Electric Vehicle charging provisions in Government Building projects (G210)

Intent

The Government of South Australia is leading the transition in decarbonising road transport by proactively transitioning the SA Government passenger car fleet to be 100% electric by 2030 [1].

The intention of this document is to provide guidance for provision of infrastructure for future Electric Vehicle (EV) charging in all Department for Infrastructure (DIT) managed building construction projects, Agency Accredited lead projects, as well as ongoing building upgrades under Across Government Facility Management Arrangement (AGFMA).

Requirements

The Department for Energy and Mining (DEM), in conjunction with DIT, have provided direction on what provisions for EV charging should be made in SA Government buildings [2].

Additionally, the National Construction Code 2022 (NCC 2022), section J9D4 calls for a base line provision for future EV charging in new developments, from 1 October 2023 onwards [3]. The majority of DIT Building Projects will be for Class 5 or 9 buildings, which will therefore require provision for future installation of EV chargers for 10% or 20% of car spaces for that building, respectively.

Implementation

Projects teams shall ensure allowances in the agency briefs and future design allow for installation of EV chargers, particularly in the electrical infrastructure and spatial requirements, including:

- Investigation/consultation of the design team with Lead Agency/End User stakeholders to determine how many SA Government (SAG) Fleet vehicles are likely to be based at the site, currently located at other sites, or what vehicles based at other sites are likely to be driven to the site frequently and would benefit with being charged there. Also, the site may have the agency's operational vehicles, e.g. vans, Utes or emergency response vehicles, for which a detailed study on usage patterns will need to be performed to determine charging requirements, typically will require fast charging capability. Also consider that whilst these vehicles may not be EVs immediately, replacements of these are likely to be EVs in the near-medium term future.

- Recommendations on how many chargers will be required to appropriately service the EVs to be based at the site. The quantity of chargers, in the near term and longer term, should consider the above requirements, and also to prioritise which vehicles are to be serviced:
    - Operational vehicles
    - SAG fleet vehicles
    - Staff vehicles
    - Public visitors
- Appropriate spare capacity in the SAPN transformer sizing, consumer mains cabling and MSB capacity. Any capacity included for future EV charging is additional to general spare capacity requirements as per DIT Guide Note G177.[4]
- Planned locations for future DB.EV and submains cable pathway from the MSB.
- Cable pathways from DB.EV to locations where these EVs are to be parked (e.g. 100mm electrical and 100mm comms conduits to light poles adjacent these parking spaces)
- Spare capacity in communications infrastructure and energy management systems.
- Locations of EV charger spaces should also consider the potential fire risk of the vehicles' batteries. Appropriate fire separation and mitigation should be provided in the design. The Metropolitan Fire Service (MFS) provides discussion of this topic [5].

Additional Requirements

Where EV chargers are to be installed as part of the project, and not just future provision, the requirements of the Technical Standard for Installation of Electric Vehicle Supply Equipment (EVSE) [6] shall be considered.

Also, impact to the electricity demand and connection requirements from SA Power Networks will need to be followed.[7]

Standards Australia AS/NZS 3000:2018 Wiring Rules, appendix P gives technical requirements for such installations (Informative).[8]

References

[1] Department for Energy and Mining, 2020, *South Australia's Electric Vehicle Action Plan*, https://www.energymining.sa.gov.au/__data/assets/pdf_file/0009/609390/DEM-Electric-Vehicle-Action-Plan.pdf

[2] Department for Energy and Mining, 2023, *Electric Vehicle Charging*

Infrastructure Guide for South Australian government sites, (copy attached to this document)

[3] Australian Building Codes Board, 2022, *National Construction Code 2002*, https://ncc.abcb.gov.au/

[4] Department for Infrastructure and Transport, 2018, *Spare Capacity and Maximum Demand for Electrical Installations on Government Sites (G177)*, https://www.bpims.sa.gov.au/bpims/library/downloadResource.do?id=1762

[5] SA Metropolitan Fire Service, 2022*, Fire Safety Position Statement - Electric Vehicles (EV) & EV Charging Stations in Buildings*, https://www.mfs.sa.gov.au/community/building-and-commercial-fire-safety/guidelines-and-information/Fire-Safety-Position-Statement-EV-Charging-Stations-in-Buildings-1.0.pdf

[6] Department for Energy and Mining, Office of the Technical Regulator; 2022; *Technical Regulator Guideline - Technical Standard for Installation of Electric Vehicle Supply Equipment (EVSE)*, https://www.energymining.sa.gov.au/__data/assets/pdf_file/0020/813512/Technical-Regulator-Guideline-Technical-Standard-for-Installation-of-Electric-Vehicle-Supply-Equipment-EVSE.pdf

[7] SA Power Networks, https://www.sapowernetworks.com.au/your-power/smarter-energy/electric-vehicles/

[8] Standards Australia, 2018, *AS/NZS 3000:2018 Wiring Rules*, https://store.standards.org.au/product/as-nzs-3000-2018

Contact

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Government of South Australia

