



Electric Vehicle Guide for Management Corporation Strata Titles (MCSTs)

The Journey
Begins Here and Now

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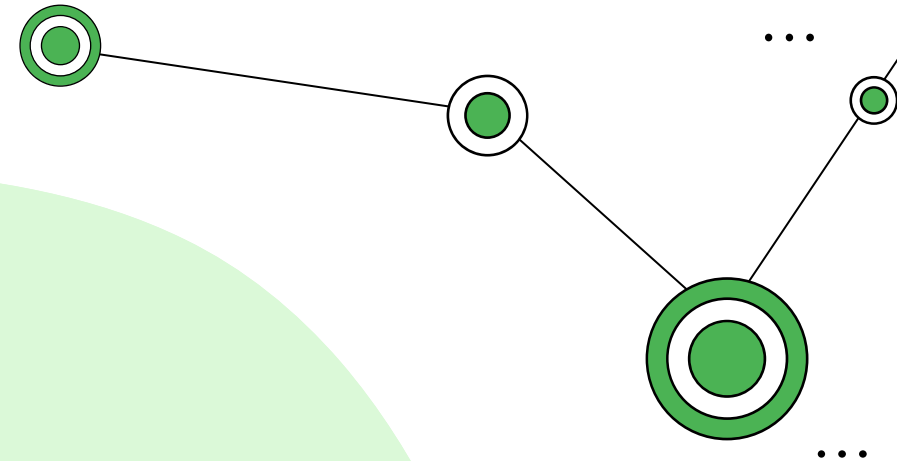
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Acronyms Used

Acronym	Description
AC	Alternating Current
AGM	Annual General Meeting
BGP	Business Grant Portal
BMSMA	Building Maintenance and Strata Management Act
DC	Direct Current
E-Stop	Emergency Stop
ECCG	Electric Vehicle Common Charger Grant
EOGM	Extraordinary General Meeting
EV	Electric Vehicle
EVCA	Electric Vehicle Charging Act
EVCO	Electric Vehicle Charging Operator
HDB	Housing Development Board

Acronym	Description
ICE Vehicle	Internal Combustion Engine Vehicle
LEW	Licensed Electrical Worker
LNO	Letter of No Objection
LTA	Land Transport Authority
MCST	Management Corporation Strata Title
NLPR	Non-landed Private Residence
NPCS	National Public Charging Standards
OCPS	Optional Public Charging Standards
RPPS	Range-based Parking Provision Standards
RRP	Registered Responsible Person
TR25	Technical Reference 25
UTC	Unable to Charge



01

Introduction

Impetus and Government Vision
for Electrification

Benefits of Electric Vehicles (EVs)

Efficiency

Up to 40%¹ more efficient than internal combustion engine (ICE) vehicles at converting energy stored to power at the wheels.

Heat

Emit 80% less heat than ICE vehicles
Reduce street level temperatures in built-up areas by up to 1°C.



Emissions

Generate about 50% less carbon than ICE Vehicles.

Noise

Twice as quiet at low speeds compared to ICE Vehicles.

Cost

Lower mileage and maintenance cost compared to ICE Vehicles. Higher upfront cost is offset by EV Early Adoption Incentive and Enhanced Vehicular Emissions Scheme rebates.

¹ <https://www.fueleconomy.gov/feg/atv-ev.shtml>

Singapore's EV Vision

2025

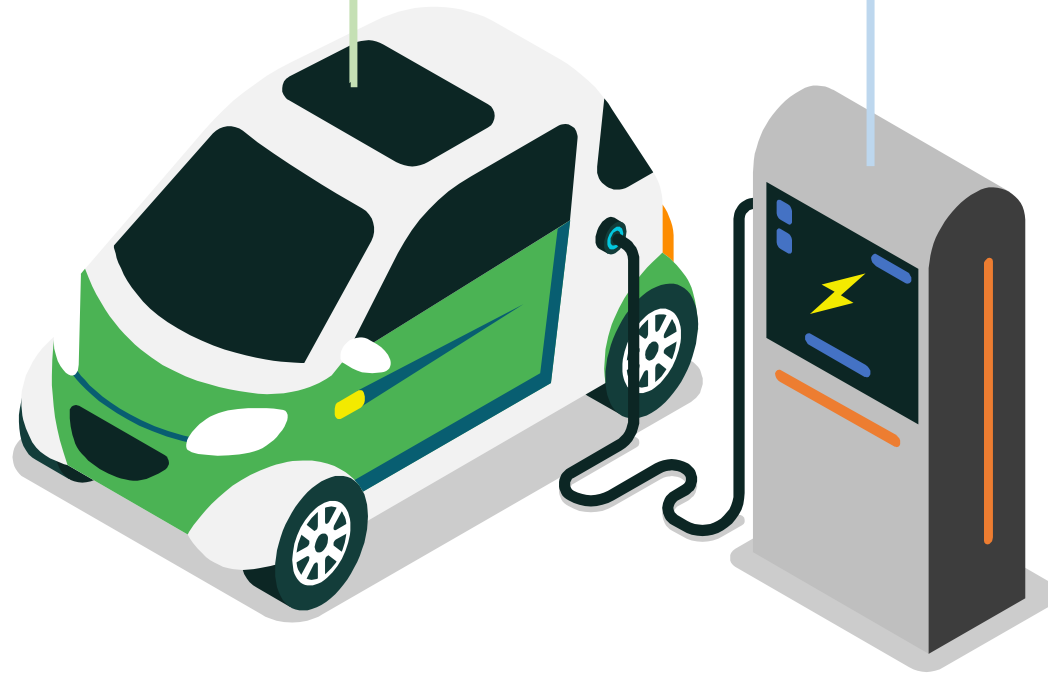
No new diesel car registration.

2030

All new car registrations will be cleaner-energy vehicles.

