

Learnings from the *Smarter Fleets Program – Electric Vehicles in Local Government*

WHERE AND WHEN TO CHARGE

The most convenient way to charge an electric vehicle is to charge overnight where the vehicle is normally parked. However, some top up charging may be required during the day, depending on use.

Generally, charging at home or fleet base accounts for 90-98 per cent of electric vehicle charging. Charging away from home or fleet base is only needed when the trip length is greater than the vehicle's range.

The most economical approach to charging electric vehicles is to prioritise charging where and when electricity is least expensive:

- during the day at sites with surplus solar generating capacity (\approx \$1.40/100km)
- during off-peak times at sites with time-of-use electricity tariffs (\approx \$2.00 - 2.50/100km)
- during peak times, or at sites with fixed electricity tariffs (\approx \$4.20 - 5.30/100km)
- at fast charging stations (\approx \$8.30/100km)

CHARGING AT FLEET BASE

Charger selection

Generally, chargers rated at 7 kW (single phase) or 10 kW (three phase) are more than adequate in a fleet setting, as they provide 325-450 km range from an overnight charge (9 hours during the off-peak period). For many fleet vehicles, charging using a 3.5kW charger will provide sufficient range (150-170 km) and can be installed at a relatively low cost of a few thousand dollars, noting that the exact installation cost will vary depending on the site (eg proximity to switchboard and capacity of switchboard).

Even though every electric vehicle within a fleet may not need to be charged each day, for the modest cost per bay it will simplify operations if each electric vehicle parked overnight has access to a dedicated charger. Having additional chargers offers flexibility to choose shorter range vehicles, and plug-in electric hybrid vehicles, which can benefit from top up charging during the day.

When the first charger is installed at a site, it is worth including cabling, or at least conduit, to allow future installation of additional chargers to meet longer-term needs. This forward planning will greatly reduce the cost of installing additional charging infrastructure in the future, as more electric vehicles are added to the fleet.

Chargers with power ratings greater than 3.5 kW should be 'smart chargers', which enable the timing and rate of charging to be programmed or controlled remotely. This functionality allows users to manage peak electricity demand and to avoid potentially higher electricity costs. This is particularly important for sites with multiple chargers. This functionality may not be required in the short-term, but will become increasingly important as the number of electric vehicles in a fleet increases.

Some fleets may require access to faster on-site charging, particularly where a fast charger is not available in the local area and where an electric vehicle often needs to do a longer trip after a day of heavy use. A 25 kW fast (DC) charger can provide this flexibility, at a cost of between \$15,000 and \$20,000.

Charging is best done in a location that is protected from the elements, such as under a carport, in a garage, or another location sheltered from extremes of sun, heat and cold. Extreme weather may lengthen charging times, although not significantly.

Chargers are rated on their resistance to dust, insects or water entering the charger. This is known as an Ingress Protection (IP) rating. The electrician who installs your charger can advise what IP rating is needed, but generally:

- In a closed garage, any IP rating is likely to be satisfactory.
- In a carport or sheltered outdoor space, a minimum rating of IP54 would be recommended.
- For fully exposed locations, IP65 is desirable, but the choice of chargers with this rating is limited.

Electricity tariffs and solar

In general, electricity generated from solar is the cheapest option. However, the contribution of solar is limited to when surplus solar energy is being generated while vehicles are parked and plugged in. For many organisations, there may be limited times of surplus generation on weekdays. However, on weekends and holidays, organisations may have a significant surplus of solar energy, which can potentially provide enough charge to an electric vehicle for the next two or three days of use.

Selecting the best tariff for a specific site depends on how much electricity use varies by time of day, day of the week, and how many solar panels the organisation has installed. Many organisations experience their peak demand during the day, and have limited consumption during off-peak periods, and so the benefits from time-of-use tariffs will differ depending on how an organisation operates. Adding solar generation to a site makes time-of-use tariffs the best option in most cases.