Electric Vehicle Charging Infrastructure Guide

for South Australian government sites

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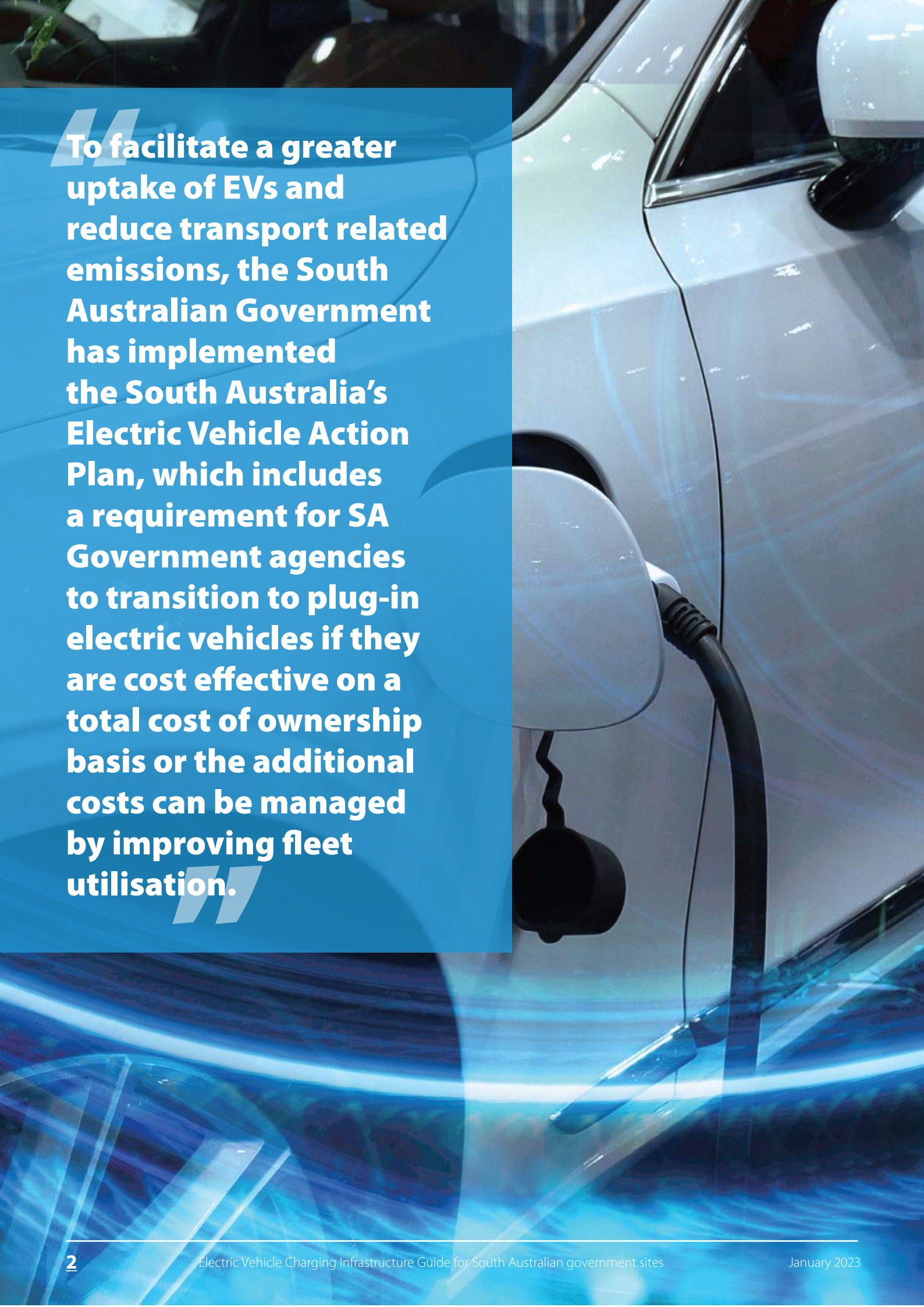
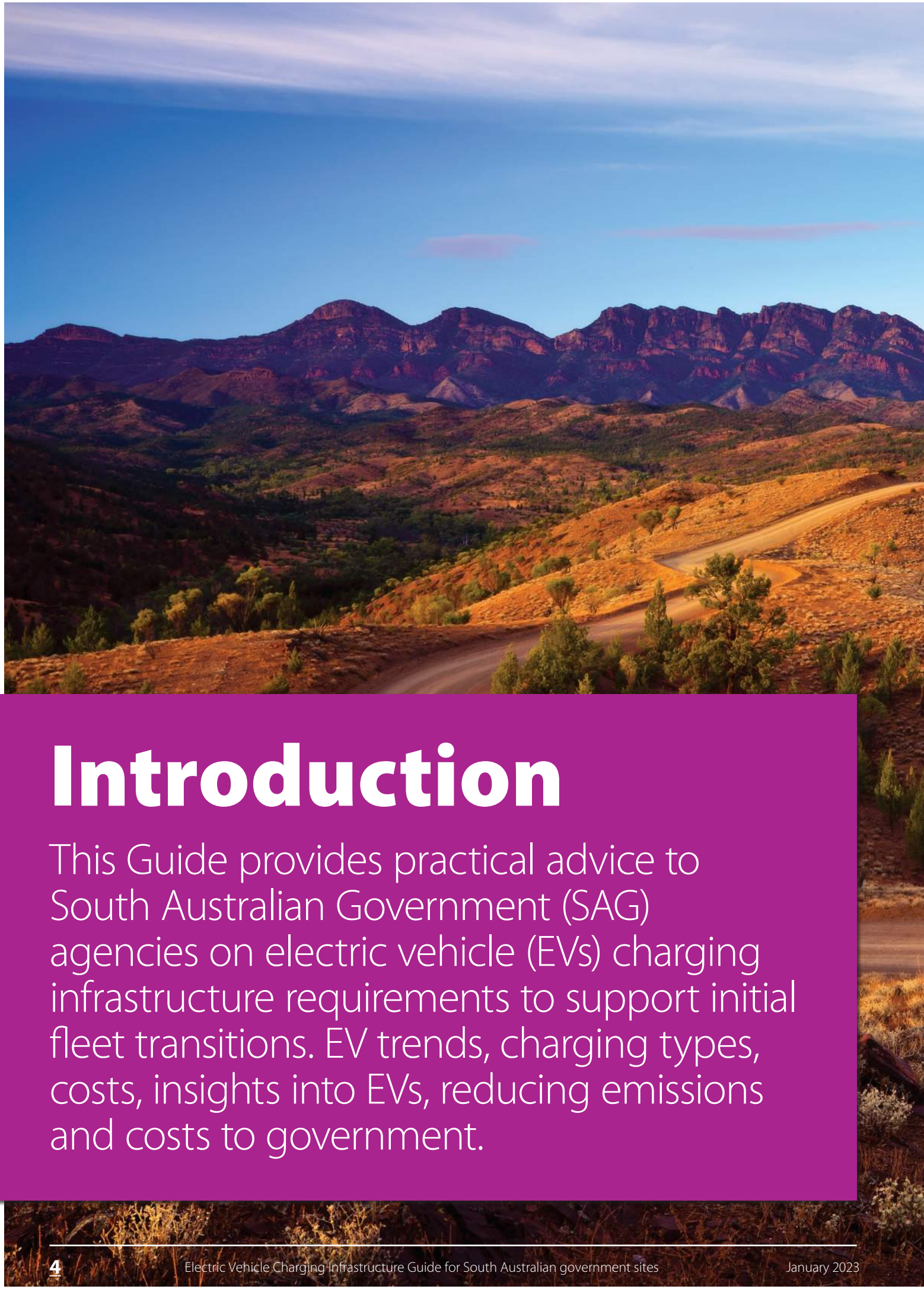


"To facilitate a greater uptake of EVs and reduce transport related emissions, the South Australian Government has implemented the South Australia's Electric Vehicle Action Plan, which includes a requirement for SA Government agencies to transition to plug-in electric vehicles if they are cost effective on a total cost of ownership basis or the additional costs can be managed by improving fleet utilisation."

Contents



Introduction

This Guide provides practical advice to South Australian Government (SAG) agencies on electric vehicle (EVs) charging infrastructure requirements to support initial fleet transitions. EV trends, charging types, costs, insights into EVs, reducing emissions and costs to government.

Analysis

Purpose

The purpose of this Guide is to provide practical advice to South Australian (SA) Government agencies on electric vehicle (EV) charging infrastructure requirements to support the transition to EVs. This includes providing information on EV trends, charging types and infrastructure, EV charging infrastructure costs, and providing insights and advice on how the EV transition will assist in reducing emissions and costs for government over time.

Scope

The scope of this Guide is to provide advice for SA Government (SAG) agencies and fleet locations, predominantly at SAG sites. This Guide is not intended for general staff vehicles (non-fleet) or public charging. This is covered by the EV Statewide Charging Network. However, public charging has been considered in the context of ensuring agencies do not over capitalise on charging infrastructure when public charging stations are available or planned.

SA Government fleet

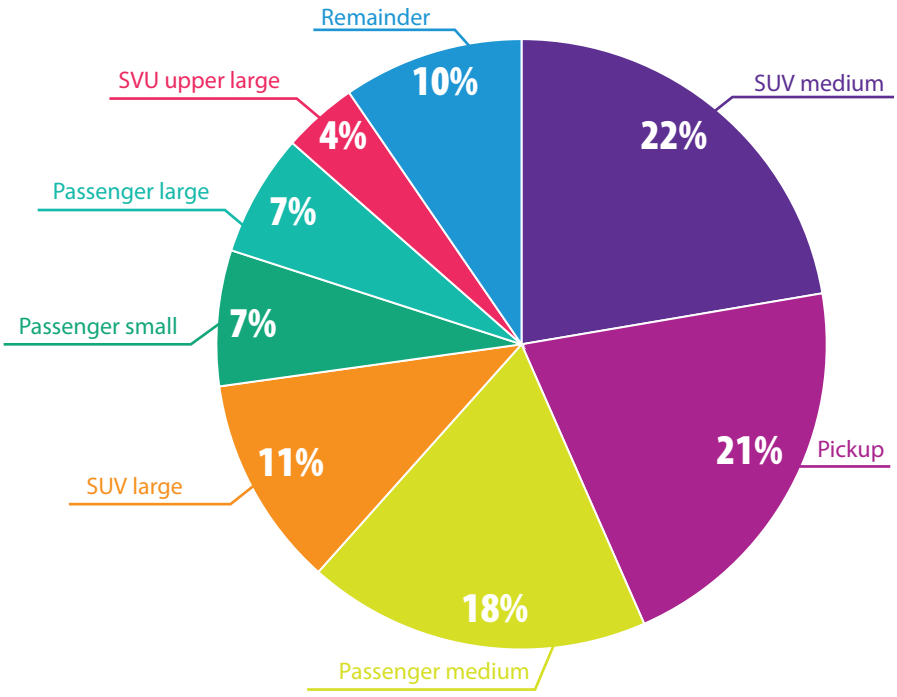
There are over 6,500 vehicles in the SA Government fleet with the majority of vehicles being petrol, diesel or hybrid petrol/electric. The main agency fleets are as follows, with the current uptake of hybrid vehicles and EVs included (as at July 2021). Note that some agencies have ordered EVs including 8 EVs by SA Water which are not included in the data.

The table is broken down by hybrid, plug-in hybrid electric vehicles (PHEV), and battery electric vehicles (BEV) to demonstrate the current transition to low emission vehicles.

Agency	Number of Vehicles	Hybrid %	PHEV	BEV	Plug-in Electric %
Department for Health and Wellbeing	1527	43%	1	0	0.1%
SA Police	1164	8%	0	5	0.4%
Department for Education	653	31%	2	0	0.3%
Department of Human Services	517	51%	1	0	0.2%
SA Water	544	7%	0	0	0.0%
Department for Infrastructure and Transport	340	17%	4	0	1.2%
Department for Child Protection	446	47%	0	0	0.0%
Department for Environment and Water	240	5%	4	0	1.7%
Department of Primary Industries and Regions	173	0%	2	0	1.2%
Department for Energy and Mining	48	15%	0	1	2.1%

SA Government vehicles travel approximately **110 million kilometres** per year, equating to over **21,000 tonnes CO_2.**

South Australian government fleet consist of the following vehicle segments with medium and large vehicles making up over 70% of the fleet.