2040

All vehicles to be cleaner energy vehicles.



2025

Every HDB town is EV ready.

2030

60,000 EV Charging points, in tandem with EV adoption.

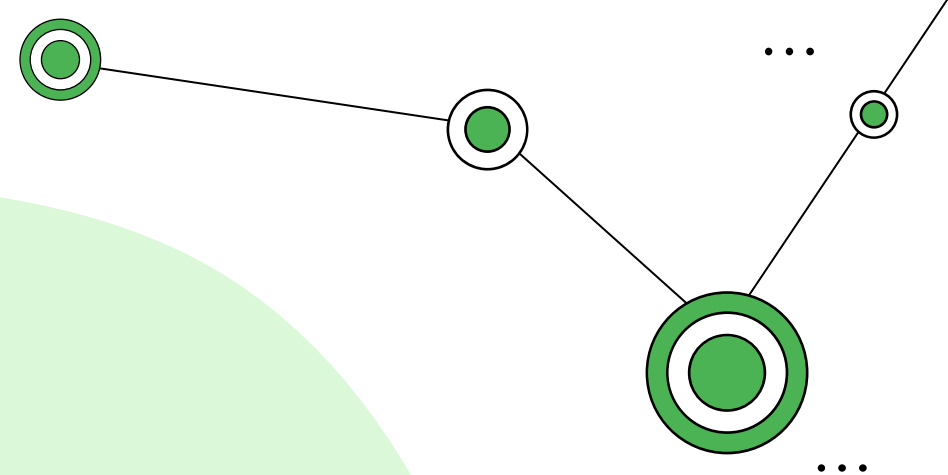
2050

Singapore has committed to significantly reduce land transport emissions in absolute terms, in alignment with our net zero target by 2050.

02

Charger Deployment Phases

Overall Charger Deployment Phases and Considerations
for MCSTs.



Overall Charger Deployment Phases for MCSTs

These are the **four main phases to charger deployment**:



1) Passing Resolution for EV Charger Installation at General Meeting

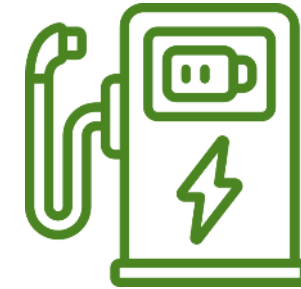
i.e. Annual General Meeting (AGM) or Extraordinary General Meeting (EOGM))*



2) Charger Planning



3) Installation phase - Registration of Chargers and Place Making



4) Operation and Maintenance of Chargers

*Refer to BCA's [Strata Management Guide](#) for more details on organising an AGM

Phase 1

Passing Resolution at AGM

Lowered Resolution Threshold
for EV Charger Installation

Phase 1: Passing Resolution at AGM

Ordinary Resolution for EV charger Installations

Amendments to the Building Maintenance and Strata Management Act (BMSMA) has **lowered the resolution threshold for EV Charger Installation proposals to an ordinary resolution requiring simple majority of votes at meeting**, with the aim to make it easier to install EV chargers in strata-titled developments.

These are the type of proposals that the lowered resolution threshold applies to:

A. Enact by-laws on the use of parking lots for EV charging
(e.g. designating charging lots to be used only by EVs)



B. Install / Uninstall EV chargers,
as long as

- The lease contract between MCST and EV charging operator does not exceed 10 years; and
- The proposal does not draw down on MCST funds

Deployment Phases

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Passing Resolution

P1

P2

Installation

P3

Operation & Maintenance

P4

Phase 2

Charger Planning

Factors to consider prior to charger installation

Phase 2: Charger Planning



A

Guidelines and Considerations

Guidelines for Charger Deployment

B

Ownership Model

Deciding on Charger Ownership Model

C

Charging Prices

Considerations for Determining Charging Prices

D

EV Common Charger Grant

Grant Details and Eligibility Criteria

2A



Guidelines and Considerations

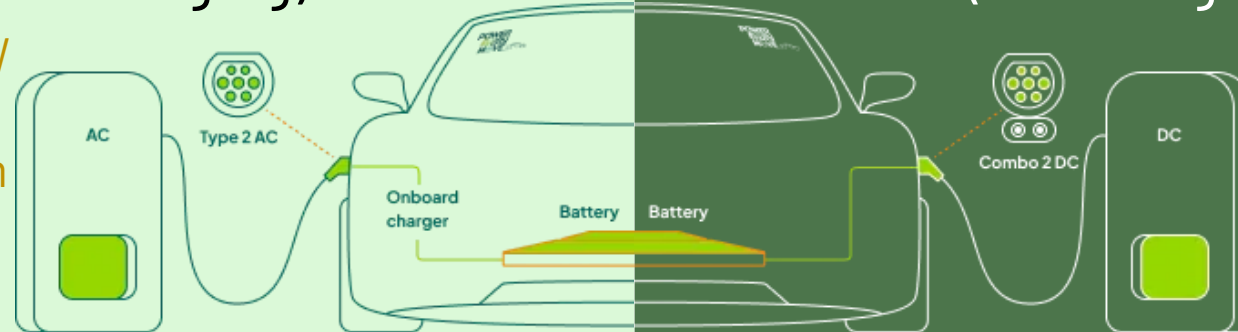
- Types of EV Chargers
- Considerations for Charger Selection
- Electric Vehicle Charging Act (EVCA)
- Power Availability
- Considerations for EV Parking and Charging

Types of EV Chargers

Slow Charging (AC Charging)



Better preserves EV battery and minimises strain on the electrical infrastructure!



