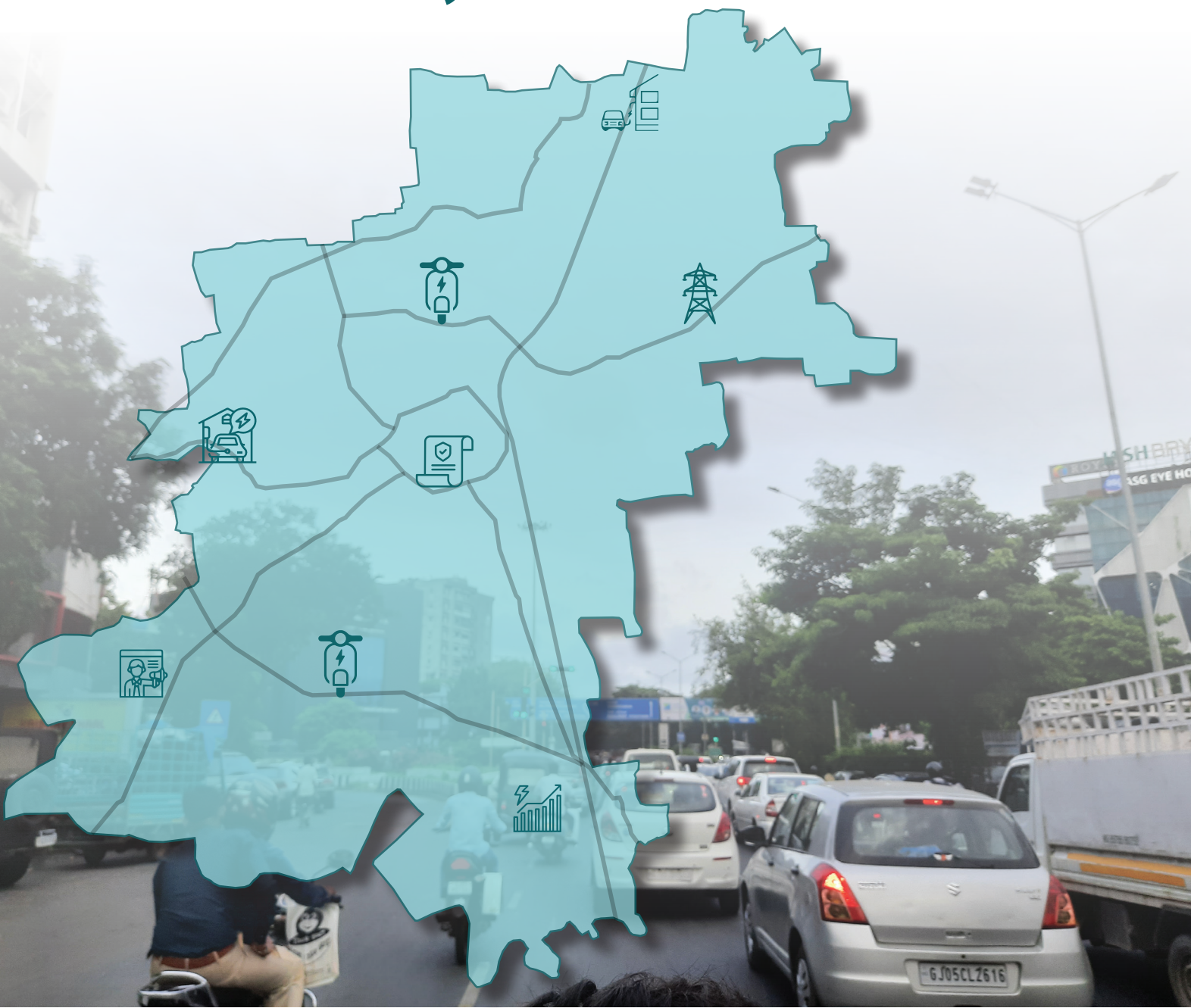




Amendments to Gujarat Comprehensive Development Control Regulations (GDCR) for EV ready Buildings

Surat City



Acknowledgement: ICLEI South Asia would like to express its sincere gratitude to the officials from Surat Municipal Corporation (SMC), Torrent Power, Surat SitiLink (SSL), Surat Urban Development Authority (SUDA), RTO Surat, and OEMs in Surat for their insights and guidance. The inputs from the Advisory Group members were crucial in finalizing the document.

Author: Dr. Saket Sarraf, Sameeha Sheth, Amrutha Balan (ps Collective)

Contributors: ICLEI South Asia: Ashish Rao Ghorpade, Vijay Saini, Nandini Shandilya

Year of Publishing: 2022

Copyright © ICLEI South Asia (2022)

No part of this booklet may be disseminated or reproduced in any form (electronic or mechanical) without prior permission from or intimation to ICLEI South Asia. Permission and information may be sought at (iclei-southasia@iclei.org).

Contact

ICLEI - Local Governments for Sustainability, South Asia

C-3 Lower Ground Floor, Green Park Extension, New Delhi – 110016, India Tel: +91-11-4974 7200

Email: iclei-southasia@iclei.org

Table of Contents

1. Background	4
1.1 Why amend GDCR?	4
1.2 Aim of this document	4
2. Basis of proposed amendments.....	5
2.1 Forecasts of EV stock.....	5
2.2 National and state level policies and guidelines.....	5
2.3 Model building byelaws (amendment) and the International code council recommendations	5
2.4 Global case studies	5
3. Proposed amendments to the General Development Control Regulations.....	6
3.1 Purpose	6
3.2 Applicability	6
3.3 Levels of EV readiness.....	6
3.4 Definitions.....	7
3.5 Building types.....	7
3.5.1 Residential buildings (Dwelling 1 and 2)	7
3.5.2 Residential places (Dwelling 3).....	8
3.5.3 Commercial buildings.....	8
3.5.4 Dedicated off-street charging stations.....	9
3.5.5 Summary	9
3.6 Retrofits	9
3.7 Guidelines and standards	10
3.7.1 General	10
3.7.2 Design considerations for all types of PCS.....	10
3.7.3 Accessibility.....	10
3.7.4 PCS in buildings.....	11
3.7.5 PCS (dedicated charging stations)	11
3.7.6 PCS for long distance and heavy-duty vehicles	12
3.7.7 DisComs and tariff.....	12
3.7.8 Data sharing.....	13
3.8 Compliance.....	13
3.9 GDCR revision.....	13

3.10	Discussions and next steps.....	14
Abbreviations		15
4.1	References.....	22
4.2	EV stock projections.....	16
4.3	GDCR: Basis of EVSE provisioning in GDCR.....	17
4.4	Guidelines for retrofit.....	19
4.5	Global case studies	20
4.6	List of some network service provides (NSPs)	21

1. Background

Addressing the quantum of emissions from the “Transport” sector emerges to be the high priority subject under the overarching umbrella of “Climate change mitigation” as committed to the UNFCC.

