana introduced the Electric Vehicles and Energy Storage Policy 2020-2030 in 2020, with the objective to encourage adoption of e-mobility. The policy talks about utilization of parking spaces for set up of Electric Vehicle Charging Stations (EVCS). At the national level too, the central government has set clear targets, incentives and aiding policies in place for realizing a targeted electric vehicle percentage adoption by 2030. To support these intended targets and growth in adoption of electric vehicles, there is a need for significant uptake of charging infrastructure in parking spaces – be it residential or commercial buildings to be able to cater to potential increase in demand. This increase in demand is influenced by:

- An increasing demand for overnight home charging of vehicles that will need to reflect in the appropriate infrastructure development in Residential Buildings.
- An opportunity to utilize a wider network of common use charging stations (captive charging/ public charging) spread across societies, malls, office complexes and other such strategic locations that help utilize vacant parking spaces.

Therefore, to keep pace with the rapidly growing interest in EVs, a network of public charging, captive charging and home charging infrastructure needs to be in place and operational. However, it is essential to consider safety related aspects when looking to install EVCS in buildings particularly basements given the risks related to fire and non-fire hazards.

1.1 Right to Charge Campaign

The Right to Charge campaign was set up by International Copper Alliance India (ICA India) and Administrative Staff College of India (ASCI) to develop a Public-Private Partnership (PPP) between the state government/ local municipal authorities and private entities to set up EVCS in public and private parking spaces in buildings so as to encourage and influence accelerated adoption of e-mobility. The campaign which is envisaged to run for 2-3 years, aims to ensure faster deployment of EVCI in public spaces such as public parking lots, municipal buildings and urban housing societies. The campaign seeks to involve policymakers that have already committed to the Government of India's Go Electric campaign and state-based intended targets towards developing a low-carbon transportation network. This campaign will primarily provide facilitation between the identified stakeholders to participate in the necessary development of a framework for installation of the EVCI in the above-identified parking spaces. The campaign aims to look at 3 broad aspects to support in the development of a plan of action to support the above aims and goals which are: a) Development of Recommendations and Guidelines for set up of EVCI in Buildings, b) Development of Institutional Frameworks (Standards and Codes as well as Integration in Building Bye-Laws) and c) Capacity Building and Awareness Generation. ASCI with support from ICA India undertook this campaign here in Telangana from June '2022 onwards and have conducted roundtable discussions, one-on-one consultative and focused group discussions. The primary aspects deliberated in the campaign are:

- Constraints, challenges and safety risks in setting up of EVCI in all types of buildings and pathways to increase adoption.
- Considerations towards aspects like institutional frameworks, building bye-laws, standards & building codes for identifying clear guidelines for set up of EVCS in buildings and pathways for approvals/ permits and enforcing compliance keeping safety in perspective.
- Identifying pathways to foster PPP for investments in EVCI set up.
- Identifying capacity building and public awareness needs for diverse stakeholders.

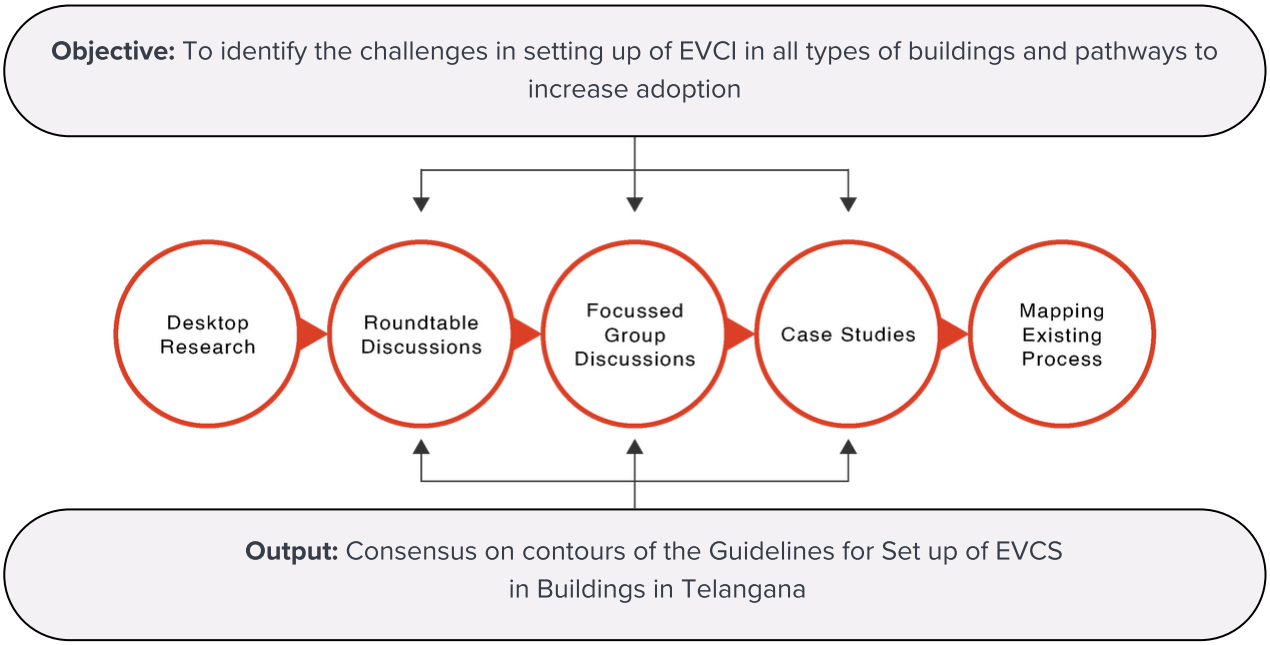
2

METHODOLOGY AND APPROACH FOLLOWED

2 METHODOLOGY AND APPROACH FOLLOWED

With an objective to identify challenges in setting up of EVCI in all types of buildings and pathways to increase adoption, the team interacted with various government and private stakeholders such as TSREDCO, TSSPDCL, GHMC, DTCP, Real Estate Developers, select RWAs, Charge Point Operators, etc.

Figure 1: Methodology and Approach Followed



2.1 Desktop Research

2.1.1 Policies and Guidelines to Support Roll-Out of EVCI in Buildings Sector

2.1.1.1 Amendments to MOHUA Model Building Bye-Laws 2016 for EVCI, 2019

MoHUA Model Building Bye-Laws 2016 were amended in 2019 for EVCI set up and they present model guidelines for the buildings sector to adopt when installing the EVCS such as charger type for different vehicle types and so on. Below are some excerpts from this:

- **Charging speeds:** Charging power, which determines the time required to charge a vehicle, can vary by orders of magnitude across charge points, as shown in Table 1. A small household outlet may charge as slowly as 1.2 kW, while the most advanced rapid charging stations can charge at up to 350 kW.
- **Different Types of EVSE:**

  Private Charging/ Home Charging: Charging batteries of privately owned cars through domestic charging points. Billing is mostly part of home/domestic metering. Public Charging: For charging outside the home premises, electric power needs to be billed and payment needs to be collected. The power drawn by these chargers may need to be managed from time to time.

AC "Slow Charging (SC)": The home private chargers are generally used with 230V/15A single phase plug which can deliver a maximum of up to about 2.5kW of power. The EVSE supplies AC current to the vehicle's onboard charger which in turn converts the AC power to DC.

DC "Fast Charging (FC)": Here, DC current is sent to the electric car's battery directly via the charge port. Fast chargers (usually 50 kW or more) can supply 100 or more kilometres of range per hour of charging. The fast chargers are generally used for top-up charging rather than complete charging. These types of chargers are important for cab companies and corporate/ commercial users who have a fleet of electric vehicles.

- **EV Share in all Vehicles:** It has been broadly projected that by the current rate (2019) of adoption of EVs, about 15% of all vehicles in the country would be EVs by the year 2020. Therefore, while assuming percentage composition of all proposed capacities in public facilities of vehicle holding capacity, the Metropolitan and Tier I cities will be assumed to have a higher percentage share of EVs, say 20% of now. The charging infrastructure prescriptions in all urban development guidelines shall, therefore, be in consonance with the said percentage.
- **Electric Vehicle Charging Infrastructure (EVCI):** Based on the occupancy pattern and the total parking provisions in the premises of the various building types, charging infrastructure shall be provided for EVs, which is currently assumed to be 20% of all vehicles in Tier 1 cities.

