

SUPPORTING A STATEWIDE ELECTRIC VEHICLE CHARGING NETWORK

Consultation Paper – October 2018

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Supporting a statewide electric vehicle charging network

INTRODUCTION

Electric vehicles powered by Tasmania's renewable energy have the potential to significantly improve the efficiency of the State's vehicle fleet through reduced transport costs and reduced greenhouse gas emissions. Electric vehicles may also help improve the State's energy security by creating further market demand for the generation of locally produced renewable energy in Tasmania.

Under *Climate Action 21: Tasmania's Climate Change Action Plan 2017-2021* (Climate Action 21) the Tasmanian Government is committed to supporting the uptake of electric vehicles. This includes supporting the rollout of a statewide electric vehicle charging network.

As part of this commitment, the Tasmanian Government is providing up to \$450,000 in funding to support the market to install chargers that are accessible to the public.

The Department of Premier and Cabinet's Tasmanian Climate Change Office (TCCO) is seeking feedback on the possible approaches the Tasmanian Government could take in providing this funding support. The key aim of which is to stimulate the market to install charging stations.

The feedback received will inform the development of a strategy to ensure the funding achieves the greatest benefit for Tasmania by increasing public electric vehicle charging opportunities statewide and providing the best possible user-experience for Tasmanians and visitors to the State.

The purpose of this paper is to seek community feedback and TCCO welcomes comment on any matters considered relevant.

TCCO is seeking feedback from all interested stakeholders, particularly potential suppliers of electric vehicle charging infrastructure and potential users of the installed electric vehicle charging stations. Stakeholders may include but are not limited to:

- local tourist organisations, local government and chambers of commerce;
- local business and industry;
- private/commercial vehicles fleets;
- potential electric vehicle charging infrastructure suppliers/providers/partners;
- electric vehicle tourists; and
- the general public.

Following consultation, a procurement process to deliver the Tasmanian Government's commitment will be developed. As part of this process, any technical specifications relating to charger installation (eg relating to charger capacity, charging socket type and electrical works etc) will be developed by TCCO in consultation with representatives from the Department of State Growth and TasNetworks. This Paper is not part of the procurement process and has not been issued for the purpose of establishing technical specifications or selecting a supplier.

BACKGROUND

Electric vehicle uptake in Tasmania

There are two key factors anticipated to increase electric vehicle uptake in Australia.

Firstly, electric vehicle model availability in Australia is expected to increase with nine new Plug-in Hybrid Electric Vehicle (PHEV) and Battery Electric Vehicle (BEV) models being introduced into Australia by the end of 2019. Five of these models are expected to be priced at \$60,000 or less.

Secondly, it is predicted electric vehicles will reach cost parity with Internal Combustion Engine vehicles by 2025, which is expected to contribute to widespread electric vehicle adoption.

Electric vehicle charging infrastructure

While the primary charging site for most electric vehicle owners is at home, public charging is needed to support longer distance drives that go beyond the current rate of charge of an electric vehicle (around 100 km to 300 km depending on the electric vehicle type).

With electric vehicle uptake on the rise, it is likely the market (via private charging station owners and operators) will lead the rollout of public fast chargers in Tasmania within the next two to five years.

Public charging infrastructure is needed for local electric vehicle users (individuals and fleets), and visitors who wish to tour the State using electric vehicles.

Electric vehicle charging stations can also act to raise community awareness of the technology, which is known to improve the likelihood of adoption among potential electric vehicle purchasers.

Further information on electric vehicle charging infrastructure is provided at Appendix I (Supplementary technical notes).

TasNetworks Electric Vehicle Fast Charger Support Scheme

TasNetworks has an *Electric Vehicle Fast Charger Support Scheme*¹ to act as an incentive for the installation of public Direct Current (DC) fast chargers.

The Scheme provides network support in the form of technical advice and cost rebate components and has a funding pool of \$250,000 over five years (commencing 2017-18). Technical advice refers to providing information regarding the technical characteristics of DC fast chargers, and the power supply upgrade options to allow the connection of a DC fast charger.