Encouraging Electric Vehicles as a viable option for phased transformation in terms of short and long-distance trips with appropriate Charging Infrastructure is a pre-condition for a phased migration to sustainable transportation.

In addition, the adoption of electric vehicles provides the following benefits to the city

- Reducing emission
- Reducing noise
- Improving air quality
- Supporting green and affordable mobility initiative
- Promoting green jobs and supporting the local economy
- Boosting the image of the city

Electric vehicle is considered a viable option only with the availability of adequate charging stations. Thus, it is necessary to make provisions for Electric vehicle Supply Equipment (EVSE) in buildings and public areas for vehicle re-fuelling / recharging. Amendments are therefore required to include the norms for charging Infrastructure provisions in General Development Control Regulations (GDCR) and enabling provisions for installing “Charging Infrastructure” in the building premises and core urban areas of the cities¹.

Based on available charging technologies and their evolution, type of vehicles, the types of chargers, indicating the number of charging points required for setting up adequate PCS within the local urban areas including the building premises of all building types, this document proposes amendments to the relevant section of the Gujarat Comprehensive Development Control Regulations, UD & UHD, Government of Gujarat. The recommendations are made with a time horizon up to 2030.

1.1 Why amend GDCR?

Amendments to the General Development Control Regulations or GDCR ensure that

- The buildings are ready to meet the current and future EV charging requirements
- EV adoption is safe, reliable, and affordable as most of the charging happens at home
- EVSE is accessible to the residents and visitors and does not compromise the safety of users and residents.
- EVSE is available at the time of need
- Cost of future retrofit to support EV charging is low
- Private entities to play a role in providing Public Charging Stations (PCS) by providing a transparent framework for action

1.2 Aim of this document

- Provide a basis for the proposed amendments to Gujarat GDCR
- Suggest changes to the code for different building types to make them EV ready
- Lists the compliance process to enforce the code, and
- Provide guidelines for retrofitting existing buildings

¹ MBBL 2022

2. Basis of proposed amendments

The proposed amendments to the GDCR are based on forecasts of EV adoption, National and state level EV policies, National model building bye-laws, and Global case studies. In addition, the amendments are mindful of the financial burden on developers and owners that may be caused by demanding additional infrastructure, while acknowledging the fast-changing dynamics of the EV industry. These are briefly discussed below.

2.1 Forecasts of EV stock

Electric vehicles as a percent of total vehicle sales are projected to increase up to 75% for two and three wheelers and as high as 50% for four wheelers by the year 2030². EVs may make up to 32% and 16% of the existing vehicle stock in 2030 as per calculations shown in Annexure 5.3. The proposed GDCR assumes a slightly higher EV share of 40% and 20% for two and four wheelers respectively in the total vehicle stock for 2030.

2.2 National and state level policies and guidelines

Following National and state level policies are taken into account in the proposed amendments

- Amendments in Model building bye-laws for electric vehicle charging infrastructure, Ministry of Housing and Urban Affairs (MoHUA), GOI, Feb 2019 and revised 2022. MBBL (2016).
- Amendments in Urban and regional plan formulation and implementation guidelines for electric vehicle charging infrastructure, Ministry of Housing and Urban Affairs (MoHUA), GOI, Feb 2019. URDPFI (2014).
- Gujarat State Electric Vehicle Policy-2021, Government of Gujarat, Ports and Transport Department, G.R. No.MVD-102019-840-Kh. Dated The 23rd June 2021. GSEVP (2021).
- Draft Battery Swapping Policy, Niti Aayog, April 2022
- Central Electricity Authority (Measures relating to Safety and Electric Supply) (Amendment) Regulations, 2019.
- Charging infrastructure for Electric Vehicles (EV) - the revised consolidated guidelines and standards No 12/2/2018-EV. 14 Jan 2022. CIEV, MoP (2022)
- Electricity (Rights of consumers) rules, Sec. 4 Sub- sec.11, 2020

2.3 Model building byelaws (amendment) and the International code council recommendations

The guidance provided in the “Amendments in Model building bye-laws for electric vehicle charging infrastructure, Ministry of Housing and Urban Affairs (MoHUA), GOI, Feb 2019 and revised in 2022”, and “Electric Vehicles and Building Codes: A Strategy for Greenhouse Gas Reductions, 2021” issued by the International Code Council are used to guide the proposed amendments in this document.

2.4 Global case studies

A review of EV related building bye-laws was conducted for about 30 global cities and two Indian states (Delhi and Karnataka). Refer to the Annexure 5.6 for the summary of global case studies.

² Status quo analysis of various segments of electric mobility, Niti Aayog, 2021

3. Proposed amendments to the General Development Control Regulations

In Chapter 25 titled Environmental Management, of the PART-III of the Gujarat General Development Control Regulations 2017, the following shall be inserted³:

25.9 Electric Vehicle Charging Infrastructure (EVCI)

Charging infrastructure (CI) shall be provided for Electric Vehicles (EVs), as a percent of the total parking spaces required as per the Zonal Regulations in all types of buildings. The provisions shall be for CI for private use or for Public Charging Stations (PCS) as specified in this Chapter. Additionally, the building shall have an additional power load, equivalent to the power required for all charging points (for the private CI and PCS) to be operated simultaneously, with a safety factor of 1.25⁴.

3.1 Purpose

To achieve the benefits of improved mobility, improved air quality and, climate change mitigation, amendments to GDCR are proposed⁵

- To enable faster adoption of electric vehicles by ensuring safe, reliable, accessible, and affordable Charging Infrastructure and ecosystem
- To proactively support the creation of EV Charging Infrastructure
- To provide for affordable tariff chargeable from Charging Station Operators/Owners and Electric Vehicle (EV) owners
- To generate employment/income opportunities for small entrepreneurs
- To encourage preparedness of the electrical distribution system to adopt EV Charging Infrastructure

3.2 Applicability

The requirements of this Part shall apply to new buildings or substantial modification in existing structures.