Residential Buildings (Plotted House):

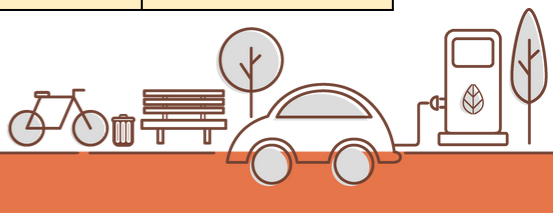
Table 1: Charging Infrastructure Requirements for Self-use (Non-Commercial Basis)

Building Type	Plotted House
Ownership of Station	Private (owner)
Connection and Metering	Domestic meter
Type of Charger	Slow Chargers (SC) as per owner's Specific requirements
Modes of Charger	AC (single charging gun)
Norms of Provisions	Minimum 1 SC and additional provisions as per the owner individual

All Other Buildings (including Group Housing):

Table 2: Charging Infrastructure Requirements for Public Use (Commercial Basis)

Building Type	Any Building Type			
Ownership of Station	Service Provider			
Connection and Metering	Commercial Metering and Payment			
Type of Charger	As per min requirements specified in Ministry of Power guidelines			
Additional Chargers	PCS providers shall install additional number of kiosks/ chargers beyond the minimum specified requirements to meet the ratio of charging points as prescribed below (by the type of vehicles):			
Norms of Provisions for Charging points	**4Ws** 1 SC - each 3 EVs 1 FC - each 10 EVs	**3Ws** 1 SC - each 2 EVs	**2Ws** 1 SC - each 2 EVs	**PV (Buses)** 1 FC - each 1 10 EVs



Note:

- Charging bays shall be planned currently at 20% capacity of all vehicles including 2Ws and PVs (cars).
- Open metering and on-spot payment options to be available for all users.
- Provision of Fluid Cooled Battery (FCB) charging station and Battery Swapping (BS) shall not be mandatory, and will be at the discretion of the service provider.

For more details on MoHUA guidelines, please refer the Compendium of Documents to set up EV Charging Stations in Buildings in Telangana

2.1.1.2 Ministry of Power Guidelines, January 2022

The Ministry of Power (MoP) first issued the Guidelines and Standards on Setting up Charging Infrastructure for Electric Vehicles to be installed at every Public Charging Station (PCS) on 14.12.2018 and thereafter has amended these from time to time. MoP guidelines majorly highlighted the public charging infrastructure siting/ location and density guidelines, public charging infrastructure requirements for long range EVs and/or heavy duty EVs, need for database maintenance of public EV charging stations, detailing of tariff for supply of electricity to EV public charging stations including service charges at PCS, need for provisioning of land at promotional rates for public charging stations as well as prioritizing roll-out of EV public charging infrastructure.

For more details on MoP guidelines, please refer the Compendium of Documents to set up EV Charging Stations in Buildings in Telangana

- **Types of Chargers:**

Table 3: Electric Vehicle Chargers as Provided under the Guidelines

Charger Type	S.No	Charger Connector Types	Rated Output Voltage (V)	No. of Connector Guns (CG)	Compatible Charging Vehicles (W = wheeler)
Fast	1	Combined Charging System (CCS) (minimum 50 kW)	200 – 750 or higher	1 CG	4W
	2	CHAaDEMove (CHAdeMO) (minimum 50 kW)	200 – 500 or higher	1 CG	4W
	3	Type – 2 AC (minimum 22 kW)	380 – 415	1 CG	4W, 3W, 2W
Slow / Moderate	4	Bharat DC – 001 (15 kW)	48	1 CG	4W, 3W, 2W
	5	Bharat DC – 001 (15 kW)	72 or higher	1 CG	4W
	6	Bharat AC – 001 (10 kW)	230	3 CG of 3.3 kW each	4W, 3W, 2W

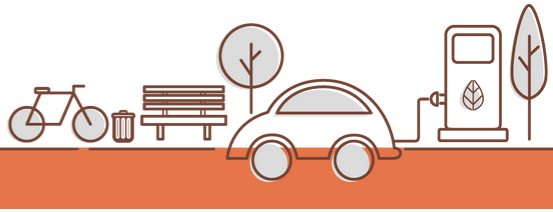
- **BIS standards for Different Categories of Chargers:**

BIS Standards such as IS 17017 (Part 2/ Sec1): 2020, IS 17017 (Part 2 / Sec 2): 2020, IS 17017 (Part 2 / Sec 3):2020, IS 17017 (Part 2 / Sec 6): 2020 suggest that accessories such as plugs, socket-outlets, vehicle connectors, vehicle inlets and cable assemblies for electric vehicles; are intended to be connected only to cables with copper or copper-alloy conductors.

Further, IS 17017 (Part 2/ Sec 1) states that, current-carrying parts, other than terminals, shall be either of, a) copper; b) an alloy containing at least 50 percent copper; and c) or other metal no less resistant to corrosion than copper and having mechanical properties no less suitable.

Table 4: Indian Standards EV Charging Notified by BIS on 01.11.2021

Light EV AC Charge Point				
Light EV AC Charge Point	**Charging Device**	**EV – EVSE Communication**	**Charge Point Plug / Socket**	**Vehicle Inlet / Connector**
Upto 7 kW	IS – 17017–22-1	Bluetooth Low Energy	IS - 60309	As per EV manufacturers
Light EV DC Charge Point				
Power Level - 2	**Device / Protocol**	**EV – EVSE Communication**	**Infrastructure Socket**	**Vehicle Connector**
Upto 7 kW	IS – 17017–25 [CAN]		Combined Socket under Development	IS –17017–2-6
Parkbay AC Charge Point				
Power Level - 2	**Device / Protocol**	**EV – EVSE Communication**	**Infrastructure Socket**	**Vehicle Connector**
Normal Power ~11 kW / 22 kW	IS – 17017-1	IS – 15118 [PLC] for Smart Charging	IS – 17017–2-2	IS – 17017–2-2
Parkbay DC Charge Point				
Power Level - 2	**Device / Protocol**	**EV – EVSE Communication**	**Infrastructure Socket**	**Vehicle Connector**
Normal Power ~ 11 kW / 22 kW	IS – 17017-23	IS – 17017–24 [CAN] IS – 15118 [PLC]	IS – 17017– 22- 2	IS- 17017–2-3
DC Charging Protocol				
Power Level 3	**Charging Device**	**EV – EVSE Communication**		**Connector**
DC 50 kW to 250 kW	IS – 17017-23	IS- 17017-24 [CAN] IS- 15118 [PLC]		IS – 17017–2-3



eBus Charging Station (Level – 4: 250 to 500 kW)			
Power Level 4	**Charging Device**	**EV – EVSE Communication**	**Connector**
DC High Power (250 kW → 500 kW)			
Dual Gun Charging Station	IS – 17017–23-2	IS – 15118 [PLC]	IS – 17017-2-3
Automated Pantograph Charging Station	IS – 17017–3-1		IS – 17017-3-2

2.1.1.3 Central Electricity Authority (CEA) Regulations

The CEA guidelines cover various aspects such as safety standards required for grid, technical standards for electric vehicles, technical standards for EV Charger (AC & DC), technical standards for connectors, communication standards between EV and Electric Vehicle Supply Equipment (EVSE), communication standard between EVSE and CMS, testing and verification of equipment with respect to standards, assessment, and strengthening of sub-transmission/distribution network to supply a load of electric vehicles as well as energy performance standards of chargers.

For more details on CEA guidelines, please refer the Compendium of Documents to set up EV Charging Stations in Buildings in Telangana

CEA Measures (Relating to Safety and Electric Supply), Amendment Regulations, 2019: These include, a) General safety requirements for EVCS, b) Earth protection system for EVCS, c) Requirement to prevent fire for EVCS, d) Testing of EVCS, e) Inspection and periodic assessment of EVCS, f) Maintenance of records and g) International standards for EVCS.

CEA Technical Standards for Connectivity of the Distributed Generation Resources Amendment Regulations, 2019: These include, a) Standards for charging station, prosumer, or a person connected or seeking connectivity to the electricity system, b) Registration in registry maintained by the Authority, c) Compliance of regulations and d) Relaxation of regulations.

2.1.2 Telangana EV Policy and Special Initiatives

The Telangana Government came out with the Telangana Electric Vehicles & Energy Storage Policy 2020 – 2030 via G.O.MS.No.12 of IT & EC Department and the provisions in the policy for setting up of EVCI in parking spaces are:

- One of the implementation strategies of the EV policy is that the preferential parking slots with required charging infrastructure shall be made available for EVs.
- EV policy states that HMR stations and TSRTC Bus Depots (across the state) shall provide reserved parking and charging points for two-wheelers in their parking zones to encourage EVs for last mile commute.
- Policy also suggests that governments shall develop night-time community parking with charging facility in PPP mode for e-autos, shared mobility taxis and public transport vehicles within industrial zones.
- Telangana State Renewable Energy Development Corporation Limited (TSREDCO), state nodal agency shall evaluate to establish PCS directly or under licensee/ franchise/ PPP model. Various public places such as airports, railway/ metro stations, parking lots, bus depots, markets, petrol stations, malls & electric poles shall be examined for the same.

For more details on Telangana EV Policy, please refer the Compendium of Documents to set up EVCS in Buildings in Telangana

2.1.3 Telangana Municipalities Act, 2019

The Telangana Municipalities Act, 2019 under **Chapter V** (Development of land and construction of building), **Clause 176** (Pre-conditions for Building Permissions), **Sub-clause 7** has included a provision that states: "All parking places except for individual independent and residential buildings have to be provided with electric vehicle charging facility".

