Level 3 Charging Stations Factsheet.

What is a Level 3 Charging Station ?

Level 3, Quick Charger, DC Fast Charger and Supercharger are all terms used for devices which can charge electric vehicles (EV) at much faster rates than a standard charger. Level 3 chargers come with 3 standards: CHAdeMO, SAE combo and Tesla Supercharger. The benefit of these level 3 chargers to the EV driver is that they can do in 30 mins what a level 2 chargers can do in 8 hours. The cost of a level 3 charger will range between $30,000 to $80,000 to supply and install. Below we will go into more detail on where that money goes and how to minimize the cost.

Types

Tesla Supercharger

The Tesla Supercharger is the fastest way to recharge a Tesla Model S. The problem with these is that they can **only** recharge Tesla cars and the chargers are only available through Tesla. If Tesla offer to install one of these at your site, at little or no capital cost by all means accept, be careful with electricity and network capacity costs. But due to the limited range of cars these chargers can accommodate and that you can only get these from Tesla we will end our discussion about Tesla here. If you require more information contact Tesla directly.

SAE Combo / Combined Charging System (CCS)

The SAE Combo or CCS, is an add-on to the SAE J1772 connector used for level 1 and 2 charging where there are extra pins added to the plug underneath to allow for faster charging. There are two main issues with this type of charger: At the time of writing this the standard is still being developed, and there are no vehicles that use this charger in Australia.

Also there are two versions of CCS. US (Type 1) and European (Type 2) and it's not clear which would be used in Australia.

The Chevrolet (Holden) Spark EV and BMW i3 use CCS, but the Japanese model i3 will ship with CHAdeMO. Neither of these cars have been released in Australia. Audi, BMW, Daimler, Ford, General Motors (Holden), Porsche and Volkswagen have indicated they will use CCS in future cars.

CHAdeMO

There are currently two production vehicles capable of using the CHAdeMO plug in Australia, the Nissan LEAF and the Mitsubishi i-MiEV. But there are over 20 vehicles worldwide which are CHAdeMO compliant [1] . In addition to this Telsa are developing an adapter cable to convert from CHAdeMO to Tesla Supercharger. So in purchasing a CHAdeMO level 3 you will also be able to support Tesla cars.

The CHAdeMO has a certification procedure and you should ensure that any level 3 charger you purchase has been tested and approved by the CHAdeMO association. The exact model should be certified not just the manufacturer.

List of all certified chargers http://www.chademo.com/wp/chademocharger/ Note: not all of these chargers have been designed for Australian power conditions.

Customer Billing Options

Eaton and Fuji Electric are compatible with the Chargepoint charger network, otherwise a credit card receptacle is a option, which is available on the Schneider Electric units. Plus the additional benefit of increased sales due to increased visitation of loyal EV drivers.

Purchasing Cost Factors

The cost of the actual charger ranges between $25,000 and $50,000, besides a variation between manufacturers there are some common elements that affect price.

Power

The power of the charger is the the peak amount that the charger will consume. Currently there are CHAdeMO units which come in a range of power levels from 10 kW to 60 kW. The power rating will also affect how fast it can charge the car. The more power the faster it will charge. But charging rates are not linear. A 25 kW charger will not take twice as long as a 50kW, because as the batteries charge you need to slow down how fast you can charge them. A less powerful charger is likely to cost less. Fuji Electric state that there is a $5,000USD difference between their 25kW and 50kW options. [2] There are also added benefits you see later when it comes to electricity costs.

Dual Chargers

Because the basics of charging are similar for CHAdeMO and CCS you can purchase level 3 chargers with both. Purchasing a charger with both you are allowing for "future proofing" for any car which may come on to the market that supports CCS. But you could be adding an extra $5000 [3] to the cost of the charger. The CHAdeMO association has suggested it should only add an extra 5% cost to the charger. [4]

Installation and Running Costs.

Physical location Selection

Undercover

Level 3 chargers are designed to be perfectly safe to use in rain, snow and other harsh weather events. Even so providing an undercover location means that the EV driver doesn't have to get wet to charge. It has also been observed that some manufacturer's claims of being weather proof are better than others. For example the Schneider units located in the open at Morisset and Tuggerah in NSW for between 1 and 2 years are suffering from rust on the external steel panels.

Civil Works Concrete and Electrical Ducts

The choice of physical location will also have an affect on the installation cost. The cheapest location would be near the electrical distribution point of the site. With easy access to dig trenches for ductwork and enough room to pour a reasonably sized concrete base. Once again the power of the charger comes into play with portable 10kW and 20kW chargers requiring no special civil works.

Incoming Power Supply Capacity.

All level 3 chargers require 3 phase power, with a significant capacity required, generally a standard connection is 100 Amps (depending on distribution area) this should be sufficient if all that is connected is a single charger and nothing else (50kW uses around 80-90 amps). To avoid having to pay for an upgrade of your connection to the grid, or a new connection it may be more appropriate to purchase a charger with less power.

Network Capacity Cost

A factor in selecting the power of your charger is the ongoing network capacity cost. This may **not** apply to your site and depends heavily on who your electrical distributor is and what category of customer you are. But for example deploying a 50kW level 3 charger (90% efficient, so around 60kW AC side) in the Ausgrid distribution area, will increase your network capacity cost by $7,227 per year (at $0.33 c/kW/day) where as a 25 kW charger will be half of that.

Separate/ Metering Connection

It may also be advisable that even though the site has a sufficient supply, to apply for a new connection just for the level 3 charger. A single charger will use less than 100Amps, which may mean that your distributor counts you as a small user and network capacity charges do not apply. This will increase the install cost, and might not be possible depending on the distributor.

Disclaimer

This document is not designed to be the complete solution to all your questions about level 3 chargers but should allow you to know what to ask a suitably qualified, electrician or electrical engineer. All cost will be subject to your site conditions.

Australian Deployments

State	Deployments
Victoria	2 Fuji Electric on Chargepoint Network
New South Wales	1 Aker Wade at NRMA 6 Schneider on Better Place Network[1] (Smart grid smart city)
Queensland	0
Northern territory	0
South Australia	1 Aker Wade at Adelaide Mitsubishi
Western Australia	0
Tasmania	0
Australian Capital Territory	0

Australian Suppliers and Installers

Club Assist Charger: Aker Wade Phone: 03 9700 9874 Website: http://www.clubassist.com.au/	Chargepoint Charger: Fuji Electric Phone: 1300 730 511 Website: http://www.chargepoint.com.au
Tritium Charger: Veefil Phone: 07 3129 4389 Website: http://tritium.com.au/	

References

[1] List of CHAdeMO certified vechicles http://www.chademo.com/wp/chademo-ev/
[2] Fuji Electric DC Quick Charger Comparison of Gen 3 25kW and Gen 2 / Other 50 kW Chargers
http://www.americas.fujielectric.com/sites/default/files/DC%20Quick%20Charging%20-%20FEA%20Comparison%20Study%20%20%2825kW%20vs%20%2050kW%29%207-3-12.pdf
[3] Circontrol chargers price list has the extra CCS port at $5,000 more.
http://e-station.com.au/chademocharge.html
[4] CHAdeMO organisation opinion on CSS
http://www.chademo.com/wp/wp-content/uploads/2013/06/2013-06-11EVSummit.pdf

[1]Some of these have been removed as part of the Better Place going bankrupt.