- 7.4kW, 11kW, 22kW
- Charges an average EV battery from 0 – 100% in around 6 hours²
- Typically used for home or staff parking, where dwell time is longer
- Most EV's AC charging are limited to 11kW charging by their onboard charger⁴

Fast Charging (DC Charging)

- 50kW, 60kW, 80kW, 100kW, 120kW etc
- Charges an average EV battery from 0 – 100% in around 1.5 hours³
- Typically used for urgent charging where dwell time is shorter or for heavy vehicles with larger battery capacity
- Higher burden on electrical infrastructure

² Assume average EV battery size of 68.7kWh ([link](#)), and use of a 11kW charger

³ Assume average EV battery size of 68.7kWh ([link](#)), and use of a 50kW charger

⁴ <https://www.recurrentauto.com/research/fastest-charging-evs>

Considerations for Charger Selection

National Considerations



16,400 km⁵

Average Mileage per Year

The average EV range for cars is assumed to be 359km⁶ per charge. This means that on average, a car would only need charging once in 5-7 days.



15% Parking Lots

With 7.4kW Chargers

Taking into account 1 charging session per week, we estimated that this is broadly sufficient for a 100% cleaner vehicle fleet in Singapore by 2040, assuming all publicly accessible carparks and NLPRs follow the guidelines.

Localised Considerations



Characteristic of carpark users: What are the operational mileage, battery size and parking duration of the EVs at your carpark?



Characteristic of parking space: Is there sufficient space for non-EVs to park even after some lots are converted to EV charging lots?



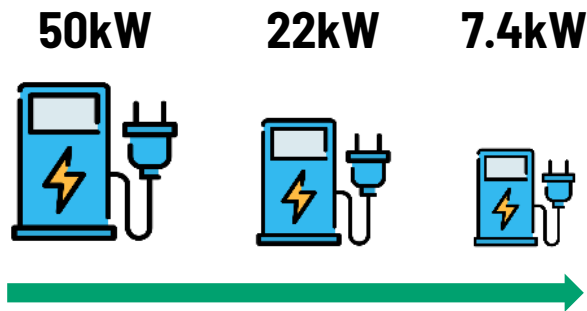
Investment cost: Chargers with higher power ratings are usually more expensive. Does the return of investment justify higher installation and operational cost, and potential electrical infrastructure upgrade cost?

⁵ Annual Mileage for Private Motor Vehicles 2022: <https://datamall.lta.gov.sg/content/datamall/en/static-data.html>

⁶ EV Database, range of full electric vehicles: <https://ev-database.org/cheatsheet/range-electric-car>

Considerations for Charger Selection

Reduce UTC



Reduce UTC

Unable to charge (UTC) refers to instances where all chargers at a premise are occupied and an incoming EV driver does not have the opportunity to charge their vehicle.

To make the most of limited power capacity, it is important to strike a balance between adding more chargers and opting for higher powered ones.

To reduce UTC events, we would recommend for MCSTs to maximise the number of chargers deployed based on available power capacity.

Since we anticipate most users to charge at home, there is no need for MCSTs to plant high powered chargers to ensure vehicles are charged from 0 -100% charge during each carpark visit.

Start Small, Scale with Demand

Considerations for Charger Selection

Charger Provision

- Start with low powered chargers e.g. 7.4kW chargers.
- Low-powered chargers would be an ideal charging mode as residents would be parking overnight.
- As more vehicles convert to EVs, and utilisation of existing chargers increase, MCSTs can consider planting more low powered chargers up to the available spare power capacity.
- If you have commercial spaces in your NLPR which attract many visitors, do take into consideration whether the carpark is shared or separated between residents and commercial visitors, as this affects charger accessibility.



EV Charging Act

Ensuring the safety of EV chargers

Purchase, Installation, and Certification

- Only type-approved chargers, which come with an LTA-issued approval label, should be purchased and installed in Singapore. The approval label proves that the chargers comply with LTA's safety standards.
- Upon purchase, chargers must be installed and certified in accordance with Technical Reference 25 (TR25).
- Under Singapore's National Public Charging Standards (NPCS), publicly accessible chargers must be Type 2 AC or Combo-2 DC.
 - CHAdeMO charging systems is an Optional Public Charging Standards (OPCS) that public charging stations can be equipped with.



Approval label



Type 2 AC
(NPCS)



Combo-2 DC
(NPCS)



CHAdeMO
(OPCS)

Charger Registration



Registration mark

- Chargers must be registered and affixed with a registration mark before they can be used.
- Registration can be done via OneMotoring, using the type approval ID found on the approval label.
- Upon registration, the registration mark must be affixed onto the approval label (if any) or at a prominent location on the charger that is clearly visible to users within 60 days from the date of registration.

EV Charging Act

Hiring a Licensed EV Charging Operator (EVCO)

- EV Charging Operators (EVCOs) are businesses which provide EV charging services or operate EV charging stations.
- All EVCOs that provide charging services for a fee, or operate EV charging stations serving members of public (including condominium residents and visitors) are required to be licensed in order to provide the service.
- Licensees are required to comply with conditions such as maintaining service uptimes, purchasing third-party liability insurance, and data sharing requirements.
- EVCO license will be valid for 3 years, and can be renewed subsequently.



Power Availability

Charger Provision

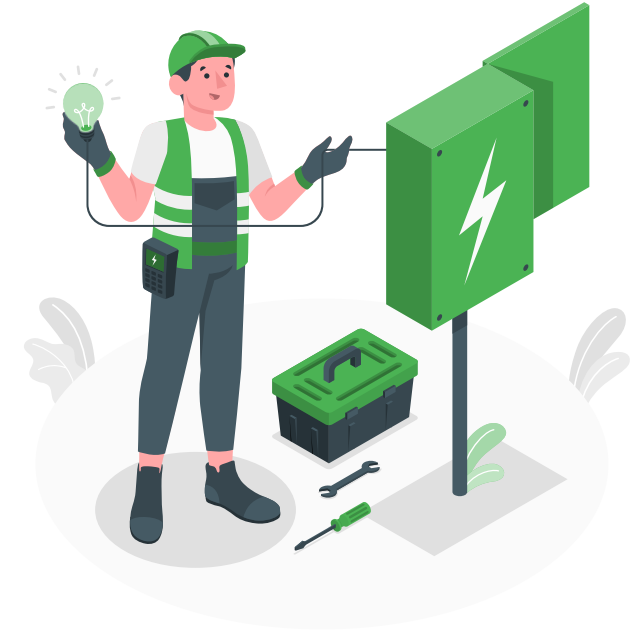
There are currently no mandatory requirements for existing developments to deploy EV chargers.