Figure 2: Provision of EVCI in Telangana Municipalities Act, 2019

(6) It shall be mandatory to provide for the requisite parking place, while constructing, depending upon the use of building. Parking in buildings, places of public convenience, commercial complexes, cinema halls and other such places, as notified from time to time, shall be provided free of charge to the users, as prescribed.

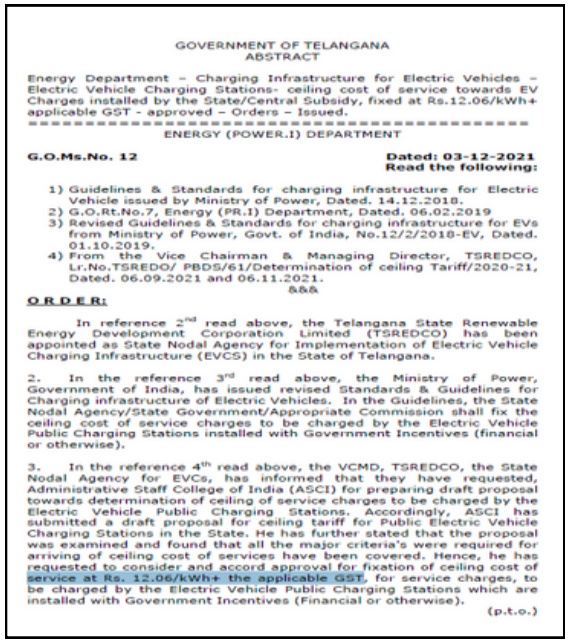
(7) All parking places except individual independent / residential buildings shall be provided with Electric Vehicle Charging infrastructure.

(8) No external roof, veranda, wall of a building shall be constructed or reconstructed of grass, leaves, mats or other inflammable materials, except with the permission of the Commissioner.

2.1.4 Tariffs

TSREDCO being the state nodal agency (SNA) and State Implementation Agency for EVCI, has been tasked to execute the Telangana EV policy. In line with this, G.O.MS.No.12 of Energy Department, has been brought out regarding fixing the ceiling cost of service charges to be charged at EV Public Charging Stations (EV PCS) installed with government incentives such as FAME subsidies. For the same, ceiling cost of service has been fixed by TSREDCO along with ASCI at Rs. 12.06/kwh + applicable GST (including energy charges) for service charges to be charged at EV PCS. For, HCS and CCS stations, charges typically include only the energy charges as these are on a non-commercial basis.

Figure 3: G.O on Fixing the Ceiling Cost of Service Charges to be charged at PCS



GOVERNMENT OF TELANGANA
ABSTRACT

Energy Department – Charging Infrastructure for Electric Vehicles – Electric Vehicle Charging Stations- ceiling cost of service towards EV Charges installed by the State/Central Subsidy, fixed at Rs.12.06/kWh+ applicable GST - approved – Orders – Issued.

ENERGY (POWER.I) DEPARTMENT

G.O.Ms.No. 12 **Dated: 03-12-2021**
Read the following:

1) Guidelines & Standards for charging infrastructure for Electric Vehicle issued by Ministry of Power, Dated. 14.12.2018.
2) G.O.Rt.No.7, Energy (PR.I) Department, Dated. 06.02.2019
3) Revised Guidelines & Standards for charging infrastructure for EVs from Ministry of Power, Govt. of India, No.12/2/2018-EV, Dated. 01.10.2019.
4) From the Vice Chairman & Managing Director, TSREDCO, Lr.No.TSREDO/ PBDS/61/Determination of ceiling Tariff/2020-21, Dated. 06.09.2021 and 06.11.2021.

&&&

ORDER:

In reference 2nd read above, the Telangana State Renewable Energy Development Corporation Limited (TSREDCO) has been appointed as State Nodal Agency for Implementation of Electric Vehicle Charging Infrastructure (EVCS) in the State of Telangana.

2. In the reference 3rd read above, the Ministry of Power, Government of India, has issued revised Standards & Guidelines for Charging infrastructure of Electric Vehicles. In the Guidelines, the State Nodal Agency/State Government/Appropriate Commission shall fix the ceiling cost of service charges to be charged by the Electric Vehicle Public Charging Stations installed with Government Incentives (financial or otherwise).

3. In the reference 4th read above, the VCMD, TSREDCO, the State Nodal Agency for EVCs, has informed that they have requested, Administrative Staff College of India (ASCI) for preparing draft proposal towards determination of ceiling of service charges to be charged by the Electric Vehicle Public Charging Stations. Accordingly, ASCI has submitted a draft proposal for ceiling tariff for Public Electric Vehicle Charging Stations in the State. He has further stated that the proposal was examined and found that all the major criteria's were required for arriving of ceiling cost of services have been covered. Hence, he has requested to consider and accord approval for fixation of ceiling cost of service at Rs. 12.06/kWh+ the applicable GST, for service charges, to be charged by the Electric Vehicle Public Charging Stations which are installed with Government Incentives (Financial or otherwise).

(p.t.o.)

2.1.5 Single Window Clearance (SWC) Mandate

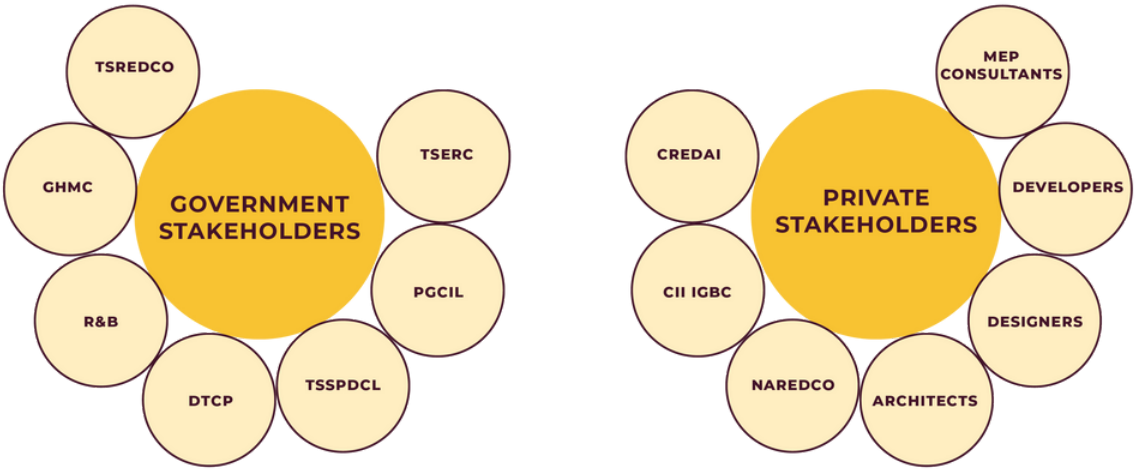
Telangana government has come out with the G.O.MS.No.18 by Energy Department, on 11th April 2022, regarding designation of TSREDCO as the SNA for promotion and implementation for EVCI as well as the Single Window Clearance (SWC) agency for setting up EVCS in Telangana. ASCI and its partners are supporting TSREDCO to develop and launch the SWC process and platform by enaging with different relevant government line departments/ agencies.

For more details on Telangana EV Policy, G.O's/ Memos, please refer the Compendium of Documents to set up EVCS in Buildings in Telangana

2.2 Primary Research

2.2.1 Stakeholders in Roundtable and Focused Group Discussions

Figure 4 : Government and Private Stakeholders involved in the Roundtable and Focussed Group Discussions



2.2.1.1 Roundtable Discussions

Stakeholders Involved in Roundtable Discussions:

Government stakeholders from TSREDCO, GHMC, R & B, DTCP, TSSPDCL, PGCIL, TSERC and private stakeholders from CREDAI Hyderabad, CII IGBC, NAREDCO, A & A Associates, Cyber City Builders & Builders, Synergy Infra Consultants involved in the roundtable discussions and consultative discussions.

Major Objectives of the Roundtable Discussions:

- To support Government of Telangana and various nodal departments and agencies in accelerating the adoption of EVs through deployment of EVCI in the state.
- To identify the challenges faced by stakeholders in set up of EVCS in private and government premises (existing and new buildings) including parking spaces and to jointly develop appropriate recommendations, solutions/ pathways to address the above challenges.
- Incentives needed for EVCS in parking spaces via service charges, upfront subsidies or waiver of demand charges.
- Including provisions for EVCS set up in parking spaces in building bye-laws, aligning with infrastructure codes and the risks, challenges and opportunities including standards, regulations and safety requirements.