3.3 Levels of EV readiness

The code proposes two levels of EV readiness

EVSE capable parking bays: These parking bays prepare for future EVSE installation. They will host Electric Vehicle Supply Equipment (EVSE) whose electrical load is accounted for in the total load calculation of the building. The load should be accounted for Level 1 slow chargers in the case of two wheelers and Level 2 slow chargers in the case of four wheelers. Installation of electrical circuit or a plug outlet for every parking bay designated for EV is not a requirement, though is advisable to reduce the cost of future retrofits.

EVSE installed parking bays: Parking bays with EVSE that is fully installed from electrical panels to charging guns and is ready to use.

³ The proposed amendments focus on the environment management and performance of the building and are hence included in part III of the GDCR

⁴ refer to the section "Guidelines and Standards" for the rationale

⁵ CIEV, MoP, 2022

3.4 Definitions

Electric Vehicle: An automotive-type vehicle for on-road use primarily powered by an electric motor that draws current from an onboard battery charged through a building electrical service, electric vehicle supply equipment (EVSE), or another source of electric current.

Electric Vehicle Supply Equipment (EVSE) shall mean an element in electric vehicle (EV) charging infrastructure that supplies electric energy for recharging the battery of the EV. CIEV, MoP (2022).

AC-Slow Charging: The house 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 alternating current (AC) to the vehicle's onboard charger which in turn shall convert the AC power to DC, allowing the battery to be charged.

DC-Fast Charging: Direct current (DC) shall be sent to the electric car's battery directly via the charge port. FC chargers (usually 50 KW or more) may supply 100 or more kilometres of range per hour of charging. The fast chargers shall be used as a top-up, rather than fully charging vehicles, for cab companies and corporate users who have a fleet of electric cars.

Private charging: Charging batteries of privately owned cars through domestic charging points.

Public Charging Station (PCS) Any Charging Infrastructure (CI) installed at public or private areas or building premises of any category that caters to the commercial mode of charging of EVs shall be deemed as a PCS.

Battery Charging Station (BCS) shall mean a station where the discharged or partially discharged electric batteries for electric vehicles are electrically recharged. For all practical purposes, Battery Charging Station (BCS) shall be treated at par with Public Charging Station (PCS), and the applicable tariff for electricity supply shall also be the same as for PCS. CIEV, MoP (2022).

Battery Swapping Station (BSS) shall mean a station where any electric vehicle can get its discharged battery or partially charged battery replaced by a charged battery. CIEV, MoP (2022).

Captive Charging Station (CCS) shall mean an electric vehicle charging station exclusively for the electric vehicles owned or under the control of the owner of the charging station e.g., Government Departments, Corporate houses, Bus Depots, charging stations owned by the fleet owners, etc. and shall not be used for commercial purpose. CIEV, MoP (2022).

3.5 Building types

The proposed amendment applies to all building types. Note that the code does not stipulate mandatory charging infrastructure for buildings with less than 20 parking spaces (except in dwelling type 1 or 2)⁶.

3.5.1 Residential buildings (Dwelling 1 and 2)

Ownership: Individual EV owners

Connection: Domestic

Metering: Domestic tariff

Usage: Dedicated charging for personal EV

Locations: Independent homes

Operation: Self-operated or CPO-managed

Code

- The type of charger will be as per the owner's specific requirement

⁶ Detached or semi-detached private home

- Mode of charging will be as per the owner's specific requirement. The provisioned load should be calculated for AC slow charger
- The parking bay should be EV capable if provided. If there is a provision for parking more than one vehicle, at least one bay should be EV capable for each vehicle type
- No separate approval is required for the installation of EVSE

Note: The charging infrastructure installed by a homeowner shall be construed as a Private CI meant for self-use (non-commercial basis)

3.5.2 Residential places (Dwelling 3)⁷

Building types included: Apartments, Hotels, Hostels

Usage: Shared charging for a restricted set of EV users

Connection: Domestic/Commercial connection

Metering: Domestic/Commercial or EV special tariff with an EV meter

Ownership: Private, Host property, Original Equipment Manufacturers (OEMs), or Charge Point Operators (CPOs)

Operation: Resident association/Facility owner/CPO-managed

Management: The RWA should ensure that the PCS is maintained as per rules and does not cause any nuisance to the residents

Code

- All EV bays are counted as part of the required parking area and are free of FSI
- EVSE capable parking bays
 - 40% of 2W parking bays, and
 - 20% of 4W parking bays
 - These need not be marked on the approval plan
- Public charging stations (PCS) with EVSE installed parking bays
 - PCS should include additional number of kiosk/chargers beyond the minimum specified requirements of EVSE capable parking bays to meet the ratio of charging points as prescribed below (by the type of vehicles)
 - SC for 5% of all 2W and 3W parking bays, and
 - SC for 2.5% and FC for 0.5% of all 4W parking bays
 - The building should have at least 20 numbers of 2W, or 20 numbers of 3W, 40 numbers of 4W, or 10 bus parking bays to require a PCS
 - Location: Visitors parking, common plot area, margins. It should be accessible, and not hamper the movement of vehicles. The location of PCS along with the number and type of chargers should be marked on the plan
 - Operation only after inspection and technical clearance from CEI

Refer to Annexure 5.4 for an example with calculations

3.5.3 Commercial buildings

Building types included: office buildings, shopping malls, hospitals, universities, government buildings, etc.