Vehicle emissions

Prior to procuring a new fleet vehicle, it is important to consider the economic, environmental and social impacts of the purchase and consider if alternative options are available. In particular, the vehicle size and fuel type can make a significant impact on vehicle emissions. The average vehicle emissions for vehicle segments and fuel types can assist agencies in selecting vehicles that reduce carbon emissions with EVs providing a significant reduction compared to internal combustion vehicles.

These emissions are based on the emissions associated with charging the vehicle from the South Australian electricity grid with an emissions factor of 0.36 tCO_2e per kWh. These emission factors will continue to reduce in line with section 1.5 and will reduce EV emissions to zero following 100% renewable energy being achieved in South Australia or in the event SA Government procures 100% renewable energy.

Vehicle type	Petrol CO_2 emission (g/km)	Diesel CO_2 emissions (g/km)	Hybrid / plug in electric vehicle CO_2 emissions (g/km)	Electric vehicle CO^2 emissions (g/km)
Small car	179	145	86	46
Small SUV	206	144	109	39
Medium car & SUV	227	167	82	61
Large car & SUV	332	234	54	49
Utility	308	252		
Small van	202	139		46
Large van	378	240		

Low emissions Medium emissions High emissions

South Australia is projected to reach 100% renewable energy generation by 2030, reducing electric vehicle emissions to zero.

EVs charged in South Australia will quickly move towards being 100% zero emissions giving consideration for fleet managers as part of climate change mitigation strategies.

Renewable energy in South Australia

South Australia is leading the country and the world in transitioning to a renewable energy future which is a key consideration for transitioning to EVs.

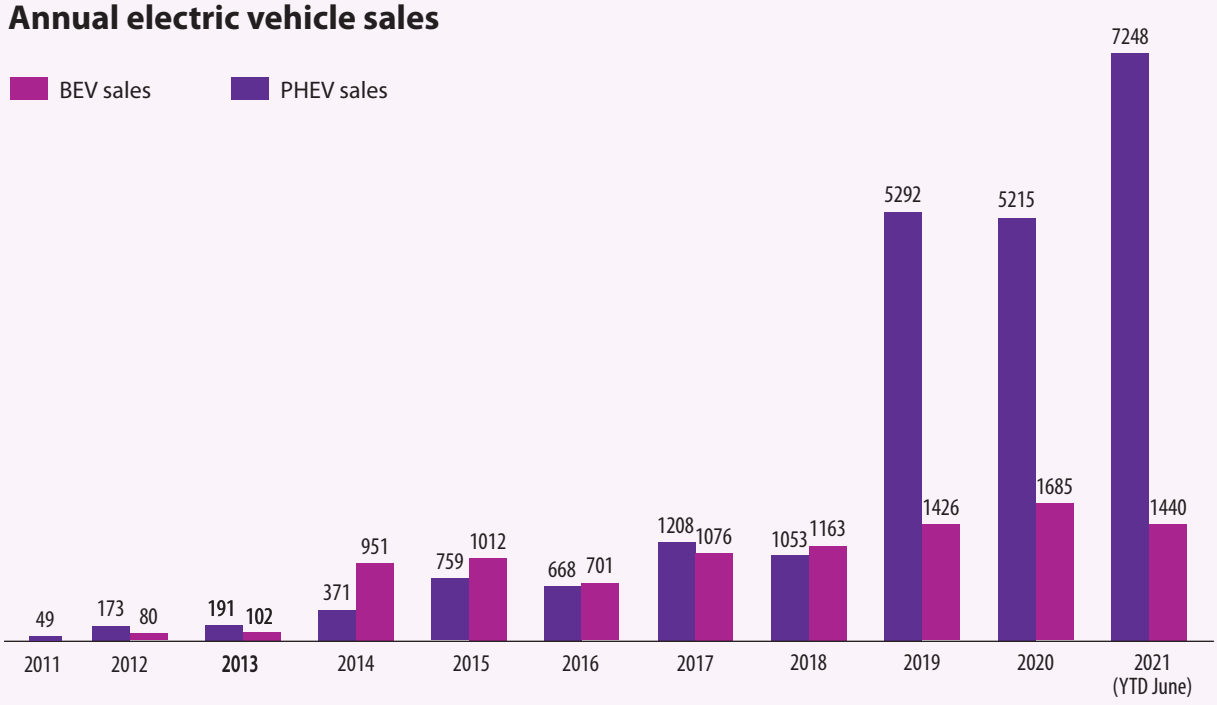
In 2006, all of South Australia's electricity was generated from fossil fuel supplies, predominantly gas and coal. In 2015, approximately 36% of electricity was from renewables, and by 2020 over 60% was from renewable energy supplies (predominantly wind with an increasing share of rooftop and utility scape solar). Based on projections by the Australian Energy Market Operator (AEMO), it is expected that South Australia will reach 100% renewable energy generation by 2030.

The August 2021 National Greenhouse Accounts Factors for greenhouse gas (GHG) emission factors for South Australia reflect the increased share of renewables and has reduced emission factors from 0.53 $kgCO_2e/kWh$ to 0.36 $kgCO_2e/kWh$. This decrease strengthens the argument to transition to all-electric technologies and EVs.

Electric vehicle trends

EVs are projected to make up an increasing share of vehicles sold in Australia; however EV uptake has been relatively slow due to the low number of EVs available on the market, higher upfront purchase prices, limited EV charging infrastructure and concerns about EV ranges and performance.

Annual electric vehicle sales



Electric vehicle availability

The Department of Treasury and Finance and the South Australian Government Financing Authority (SAFA) are continually collating information and pricing on new EVs entering the market and provide options for agencies to lease EVs.

It is recommended that fleet managers contact SAFA to obtain the latest information on EV availability and to ask any questions on potential options.

There are currently 32 EVs available for purchase in Australia, with more models and vehicle segments entering the market each year. However, the majority of EVs are not suitable for SA Government purchase due to operational requirements, minimum Australasian New Car Assessment Program (ANCAP) safety standards, or due to being premium or luxury car.

It is recommended that agencies review models with a relatively consistent travel distance.

SA Government renewable energy

It is recommended that agencies install EV charging stations at sites with existing or planned solar PV systems to take advantage of lower charging costs, while reducing electricity exported to the grid. In particular, EV charging should occur between 10am and 3pm when net negative demand periods are occurring due to the high penetration of rooftop solar which will support grid stability.

This can be achieved with either smart charging systems which program charging between set periods or by implementing procedures to plug vehicles in during set times, subject to operational requirements.

Examples of large-scale solar PV installed at SA Government facilities include:

- SA Health: >3MW
- Department for Education: >5MW solar PV installed across schools
- SA Water: >150MW in delivery/planned

The whole of government electricity contract with ZEN Energy includes provisions for the purchase of 100% renewable energy at an additional cost through Large-scale Generation Certificates (LGCs). It is recommended that agencies consider purchasing 100% renewable energy through this contract to reduce emissions associated with the supply of electricity, and in particular reduce EV emissions to zero.

A medium sized petrol combustion vehicle produces approximately 200 grams of CO_2 for every kilometre travelled.

Based on travelling 10,000 km per annum, this equates to 2 tCO_2-e.

An equivalent electric vehicle charged in South Australia results in 70-80 grams of CO_2 per km, reducing emissions by over 60%.

SA Government fleet emissions

With over 6,500 vehicles in the SA Government fleet traveling over 110 million kilometres per year. The average emissions equates to over 21,000 tonnes of CO_2 per year.