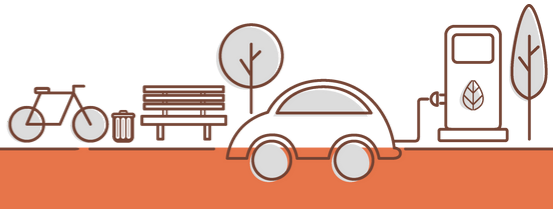
Discussion Items:

1. Scaling e-Mobility Adoption

- 6500 charging stations would be needed in city of Hyderabad alone by 2030 based on India's targets. Government of Telangana came out with ceiling service cost charges for subsidized EVCS under FAME – II (138 nos). Further, 3,000+ nos of public EVCS are being planned by TSREDCO by 2025.
- The government is keen to develop and scale up public EVCS in government land parcels. Various organizations have been reaching out to TSREDCO to support them in setting up EVCI in their premises/ land parcels. NHAI is also keen to install EVCS along highways.
- Further, Telangana govt is planning to set up charging hubs, where 25-30 vehicles can charge at a time utilizing fast chargers with a load of 1500 kW or more. Central government has allowed open access for EVCS as well and reduced the limit from 1 MW to 100 kW and this would be beneficial here as well.
- Apart from CPOs investing in charging infrastructure set up, TSREDCO is also willing to take up costs of EVCI set up under a PPP mode basis with land leased for 10 years and remuneration for the land fixed at INR 1 per kWh. So, there is opportunity to utilize parking spaces – both government and private for this purpose. Further, TSREDCO is willing to invest in set up of public EVCS in building premises on a commercial revenue sharing basis to lower upfront costs for developers/ RWAs/ GHS keen to set up common use charging stations. Moreover, charger costs can be additionally optimized via bulk procurement / empanelment.

2. Tariffs

- High wait time for transformers was an issue during COVID-19 pandemic alone. However, delays maybe present for set up, inspection and commissioning of electrical infrastructure. However, DISCOMs do bulk procurement of transformers based on yearly planning and therefore can provide lowest cost transformers to consumers.
- Tariffs need to be changed every year as there is a need to balance the interests of both DISCOMs and customers. Further, tariffs can be changed mid-year as well if needed via two approaches – via petitions and an annual change or via a direction letter from government under relevant section.



3. Set up of EVCS and Permits/ Approvals:

- Government departments are not aware of how to go about setting up a charging station at their premises. Therefore, there is a need to develop ready reckoners on the permit/ approval process, the forms for power connection/ load enhancement etc.
- There is need for gathering wide stakeholder feedback to identify challenges in setup of EVCS in buildings and to develop consensus on a single window clearance (SWC) process with compendium of documents, ready reckoners, FAQs etc.
- Memo No 11452 / P.g III/2021 Dated 13.10.21 by Municipal Administration and Urban Development (MAUD) Department, Government of Telangana states that EVCS may be set up in 25% of parking spaces in IT buildings and commercial buildings. Both new and existing IT buildings are expected to implement the same. However, for existing IT buildings that are particularly multi-tenant, identifying 25% of all parking spaces to set up EVCS is difficult as parking spaces are already allotted. MoHUA Model Building Bye-Laws recommend 20% of parking spaces in residential buildings for setting up EVCS. However, here too parking spaces are already allotted and further common/ visitor parking lots available are typically much lower in number. Therefore, appropriate adoptable guidelines must be developed seeing projections in the growth of e-mobility adoption as well as safety-related aspects in set up of EVCS in buildings.

4. Electrical Infrastructure Set up/ Upgrade Costs

- Significant electrical infrastructure upgrade requirements will be needed like transformers, metering boards, meters, cabling, wiring etc., given an increase in loads and power demand from night-time home charging in residential buildings and from work-place charging in office/ commercial buildings. Therefore, there is need for incentives in set up of EVCS in buildings given the high upfront costs with set up of electrical and charger infrastructure. Distribution of costs happens among each residential unit but depending on the type of housing – affordable housing, middle income housing, luxury/ premium housing – the costs and affordability for consumers would vary. So upfront subsidies may be essential for EV charging infrastructure and case studies maybe carried out on distribution of costs among residential units with provision of EVCS to reach residential unit.
- Additionally, in large housing socities that have HT category VI connections, the builder/ RWA has the responsibility for electrical infrastructure set up (including metering/ wiring/ distribution transformers, etc.). Here, when only few people opt for EVs and home charging, there may be need for upgradation of electrical infrastructure for the whole society, thereby unduly burdening those that have not opted for EVs. To solve for this, the recommendation was to consider petitions to the regulatory commission to have the DISCOM take up the set up of electrical infrastructure and to park the costs under the Gross Fixed Asset category for distribution among all consumers under the jurisdiction of the DISCOM.

5. Safety Considerations

- With increasing incidents of fire, there are concerns among all stakeholders on set up of EVCS in basements. Further, there are no directions/ guidelines/ regulations from CEA on set up of EVCS in basements/multi-level parking. Therefore, there is a need for development of appropriate guidelines that consider safety while setting up EVCS in basements of buildings.

Action Items from the Roundtable Discussions:

1. Detailing the Process for Set up of EVCS and Permits/ Approvals:

To run the Right to Charge campaign to support TSREDCO, GHMC, DTCP and TSSPDCL and other stakeholders to:

- Identify and map the existing permit/ approval process for EVCS set up in buildings, constraints/ challenges and risks (including safety related) with set up of EVCS in buildings, additional statutory permits/ approvals needed from a safety perspective etc., as well as the standards and regulations to be followed in the permit approval process.
- Prepare a compendium of documents, forms, process, standards/ regulations, policies, government orders, FAQs and ready reckoners on existing application/ permit/ approval process with all templates for set up of EVCS (PCS/ CCS/HCS) in buildings.

2. Charger Deployment & Safety Guidelines:

There are no direct guidelines/regulations from CEA/ BEE/ MOHUA/ Ministry of Power or others on basements/ multi-level parking. Therefore, appropriate guidelines need to be developed via discussions with state government's nodal agencies/ departments and private stakeholders on type of chargers/ capacity of chargers across different basement levels and different types of buildings (high rise/ low rise) from a safety perspective including related enforcement/ compliance mechanism like statutory permit/ approval from fire department.

3. Costs:

TSREDCO is willing to set up Public EVCS (for vehicles permitted into the building/ premise) on own costs and operate on a commercial revenue sharing basis. Alternatively, captive use (non-commercial basis) charging stations can be explored in buildings. Both public/ captive chargers with appropriate fast charging facilities would be useful in buildings where tenants/ RWA/ GHS are not willing to permit/ adopt individual home charging/ private use charging facility in lower basement levels.

4. Case Studies:

Need to develop case study of existing practices in Hyderabad buildings/ societies on charger deployment strategy, type of chargers, costs per unit, tariffs being charged, etc.

Figure 5: Pictures from the Roundtable Discussions

2.2.1.2 Consultative Meetings and Focussed Group Discussions

Building on the recommendations from the roundtable discussions, it was essential to develop guidelines for set up of EVCS in buildings in Telangana. Based on additional interactions with various nodal departments, it was understood that there would be need for focused discussions on safety related

infrastructure requirements for EVCS set up in basements, need for statutory approvals from departments/ agencies like CEIG and Fire Department as well as considerations on developing compliance mechanism for the guidelines that would be developed. In line with the above, ASCI and ICA India deliberated with stakeholders, to arrive at a consensus on considerations towards development of guidelines for EVCS set up in buildings and related compliance mechanisms.

Major Objectives:

- Infrastructure requirements from a safety and technical perspective for set up of EVCS in buildings and particularly basements of buildings.
- Different types of charging stations that may be set up in basements and their deployment strategy in buildings.
- Clearance process and compliance mechanisms for EVCS being set up in buildings (both existing and new as well as high rise and low-rise buildings).

Figure 6: Pictures from Focused Group Discussions

2.2.2 Case Studies – Practices and Approaches taken towards EVCS Set up in Buildings in Hyderabad, Telangana

Based on the recommendations from the roundtable discussions, a case study was done to identify the practices of builders/ developers in set up of EVCS in buildings in city of Hyderabad, Telangana. The aim was to understand whether the buildings have followed the safety standards or guidelines in the installed locations, the deployment strategy followed for EVCS within the building premises in terms of allotment of charging spaces, the metering arrangement, the costs, costs per unit (if any) and so on.

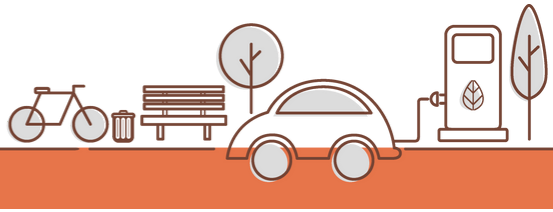
ASCI conducted the case studies in four residential group housing societies in Hyderabad. While three socities have opted to provide a set of charging stations for common use by all residents, one of the society has opted to provide each unit with a dedicated EV charging station for self/ individual use in their individual parking spaces.

The cost of EVCS set up and infrastructure cost are planned to be distributed to all customers and this comes out to approximately INR 60,000 per flat with a separate EV meter. In one of the projects, DC fast chargers have been provided for common use, but residents have communicated their preference for AC slow charging to preserve battery life.