Usage: Shared charging for a restricted set of EV users

Connection: Commercial connection

Metering: Commercial or EV special tariff with an EV meter

Ownership: Private, Host property, Original Equipment Manufacturers (OEMs), or Charge Point Operators (CPOs)

Management: The RWA should ensure that the PCS is maintained as per rules and does not cause any nuisance to the residents

Code:

- All EV bays are counted as part of the required parking area and are free of FSI
- EVSE capable parking bays

⁷ E.g., Apartments, Hotels, Hostels

- 20% of all 2W and 3W parking bays, and
- 10% of 4W parking bays
- These need not be marked on the approval plan
- Public charging stations (PCS) with EVSE installed parking bays
 - PCS should include additional number of kiosk/chargers beyond the minimum specified requirements of EVSE capable parking bays to meet the ratio of charging points as prescribed below (by the type of vehicles)
 - SC for 5% of all 2W and 3W parking bays
 - SC for 2.5%, and FC for 0.5% of all 4W parking bays, and
 - 1 FC for each 10 Bus bays
 - The building should have at least 20 numbers of 2W, 20 3W, 40 4W, or 10 bus parking bays to require a PCS
 - In addition to the above EVSE requirement, FCB CS and BS may be provided at the discretion of the service provider
 - Location: Visitors parking, common plot area, margins. It should be accessible, and not hamper the movement of vehicles. The location of PCS along with the number and type of chargers should be marked on the plan
 - Operation only after inspection and technical clearance from CEI

3.5.4 Dedicated off-street charging stations

Refer to section 10 of the Comprehensive Development Control Regulations – 2017, UD & UHD, Govt. of Gujarat for code related to the area of the building unit and frontage, location, maximum permissible ground coverage, and margins, heights, FSI, and parking requirements.

Refer to additional guidelines in section 4.7.6 of this document for off-street charging stations.

3.5.5 Summary

The summary of EVSE related code for various building types discussed above is presented below.

Rule	2/3W			4W			Bus	
	EV capable bays	EVSE installed bays (SC, PCS)	Eligibility (min parking for PCS)	EVSE capable bays (SC)	EVSE installed bays (SC, PCS)	EVSE installed bays (FC, PCS)	Eligibility (min parking for PCS)	Fast charger
Single family	1			1				
Apartment complex	40%	5%	20	20%	2.50%	0.50%	40	10%
Commercial	20%	5%	20	10%	2.50%	0.50%	40	10%
- All figures are expressed as percent of the total parking provided for the given vehicle type as per the current GDCR								
- The number of EV ready bays are to be considered as part of EV capable bays when doing the calculations								
Example	2 Wheeler parking		200					
	4 Wheeler parking		200					
	Bus		10					
	2/3W			4W			Bus	
	EV capable bays	EVSE installed bays (SC, PCS)		EVSE capable bays (SC)	EVSE installed bays (SC, PCS)	EVSE installed bays (FC, PCS)		Fast charger
Apartment complex	80	10		40	5	1		1
Commercial	40	10		20	5	1		1

3.6 Retrofits

If the modification/retrofit involves changes to more than 50% of the floor area (or more than 10 parking spaces are added), the EV regulations will apply to the entire facility.

3.7 Guidelines and standards⁸

3.7.1 General

- These standards provide minimum EV enabled parking requirements.
- Minimum infrastructure requirements shall not apply to Private Charging Points which are meant for self-use of individual EV owners at home and office (non-commercial basis).
- When the calculation of the number of EV ready or capable parking bays results in a fraction, it should be rounded DOWN to the nearest whole number
- Type of charger to be provided as per the minimum requirements specified in MoP Guidelines
- All CI should meet technical, safety, performance standards, and protocols laid by the Bureau of Energy Efficiency (BEE) and Central Electric Authority (CEA) from time to time (CIEV 2022⁹)
- Electrical load provision should be for all EV capable bays + PCS with a safety load factor of 1.25. With further advancement of charging technologies and the enhanced capacity of chargers to draw more power, it is advised that the load capacity assigned to each premise should be kept with a safety factor of 1.25 with a long-term vision
- All housing and commercial establishments shall give a 'No Objection Certificate' (NOC) to its members who wish to install charging stations with designated parking spaces (GEVP 2021)
- Connectivity regulations and Safety norms shall be defined by respective authorities such as Central Electric Authority/MoP for grid access to such PCS / any other charging station/infrastructure.
- Battery swapping
 - The option of Battery Swapping (BS) for privately owned 2-Wheelers and PV(Cars) shall be limited to Private CI.
 - For 3-Wheelers, the BS shall be made available in PCS, for faster recharge experience only.
- For PV (Buses), Captive Fast charging infrastructure for 100% internal use for fleets may be adopted by privately owned Depots/Garages.
- Captive charging infrastructure for 100% internal use for a company's own fleet shall not be required to install all types of chargers and to have NSP tie-ups.

3.7.2 Design considerations for all types of PCS¹⁰

- Charging equipment must be mounted on the wall or on a structure at the end of the electric vehicle parking space provided.
- No charging devices may be placed within the dimensions of a space on the sides or entrance to a space.
- When cords and connectors are not in use, retraction devices or locations for storage shall be located sufficiently above the pedestrian surface and the parking lot as to reduce conflicts with pedestrians and vehicle manoeuvring.
- Cords, cables, and connector equipment shall not extend across the path of travel in any sidewalk or walkway.
- Equipment mounted on structures such as pedestals, lighting posts, bollards, or other device shall be located in a manner that does not impede pedestrian, bicycle, or transit travel.

3.7.3 Accessibility

- A minimum of one EVSE installed space shall be located adjacent to Divyang designated space to provide access to the charging station at all Public Charging Stations (PCS) within the buildings and at on/off street locations.
- The accessible space must be designated as an EV reserved space.

⁸ This section is adapted from MBBL 2022 with very minor modification and will require detailed consultation with stakeholders

⁹ "Charging stations to meet the guidelines and standards of the Ministry of Power Circular, dated 1st October 2019 and any amendments thereafter."

¹⁰ Orlando EV readiness guide, 2021

- These EVSE accessible spaces should have all relevant parts located within accessible reach, and in a barrier-free access aisle for the user to move freely between the EVSE and the electric vehicle.