Fleet emission reduction opportunities

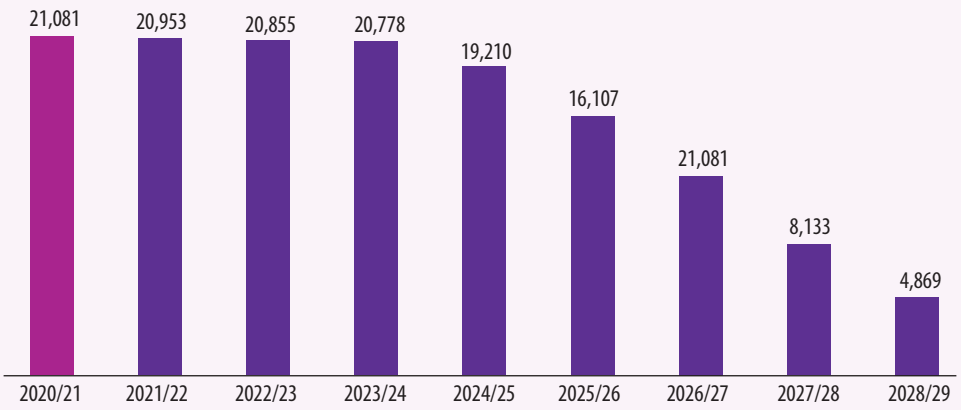
The potential emission reduction opportunities to transition to EVs, projections have been developed for a staged transition which takes into account the high penetration of renewable energy in South Australia:

- **3-year replacement period:** end of the current lease period, an EV will be procured in line with the following vehicle segments:
  - **Small passenger vehicles and SUVs:** replaced at end of current 3-year lease period:
    - 60% of vehicles in this segment are already hybrid electric vehicles, reducing the emissions impact significantly. Small passenger vehicles only represent approximately 8% of the fleet and not have a large impact.
  - **Medium passenger vehicles and SUVs:** replaced from 2024 onwards.
  - **Large passenger and SUVs:** replaced from 2025 onwards.
  - **Large SUVs 4x4s and utility/pick-up vehicles and all remaining vehicles:** replaced from 2026 onwards.
    - It has been assumed that larger vehicle segments (large SUVs, 4x4s, utility/pick-up, etc.) will not have a cost-effective replacement for SA Government vehicles until 2026 however the market is continually changing.
- **Emissions factors (Scope 2 + 3):** average EV emissions for vehicle segments have been developed based on the following emission factors. Where an EV segment is currently not available, an average emissions reduction for EVs has been used for the vehicle segment compared to current emissions.
  - 2021/22: 0.36 $kgCO_2e/kWh$
  - 2022/23: 0.32 $kgCO_2e/kWh$
  - 2023/24: 0.28 $kgCO_2e/kWh$
  - 2024/25: 0.24 $kgCO_2e/kWh$
  - 2025/26: 0.20 $kgCO_2e/kWh$

There is an opportunity to significantly reduce SA Government fleet emissions (below graph). The largest reductions will be achieved when medium to large vehicle segments are expected to have an EV equivalent available.

The fleet transition projects also highlight that large-scale EV charging infrastructure investment will be required in the next 3-4 years to support the transition to EVs.

Fleet emission projections (km)



Awareness and training

Electric vehicle awareness sessions are provided to SA Government employees through the Australian Driving Institute (ADI). These courses are subsidised by the South Australian Government Financing Authority (SAFA), and provide an introduction to EVs, charging requirements and managing range, and a practical test drive.

The training courses can be booked online with further information available at the following websites:

StateNet access required:

- https://intra.fleetsa.sa.gov.au/leasing/electric.php
- https://intra.fleetsa.sa.gov.au/safedriving/training.php (training subsidy listed here)

Public access:

- https://www.austdrive.com/approved-government-of-sa-programs

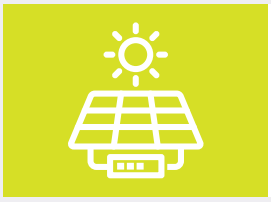
It is recommended all fleet managers undertake the course to provide confidence in the technology, understand charging requirements and increase EV awareness.

Charging infrastructure

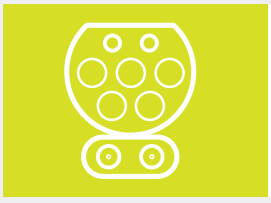
SA Government vehicles travel approx. 110 million kilometres per year, generating over 21,000 tonnes of CO_2.

An average EV charged in South Australia reduces emissions by over 70% compared to a petrol vehicle.

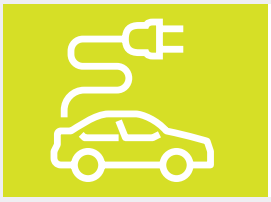
South Australia is projected to reach 100% renewable energy generation by 2030, reducing EV charging emissions to zero.



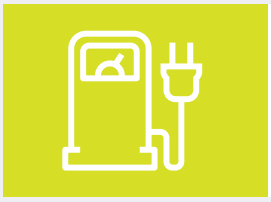
Solar PV has been installed at SA Government sites across the state including hospitals, schools, police stations and administrative buildings, reducing emissions and costs associated with EV charging.



Charging plug types are becoming standardised with the Type 2 Mennekes AC and CCS2 DC used on most EVs.



Increased EV availability and reduced price are expected over the next few years.



The SA Government is investing $13.4 million in public fast charging networks which will support SA Government fleet charging.

Design Principles

The following key design principles have been used to develop this Guide based on a 3S's approach – Safeguarded, Smart and Scalable.

Safeguarded

EV charging stations are safeguarded with access controls, ongoing maintenance and clear signage and instructions for government use.

- Access is restricted to government fleet vehicles or provisions are in place for on-charging.
- Asset registers and maintenance schedules are up to date, ensuring charging stations are maintained and compliant.
- Signage and instructions ensure charging is easy for all users.

Smart

EV charging stations will have smart controls and communication systems to enable demand management and support the SA electricity grid.

- Charging stations have demand management capabilities to reduce peak demand charges.
- Charging is managed during peak and negative demand periods to reduce and support the SA electricity grid.
- Consumption and demand are monitored to the EV fleet (signage and instructions easy for all users.)

Scalable

Flexible designs and technologies will be used to ensure EV charging stations support operations now and can be scaled into the future.

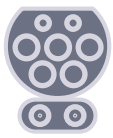
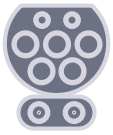
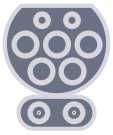
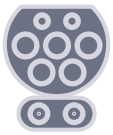
- Designs are flexible and ensure accessibility and ease.
- Future electrical infrastructure provisions are incorporated into designs to future proof government assets.

Options

More models with a comparable total cost of ownership to diesel-powered vehicles are expected from 2022 onwards

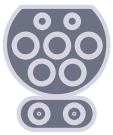
Vehicle	Make / Model	Vehicle segment	Driving range	
			General use / Mild weather	Highway / cold weather
	Hyundai Ioniq (38.3kWh)	Passenger Small	250-300km	175m-200km
	Hyundai Kona Electric (64kWh)	SUV Small	450-500km	280-360km
	MG ZS EV (44.5kWh)	SUV Small	200-250km	125-175km
	Kia Niro PHEV	SUV Small	Plug-in Hybrid EV (PHEV) 30-50km battery only Hybrid electric/petrol mode recommended	
	Mitsubishi Outlander Exceed/GSR PHEV (13.8kWh)	SUV Medium	Plug-in Hybrid EV (PHEV) 30-50km battery only Hybrid electric/petrol mode recommended for longer trips	
	Mitsubishi Eclipse Cross ES PHEV AWD (13.8kWh)st	SUV Small	Plug-in Hybrid EV (PHEV) 30-50km battery only Hybrid electric/petrol mode recommended for longer trips	

Examples of vehicles that may be procured by agencies.

Charging plug type AC / DC	Maximum charge rate / time to 80% charge	
	AC	DC
 Type 2 / CCS2	 7.2kW / 6 hours	 100kW / 50-60 mins
 Type 2 / CCS2	 7.2kW / 9 hours	 100kW / 60-70 mins
 Type 2 / CCS2	 6.6kW / 7 hours	 76kW / 40-50 mins
 Type 2 / CCS2	 3.3kW / 2-3 hours	 100kW / 60 mins
 Type 2 / CHAdeMO	 3.7kW / 5-6 hours	 22kW / 20-30 mins
 Type 2 / CHAdeMO	 3.7kW / 5-6 hours	 22kW / 20-30 mins

Charging plugs

The majority of vehicle manufacturers have transitioned to a consistent platform which includes the Type 2 Mennekes AC plug and the CCS2 DC plug.

Plug type	Name	Description	Plug examples
	**Type 2 Mennekes**	AC charging plug used on all EVs expected to be procured by agencies. It is recommended all AC charging stations provide a Type 2 charging port. Fixed Type 2 cables can also be provided with a lockable enclosure.	
	**CCS2**	**Combined AC and DC charging plug used on the majority of EVs expected to be procured by agencies.** **Type 2 AC charger can be plugged independently into the top socket.**	
	**CHAdeMO**	**DC charging plug typically used on Japanese and older EVs to enable two-way charging.** **Only expected to be relevant for agencies that procure the Mitsubishi Outlander PHEV is recommended that agencies only install AC charging stations due to the small battery size on the Outlander and availability public charging stations.**	

The only exception is the Mitsubishi Outlander PHEV which continues to use CHAdeMO plug to allow two-way charging. This feature is not expected to be relevant for SA Government fleets in the near future however will need to be considered by agencies procuring the Outlander PHEV

Charging rate

The majority of EVs available to SA Government can only charge at a rate of up to 7.2kW for Alternating Current (AC), AC Level 2 chargers are recommended Direct Current (DC) charging can be provided in specific circumstances.