Below are few of the observations from the case study:

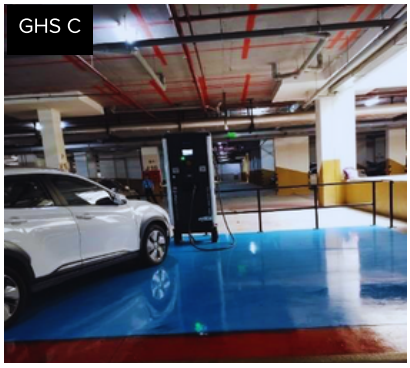
Table 5: Case Studies Regrading EVCS in Various Residential Societies

Societies → / Parameters ↓	GHS A*	GHS B*	GHS C*	GHS D*
Status of the Township/ Building	Under Construction	Planned/ Design stage	Occupied by Residents	Occupied by Residents
Number of Units (Households)	1197	1100	1544	1361
No of Charging Stations (Planned/ Installed)	Planned 20	Planned 100% Coverage (each unit to be provided with ONE charging facility)	Installed 2	Installed 2
Type of Charging Stations	16 AC Type II CCS Chargers (7kW each) 4 DC Dual Gun CCS Fast Chargers (60kW each)	AC Slow Chargers (3.5 kW each)	DC Chargers (50 kW each)	AC Chargers (7.5 kW each)
Location of Charging Stations	Visitors Parking (open ground level)	Each individual parking (4 basements)	Common area parking (ground level stilt parking)	Visitors parking (ground level stilt parking)
Ownership of the Charging Stations	RWA	Individual Residents	CPO (Exicom)	CPO
Cost of EVCI Set up	~INR 70 Lakhs	~INR 60000 per residential unit ~INR 6.44 Crores for a built-up area of ~1.44 acres	~INR 20 Lakhs	~INR 3 Lakhs
Who bears the cost of EVCI Set up?	Developer with costs distributed to individual residential units	Developer with costs distributed to individual residential units	CPO	CPO



Is an Additional Transformer Set up/ Planned?	EV load is within the planned load for the township	EV load will be included in the total transformer capacity calculation	No	No
Is Separate Cabling Installed/ Planned?	Yes	Yes	Yes	Yes
Type of Connection / Meter for EV Charging	Existing Commercial Connection (Common Area)	EV Meter for every unit	Existing Commercial Connection (Common Area)	Existing Commercial Connection (Common Area)
Tariff for EV Charging	Commercial Tariff	EV Tariff	Commercial Tariff	Commercial Tariff
Type of DISCOM connection	Single Point Supply	Single Point Supply	Single Point Supply	Not Known
Tariff	Tariff under construction	Tariff under construction	INR 8.25 per unit	INR 14 per unit (INR 9 - Energy charges, Rest - Service charges)

Figure 7: Proposed EV Charging Station at GHS A (under Construction), C, D



Case Study: Electrical Infrastructure Requirements with EVCS being Provided to each Residential Unit:

A large group housing society (GHS) in Hyderabad, Telangana has a total area of 8 acres and open area of 82% resulting in built up area of 1.44 acres. The GHS planned and set up one EVCS for every residential unit (total 1100 units) in the basement parking. The additional cable requirement for achieving this was ~ 1.03 meters per square feet (65,000 meters of cable requirements for a built-up area of 62726 square feet) or approximately ~60 meters per residential unit.

India Cabling Needs: Based on an IBEF Real Estate sector study accessed on 26th Dec 2023) the number of units of shortfall in urban areas is approximately 10 million units and up to 2030, at least 25 million units of affordable housing are needed, in India. The estimated requirements for cabling/ wires towards EVCI as per the IBEF projections, would be between 600 million meters to 1.5 billion meters. In addition, there will be the set-up of commercial spaces, as well as need to set up LT metering boards, transformers and meters to cater to the increased energy demand and separate incentivized tariffs that will also need additional cabling requirements. A similar estimate can be made for copper wiring needs at the state level too.

2.2.3 Mapping Existing Permit/ Approval Process for EVCS Set up in Buildings:

Building on the action items from Roundtables, the first step was to map the existing clearance process for EVCS. Based on interactions with stakeholders, the following was identified:

- TSREDCO has come out with an offline application form which is available for installing EVCS in the state. In the existing application process, the application form is used for approvals/ permits for Public Charging Stations only but has provisions for Home Charging Stations (HCS)/ Domestic Charging and Captive Charging Stations (CCS) as well. The form also includes aspects such as company details, location of the proposed site with details, details of the registration fee remitted, estimated cost of the project proposed, financing arrangement, details of registration fee remitted, declaration.

- The permits/ approval process for installation of PCS in government land/ property is largely similar to the process involved for PCS set up in private land/ property with one small difference. In case of PCS set up in government land/ property, the lease agreement is not required as TSREDCO has an agreement with the Government organizations in Telangana for land allotment towards the setting up of PCS. Below is the detailed process with documents required for PCS/ CCS/ HCS set up in the state.

- The application to DISCOM for power connection as well as sharing of relevant documents to CEIG involves an offline application in the existing permit/ approval process for EVCS. Therefore, there is need to ease the process of clearance/ permit by bringing most aspects on a single digital platform.

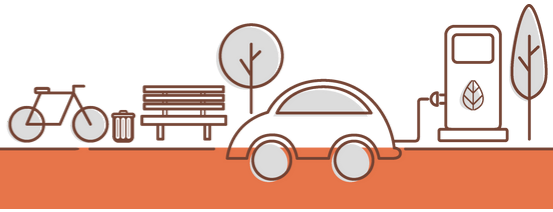


Table 6: Documents Required and Process for Different Types of Charging Stations

Steps	Details	PCS	CCS and HCS
STEP-1	Application to TSREDCO for NOC for EV meter	CPO / Property Owner (Govt. or Private)/ Developer / RWA submits the offline Application Form to TSREDCO with following documents: a) Letter of request on company letterhead to TSREDCO identifying the land parcel (in case of public/ government land parcel) b) Lease / ownership document (as applicable) c) Registration fee by way of Demand Draft, drawn in favor of TSREDCO Ltd, payable at Hyderabad d) Certified copy of the Memorandum & Article Association of the company/partnership deed e) Certified copy of the Registration Certification f) Copy of PAN Card / CIN g) Copy of GST Registration (if applicable) h) Certified copy of the Authority confirming powers on the person(s) who are competent to execute the MOU / the agreement with TSREDCO / DISCOM i) Certificate from the Chartered Accountant showing the "Net Worth" of the company j) ARAI Certificate Note: For government owned land parcels, TSREDCO will approach the relevant land-owning government entity to sign a Revenue Sharing agreement.	For CPO / Govt or Private Property Owner / Developer / RWA keen to avail special EV tariff & meter, an offline application form needs to be submitted to TSREDCO with following documents: a) Registration fee by way of Demand Draft, drawn in favor of TSREDCO Ltd, payable at Hyderabad b) Copy of address (latest electricity bill/water bill) c) Copy of PAN Card / Aadhar Card No d) Technical data sheet of the specific charger Note: For CPO / Govt or Private Property Owner / Developer / RWA willing to go with existing meter and tariff, an application can be directly made to DISCOM and CEIG for new load addition/ load enhancement (as applicable) (see STEP 3 onwards directly).
STEP - 2	NOC from TSREDCO	TSREDCO provides the NOC	

STEP-3	Application to DISCOM for EV meter & to avail EV tariff	CPO / Developer / RWA / Property Owner, submits the application to the relevant area DISCOM with the following documents for seeking EV meter and special EV tariff: **DISCOM Application form:** TSSPDCL – *https://www.tssouthernpower.com/newserviceregistrations* TSNPDCL – *http://210.212.223.83:7001/J2S/j2s/websiteLoginUsers.action* **Documents needed by DISCOM:** a) Application form for power connection b) NOC by TSREDCO c) Lease agreement from owner + sale deed if needed d) Nearest Service Number e) Authorized person ID proof / photo	CPO / Developer / RWA / Property Owner, submits the application to the relevant area DISCOM with the following documents for seeking EV meter and special EV tariff: **DISCOM Application form:** TSSPDCL – *https://www.tssouthernpower.com/newserviceregistrations* TSNPDCL – *http://210.212.223.83:7001/J2S/j2s/websiteLoginUsers.action* **For Existing Connection and to add new load/ enhance sanctioned load:** ***Application form:*** TSSPDCL – (online form) *http://210.212.220.126:8080/TSSPDCL/LeftMenu/Downloads/CSC.pdf* TSNPDCL – (offline form) *https://tsnpdcl.in/Menu/ServiceRequest* **Documents needed by DISCOM:** a) Application form for load upgradation / load enhancement b) Lease agreement / Revenue Sharing agreement from owner + sale deed if needed c) Nearest Service Number d) Authorized person ID proof / photo
STEP-4	Site inspection by DISCOM (for estimation of connection feasibility, electrical infrastructure needs & connection costs)		
STEP-5	Preparation of estimation and sanction of estimation by DISCOM (online via acknowledgment number)		
STEP - 6	Payment of fees by consumer to DISCOM (online)		
	HT Connection: If loads > 56 kW or Point of Commencement > 650 volts only)		**LT Connect:** If loads < 56 kW or Point of Commencement < 650 volts only