3.7.4 PCS in buildings

- Any person seeking to set up a Public Charging Station may apply for connectivity and he shall be provided connectivity on priority by the Distribution Company licensee to supply power in the area.
- Any Charging Station or Chain of Charging Stations may also obtain electricity from any generation company through open access.
- Setting up of Public Charging Stations (PCS) shall be a de-licensed activity and any individual or entity is free to set up public charging stations provided that, such stations shall meet the technical as well as performance standards and protocols laid down below, as well as any further norms, standards or specifications laid down by the Ministry of Power and Central Electricity Authority from time to time.
- Any Charging Infrastructure (CI) installed as a PCS and shall have to install the minimum requirements of chargers as specified in the guidelines issued vide No. 12/2/2018-EV, dated 14.12.2018 by the Ministry of Power, Government of India
- Public Charging Station service providers shall be free to create charging hubs and to install additional number of kiosk/chargers in addition to the minimum chargers prescribed here, including options for installation of additional chargers, if required.
- On spot payment options to be available for all users
- Charging station data of PCS to be shared with the City and DisComs, and one online Network Service Providers (NSPs)
- Every Public Charging Station (PCS) shall be operational only after inspection and clearance as communicated by a suitable clearance certificate, by the concerned electrical inspector or technical personnel, designated specifically by the respective DisCom for this purpose. DisCom may also empanel one or more third party authorized technical agencies for this purpose.
- Electric Vehicle Service Equipment (EVSE) shall be type tested by an appropriate reputed authority.
- Public Charging Station may have the option to add Stand-alone battery swapping facilities in addition to the above mandatory facilities, provided space and other conditions permit.

3.7.5 PCS (dedicated charging stations)

Every Public Charging Station (PCS) shall have the following minimum infrastructure:

- An exclusive transformer with all related substation equipment including safety appliances
- 33 or 11 KV line or cables with associated equipment including as needed for line termination, metering, etc.
- Appropriate civil works
- Adequate space for charging and entry or exit of vehicles
- The kiosk or board may have options for installation or additional chargers if required
- The Public Charging Station Providers shall be free to create Charging Hubs and to install additional number of Kiosk or Chargers in addition to the minimum number of chargers prescribed above
- Tie-up with at least one online Network Service Providers (NSPs) to enable advance remote or online booking of charging slots by EV owners. Such online information to EV owners shall include information regarding location, types, and numbers of chargers installed or available, etc.
- Appropriate public amenities
- The following additional infrastructure shall be provided
 - appropriate Liquid Cooled Cables, if high speed charging facility for onboard charging of Fluid Cooled Batteries (FCBs) is provided; and
 - appropriate Climate Control Equipment for Fast Charging of batteries to be used for swapping (i.e., not onboard).

Public Charging Stations shall have one or more electric kiosks or boards with the installation of all the charger models as follows:

Charger Type	Charger Connectors*	Rated Voltage (V)	No. of Charging Points/No. of Voltage (V) Connector guns (CG)
Fast	CCS (min. 50 kW)	200-1000	1/ 1 CG
	CHAdeMO (min. 50 kW)	200-1000	1/ 1 CG
	Type-2 AC (min. 22 kW)	380-480	1/ 1 CG
Slow/ Moderate	Bharat DC-001 (15 kW)	72-200	1/1 CG
	Bharat AC-001 (10 kW)	230	3/3 CG of 3.3 kW each
*In addition, any other fast/slow/moderate charger as per approved BIS standards whenever notified.			

3.7.6 PCS for long distance and heavy-duty vehicles

Public charging Infrastructure (PCI) for long distance EVs and/or heavy duty EVs like trucks, buses, etc. shall have the following minimum requirements, namely

- at least two chargers of minimum 100 kW (with 200-1000 V), each of different specification (CCS & Chaderno) and with a single connector gun, each in addition to the minimum charging infrastructure requirements as mandated for Public Charging Stations in para 3.
- appropriate Liquid Cooled Cables for high-speed charging facility for onboard charging of Fluid Cooled Batteries, currently available in some long range EVs.

Fast-Charging Stations (FCS) for Long Distance EVs and/or Heavy Duty EVs may also have the option of swapping facilities for batteries, for meeting the charging requirements. For Fast Charging or Long-distance use of EVs and/or for Heavy Duty Vehicles like buses/trucks etc. FCBs shall have a higher charging rate and longer life. Such Fast-Charging Stations (FCS) which are meant only for 100% in-house/captive utilization, for example, buses of a company, shall be free to decide the charging specifications as per requirement for its in-house company EVs.

For long range EVs, like long range SUVs and heavy duty EVs like buses, trucks, etc., there shall be at least one Fast Charging Station with Charging Infrastructure Specifications at every 100 km, one on each side of the highway or road located preferably within or alongside the stations. Within cities, such charging facilities for heavy duty EVs shall be located within Transport Nagars, and bus depots. Swapping facilities shall not be mandatory within cities for Buses, trucks, etc.

3.7.7 DisComs and tariff

- The State Distribution Licensees (DisComs) shall allow charging of EVs from the existing connection of a Consumer at the existing tariff, except from agriculture connection. (GSEVP, 2021)
- The tariff for new third-party owned EV charging infrastructure shall be as per the GERC tariff order for utilities dated 31.03.2018 and any amendments thereafter. (GSEVP, 2021)
- "The Gujarat Electricity Regulatory Commission (GERC), pursuant to the above policy, has declared concessional electricity tariff for EV charging stations at Rs. 4/unit to the HT connection holders and Rs. 4.1/Unit for LT connection holders with 100% exemption in the electricity duty (GSEVP, 2021)
- The tariff applicable for domestic consumption shall be applicable for domestic charging.
- Any person seeking to set up a Public Charging Station may apply for connectivity and shall be provided connectivity on priority by the Distribution Company licensee to supply power in the area.
- Any Charging Station or Chain of Charging Stations may obtain electricity from any generation company through open access.

3.7.8 Data sharing

The PCS data for all building types will be shared digitally and in real-time with the following as per appropriate protocols

- Network Service Provider (NSP)
- ULB
- DisCom and CEA

City shall create and maintain an online database of all the Public Charging Stations. Appropriate protocols shall be notified by DisComs for this purpose which shall be mandatorily complied by the PCS or BCS. The data on charger type (slow or fast), energy consumed, and hours used by vehicle type should be shared at the minimum.

3.8 Compliance

The compliance for EV readiness will happen at three stages of project lifecycle namely project approval, building use permission and during operations, as detailed below.

Project approval stage

- Mention the total parking bays (by vehicle types)
- Calculate the number of EV bays by vehicle types
- Mark Public charging points by charger type, vehicle type on the plan
- Provide for additional electrical load, meters and transformers

Building-use permission stage

- Affidavit for meeting standards and safety compliance as per MoP guidelines
- NoC from DisCom (Grid readiness, load calculations including EVCI)
- NoC from Chief Electricity Inspector (Standards & electrical safety)
- NoC from Fire inspector (Fire safety)

Operations stage

- NoC from Chief Electricity Inspector (Standards & electrical safety) every 2 years

Private homes: Charger type and location along with the parking to be shown in approval drawing

Off street charging stations: Additional compliance for dedicated off street charging stations include NOC from Traffic Police and Transport department

3.9 GDCR revision

The number of EV ready bays and installed chargers in PCI (by vehicle and charger types) as specified in this version of the code will be doubled from 2027 for all building types in response to the changing EV market and technology landscape in the country.