Level 1 (AC)

Standard/domestic power points

- Up to 3.6kW charge (10-15 Amp single phase)
- Typically domestic home charging
- Will provide approximately 10 km to 20 km per hour
- Most EVs will not fully charge overnight
- Charging cable should be left in the vehicle for emergency use

Level 2 (AC)

Dedicated AC charger

- 7kW (32 Amp single phase)
- Typically installed at locations where the EV will be parked for longer periods
- Will provide approximately 40 km per hour
- Will charge most EVs overnight
- Recommended for most agencies/fleet locations

Level 3 (DC)

Dedicated DC charger

- 25kW to 450kW (40 – 500 Amp three phase)
- Typically installed in public locations / side of the road for fast charging
- Typical DC roadside fast charging stations will provide approximately 150km to more than 450km per hour
- Ultra-fast DC stations can charge an EV in 10-15 minutes

Costs are based on a basic installation with no major electrical infrastructure upgrades and with the chargers installed in close vicinity to the building, reducing/ removing trenching/cabling requirements and costs. Refer to the indicative cost section which includes a budget estimator.

Example		Charging type	Charge speed	Description	Indicative cost
		1 x AC 7kW	 **Approximately 40-50km per hour**	Single plug 7kW AC charging stations recommended at locations where there is likely to be only a small number of EVs e.g. 1-2	Charger cost: **$1,500–$3,000** Basic installation cost: **$1,000–$3,000**
		**2 x AC 7kW** (dual plug)	 Approximately 40-50km per hour per vehicle/plug	Dual plug 7kW AC charging stations recommended for locations with larger fleets with 1 charger positioned between 2 parking bays to improve installation costs and efficiencies.	Charger cost: **$5,000–$6,000** Basic installation cost: **$2,000–$3,000**

Both suitable for fleet locations where vehicles are parked for longer periods e.g. providing a full charge overnight.

Ideal for fleet vehicles and vehicles with shorter travel distances or commutes.

Single phase supply only.

Example	Charging type	Charge speed	Description	Indicative cost
	DC 24-25kW	 **Approximately 100-150km per hour**	Suitable for fleet locations with higher utilisation, shorter layover times, longer travel distances and where flexibility is required. Only recommended where fleet locations do not have direct access to publicly available DC fast charging networks.* Three phase supply required	Charger cost: **$15,000–$20,000** Basic installation cost: **$3,000-$4,000**

*Where fast charging is required for SA Government fleet operations, the EV statewide Charging Network may support government requirements through controlled or reserved scheduled times.

Purchase options:

- **Capital install:** The agency installs EV charging stations through the Across Government Facilities Management Arrangements (AGFMA) and their Service Delivery Lead (SDL) which will ensure all works are in line with government procurement requirements and specifications.
- **Leased through LeasePlan:** LeasePlan Australia is appointed as the South Australian Government Financing Authority's (SAFA) agent for the provision of Fleet Management Services for the Government of South Australia's passenger, SUV and light commercial motor vehicle fleet. LeasePlan is investigating the feasibility of agencies financing the cost of EV charging hardware, including the cost of installation, to negate the need for agencies to use capital funding.

  LeasePlan is investigating:
  - lease the charger and a vehicle with a monthly fee and at the end of the lease, purchase the charger (the charger remains the property of the agency); or
  - lease the charger only with a monthly fee (owned and managed by LeasePlan).

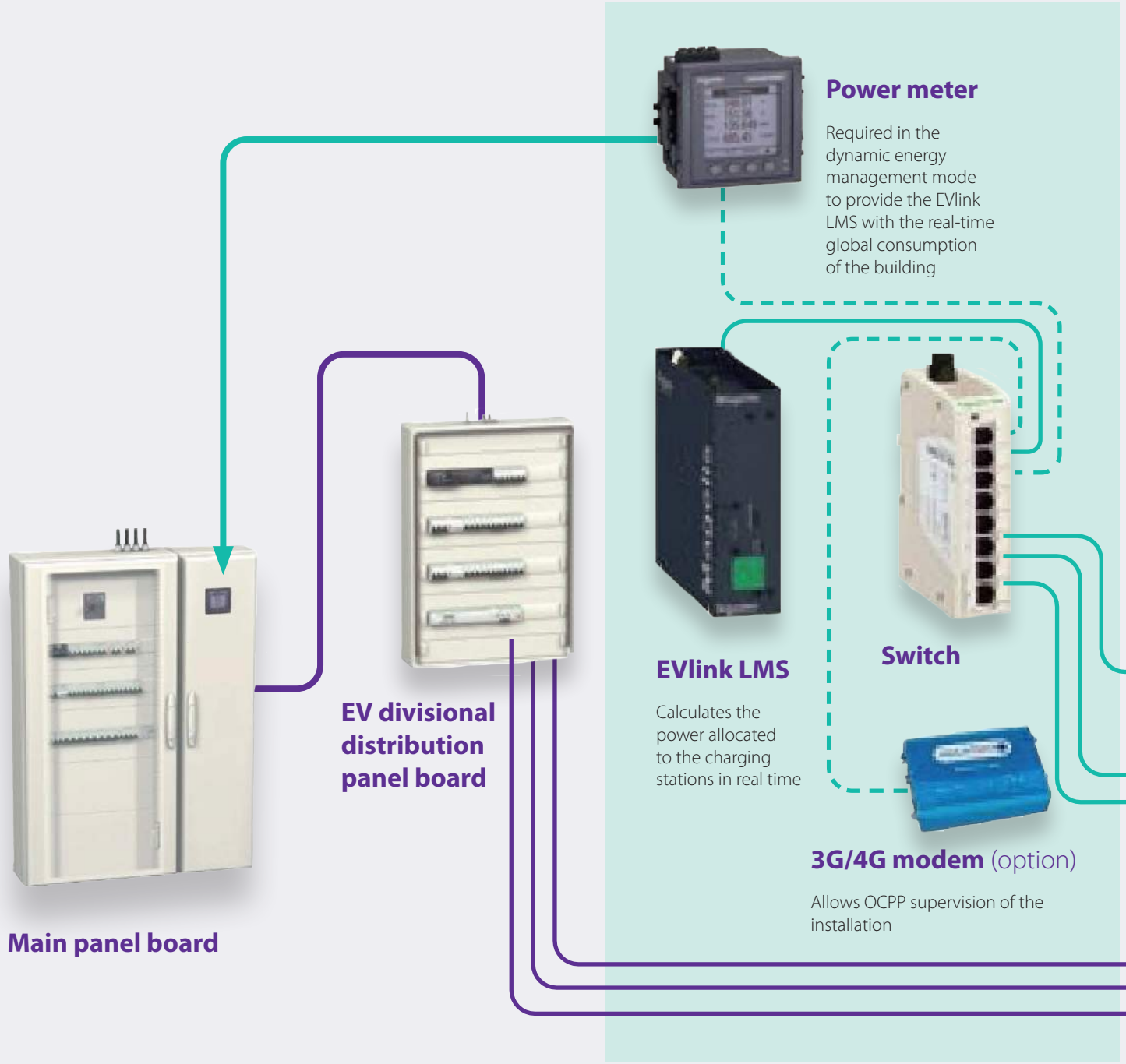
Both options to utilise RFID cards to control access, enabling data capture and reporting, with billing managed via existing processing. For further information contact LeasePlan at sagovt@leaseplan.com.au or via your Customer Relationship Manager. Consistent with Australian Standards, a periodic maintenance program should be provisioned for with each deployment.

Refer to Appendix A for a summary of the decision tree process to procure EV charging stations.