Facilities Manager

If your non-landed private residence (NLPR) is interested to deploy EV chargers, please check with the building facilities manager if there is sufficient spare power for EV chargers. If necessary, do hire a Licensed Electrical Worker (LEW) to assess power capacity at the substation and switch room. More information about hiring LEWs can be found [here](#).

Limited Power at Switch room?

NLPR may consider upgrading the switch room capacity at your own cost or deploying innovative solutions such as dynamic load management to maximise available power.



EV Charger Power Rating (kW)	Type (AC/ DC)	Estimated Spare Power Capacity Required per Charger (A)*	Number of Phases
7.4kW	AC	32A	Single Phase
22kW	AC	32A	Three Phase
50kW	DC	80A	Three Phase

* Based on design ratings. Actual breakers required might differ.

Considerations for EV Parking and Charging



Parking Safety



Chargers should only be installed near a demarcated lot and not at any free space



If there are no lots available to be converted for EV charging, more lots can be drawn, provided that:

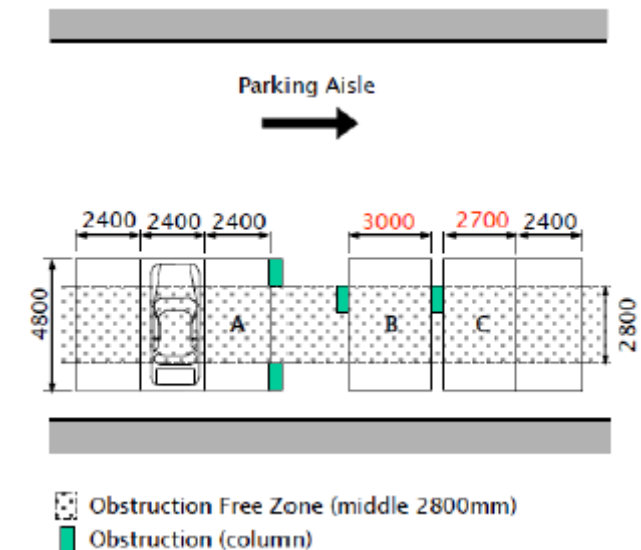
- Total lot count does not exceed the [Upper bound of the Range-based Parking Provision Standards \(RPPS\)](#) for the development, and
- There is sufficient space to draw lots of standard dimension without obstructing traffic (see next page for more info)

Considerations for EV Parking and Charging

Parking Lot Dimensions

- MCSTs may refer to LTA's Code of Practice for Vehicle Parking Provision in Development Proposals on the parking lot dimensions ([Link](#)).
- Minimum dimensions required of a car parking lot are indicated in the table on the right.
- If there are chargers placed in the middle 2800mm length of the lot, an additional width of 300mm must be provided for each obstructed side.
- Vehicle charging port could be located on any side of the vehicle depending on their make and model.
- MCSTs and EVCOs should be aware of the following when deciding on the location of the chargers around the lot:
 - Ensure that chargers do not encroach into any designated parking space.
 - Recommend installation of wheel stoppers for EV charging lots to minimise risk of charger damage.
 - Provide sufficient gap between the chargers and the vehicle in the lot and account for opening of vehicle boot or door.
 - If chargers are to be planted on a stand instead of a wall, ensure that appropriate protective barriers are put in place to prevent vehicles from damaging charger infrastructure.

Minimum Parking Lot Dimensions for a car	
Width	2.4m
Length	4.8m
Length for parallel parking	5.4m



2B

Ownership Model

- Comparisons between different ownership models



Capex Free Model

A Capex-free model is one where the EVCO installs, operates and maintains EV chargers at no cost to the NLPR, and charging fees will be collected by the EVCO. The chargers installed are owned by the EVCO.

Suitability



- MCSTs who prefer for partnered EVCOs to have full ownership and control of the chargers

Advantages



- No cost for hardware and installation
- Minimal responsibility for operation and maintenance
- All queries fronted by EVCO

Disadvantages



- Charging price determined by EVCO



Capex Intensive Model

A Capex Intensive model is one where the MCST pays for the installation, operation and maintenance of the EV chargers. The charging fees will be collected by the MCST and the chargers installed are owned by the MCST.