STEP-7	Electrical infrastructure set up (wiring/ cabling, transformer, etc): Setup/ upgradation of transformer and related electrical infrastructure (if needed) ➢ If applicant undertakes works through licensed electrical contractor (payment of 10% charges to DISCOM) If DISCOM undertakes work (payment of 100% charges)	Electrical infrastructure set up (wiring/ cabling, transformer, etc): Setup/ upgradation of transformer and related electrical infrastructure (if needed) ➢ If applicant undertakes works through licensed electrical contractor (payment of 10% charges to DISCOM) If DISCOM undertakes work (payment of 100% charges)
STEP-8	Setup of EVCS	Setup of EVCS
STEP-9	**Application to CEIG:** For HT Loads, applicant seeks approval from CEIG with an application and relevant documents as follows: a) Agreement letter between contractor & owner b) Contractor license copy c) Contractor / project electrical supervisor permit copy d) Feasibility report from the DISCOMS e) Electrical single line diagram from point of commencement of supply to the end use of electrical energy (clearly showing the addition in red colour and deletions in yellow colour) f) The structural layout showing plan and elevations with sectional and safe clearances (clearly showing the additions in red colour and deletions in yellow colour) g) General arrangement of the equipment drawing showing the location of various equipment (clearly showing the additions in red colour and deletions in yellow colour) h) The earthing layout diagram (clearly showing the additions in red colour and deletions in yellow colour) i) Site layout (clearly showing the additions in red colour and deletions in yellow colour)	
STEP - 10	Inspection and approval from CEIG	
STEP - 11	CEIG approval submission to DISCOM and HT agreement with DISCOM	Work completion report to be submitted to DISCOM (if applicant undertakes the electrical infrastructure set up)
STEP - 12	“Release of service order from DISCOM” / Provision of EV Meter	
STEP - 13	Energization of EVCS	

3

RECOMMENDATIONS AND WAY FORWARD

3 RECOMMENDATIONS AND WAY FORWARD

3.1 Consensus on Developing Guidelines for Set up of EVCS in Buildings

Various aspects were proposed for development of guidelines considering safety, ease of implementation and ease of compliance as captured below.

Guideline Aspect	Building Types and Recommendations
Vehicle Deployment based on Battery Testing Standards	**All Building Types** Given new battery testing parameters have come into force on April 1st 2023, stakeholders recommended considering limiting the deployment of EVs and creation of EV parking based on the category of vehicles and the standards against which they have been tested and certified. This was built from the understanding that the vehicle battery poses a greater fire and non-fire hazard than the charger. Therefore, the following were the recommendations proposed: • Parking spaces for e-2Ws/e-3Ws tested based on older battery testing standards (prior to April 1st 2023), may be set up only in open ground level /ground level open stilt parking /upper podium parking. These EV parking spaces must be dedicated parking areas and specially demarcated with clear signage. Further, appropriate safety related infrastructure requirements are necessary in certain parking space types. • Parking spaces for e-2Ws/ e-3Ws that have been tested based on new ARAI testing parameters in force from April 1st 2023, may be set up only in open ground parking/ ground level open stilt parking/ upper podium parking/ or upto 1st basement levels. These EV parking spaces must be dedicated parking areas and specially demarcated with clear signage. When setting up parking spaces for such e-2Ws/ e-3Ws in 1st basement, appropriate safety related infrastructure requirements are needed as detailed below, • Parking spaces for e-4Ws maybe set up across different basement levels with appropriate safety related infrastructure requirements. **Note:** The above are subject to change based on review by concerned state government agencies and departments based on maturity in technologies, maturity of the EV industry and better testing and safety related infrastructure set up as well as any amendments in safety-related infrastructure requirements as per NBC.
Charger Capacity and Deployment Strategy	**All Buildings (number of parking spaces to be provided with EVCS):** • The Memo No 11452 / P.g. III/2021 Dated 13.10.2021 by MAUD Department, Government of Telangana mandates the set-up of EVCS in 25% of the parking spaces in IT buildings (both new and existing). Real Estate Stakeholders identified that this mandate is difficult to implement in the existing multi-tenant buildings. For example, existing multi-tenant buildings where parking spaces have already been allotted how does the developer/ owner identify 25% parking spaces to set up EVCS. This gets further complicated when considering residential buildings. • The stakeholders therefore recommended to not limit EVCS deployment in parking spaces through a percentage limit but rather provide guidelines for

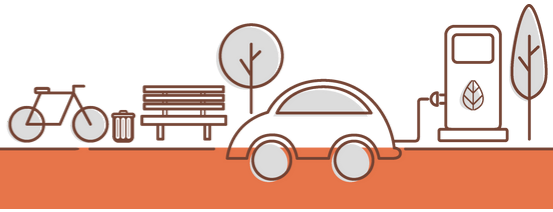
Charger Capacity and Deployment Strategy	deployment in various building types (as captured below) including where possible / needed 100% coverage but with due consideration to safety related infrastructure requirements as well. These recommendations and considerations have been captured below in brief: **<u>Residential Buildings:</u>** **Home Charging Stations (HCS):** • In High Rise/ Low Rise Buildings, stakeholder consultations and recommendations were to permit only AC slow chargers of upto 7.2KW defined as per BIS standards, to be set up in any basement levels subject to these levels have ventilation, water sprinkler grid, fire water capacity and other fire safety requirements as per NBC and as amended from time to time or additional safety related infrastructure requirements as detailed in relevant section below: • Else *(either if higher wattage HCS are to be installed or if safety related infrastructure requirements as per NMC are not met), HCS maybe set up only in open ground level/ open stilt parking/ upper podium parking levels.* **Note:** Home chargers will typically be used for overnight charging when vehicles are in premises for long durations and slow chargers are better from a battery health and safety perspective as well. **Public Charging Stations (PCS) and Captive Charging Stations (CCS):** • Recommendations were to limit these types of common use chargers (PCS and CCS) of any wattage (slow / fast) only to open ground floor/ open stilt parking/ upper podium parking. However, in high rise buildings, 1st basements may also be used for set up of PCS / CCS, but these must AC slow chargers upto 7.2kW capacity as per BIS standards only. Further, relevant safety related infrastructure requirements must be present as per NBC (mechanical ventilation, fire water capacity, water sprinkler grid, compartmentation, etc.) and any other additional guidelines as detailed below: • In low rise buildings again in 1st basements, PCS / CCS maybe set up only with AC slow chargers of upto 7.2kW capacity, provided this level has safety related infrastructure as per NBC (atleast natural ventilation, fire water capacity and other safety related infrastructure) as detailed in relevant section below: **Note:** Common areas/ amenity areas may be identified for PCS and CCS set up for common use by multiple residents. **Commercial Buildings (Offices/ Showrooms/ Mixed Use Properties):** • **PCS:** Same as Residential Buildings • **CCS:** Same as Residential buildings **Commercial (Assembly Occupancies):** • **PCS and CCS:** Same as Residential/ Commercial buildings • **Note:** When setting up EVCS in open ground level stilt parking/1st basements, clearly demarcated separate EV Zones with appropriate fire compartmentation, mechanical ventilation, smoke detection, fire control and alarm system, appropriate fire water capacity and water sprinkler grid as per NBC and other safety related infrastructure must be present as detailed later sections below. **Additional Guidelines :** • For any buildings type (residential/ commercial), the recommendations were to

	limit e-2W/e-3Ws to parked only in ground floor/ open ground stilt parking/ upper podium and not in any basements.
Direct 15A Charging	• The stakeholders recommended to not permit Direct 15A socket charging given safety considerations for any EV. An appropriate designated charger must be used meeting the relevant standards may be permitted (for example: at least a LEV AC / DC charger is preferred over 15A socket). • Moreover, the stakeholders recommended not to permit portable batteries (typically present in e-2Ws/ e-3Ws) to be carried to upper floors for direct 15A charging at home/ offices given safety considerations (particularly those batteries tested as per earlier testing standards).
Standards/ Type Test Certificates	The recommendation was that EVSE and EV to be deployed must be a type-tested equipment by an agency/ lab accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) from time to time and must meet BIS standards / ARAI standards (as directed by the Ministry of Power/ Department of Heavy Industries etc. as relevant).
Load/ Infrastructure Planning and Upgradation	**Stakeholders Recommended the following aspects:** • All the electrical installation work for the charging station must be carried out by a Licensed Electrical Contractor approved by CEIG. • Each EV charging installation must have sufficient sanctioned load available to accommodate EV charging loads in addition to the residential unit / commercial unit load. If not, the consumer/ charging station owner must make an application for a new load/ additional load to the relevant area DISCOM. • Adequate measures must be undertaken by the consumer to mitigate the load requirements for EV charging if going with existing sanctioned load. • Augmentation of the wiring and cabling along with the protection system must be carried out by the consumer. For the same, advise maybe taken from licensed electrical contractor and/ or DISCOM. • Distribution transformer must be set up at the ground floor/ open ground level (not in cellars/ basements). • Developers/ RWA/ GHS/ Individuals may approach the relevant area DISCOM for estimating load availability in existing transformer, need for upgrading transformer, connection feasibility, electrical infrastructure requirements (cabling, meter, metering board requirements) as well as connection costs (post payment of relevant fees to DISCOM). 1. For existing townships/ buildings/ complexes, if there are only few early adopters of EVs keen to set up EVCS, there would be concerns among other residents/ occupants on the need to unnecessarily bear additional electrical infrastructure upgrade costs like distribution transformer / wiring/ cabling/ metering upgrades. 2. In this case, RWAs/ GHS/ Consumers may consider opting to set up common use CCS in visitor parking spaces/ common areas.CCS are common use charging stations operated on a non-commercial basis. The tariff of CCS therefore is typically lower than PCS but higher than private use HCS. • Chargers introduce lots of harmonics, which can affect appliances/ electronic items. Therefore, stakeholders recommended that if feasible, separate K-rated transformers maybe considered for EV connections only (separate from residential connections).