Charging control and monitoring

Electical installation with energy management

From 1 to 1000 charging stations depending on the EVlink LMS (Load Management System) model selected

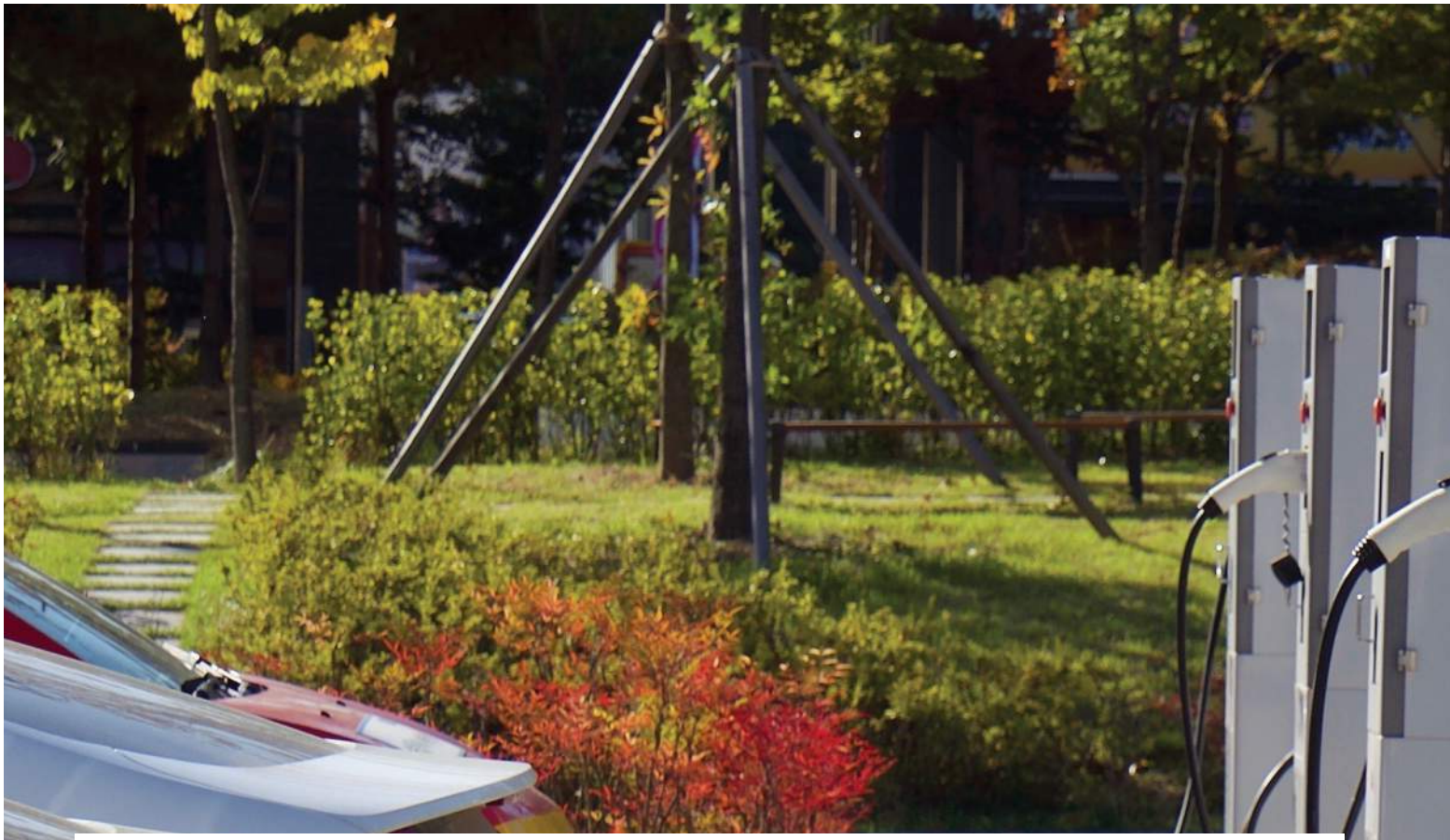


Charge control and monitoring integrates EV charging into the existing site electricity demand, additional peak electricity demand could materially increase SA Power Network supply charges.

There are a number of charging management systems available that will assist agencies in monitoring charging stations and managing peak electricity demand. Where more than two EV charging station are to be installed, a networked charging and load management system should be incorporated, including energy monitoring to track consumption and manage peak demand. The charging stations and all associated management systems must be compliant with the Open Charge Point Protocol (OCPP) and have remote communications and demand response capabilities.

Load Management Systems should be designed to integrate components from multiple manufacturers rather than closed proprietary systems that limit future supplier choice.

There are short falls around the use of onboard dynamic charger demand management systems. Over reliance on this feature may limit scaling, integration and impair reliability, if for example, the parent charger fails. Consideration should be given to installing a secure on-premise central EV Energy Management System (EMS), that deliver more flexibility and capability to protect building electrical systems, enable dynamic balancing options and offer unlimited site scaling, and elevated centralised administration services via cloud where required (central firmware updates to chargers, Dynamic Service Negotiation Protocol (DSNP), renewables, Building Management System (BMS) integrations etc).



Management system	Summary	Example
Proportional	All charging stations have their capacity equally reduced by the same amount. This option is typically recommended to support SA Government installations to manage peak demand within an agreed capacity. Recommended for most agencies and fleet locations.	An agency bank of 6 x 7kW AC EV charging stations electrical capacity or peak demand charges are a concern. A load management system is incorporated to reduce peak demand within a set amount. When only one EV station is charging it provides the full charging capacity. As more EVs are plugged in, the charge rate is reduced proportionally to manage peak demand within the circuit breaker capacity or maximum site demand limit.
The below options can provide additional management capabilities that typically have a higher capital and operational cost.		
Via privilege	In the case of a faster charging option, the charge capacity of the AC Level 2 charges is sacrificed in the short term to allow the DC Level 1 charge to be expended in as short a period of time as possible.	An agency bank of 2 x 25kW DC charges and 4 x AC EV charging stations electrical capacity or peak demand charges are a concern, a small number of EVs must be fully charged at all times to maintain operations. The DC chargers are prioritised to charge first, while the AC chargers are reduced or restricted. Once the priority vehicles are fully charged, the AC chargers become fully operational.
In descending order	The highest capacity chargers have their capacity reduced first until they reach the same level as the lowest, then reduction becomes proportional.	As above, however the DC chargers will reduce capacity first, then all stations will reduce charging rates proportionally to support all EVs charging at the same time.

Communications

To provide flexibility of system supplier and to ensure a monopoly is not created during the initial in charging systems, the charging stations and all associated management systems should be compliant with the Open Charge Point Protocol (OCPP) as managed by the Open Charge Alliance. The OCPP is the communication protocol of choice for over 10,000 operating charging stations in 50 countries, and makes it possible to connect to any network management system irrespective of the supplier. OCPP is an open protocol with a free licence, however each charging station manufacturer may have their own monitoring and management software which will have a subscription or service cost associated with accessing the system.

Energy monitoring

All EV chargers must have energy monitoring systems incorporated to track electricity consumption and demand to monitor and plan for the transition to EVs.

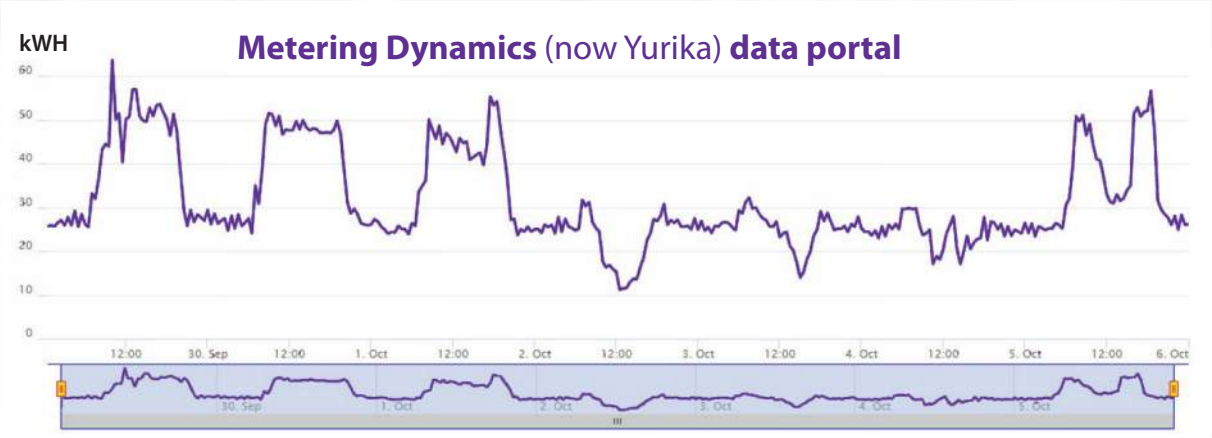
The preferred design solution will enable data capture (granular) of each EV charger activity, sessions, and billing to facilitate monitoring and evaluation of individual chargers, users and cost allocation to the department that is responsible for the vehicle receiving the charging service, reimbursement to the landlord and a simple dashboard showing key metrics of performance and utilisation. This mirrors existing requirements for fuel cards and will enable full tracking and transparency of charge activity with all costs captured and attributed to a vehicle and any expenses allocated to the relevant department or subsidiary. As a minimum, the charging station must be capable of monitoring electricity consumption (kWh) and peak demand (kVA) at 15-minute intervals to allow effective monitoring and enable projections for EV fleet transitions to be developed.