Suitability



- MCSTs who prefer to have full ownership and control of the chargers

Advantages

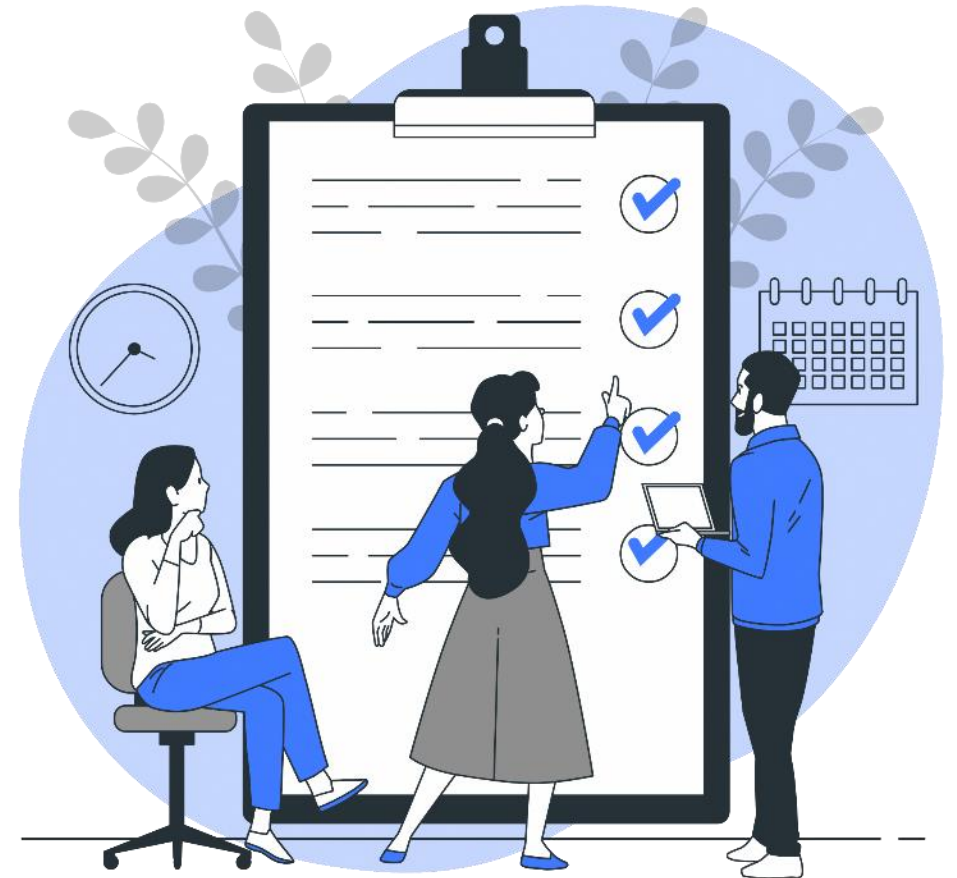


- Control and flexibility over charging prices
- Easier interface for innovation projects with charger

Disadvantages



- Higher capital cost
- MCST must be licensed by LTA as an EVCO, which incurs fee and obligations



Capex Intensive Model

Estimated Cost of Charging Equipment

Key Cost Components

Charger Power Rating	Estimated hardware cost for each charger* (SGD)
7.4kW to 22kW AC	\$2,000 - \$5,000
≥50kW DC	≥\$40,000

* Estimated based on market survey dated May 2023.

Does not include installation and cabling cost.

1. Charger hardware
2. Electrical equipment components and switch room isolators
3. Possible switch room and sub-station upgrades if insufficient power capacity at site
4. Electrical cabling from switch room to charger
5. Trenching works (if unsheltered carpark)
6. Emergency stop buttons
7. Manpower cost for installation
8. Building LEW and Project LEW fees
9. Ancillary services (painting / protective barriers)

Hybrid Model

A Hybrid model is one where the MCST partially owns the chargers by taking charge of the operation and maintenance of the EV chargers while the EVCO pays for the installation or vice versa. The charging revenue is shared between the MCST and EVCO.

Suitability



- MCSTs who prefer to have some ownership and control of the chargers

Advantages

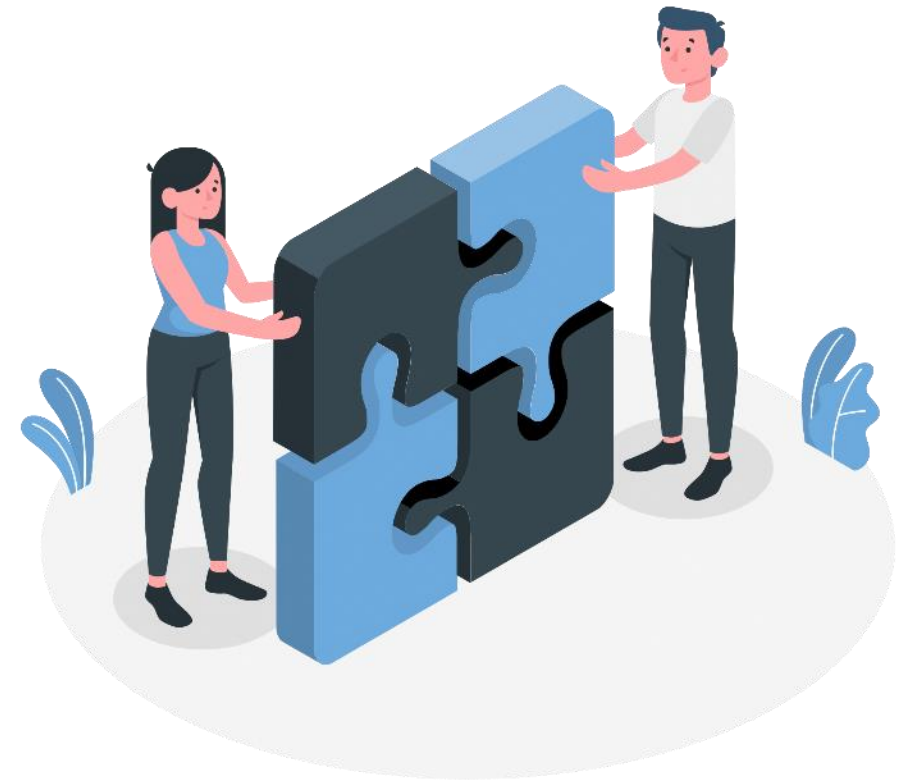


- Mutually agreed charging price between MCST and EVCO
- Flexibility on degree of ownership and responsibility