Metering Connection from DISCOM and Metering Connection for EV	**All Building Types** For metering the stakeholders recommended the following: • PCS must avail separate EV meter connection to be able to provide special EV tariff benefits to potential EV users and to be able to log consumption as per MoP guidelines. • CCS and HCS, may opt for existing meter and tariff (domestic/ commercial/ single point HT as applicable) as per MoP guidelines and this would be a faster process. For, a separate special EV tariff meter connection, an application may be made to the nodal agency TSREDCO with relevant documents. • In large townships with single point HT connections under Category VI, from DISCOM and sub-metering by RWA, there are demand charges that are distributed among all residents. In such metering, irrespective of the number of residents who have adopted EVs and EV charging, the additional demand charges are distributed among all residents (thereby unfairly burdening those residents that have not adopted EVs). **Note:** On this, appropriate representations/ petitions may be needed to be made to Telangana State Electricity Regulatory Commission (TSERC) and the DISCOMs for directives to navigate this issue. **Note:** A proper assessment maybe made here through CPOs/ Consultants in the market on the benefits or lack of therein between special EV tariff meter and existing tariff meter.
Safety Related Infrastructure Requirements in Basements	• **Mechanical Ventilation:** Mechanical ventilation was recommended by stakeholders to be required for multi-basement levels (as per NBC). 1st basements may continue with natural ventilation cut outs. Low rise buildings may consider having natural ventilation (as per NBC) in 1st basements when considering set up of EV Parking/ EVCS at this level. Else, EV parking / EVCS may be considered in such buildings only in ground level/ open ground stilt parking levels. • **Water Capacity:** Each e-4W requires about 10kL of water for firefighting. It was recommended to consider having fire water capacity to be as per NBC for buildings with basements that aim to set up EV Parking/ EVCS in these lower levels: 1. In buildings where such sufficient fire water capacity is not available, it was therefore considered to recommend having domestic water being tapped as well. For the same, the domestic water tank be tapped via booster pump and down corner and an outlet be provided near the EV Parking / EVCS in basements to effectively fight EV fires in case of emergencies. Where, there are underground water sumps, appropriate pumps may be set up to access this water for fire-fighting. 2. For buildings with no basements, underground fire water tank capacity is not mandatory. 3. Further, it was recommended to consider having intermediate fire pumps arranged for every 150 m in buildings with basements.

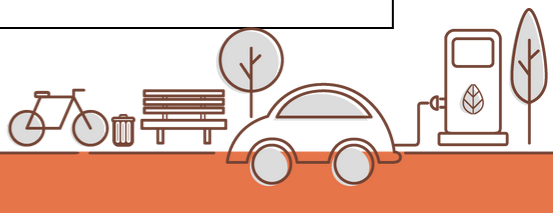
Safety Related Infrastructure Requirements in Basements	• **Water Sprinkler Grid:** The recommendation was to ensure that for buildings with basements where there is a plan to set up EV Parking/ EVCS, water sprinkler grid must be present as per NBC. New buildings it was recommended may consider setting up a more compact grid of 9 sqm with 1 sprinkler above each car parking or charging spaces given. • **Compartmentation Zone:** Compartmentation zones in all kinds of buildings in basements it was recommended to continue to be considered as per NBC in both existing and new buildings (high-rise and low-rise). Additionally, in assembly occupancies, it was recommended to have separate demarcated EV zones with compartmentation, fire water outlet, water sprinkler grid, mechanical ventilation, smoke detectors etc. In assembly occupancies, to set up EVCS and EV parking spaces in 1st basements, it was recommended that it maybe considered to set up separate 2-hour fire compartmentation subject to additional consultations. • **Smoke Detectors:** These are extremely essential to monitor EV fires and therefore, the consensus was that smoke detectors must be provided in each EV parking space in all basements wherever EVCS is to be set up or EVs are to be parked. For the same, the smoke detectors recommended were to be of the appropriate type that can differentiate between dust and smoke to avoid false alarms. Further, the consensus was that even individuals setting up HCS on their own must set up smoke detectors in the appropriate places. Further, as dedicated parking spaces are to be set up for e-2Ws/e-3Ws, these spaces must also set up the above appropriate smoke detectors as well. • **Fire Extinguishers:** The consensus was that it must be recommended to have fire extinguishers for every 200 sqm as per IS 2190 in all basements. **Consensus on Additional Guidelines for EVCS being Set up in Basements:** • The recommendations were to seek additional comments/ feedback through consultative discussions with stakeholders to draft a complete set of guidelines for set up of EVCS in buildings that would be updated based on need from time to time and aligned with appropriate changes in national and/ or state level directives/ standards/ laws/ government orders/ memos.
CEA Technical and Safety Guidelines	• Ministry of Power and Central Electricity Authority, developers/ RWAs/ DISCOMs must comply with the provisions of the CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010, and CEA (Technical Standards for Connectivity of Distributed Generation Resources) Regulations, and their amendments released from time to time. • These regulations should be adhered to for the safe installation, operation, and maintenance of the charging points as well as the safe connectivity of these distributed generation resources. **CEA Technical Standards:** • EV charging equipment must have provision to detect various faults/ abnormal conditions as well as have appropriate means to isolate the faulty equipment or system automatically. It must be ensured that the fault of charging equipment or charging system does not affect grid adversely.

CEA Technical and Safety Guidelines	• Harmonic Current injections from the generating unit and DC current injections at the interconnection point must not exceed the limits specified in the CEA Technical Standards. • Power quality parameters such as Voltage Sag, Voltage Swell, Flicker, Disruptions etc., must be according to BIS standards and/ or the relevant IEC/ IEEE standards where BIS is not available. **CEA Measures of Safety Regulations:** <u>General Safety Requirements:</u> • All EVCS must be provided with protection against the overload of input supply and output supply fittings. • All EVCS must be installed so that any socket-outlet of supply of electric vehicle charging points shall be installed at least 800 millimetre above the finished ground level. • Maximum length of the supply lead must be 5 meters/ the parking place must be within 5 meters from the electric vehicle charging point so that there is minimal extension and damage to the cord assembly, EVSE / interconnection point. In other words, the distance between the charging point and the connection on the electric vehicle shall not be more than five metre during charging. The length of charging cables should be sufficient to allow their use with the intended equipment without risk of damage. • Suitable lightning protection system must be provided for the EVCS as per relevant standards (IS/ IEC 62305). • The EVCS must be equipped with a protective device against the uncontrolled reverse power flow from the electric vehicle. • A cord extension set or second supply lead shall not be used in addition to the supply lead for the connection of the electric vehicle to the charging point and shall not be used as a cord extension set. No adaptor shall be used to connect a vehicle connector to a vehicle inlet. • One second after having disconnected the EV from the supply (mains), the voltage between accessible conductive parts or any accessible conductive part and earth must be less than or equal to 42.4 V peak (30 V rms), or 60 V D.C., and the stored energy available must be less than 20 J (as per IEC 60950). A warning label must be attached in an appropriate position on the charging stations in case voltage is greater than 42.4 V peak (30 V rms), or 60 V D.C., or the stored energy is 20 J or more. • For PCS being set up in buildings, an emergency push button must be provided at the power incoming side for disconnection of power supply to Public EVCS. • A vehicle connector used for direct current (DC) charging shall be locked on the vehicle inlet if the voltage is higher than 60 V DC and in case of charging system malfunction, a means for safe disconnection shall be provided. The vehicle connector must not be unlocked (if the locking mechanism is engaged) when hazardous voltage is detected through charging process including after the end of charging. In case of charging system malfunction, a means for safe disconnection may be provided. • EVCS must disconnect supply of electricity to prevent overvoltage at the battery, if output voltage exceeds maximum voltage limit permissible for the vehicle.