The TasNetworks Scheme, which focuses on providing electricity network support, is complementary to the Tasmanian Government's commitment to support a statewide charging network through providing funding.

¹ Further information on the Electric Vehicle Fast Charger Support Scheme is available on the TasNetworks website at: <https://www.tasnetworks.com.au/industry-and-development/electric-vehicle-fast-charger-scheme/>.

RELEVANT CONSIDERATIONS

Types of electric vehicle chargers

There are three main types of electric vehicle charging: home, destination and inter-regional fast charging.

A key consideration for the Tasmanian Government is determining which type of charging stations, or which mix of charging stations, to support.

Given the Government's commitment to support publicly available charging stations, the two types of chargers the Government can consider supporting are:

- **destination chargers** in locations where drivers/electric vehicles remain for an hour or more (businesses, accommodation providers (eg hotels and caravan parks) and visitor/tourist attractions); and/or
- **inter-regional fast chargers** to enable electric vehicle users to complete longer routes or return journeys.

A key consideration is to determine what type of electric vehicle chargers are required in which locations, to deliver a coordinated electric vehicle charging network.

There are a number of other technical considerations with regard to chargers including compatibility with different electric vehicle types, consistency with market trends and the ability of chargers to be upgraded as technology improves.

Table 1: Types of electric vehicle charging

Name	Type	Notes
Home	Basic Alternating Current (AC) charging	Most electric vehicle charging is undertaken at home overnight, as this is generally the most convenient form of charging.
Destination	Permanently wired AC charging	This form of charging may be faster than home charging but is best used in locations where people typically stop for an hour or more, for example workplaces or tourist destinations.
Inter-regional fast charging	Permanently wired Direct Current (DC) fast charging	This form of charging can provide a high rate of charge and would be installed where drivers need to recharge and continue their journey promptly. Recharging to 80 per cent takes 20 to 90 minutes from empty, depending on the car and the charger. A top-up to reach a destination may take only a few minutes.

(Q1) Should the Tasmanian Government support the installation of both destination (slower charge) and Inter-regional DC fast chargers?

(Q2) What factors should be considered in determining what type of charger should be installed where?

Location of electric vehicle chargers

A statewide charging network needs to consider the charging needs of Tasmanian electric vehicle users (individuals and fleets) and electric vehicle tourists. It also needs to consider charging opportunities in both high-population areas and regional areas.

Larger population centres and major highways (eg Hobart, Launceston and Burnie central business districts, and the Midland Highway) are likely to have higher charging use. Usage will derive from local users (including private individuals and fleets, and the tourism industry). Higher usage means these areas are likely to attract private investment in charging infrastructure because they will be commercially viable sooner.

The installation of electric vehicle charging, particularly in regional areas, can have positive flow-on effects to the economy in terms of attracting visitors through growing the electric vehicle tourism industry.

In determining locations where electric vehicle charging infrastructure could be installed, other key considerations include:

- the distance between charging stations, particularly fast chargers;
- ease of access from major transport routes;
- the ability of the existing electricity network to support the chargers; and
- convenient access across all areas of Tasmania for electric vehicles.

Installing charging infrastructure in regional Tasmania is important to support local users (individuals and fleets) to be able to drive between main population centres, and to support visitor drive journeys (the electric vehicle tourism industry).

(Q3) Which locations (for example high-population areas or less-populated regional areas) should the Tasmanian Government consider as the highest priority for installing electric vehicle charging stations?

Amenity and safety

The site on which a charging station is located can have a considerable impact on user-experience and is therefore an important consideration.

This includes access to amenities (eg shelter, food and public toilets), security considerations, and characteristics including lighting and visibility of the surrounding area. It also includes ensuring that vehicles not using charging facilities do not block access to charging stations.