Disadvantages



- MCST may need to front charging queries and handle operations and maintenance



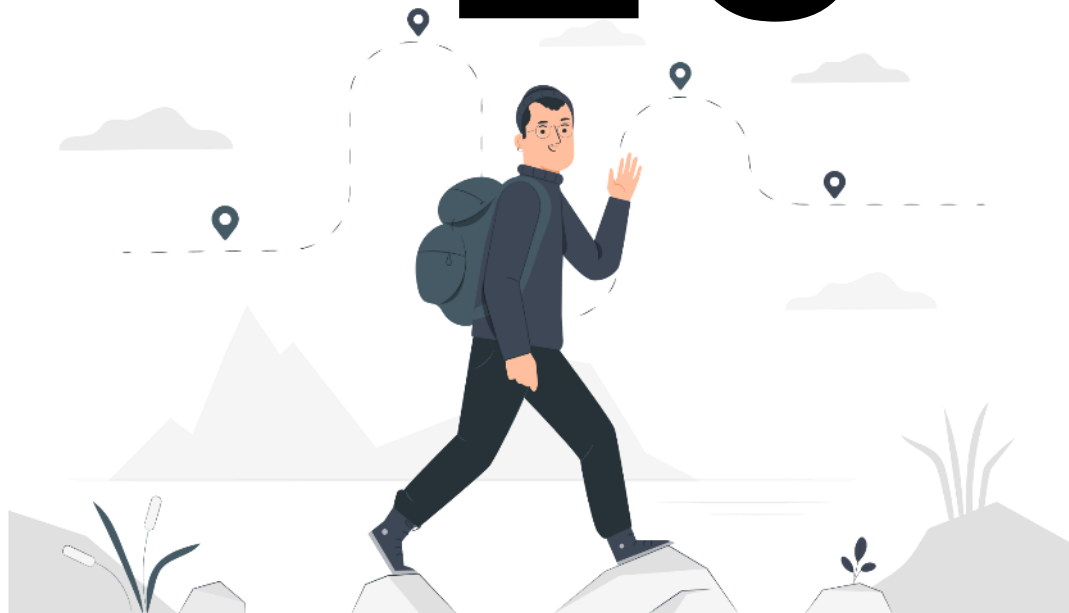
Summary of Ownership Models and Operation of chargers

	Capex Free	Hybrid	Capex Intensive
Charger Owners	EVC0	EVC0/MCST	MCST
Operators	EVC0	EVC0	MCST
Hardware and Installation Cost	EVC0	EVC0/MCST	MCST
Managing Maintenance	EVC0	EVC0/MCST	MCST
Charging Fee and Revenue	EVC0 sets fees	EVC0 and MCST shares revenue	MCST sets fees and collects revenue
Managing User Queries	EVC0	EVC0 and MCST	MCST

2C

Charging Prices

- Depending on Ownership Model, MCSTs may choose to set the EV charging price or have the EVCO propose a suitable charging price



If EVCO sets EV charging price (preferred option)

Market Rate

- EVCOs would typically charge at a price that is reflective of the market
 - Nonetheless, MCSTs are advised to discuss the charging price with the EVCO before engaging them for their service
- MCSTs could request for interested EVCOs to provide a formula detailing the derivation of the EV charging price.
 - The formula would allow MCSTs to hold EVCOs accountable when EVCOs propose changes to EV charging price



If MCST sets EV charging price

Considerations

- MCST may use a combination of these factors to determine their charging price (Note that this list is non exhaustive):