The updated version of the code may include provisions for mandatory retrofits.

The State Government may undertake a mid-term review of this Policy as and when the need arises because of any technological breakthrough or to remove any difficulties or inconsistency with the Electricity Act 2022, as amended from time to time.

3.10 Discussions and next steps

The recommendations in this document have evolved from interactions with real estate developers, ULB officials, Charging Point Operators (CPOs), and other stakeholders. There is a consensus about the need for having EV ready buildings, and using GDCR as an instrument to achieve this goal.

Certain issues were raised during final consultations about the current regulatory frameworks that need further consultation and engagement at the state government level. These include discussions at the state level with Gujarat Electricity Regulatory Commission (GERC), Urban Development and Urban Housing Department (UDD), the Gujarat Real Estate Regulatory Authority (RERA), and engagement with other stakeholders like the Developer's organization like CREDAI, EV dealers' association, OEMs and Charge Point Operators.

Some additional points that are worth considering to further develop the bye-laws may include

- Exploring the opportunities for integrating solar photovoltaics with charging infrastructure
- Deliberating on the feasibility of battery swapping facilities in the local context.

Abbreviations

2W	Two wheelers
3W	Three wheelers
4W	Four wheelers
BSS	Battery swap station
CEI	Chief electrical inspector
CI	Charging infrastructure
CPO	Charging point operators
CVs	Commercial vehicles
DisCom	(Electricity) Distribution company
EV	Electric vehicles
EVCI	Electric vehicle charging infrastructure
EVSE	Electric vehicle supply equipment
FC	Fast charger / Fast charging (DC and a few AC ones)
FCB CS	Fluid cooled battery charging station
GDCR	General development control regulations
NSP	Network service provider (information network)
OEM	Original equipment manufacturer
PCI	Public charging infrastructure
PCS	Public charging station
RWA	Resident welfare association
SC	Slow charger / Slow charging (AC)

4.1 EV stock projections

EV stock calculations for 2030

	2W	4W														
					Total sales ('000s)		EV share in sales		New EV added		Stock (total)		Stock (EV)		EV share in stock	
Vehicle life (years)	7	15														
% scrapped before EoL	10%	10%														
					2W	4W	2W	4W	2W	4W	2W	4W	2W	4W	2W	4W
Annual vehicle sales growth	7%	7%		2005	100	100										
				2006	107	107										
				2007	114	114										
				2008	123	123										
				2009	131	131										
				2010	140	140										
				2011	150	150										
				2012	161	161										
				2013	172	172										
				2014	184	184										
				2015	197	197										
				2016	210	210										
				2017	225	225										
				2018	241	241										
				2019	258	258										
				2020	276	276	1%	1%	3	3	1,614	2,538	3	3	0%	0%
Annual vehicle sales growth	11%	11%		2021	306	306	2%	1%	5	5	1,738	2,726	7	7	0%	0%
	(10%-20%)	(10%-15%)		2022	340	340	2%	2%	8	7	1,882	2,939	15	14	1%	0%
				2023	377	377	4%	3%	14	12	2,048	3,179	28	25	1%	1%
				2024	419	419	6%	5%	24	20	2,240	3,450	50	44	2%	1%
				2025	465	465	9%	7%	40	33	2,460	3,755	88	75	4%	2%
				2026	516	516	13%	10%	69	54	2,713	4,099	153	126	6%	3%
				2027	573	573	21%	15%	118	89	3,002	4,485	263	209	9%	5%
				2028	636	636	32%	23%	201	145	3,332	4,919	450	346	14%	7%
				2029	706	706	49%	34%	344	239	3,699	5,406	770	570	21%	11%
EV share 2030 in sales	75%	50%		2030	783	783	75%	50%	588	392	4,106	5,954	1,316	937	32%	16%

4.2 GDCR: Basis of EVSE provisioning in GDCR

Group housing					
Total Parking as per GDCR			400		
Calculations					
	Total Parking			EV bays	
	Total	2W	4W	2W	4W
		50%	50%	40%	20%
Allotted	360	180	180	72	36
Visitors	40	20	20	8	4
	400	200	200	80	40

Charging points Public Charging Station (PCS)					
	2W		4W, SC	4W, FC	
unallotted	8.3%	6.6	8.3%	3.3	
resident	1.7%	1.19	1.7%	0.59	0.96
visitor	25.0%	2	25.0%	1	
	9.8		4.9	0.960	
round off	5.0%		2.5%	0.50%	
	0.12235		0.12235	0.024	
	8.2		8.2	41.7	
	1 in 8		1 in 8	1 in 40	

Assumptions

2W	SC	There are 25% additional vehicles owned by the residents than the parking provided, 33% of them may want to charge at any time (6 hrs charging per vehicle) 5% resident may have emergency use on any given day, 33% of them may want to use the charger at any given time 25% of visitors may want to charge at any given time
4W	SC	There are 25% additional vehicles owned by the residents than the parking provided, 33% of them may want to charge at any time (8 hrs charging per vehicle) 5% resident may have emergency use on any given day, 33.33% of them may want to use the charger at any given time 25% of visitors may want to charge at any given time
	FC	20% resident/visitor/unallotted parking with EVs may have super emergency use on any given day. One FC can charge 10 cars comfortably in a day, after scheduling gaps

Example: Apartment building

Total Parking shown in approval drawing (4W) 200
Total Parking shown in approval drawing (2W) 200

	Total Parking			EV bays	
	Total	2W	4W	2W	4W
		100%	100%	40%	20%
Alotted	90%	180	180	72	36
Visitors	10%	20	20	8	4
	1	200	200	80	40