Where a time-of-use tariff is in use, charging electric vehicles during the off-peak period overnight is the most economical option (after solar), and the most convenient charging option.

CHARGING AT EMPLOYEES' HOMES

Charger selection

Charging at home requires an adequate home power supply. Particularly for older homes, charge rates greater than 2.4 kW or 3.6 kW may require upgrades to the switchboard or power supply. This needs to be assessed on-site by a licensed electrician. Homes without private off-street parking and rental homes may also not be suitable for employees to charge a fleet electric vehicle.

Organisations may need to consider how to reimburse employees for electricity used to recharge fleet vehicles at home, and this may affect the type of charger required (eg a metered charger that can be read remotely). See the *Policy Considerations for Electric Vehicles* Fact Sheet in this series for further information.

Electricity tariffs

Under the current tariff arrangement used by the vast majority of Tasmanian homes, chargers would be connected to the Light & Power Tariff 31. This tariff is relatively expensive (\approx \$4.40/100km) compared to the off-peak rate of the time-of-use Tariff 93 (\approx \$2.48/100km). The difference may amount to several hundred dollars per year. It may be in an organisation's interest to encourage employees who charge work vehicles at home to switch to Tariff 93, depending on the available charging infrastructure.

Sustainable Living Tasmania completed modelling using 10 minute interval data from 36 Tasmanian households, which showed that most households can save money by switching to time-of-use Tariff 93. This is without any changes in equipment or behaviour.

The modelling showed that by installing a timer on hot water cylinders to ensure they come on only during off-peak periods, almost all households can save money by changing to the time-of-use Tariff 93, saving an annual average of \$275. Further savings can be made by using other appliances (dishwashers, washing machines, dryers, etc) within off-peak periods. For homes with solar panels, switching to Tariff 93 also significantly increases solar self-consumption, which can result in considerable savings.

To reduce its costs for reimbursing employees for charging fleet vehicles at home, an organisation may consider incentives to encourage employees to change their household to time-of-use Tariff 93. Such incentives may include the organisation offering to pay to modify hot water timers or ensuring that electric vehicle chargers are written down by the organisation, to remain the property of the employee.

CHARGING ON THE ROAD

While most charging will occur at a fleet base or an employee's home, sometimes charging will be required during a journey. A very useful resource for locating charging sites is PlugShare - a global app and website that provides a list of electric vehicle chargers that is updated by users.

Fast (DC) chargers allow vehicles to charge quickly at the highest rates and are the most practical for work-related journeys, as they minimise recharging times. Through Tasmanian Government funding and some commercial investment approximately 12 to 15 fast chargers will be installed around the State by the end of 2020. The charger locations will have a maximum spacing of about 150 km across the State, meaning that electric vehicle drivers are able to travel around Tasmania.

Payment to use fast chargers may consist of a swipe card, an application, or may be made by credit card. Organisations that install fast chargers can choose how they charge for the electricity used. Like fuel cards, these payment methods can provide useful information to the organisation about charge events on the road.

It is likely that the cost of using a fast charger to charge will be about the price as refuelling with petrol. When fast chargers are used to recharge fleet vehicles, they should be used to provide enough charge just to complete a journey with a little to spare, rather than charging to 100 per cent charge.

This document was prepared by Sustainable Living Tasmania to summarise the general information provided to councils during the Smarter Fleets Program – Electric Vehicles in Local Government.

The Smarter Fleets Program supported 10 Tasmanian councils to prepare to introduce electric vehicles into their fleets. The Program provided tailored information and analysis of the participating councils' existing fleets to calculate the environmental benefits and cost reductions that electric vehicles can offer.

The Program ran from July 2018 to June 2019 as a partnership between the Tasmanian Government and Sustainable Living Tasmania and was funded by the Tasmanian Government. This information is correct as at October 2019, but is general in nature so it may not be relevant to your fleet