Price of EV charging in surrounding premises for similar types of chargers



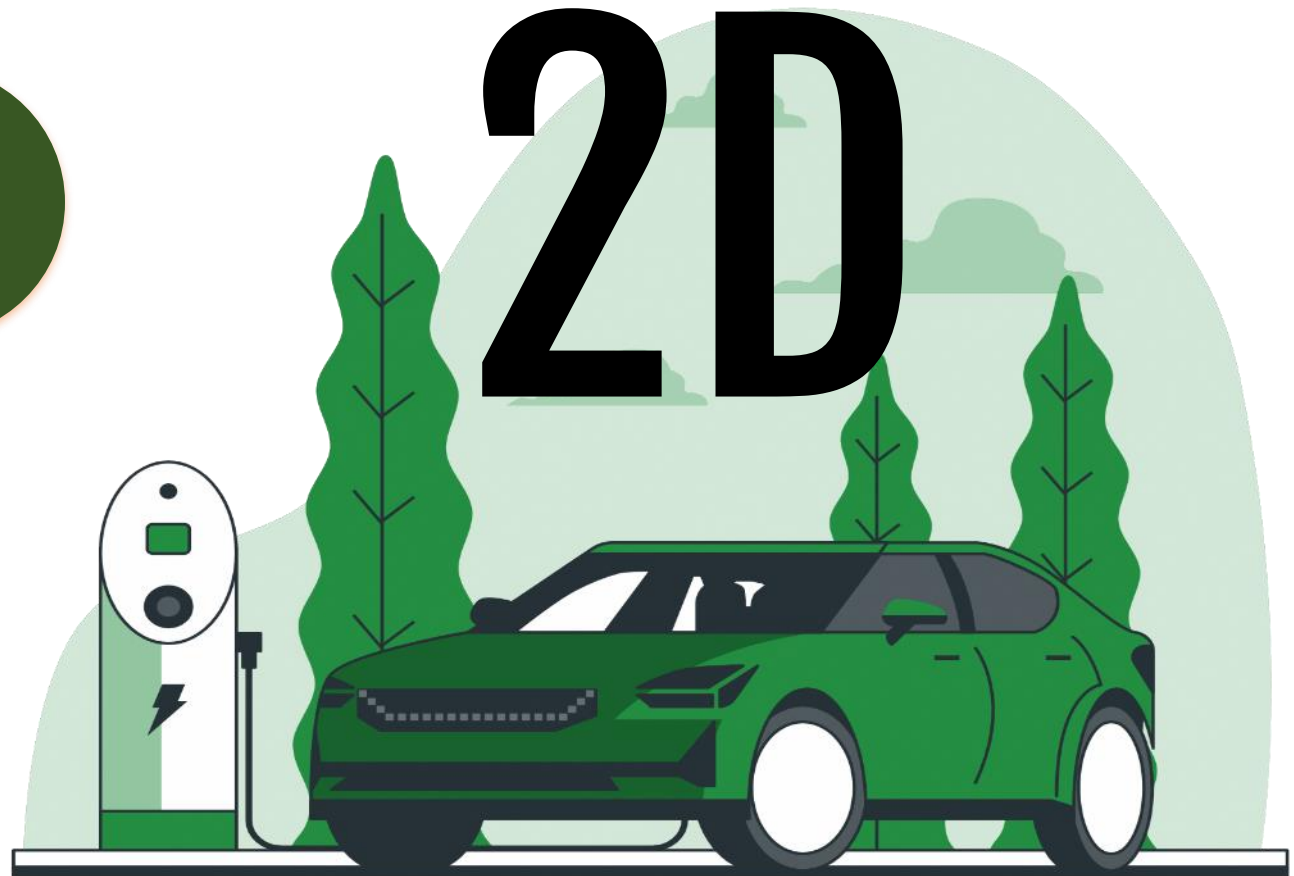
Cost of electricity at premise



Maintenance and operation cost of charger

EV Charger Common Grant (ECCG)

2D



EV Charger Common Grant

Objective

Introduced to spur installation of EV chargers in Non-landed Private Residences (NLPRs) as an early adoption incentive by co-funding upfront installation costs.

Availability

Assessed on a first come, first served basis, the grant will be available until 31st December 2025, or until 2,000 chargers have been approved for co-funding, whichever is earlier.

Co-funding Amount

Co-fund 50% of each cost component excluding GST, subject to the relevant cost component cap, and an overall cap of \$4,000 per charger:

- Charging system (e.g. charger hardware);
- Cabling and installation costs (subject to \$1,000 cap); and
- Licensed electrical worker fees.



Grant Eligibility Criteria

Premise of Installation	Within an NLPR Installed at Common Areas	Definition of NLPRs: Private developments that include residential units, <i>with the exception of landed properties, shophouses, hotels, hostels, serviced apartments, and workers' dormitories.</i> Chargers must be installed in a common area that is accessible and shared to the residents in the NLPR.
Resolution	Passed Resolution for EV Charger Installation	NLPR must pass the appropriate resolution for charger installation. Do refer to BCA's Strata Management Guide for more details.
Charger Eligibility	Charger Installation date	Chargers must only be installed after applicant has received grant approval from LTA to ensure no pre-emptive installation of chargers.
	Number of Chargers Eligible	Grant eligible for 1% of residential car park lots , rounded-up to the nearest whole number <ul style="list-style-type: none">• Example 1: 140 lots = 2 lots eligible• Example 2: 70 lots = 1 lot eligible
	Charger Models	Applicable only for Reviewed Smart Chargers that have obtained a valid Letter of No Objection (LNO) or are type-approved by LTA under the Electric Vehicle Charging Act (EVCA). These chargers must have a power rating of $\leq 22\text{kW}$, in line with the overall approach of overnight charging under our masterplan
Application	Application by Charger Owner	Depending on the ownership model, either the NLPR or the EV Charging Operator (EVCO) can apply and be eligible for the grant. EVCO must be a reviewed charger operator under ECCG during the transition period of the EVCA or a licensed EVCO under the EVCA.
	Submission	To apply via Business Grants Portal with a Corppass Account (see next slide for more info).

Overall Application Procedure

1) Owner of Chargers (NLPR / EVCO) Applies for Grant on Business Grants Portal (BGP) with Corppass*

Verification by LTA. All correspondence through BGP.

2) Upon Grant Approval, Applicant Awarded with Letter of Offer on BGP if Criteria is Met.

3) Completes EV Charger Installation at NLPR

Verification by LTA. All correspondence through BGP.

5) Upon Claim Approval, Applicant Submits E-Invoice on vendors@gov for Grant Disbursement

Note: Grant recovery will occur if subsequent audits identify that applicant had over-claimed or have engaged in fraudulent claims. Penalties and enforcement from relevant authorities will be taken.

4) Owner of Chargers apply for claim on BGP*

Note: Claim Application must be submitted within 6 months of being awarded the Letter of Offer in (2). If an extension to the validity period is required, a Change Request must be submitted.

Verification by LTA. All correspondence through BGP.

For Full Details on the ECCG, visit LTA's Webpage



Queries? Contact us at:
LTA_Electromobility@lta.gov.sg

*Required to complete additional application documents and upload onto BGP. The application documents can be found on LTA's ECCG website.

Deployment Phases

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Passing Resolution

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Planning

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Installation

Operation & Maintenance

P4


P3


Phase 3

Charger Installation

Place Making

Carpark Signage

 MCSTs can consider placing signages for Resident's troubleshooting when they encounter any issues using the EV chargers as intended. The signage template below is part of LTA's PowerEVERYMove Campaign

 It is recommended that the signage has the EVCO's support hotline and/or email. The signage placement should be at visible locations that can still be seen even when the EV lot is occupied.

This is the Carpark Charging Point Signage used in publicly accessible carparks. MCSTs can choose to adopt the same design to demarcate EV lots.

A clear space equivalent to the letter "E" should be maintained around the logos.

Partner logo could be your MCST's and/or EVCO's logo.