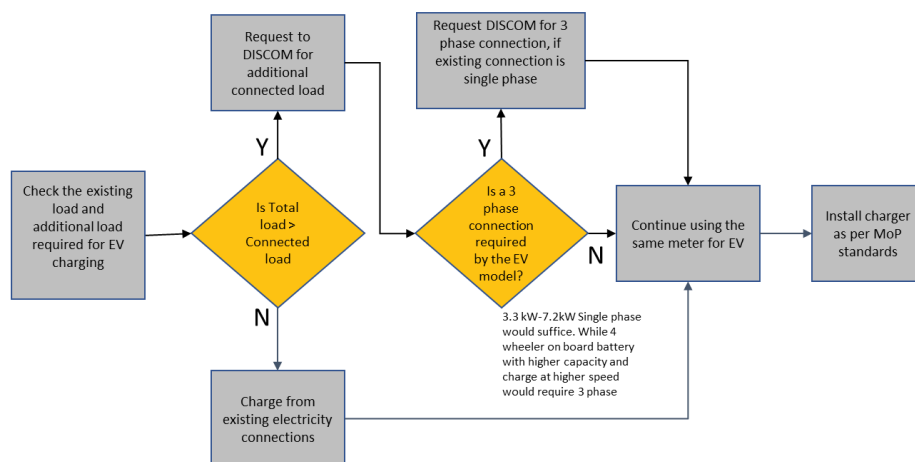
	Charging points, Public Charging Station (PCS)		
	2W/SC	4W/SC	4W/FC
Rule	5%	2.5%	0.5%
Number of chargers	10	5	1

	Cost of chargers (PCS)		
	2W/SC	4W/SC	4W/FC
Unit costs	10,000	10,000	1,250,000
Cost	100,000	50,000	1,250,000
	Total cost 1,400,000		
	+ electric connection, transformer, meters, wiring, civil work		

	Electrical load		
	2W/SC	4W/SC	4W/FC
kW/Charger	3.3	7.2	22
PCS chargers	10	5	1
PCS charger load	33	36	22
EV bay chargers	80	40	
EV bays load	264	288	0
	297	324	22
			643
		Safety factor	1.25
	Additional EV load (kW)		804

4.3 Guidelines for retrofit

Voluntary retrofit flowchart

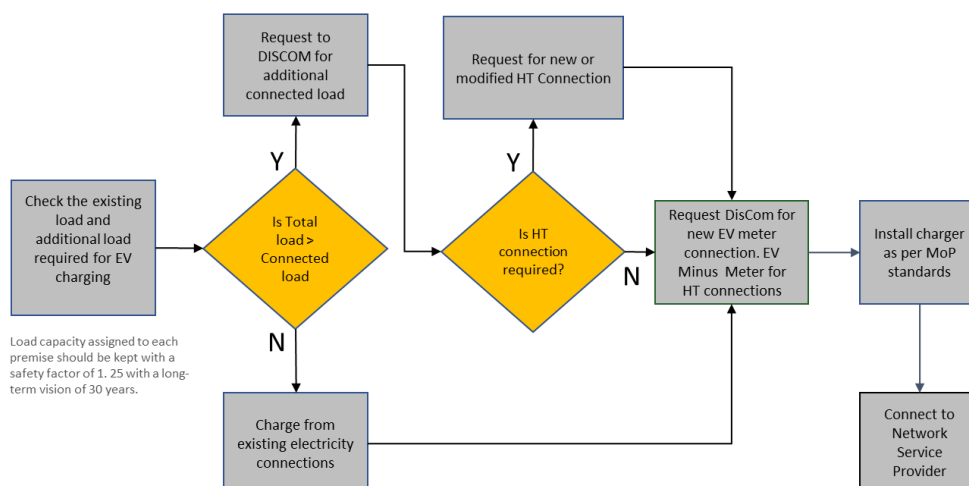


Residential (Private) / Plotted House

75

Voluntary retrofit flowchart

All housing and commercial establishments shall give a 'No Objection Certificate' (NOC) to its members who wish to install charging stations with designated parking spaces (GEVP 2021)

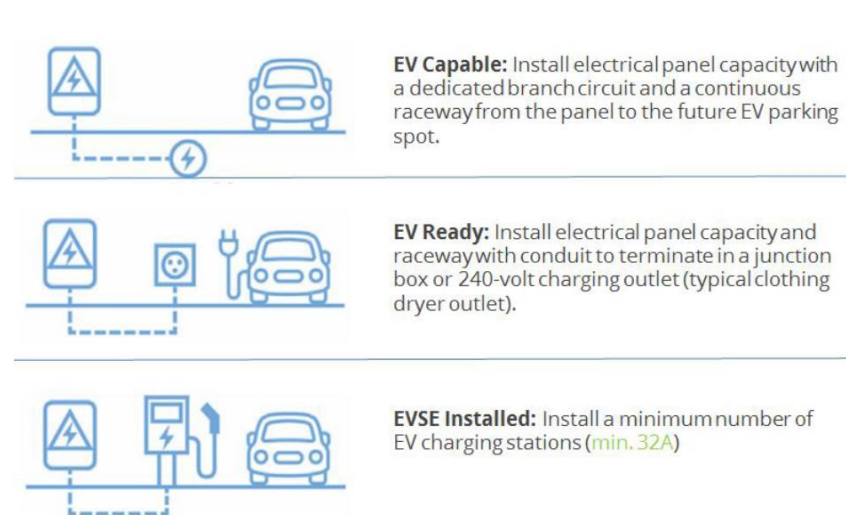


RWA / Commercial

76

4.4 Global case studies

Globally, cities are talking about three levels of EV readiness as shown below¹¹.



Review of the building code for about 30 cities shows a varying degree of the above three levels of readiness.