For government owned and leased facilities that fall under the across government electricity and metering contracts, the following metering options must be incorporated into EV charging station projects to ensure data is collected in a consistent format and is made available to key government agencies responsible for across government policy and procurement. The SA Government nominated Metering Coordinator (currently Metering Dynamics/Yurika) must be used for electricity metering and submetering:

- a NEM Type1-4 smart meter should be installed at the facility to enable remote data monitoring and track total facility consumption (kWh) and demand (kVA).
- a smart submeter which captures 15-min interval data supplied by the DTF Metering Coordinator which complies with their integration requirements should be installed on each circuit supplying each individual EV charging station, individual and consolidated charging data (kWh/kVA) can be tracked across government agencies.

Car parks which are individual land parcels or a significant distance from electrical infrastructure, a new electricity supply with an individual National Meter Identifier (NMI) may be warranted. In these circumstances, the above metering requirements will also apply.

The Metering Dynamics (now Yurika) data porta is administered by the Department of Treasury and Finance (DTF) Strategic Procurement team, with data available to individual agencies at an across government level. (below graph). Monitoring capabilities will enable SA Government to track consumption and demand, identify time periods that EVs are consistently charged and plan for the EV transition, including impacts on the across government electricity and fuel contracts.



Electrical infrastructure

To facilitate the installation of EV charging, there must be sufficient capacity in the electrical infrastructure, the facility infrastructure and from the SA Power Networks electricity supply connection.

Grid electricity supply connection capacity

The electrical capacity for the facility must be checked to ensure the EV charging stations will not increase the facility's peak demand beyond the network supply capacity.

The Service Delivery Lead (SDL) should be contacted early in the process to confirm any known issues with the site's electrician who undertakes Preventative Maintenance (PM) as they will typically be able to advise of known issues at the site including compliance and electrical capacity.

Following a review by the SDL, an approved electrician or electrical engineer should be engaged, either through the EV charging station company, or via the SDL to confirm:

- electricity supply capacity and agreed maximum demand from SA Power Networks' distribution network
- supply cabling capacity
- electrical compliance

Where there is insufficient capacity from the network supply, charging management systems should be incorporated to reduce demand and defer or mitigate supply upgrade costs. Any switchboard modification (i.e. addition of circuit breakers for EV power) should be in compliance with AS 61439.

Additional opportunities to improve energy efficiency and incorporate renewable energy and battery storage should also be considered to reduce peak demand prior to implementing a supply upgrade.

Installing solar PV to supply the EV chargers with onsite renewable energy is also recommended to reduce emissions and costs associated with importing electricity from the grid.

Electrical infrastructure capacity

The facility's electrical infrastructure capacity must be checked (internal cabling, main switchboard and/or distribution boards) to ensure there is sufficient space and capacity for EV charging stations.

Where there is sufficient capacity and compliant infrastructure, proceed with the installation.

Where there is insufficient capacity consider:

- charging management systems which interconnect the charging stations on one circuit and reduce charge rates proportionally (refer Charging Controls and Management above)
- distributing and balancing EV charging loads across the three supply phases
- upgrading the electrical infrastructure to accommodate the proposed EV stations, as well as potential future stations

Electrical trenching, cabling and communications

The distance from the electrical infrastructure (distribution board / main switchboard) to the charging station location should be considered to ensure the charging station location has access to a power supply which doesn't require extensive trenching and electrical cabling.

Where trenching and cabling are required, allow for $225 per metre for conduits and additional cabling as part of budget approvals. Additional costs may apply for all weather surface reinstatement (bitumen and paving).

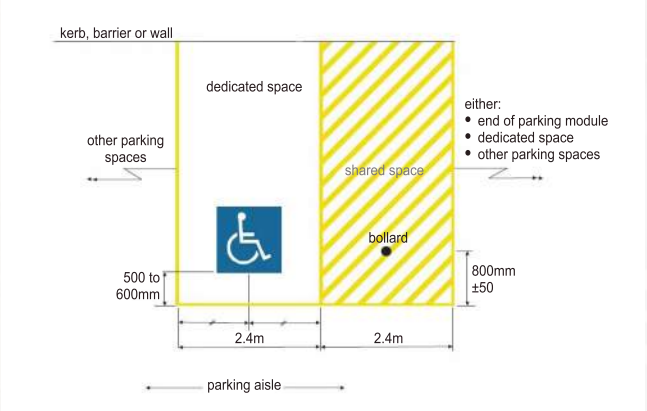
System design should incorporate communication cabling and infrastructure to enable integration into a CPO network (outside of the Government IT networks) with appropriate firewall and cyber protections. Modems must either be connected to an independent communication port or operate via independent mobile services.

To measure the distance from the building to the proposed charging station location use the SA Property and Planning Atlas tool.

Design, location and accessibility

Accessibility

Charging stations should be located in an accessible location for all users and should be in close vicinity to main building entrances, with accessible walkways and ramps. Charger design will provide safe and convenient access for persons with different levels of mobility, giving due regard to ramps, kerbs, objects on footpath and relative heights.



Use alternative line markings to standard EV car parks is recommended to clearly identify accessible EV car parks e.g. white line marking for standard EV parks and yellow for accessible EV parks.

Charging stations should be aligned with existing accessible car park shared areas where possible with a shared space provided in line with *AS/NZS 2890.6:2009 Parking facilities Off-street parking for people with disabilities* and longer charging cables may be required.

Cable access

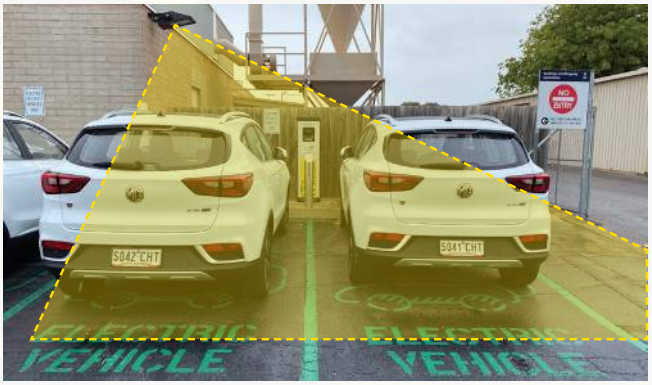
Where charging stations are located in garages and enclosed car parking facilities with limited access (small/compact parking bays), consider cable management systems fixed above the vehicle to enable vehicles to be charged at the front or rear of the vehicle. This also reduces trip hazards with the cables kept off the ground and above the vehicle.

Additional options include retractable cable management systems which provide a neat and enclosed system, reducing trip hazards and potential damage to the cables.

Visibility and lighting

Charging stations should be well lit to ensure the user can safely access the charging station, easy to read any instructions and ensure trip hazards are clearly visible e.g. the charging cable or steps.

Where stations are not located in secure areas, they should be in locations with passive supervision e.g. line of site from main entrances and buildings.



EV charging station locations will need to be selected based on a number of considerations.

Lines and markings

EV charging station parks should be clearly identified by the electric car symbol and shall be painted white. The symbol should be centrally located within the parking space. Lines should also be painted white

Bollards & wheel stops

Where charging stations are located in areas that vehicles may hit and damage the station (on pedestals) or a risk to users when other vehicles are being parked, safety bollards installed.

Products should be selected from a DIT approved product list, be installed in line with the manufacturer's instructions and located to ensure vehicle sensors can detect the bollards. Sufficient space between the bollard and EV charging station should be allowed to factor in bollard movement in the event of a vehicle collision.

Allow for $500 per bollard as part of budget approvals. Alternatively, wheel stops can also provide an effective option if there is insufficient space for a bollard.