It is also important that charging infrastructure complies with appropriate standards for electrical work. In Tasmania relevant legislation includes the *Occupational Licencing Act 2005* and the *Occupational Licencing (Standards of Electrical Work) Code of Practice 2017*.

(Q4) Which amenities are important to have nearby electric vehicle charging stations to facilitate a positive and convenient user-experience?

Operation and maintenance

A key consideration in relation to electric vehicle charging stations is whether users pay to charge their vehicle, and if so how much.

Most fast charging stations incorporate simple user interface payment mechanisms (eg smartphone app, cloud-based accounts or credit card) to cover the ongoing cost of the electricity consumed. There is also the potential for charging stations to offer online bookings to improve the user-experience.

Charging infrastructure also needs to be maintained and may need to be upgraded as technology improves.

The reliability and availability of installed charging stations is another consideration for potential users. For example, there may be waiting periods during peak usage times (eg when people are travelling during holidays or attending large events), or the potential for people to become stranded if a charging station fails to work (eg due to technical issues). Possible solutions to this issue could be to install more than one charger at certain locations, or ensure mobile charger(s) are available for use in Tasmania when needed.

Providers of charging stations also need to offer customer care such as ensuring repairs are undertaken quickly if issues arise.

Ensuring Tasmanian Government supported charging stations remain operational for a reasonable amount of time (eg five to ten years) may be another consideration.

(Q5) What type of operation and maintenance issues should be considered to ensure a positive and convenient user experience?

(Q6) What is the preferred payment mechanism(s) for electric vehicle charging station from a user perspective and an operator perspective?

(Q7) Should charging stations offer an online booking system?

(Q8) What are the expectations of users with regards to reliability and availability of installed charging stations and how could these expectations be met?

(Q9) How important is providing multiple chargers at each site to cover for availability and possible equipment failure?

Cost and funding delivery

A key consideration for the Tasmanian Government is determining the most effective approach to deliver its funding support for charging infrastructure.

An effective delivery model will stimulate the market-led installation of charging infrastructure to increase public charging opportunities across Tasmania. It will also ensure the ongoing operation and management of any installed charging infrastructure.

There are a variety of funding-delivery options available to the Tasmanian Government, including:

- procuring a central coordinator or service provider to manage the installation and ongoing management of the funded electric vehicle charging infrastructure; and
- partnering with local organisations (eg tourism operators, electricity utilities, councils, local business, private sector providers, and industry groups to manage the installation and ongoing management of the funded electric vehicle charging infrastructure.

The cost of an electric vehicle charging station is dependent on three main variables:

1. *Up-front cost of the charger* – varies depending on capacity, type and features (eg DC fast chargers are more expensive compared to destination chargers).
2. *On-site installation works* – varies depending on works required at the location to install the charger and connect it to a switchboard. If the electrical switchboard needs upgrading, the installation cost can increase significantly.
3. *Cost for power supply upgrade* – may be an issue for higher power chargers and may vary depending on the existing capacity within the network to meet the electricity usage of an electric vehicle charger.

In addition to the capital cost of electric vehicle chargers, there are associated operating costs, including:

- electricity, as levied by the electricity retailer;
- maintenance;
- customer support; and
- billing system costs, which are levied by the billing service provider.

(Q10) What funding delivery model would work best to stimulate potential suppliers to install electric vehicle charging infrastructure in Tasmania and why?

(Q11) What level of funding (eg a percentage contribution to upfront costs) would be reasonable for potential partner organisations/businesses to make towards the installation of electric vehicle charging infrastructure and why?

(Q12) Who should be responsible for ongoing costs and maintenance?

(Q13) Should fees for charging at a station be based on commercial pricing or be subsidised to some extent?

Visibility and awareness

It is important that local electric vehicle users and potential electric vehicle tourists are aware that charging infrastructure exists in Tasmania and how it can be accessed.

The use of signage, marketing materials and branding of charging infrastructure may assist with charging station visibility and awareness.