CEA Technical and Safety Guidelines	• EVCS shall not energise the charging cable when the vehicle connector is in unlock position. • The electric vehicle connector shall not unlock if the voltage between the vehicle connector and the earth is more than 60 V. • Only four core cable shall be used for charging points which require three phase power supply besides separate 2 runs of Earthing wires. For single phase, 3 core cables may be used including earthing. • Underground cables through the charging area or vehicles passage shall be avoided and if provided shall be at a minimum depth of one metre from the finished ground surface. • Underground cables shall not cross the underground oil tank or oil pipeline. • Safety clearance between the oil or gas dispenser and electric vehicle charging point shall be as per the order issued by the Authority. <u>Earth Protection System for the Charging Station:</u> • Each electric vehicle charging points shall be supplied individually by a dedicated sub-circuit protected by an overcurrent protective device complying with the relevant standards and the overcurrent protective device shall be part of a switchboard. • Co-ordination of all protective devices in the charging stations shall be ensured. • All electric vehicle charging stations shall be provided with an earth continuity monitoring system that disconnects the supply in the event of the earthing connection to the vehicle becomes ineffective. • The charging lead shall be fitted with an earth-connected metal shielding and the cable insulation shall be wear resistant and maintain flexibility over the operating temperature range. • A protective earth conductor shall be provided to establish an equipotential connection between the earth terminal of the supply and the conductive parts of the vehicle which shall be as per the relevant standards. <u>Requirement to Prevent Fire for Electric Vehicle Charging Station:</u> • The enclosure of electric vehicle supply equipment shall be made of fire-retardant material with self-extinguishing property and free from halogen. • The fire detection, alarm and control system shall be provided as per relevant standards. <u>Testing of Charging Station</u> • The owner of the charging station must ensure that the tests as specified in the manufacturer's instructions for the residual current device and the charging station have been carried out. <u>Maintenance of Records:</u> • The owner of the charging station shall keep records of design, construction and labelling to be compatible with a supply of standard voltage at a nominal frequency of 50 Hz of the charging station. • The owner of the charging station shall keep records of the relevant test certificates as indicated in these regulations and as per the relevant standards.

CEA Technical and Safety Guidelines	• The owner of the charging station shall keep records of the results of every inspection, testing and periodic assessment and details of any issues observed during the assessment and any actions required to be taken in relation to those issues. • The owner of the charging station shall retain a copy of all records, as specified in sub-regulation (1), (2) and (3) of above, either in hard form or in electronic form, for at least seven years and shall provide a copy of the records to the officials during the inspection.
Additional Fire Safety & Personnel Safety Recommendations	**Stakeholder Discussions and Recommendations were:** • No flammable or combustible material, other than those which form parts of the vehicle and their associated chargers, must be stored within the designated charging area. • Distribution shall be in such a way that load is balanced on all three phases. Further, branch wise/ phase wise loads may be monitored and protected against over load. In case of any overload, it shall be possible to reduce the charging current in that branch circuit or cut off some chargers (based on first cum first serve basis). • The EV Charging related power cables/ wires laid must not be taken along other service connections like gas lines/ pipes, fire exit paths etc. • Any type of EV must not be parked in fire escape routes where they may become an additional hazard in case of an evacuation. • All chargers and associated equipment must be installed, used, and maintained in accordance with the manufacturer's instructions. • Servicing and maintenance must be carried out by a competent licensed electrician. • Where multiple chargers are in use, there must be clear and prominent notices at each charging point indicating for which equipment or vehicle(s) i.e., AC or DC it is suitable. • Where DC fast charging stations are set up, these must be clearly differentiated by clear signs and labels from conventional charging points because of the hazards associated with the direct current. • While identifying common areas to set up common use EVCS (Public/ Captive charging), care must be taken to avoid children's play areas and these must ideally be made child-proof. A security guard / attendant may be provided by the RWA/ GHS/ Charging Station Owner/ Developer as added security and safety. • Charging bays must be signed and marked prominently on the ground to allow vehicles to park close to the charging point and prevent the stretching of charging cables. • An appropriate barricade/ barrier must be placed in front of the EVCS to avoid hitting the EV charger by an Electric Vehicle. • When creating separate EV Zones for common use charging stations such as PCS and CCS, it must be ensured that other vehicle types must not be allowed to park in these designated parking spaces. Signs/ labels on the ground and/ or on the front with clear visibility including presence of removable barriers may help towards this end as well. • Charging points should also be protected against the ingress of water and foreign objects. • The cables/ wires used for EVSE from Panel boards must have appropriate mechanical protection.



	• No EV charging stations and EV parking spaces must be set up within 10m of any combustible materials, be they waste materials, stock, or combustible elements of the structure. • No EV Charging stations and EV parking spaces must be within 15m of hazardous installations such as transformers, flammable liquid stores and liquefied petroleum gas tanks unless protected by 2hour fire rated walls. • For common use charging stations (PCS/CCS), the service provider app it is recommended may provide instructions on how to charge (given lots of existing EV users are also not aware about how to charge. • There must be a proper escape plan in case of emergencies from basements with sufficient illumination in parking areas at all levels. • Appropriate Civil Works must be carried out as directed by agencies. • Direct 15 A charging must not be undertaken for any type of vehicle. **E-2Ws and E-3Ws:** • Direct 15 A charging is not recommended for e-2Ws and e-3Ws and even for portable/ removable batteries of these types of vehicles. A dedicated EV charger that conforms to relevant standards may be utilized. • Removable / portable batteries of E-2Ws and E-3Ws must not be taken to individual flats/basement floors for charging. Further these must be checked periodically during charging for untoward heating and / or any other behaviour. • Dedicated parking spaces must be provided for e-2W and e-3Ws. • The service provider app must also provide instructions on how to charge (given lots of existing EV users are also not aware of how to charge). • Appropriate civil works must be carried out as directed by agencies. **Note:** Here, it is recommended that similar to the strategy used by the National Fire Protection Agency (NFPA) in the USA, first responder/ second responder emergency response guidelines may be developed, and EV OEMs may be urged to prescribe vehicle platform/ model specific emergency response guidelines.
Compliance Mechanism	**Appropriate Compliance Mechanisms:** Consensus was built on the need for appropriate compliance mechanisms covering High Rise Buildings and Low-Rise Buildings and across different Charging Station types (Public/ Captive/ Home).

Note: The official guidelines, "Guidelines for set up of EVCS in buildings in Telangana" will be released later officially after additional stakeholder government line department feedback along with the related Single Window Clearance process/ platform design.

3.2 Way Forward

- The above recommendations must be put together in the form of detailed guidelines that consider safety related infrastructure and compliance requirements for enabling faster roll out of EVCI in buildings particularly basements. These maybe officially launched after additional stakeholder consultation/ government line department feedback.

- Incentives against high upfront costs for set up of EVCS in buildings must be introduced in form of:

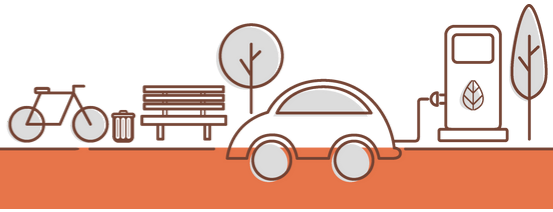
  1. Upfront subsidies and/ or additional Floor Area Ratio (FAR) permits.
  2. Waiver of demand charges for Net Zero buildings may be considered as an additional incentive.
  3. DISCOMs may take up responsibility of Distribution transformer set up in HT Category VI residential housing societies when load enhancement is needed due to additional EV loads, thereby parking costs under the Gross Fixed Asset (GFA) category.

- Need for set up of a Single Window Clearance platform for set up of EV Charging Stations (in buildings or any other premises) that seamlessly interacts with portals of other line departments/ agencies like B-Pass/ CEIG portal/ DISCOM portal/ others for obtaining relevant approvals/ power connections/ special EV Tariff meter/ load enhancement etc.

- Given rise in safety concerns due to increasing number of electric vehicle battery fires, there was initially a felt need to include Fire Services Department statutory approval in the EVCI permits/ approvals process. However, given that additional permits/ approvals will further burden and lower the ease of implementation of EVCI, recommendations were to consider seeking safety guidelines/ directives from Fire Services Department that may be adhered to by an applicant and submitted via a Self-Declaration form through the proposed Single Window Clearance portal. This self-declaration may be kept for record keeping with TSREDCO, DISCOM, CEIG as well as Fire Services Department.

- Need for central government to consider developing model first responder and second responder emergency response guidelines in case of Fire and Non-Fire hazards with EVs and EV batteries. Additionally, there is a need for these guidelines to provide a directive to EV OEMs to prescribe vehicle platform/ model specific emergency response guidelines similar to the mandate for EV OEMs in the USA.

- Once the guidelines and the SWC portal are launched and/ or announced, there will be need for targeted activities as part of Right to Charge Campaign on capacity building and awareness generation for various target stakeholder groups such as a) Architects/ Designers/ MEP Consultants, b) Real Estate Developers, c) RWAs, d) Government Stakeholders – DISCOM, DTCP, GHMC, R&B, CEIG, Fire Department etc., and e) Potential chartered safety engineers for empanelment by CEIG/ Fire Department.



----------KNOWLEDGE PARTNERS----------