# Overview of Charging station technologies

## Charging Services

One of the major benefits of electric vehicles is that charging can be integrated into the activities of the user. This means that the most convenient chargers that will attract the most use will be where people live, work and shop/eat. This type of charging is often called *destination* or *convenience* charging.

For businesses that are making the transition to electric vehicle fleets, charging must be effectively integrated into the duties of the vehicle. This might mean a combination of a dedicated charging bay at the business site and charging at trade centres or industrial estates. This type of charging is often called fleet charging and opportunity charging.

For central New South Wales, fast or ultra-fast journey enablement charging infrastructure will provide an essential service for regional locals who must travel long distances between towns for other services. Journey enablement charging infrastructure opens the region to visitors and Eco tourists who choose to visit the region by electric vehicle.

## Types/Levels of charger

The power of a charger is typically referred to by the rate at which the charger delivers power to an EV over time, and is most usefully presented as the time to provide 100km of added range to an EV. To simplify the many types and charging powers available on the market, the industry uses terms such as slow, fast and ultra-fast, as well as grouping chargers into 'types' to describe the charger's charging rate.

The table below sets out the definition of levels and common names that we will use throughout this document.

# Charger Terminology and Descriptions

| Power Level | Common name | Charger Type | Power | Range delivered by charge in 15 mins* | Time to charge 100 km of range* | Application |
|---|---|---|---|---|---|---|
| Level 1 | Slow charging | Wall socket | 2.3 kW | 2.9 km | 8 hr 42 min | Home Charging |
| Level 2 | | AC Charger | 3.5 kW | 4.4 km | 5 hr 43 min | Workplace charging, all day/night parking |
| | AC fast charging | | 7.4 kW | 9.3 km | 2 hr 42 min | Public destination charging |
| | | | 22.1 kW | 28 km | 54 min | Public multi-purpose charging |
| Level 3 | DC fast charging, Rapid charging, | DC Wall Charger | 25 kW | 31 km | 48 min | |
| | | DC Charger | 50 kW | 63 km | 24 min | Public journey-enablement |
| | | | 100 kW | 125 km | 12 min | |
| | Tesla Supercharging | | 120 kW | 150 km | 10 min | |
| | Ultra-fast charging | | up to 350 kW | 440 km | less than 10 min | |

*For vehicles with typical driving energy efficiency of 20 kWh/100 km. Where AC charger used, assuming the vehicle internal hardware allows does not limit charging at the stated rate.

# Charger Design and Features

## Wall vs Pedestal Mounting

Many Level 2 EVSEs can be mounted on a wall or integrated into a pedestal installed on the ground. Functionally, there is little difference between the two, however pedestal mounted EVSE provide more installation location possibilities and can be around 25% more expensive to install for a similar location due to additional civil works required.

## Connector Types and Tethering

AC and DC charging require different connectors, and within each category there are alternative connector types. The Type 2 plug is the standard AC connector, while Japanese auto manufacturers generally favour CHAdeMO DC connectors and European and U.S. automotive manufacturers favour CCS DC connectors. Most DC charger units can be specified with either or both connectors.

An untethered charger features a socket and requires drivers to supply their own cable. A tethered charger on the other hand is one where the charging cable is permanently connected to the EVSE, providing convenience that is generally preferred by EV users.

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**Networked Chargers and Open Charge Point Protocol**

It is recommended that selected chargers can be configured with networking hardware such as 3G or WIFI. It is also recommended they are designed to be Open Charge Point Protocol (OCPP) compliant. This means that the EVSE can communicate with a cloud based management software, either stand-alone or as part of an EV charging network.

## Management software and billing services

OPCC allows operators to use their choice of management software; however, most chargers are most effective when running on software that is installed by the distributor. Major charger brands offer management and billing software in Australia that can be installed on these chargers, or alternatively no management software can be installed where the intended use case is to offer the service at no cost.