(Q14) What should the Tasmanian Government consider in raising community awareness of the statewide electric vehicle charging network?

SUBMITTING YOUR FEEDBACK

Feedback is requested to be provided in writing by 5.00pm, **Monday 12 November 2018**.

Submissions can be forwarded to:

Email: climatechange@dpac.tas.gov.au

Mail: Tasmanian Climate Change Office, Department of Premier and Cabinet, GPO Box 123, Hobart, Tasmania 7001

All submissions should include the name and contact details of the person making the submission, and the organisation they represent, if applicable.

Submissions will be published on the TCCO website. If you would like your submission to be kept confidential, please note this in your submission. No personal information other than your name or the organisation making a submission will be published.

We are committed to ensuring Government information is accessible and easily understood by people with diverse communication needs. Where possible, please write your submission in plain English.

For further information, please contact the TCCO by telephone on (03) 6232 7173 or by email to climatechange@dpac.tas.gov.au.

APPENDIX I: SUPPLEMENTARY TECHNICAL NOTES

Electric vehicle charging rates

The charging rate for electric vehicle charging is determined by the lowest capacity of:

- the car (on board AC/DC converter for AC or maximum DC charge rate for DC set by battery size and chemistry);
- the power supply (AC from the mains or DC rectified on a fixed charger); and
- the cable from the power supply to the car.

Most cars have on-board AC/DC converters from 3.5 kW (single phase) to 22 kW (3 phase). These limit AC charge rates for the vehicle regardless of AC power source or cable size.

Home charging

Electric vehicle home charging is typically AC:

- from 2.5 kW (single phase, 10 A delivering about 12 km driving range per hour of charge)
- up to 22 kW (32 A three phase delivering about 100 km driving range per hour of charge)
- but commonly 7 kW (32 A single phase, 35 km range per hour)

Destination charging

Destination chargers with 22 kW AC, three phase; these chargers deliver the maximum capacity most electric vehicles can currently accept. Sites with only single phase supply or limited power capacity may offer less, but still supply the maximum 7 kW AC charge rate for many vehicles.

DC fast charging

Most electric vehicles have a limited AC charging capacity but can charge faster using DC (some models, particularly Plug-in Hybrid Electric Vehicles (PHEVs), lack DC charging capabilities). DC charging can be at any power level from 1 kW to up to 1,000 kW or more. It can overcome AC charge rate limits, so is often called DC Fast Charge.

Even for DC charging, electric vehicle batteries have a maximum charge rate that slows as the battery fills. This rate slows markedly above 80 per cent state of charge. Current model electric vehicles have peak charge rates of 40-110 kW.

The cost of installing more powerful chargers is much higher than lower power chargers, as higher-powered chargers often need expensive upgrades to the power supply. The first generation of DC fast chargers were mostly 50 kW (4 km/min of charge, peak), with the exception of Tesla superchargers which provide up to 110 kW (9 km/min of charge, peak).

New model electric vehicles have been announced with higher peak charge rates. Trucks and buses, with much larger batteries, also can accept higher charge rates, up to 700 kW (55 km/min of charge) with even faster rates proposed. Charge rates more than about 175 kW require charging cables to be cooled to avoid overheating (or instead use very thick cables which are heavy).

Electric vehicle driving range and charger spacing

Determining the correct distance between chargers depends on the kilometre range of electric vehicles, when they have a full battery. Many first generation electric vehicles have ranges under 150 km, which shortens at high speed, going uphill, driving into the wind, in cold weather and as the battery ages. While suitable for urban use, these first generation electric vehicles are impractical for long journeys.

Newer electric vehicles have larger batteries and longer ranges, mostly between 200 km and 500 km. A 200 km range allows for two hours of driving before stopping to recharge. A distance between chargers of no more than 150 km means that a charge to 80 per cent capacity will allow a 200 km range electric vehicle to drive to the next charger. Shorter distances between chargers would allow for side trips, adverse conditions, battery ageing, as well as provide greater convenience.



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