ULB/State	Year	Single-Family	Multifamily	Commercial
Orlando, FL	2021	-	20% EV-Capable	10% EV-Capable, 2% EV-Installed (250+ spaces)
Avon, CO	2021	1 EV-Ready Space per dwelling Unit	5% EV-Installed, 10% EV-Ready, 15% EVCapable (7+ spaces)	5% EV-Installed, 10% EV-Ready, 15% EVCapable (10+ spaces)
St. Louis, MO	2021	1 EV-Ready Space per dwelling Unit	2% EV-Installed, 5% EV-Ready (increases to 10% in 2025)	2% EV-Installed, 5% EV-Ready
Madison, WI	2021	-	2% EV-Installed, 10% EV-Ready (increases by 10% every 5 years)	1% EV-Installed (increases by 1% every 5 years), 10% EV-Ready (increases by 10% every 5 years)
Washington D.C.	2021	-	20% EV-Ready (3+ spaces)	20% EV-Ready (3+ spaces)
Summit County, CO	2020	1 EV-Ready Space per dwelling Unit	5% EV-Installed, 10% EV-Ready, 40% EVCapable (10+ spaces)	5% EV-Installed, 10% EV-Ready, 40% EVCapable (25+ spaces)
Dillon, CO	2020	1 EV-Ready Space per dwelling Unit	5% EV-Installed (at least 1 dual-port charging station), 10% EV-Ready, 40% of remaining spaces EV-Capable (10+ spaces)	5% EV-Installed (at least 1 dual-port charging station), 10% EV-Ready, 40% of remaining spaces EV-Capable (25+ spaces)
Breckenridge, CO	2020	1 EV-Ready Space per dwelling Unit	5% EV-Installed, 10% EV-Ready, 40% EVCapable (10+ spaces)	5% EV-Installed, 10% EV-Ready, 40% EVCapable (25+ spaces)
Frisco, CO	2020	1 EV-Ready Space per dwelling Unit	2 EV-Installed Spaces, 20% EV-Capable (26+ spaces)	2 EV-Installed Spaces, 20% EV-Capable (26+ spaces)
Salt Lake City, UT	2020	-	1 EV-installed per 25 spaces (>5,000sf)	1 EV-Installed per 25 spaces (>5,000sf)
Denver, CO	2020	1 EV-Ready Space per dwelling Unit	5% EV-Installed, 15% EV-Ready, 80% EV-Capable	5% EV-Installed, 10% EV-Ready, 10% EV-Capable
Honolulu, HI	2020	1 EV-Capable Space per dwelling unit	25% EV-Ready (8+ spaces)	25% EV-Ready (12+ spaces)
Chicago, IL	2020		20% EV-Ready (5+ spaces)	20% EV-Ready (30+ spaces)
Lakewood, CO	2019	1 EV-Capable Space per dwelling unit	2% EV-Installed, 18% EV-Capable (10+ spaces)	2% EV-Installed, 13% - 18% EV-Capable (10+ spaces)
Flagstaff, AZ	2019	1 EV-Ready Space per dwelling Unit	3% EV-Ready	3% EV-Ready
Massachusetts	2019	-	-	1 EV-Ready space (15+ spaces)

¹¹ [iccsafe.org](https://www.iccsafe.org)

Seattle, WA	2019	1 EV-Ready Space per dwelling Unit	100% EV-Ready up to 6 space, 20% for parking lots with 7+ spaces	10% EV-Ready
Sedona, AZ	2019	1 EV-Capable Space per dwelling Unit	-	5% EV-Capable
Golden, CO	2019	-	1 EV-Installed Space per 15 parking space, 15% EV-Capable	
San Jose, CA	2019	1 EV-Ready Space per dwelling Unit	10% EV-Installed, 20% EV-Ready, 70% EV-Capable	10% EV-Installed, 40% EV-Capable
Fort Collins, CO	2019	1 EV-Capable Space per dwelling Unit	10% EV-Capable	-
Vancouver, BC	2019	1 EV-Ready Space per dwelling Unit	100% EV-Ready	10% EV-Ready
Oakland, CA	2018	-	10% EV-Ready, 90% "Raceway Installed", 20% total panel capacity	10% EV-Ready, 10% "Raceway Installed", 20% total panel capacity
Atlanta, GA	2017	1 EV-Capable Space per dwelling Unit	20% EV-Capable	
Aspen, CO	2017	1 EV-Capable Space per dwelling Unit	3% EV-Capable (240V individual circuit branch with EV CAPABLE labelling)	-
San Francisco, CA	2017	1 EV-Ready Space per dwelling Unit	10% EV-Ready, Panel Capacity for 20%, Raceway for 100%	
Palo Alto, CA	2017	1 EV-Capable Space per dwelling Unit	1 EV-Ready Space per Unit, 20% EV-Capable for Guest Parking with 5% EV-Installed	20% EV-Capable, 5% EV-Installed
Oregon	2017	-	5% EV-Ready	
Boulder County, CO	2015	1 EV-Ready Space per dwelling Unit	2% EV-Ready (for new construction and 50% or 5,000 SF additions)	
Washington	2015	-	For Group B, Group R-1 hotel and motel only, Group R-2 occupancies: 5% of parking spaces shall be EV Capable. Size electrical room to serve 20% of spaces	
New York City, NY	2013	-	20% EV-Capable	-
California (CALGreen)	2010	1 EV-Capable Space per dwelling Unit	10% EV-Capable	

4.5 List of some network service provides (NSPs)

Following are some of the existing Network service providers



4.6 References

- Amendments in Model building bye-laws for electric vehicle charging infrastructure, Ministry of Housing and Urban Affairs (MoHUA), GOI, Feb 2019 and revised 2022. MBBL (2016).
 - Amendments in Model building bye-laws for electric vehicle charging infrastructure, Ministry of Housing and Urban Affairs (MoHUA), GOI, Feb 2019 and revised 2022. MBBL (2016).
 - Amendments in Urban and regional plan formulation and implementation guidelines for electric vehicle charging infrastructure, Ministry of Housing and Urban Affairs (MoHUA), GOI, Feb 2019. URDPFI (2014).
 - Gujarat State Electric Vehicle Policy-2021, Government of Gujarat, Ports and Transport Department, G.R. No.MVD-102019-840-Kh. Dated 23rd June 2021. GSEVP (2021).
 - Draft Battery Swapping Policy, Niti Aayog, April 2022
 - Central Electricity Authority (Measures relating to Safety and Electric Supply) (Amendment) Regulations, 2019.
 - Charging infrastructure for Electric Vehicles (EV) - the revised consolidated guidelines and standards No 12/2/2018-EV. 14 Jan 2022. CIEV, MoP (2022)
 - Electricity (Rights of consumers) rules, Sec. 4 Sub- sec.11, 2020
-



ICLEI - Local Governments for Sustainability, South Asia

C-3, Lower Ground Floor, Green Park Extension, New Delhi - 110016, India

Tel: +91 – 11 – 4974 7200; Fax: +91 - 11 - 4974 7201; Email: iclei-southasia@iclei.org