COLOUR PALETTE

PANTONE 329 C

CMYK C100 / M8 / Y50 / K40

RGB R0 / G102 / B94

HEX #00685E



PANTONE -

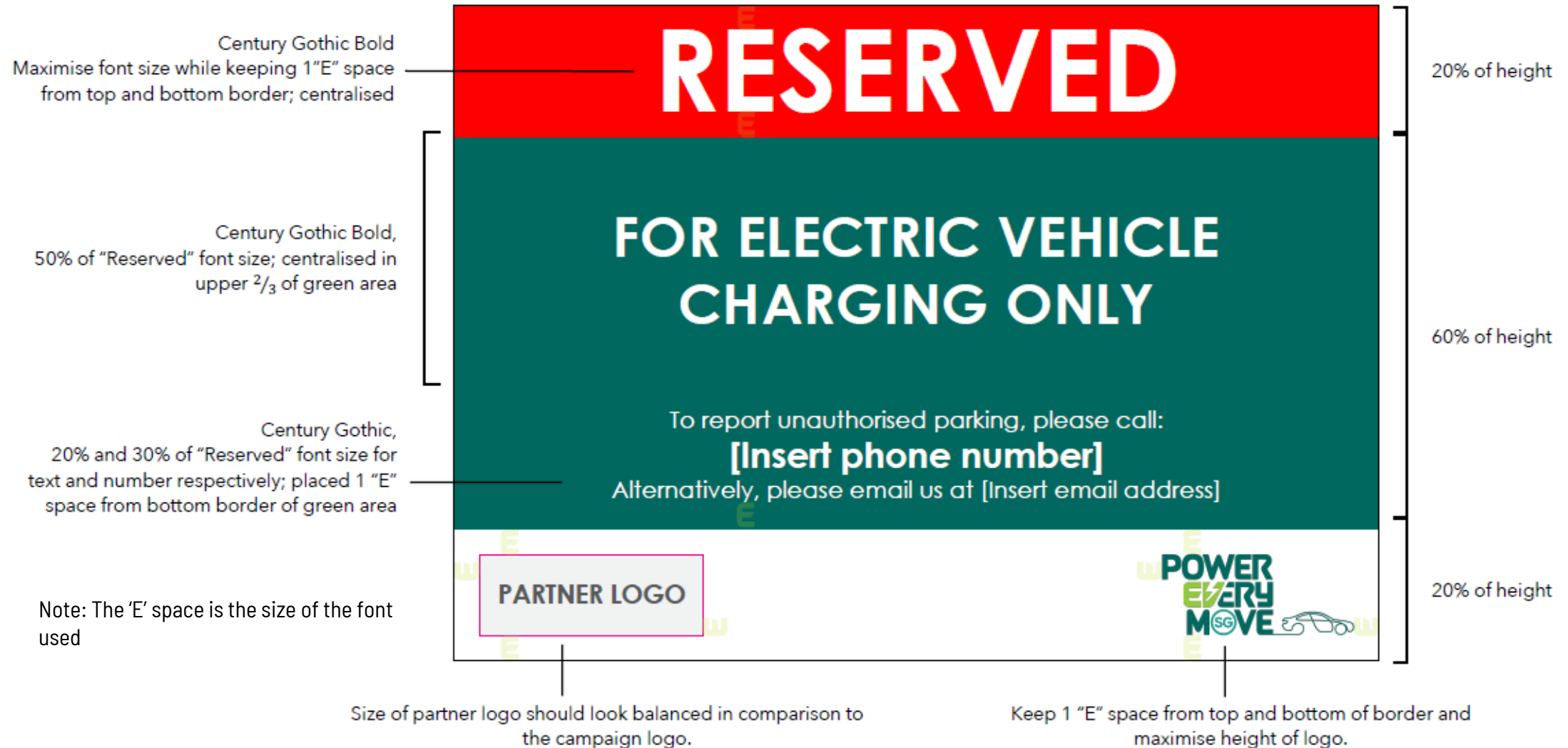
CMYK C0 / M100 / Y100 / K0

RGB R255 / G0 / B0

HEX #FF0000



Carpark Charging Point Signage Design



Deployment Phases

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Operation & Maintenance

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Phase 4

Operation & Maintenance

To ensure chargers are kept in good working condition

4A

Periodic Inspection of Chargers

To ensure chargers are well-maintained



Periodic Inspection of EV chargers

To ensure that chargers are well-maintained, under the EVCA, MCSTs *who are the charger owners* must:

- 1) Engage an **LEW and a Charger Equipment Specialist** to conduct periodic inspections and rectify any defects

The frequency and standard of inspection must be in accordance with TR25, as follows:

**For Non-Restricted
Access such as
NLPRs**

By Equipment
specialist

Every 6 months

By LEW

Every 12 months

Upon inspection and maintenance, the equipment specialist will issue a **Certificate to the Registered Responsible Person (RRP)**.



- 2) **RRPs** are to **keep a record** of these inspection certificates and provide them to LTA upon LTA's request



4B



Cultivating Good Charging Etiquette

Measures to Ensure a Positive EV Charging Experience for Residents

Encouraging Good Charging Etiquette

To cultivate considerate charging and lot usage behaviour for a positive charging experience for all residents, MCSTs can choose to adopt these few measures:

Digital Measures via the EV Charging Mobile Application

Utilise a **digital charger reservation function** to provide assurance on availability of chargers

Implement **idling fee** upon a vehicle's full charge to mitigate lot hogging



As some residents may prefer to charge overnight, this should only be applied during reasonable hours in the day where there may be peak usage

Physical Reservation System for better lot reservation

- Install a Parking Reservation Lock which must be unlocked before charging or
- LED Lighting system to indicate charger has been reserved



Signages for deterrence against charger and lot misuse

To remind users at the end of a charging session to:

- Recoil and place back the used charger cable nicely and
- Not to overstay in a charging lot when vehicle is fully charged

To remind other residents:

- Not to park in these lots if they are not charging
- Not to press the E-stop button



Credits



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