Signage

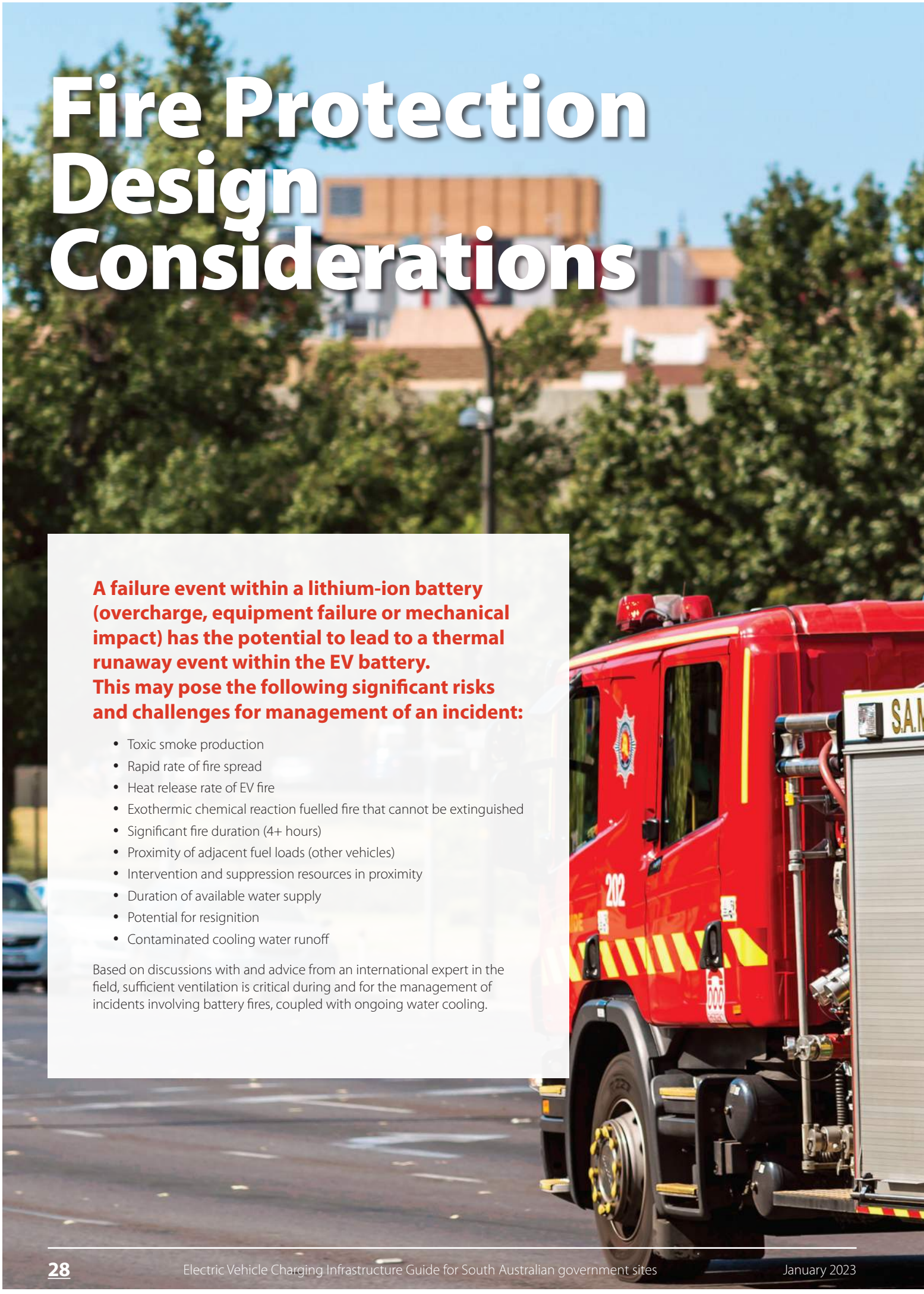
Signage on how to operate the charging station should be provided including contact details for 24 hr support as a dedicated option incorporated into the charging station, or as standalone signage.

Depending on the location and marketing strategy, integrated charging station signage can provide a cost-effective option while being clearly visible and providing a promotional opportunity.

Signage should be generic in nature and avoid Charge Point Operator branding to minimise signage replacement costs and ensure a consistent user experience.

Note: parking control signage for EV parking bays is currently being developed and will be available in DIT's Code of Technical Requirements in the near future.

Fire Protection Design Considerations



A failure event within a lithium-ion battery (overcharge, equipment failure or mechanical impact) has the potential to lead to a thermal runaway event within the EV battery.
This may pose the following significant risks and challenges for management of an incident:

- Toxic smoke production
- Rapid rate of fire spread
- Heat release rate of EV fire
- Exothermic chemical reaction fuelled fire that cannot be extinguished
- Significant fire duration (4+ hours)
- Proximity of adjacent fuel loads (other vehicles)
- Intervention and suppression resources in proximity
- Duration of available water supply
- Potential for resignition
- Contaminated cooling water runoff

Based on discussions with and advice from an international expert in the field, sufficient ventilation is critical during and for the management of incidents involving battery fires, coupled with ongoing water cooling.

EV Charging Stations in Buildings

When considering design of EV charging systems, consideration should be given to the following items:

- Emergency and automatic shutdown controls for EV charging stations;
- Block plans for the building to include locations of EV charging stations;
- Block plans for the building to include locations of EV distribution boards and emergency shutdown controls;
- Vehicle impact protection (e.g. bollards or wall mounting above impact height) for EV charging stations; and
- Location of EV charging stations and their proximity to exits and other fire safety systems.

Future infrastructure planning

EV charging provisions should be taken into consideration in all major capital works projects to support the initial EV transition. These ratios are used as guides over the next 1-3 years to support the initial rollout at SA Government sites.

All new car parks should incorporate electric vehicle charging station provisions including conduits and electrical board capacity to facilitate EV charging.

As a minimum the following should be incorporated for conduits and electrical infrastructure:

Capital works, minor works and car park projects

Any capital works projects which incorporate car parks should include EV charging provisions and charging stations as part of the budget to support the transition over time.

Parking spaces on site	Recommended number of EV chargers to be installed now	Recommended allowance for future charging infrastructure
<10	1 x dual 7kW AC charger	Provide conduits and electrical capacity for 2 x dual 7kW AC chargers (4 car parks).
10–<30	1 x dual 7kW AC charger	Provide conduits and electrical capacity for 3 x dual 7kW AC chargers (6 car parks).
30–<50	2 x dual 7kW AC chargers	Provide conduits and electrical capacity for 3 x dual 7kW AC chargers + 1 x 25 kW DC fast charger (7 car parks).
>50	Case-by-case analysis	Per 30-<50 spaces recommendation + 1 x 7kW AC charger for every additional 8 parking spaces and 1 x 25kW DC fast charger for every additional 50 spaces.

Where fast charging options are required for SA Government fleet operations, State Wide Charging Network (SWCN).

Car park resurfacing

All car park projects which include resurfacing and bitumen works should incorporate conduits to ideal locations for EV charging stations.

Car park resurfacing (bitumen), EV charging conduits should be incorporated to reduce costs associated with trenching and providing supply to the charging stations. Consideration should be given to oversizing of conduits and / or cable trays to provision for the future needs of fleet electrifications.

Indicative cost

To assist agencies in developing funding requests a calculator has been developed indicative cost on typical installations.

The calculator can be used to gain budget approval to begin investigations and raise a job through the Service Delivery Lead (SDL) in Panorama. Funding should also be investigated by agencies in consultation with DTF, SAFA and DEM, noting that a quote should be requested from the Leaseplan customer relationship manager to provide agencies with ability to compare between purchase or lease of charging infrastructure.

This does not include electrical supply upgrades which can vary significantly depending on the site, electrical infrastructure condition and if a supply upgrade is required.

Please note the tables below do not factor in ongoing service fees for system integrator. Current indicative costs include:

- system integrator for load management system, metering co-ordinator and charge point operator
- $370 per dual port for charge point operator
- $120 for load management
- $TBC metering co-ordination

Note: make allowance for metering coordination (costs will vary)

South Australian Government—
Electric Vehicle charging station cost estimator

Site	Example site
Panorama site #	1234
Completed by	John Smith
Date	10/04/2022

Cost Summary

Number of charging stations	0
Total indicative cost	$
10% contingency	$
Total charging station budget	$
Eletrical infrastructure upgrade cost	$

Charging stations - option 1

Number of stations	0
Charging type	7kW AC Single
3G/4G modem capability (Y/N)	
Branding (Y/N)	
Total EV charging station cost	$
Trenching distance (m)	
Ongoing services of bollards	$0
Total site costs	$
Total option 1	**$**

Charging stations - option 2

Number of stations	0
Charging type	7kW AC Dual
3G/4G modem capability (Y/N)	
Branding (Y/N)	
Total EV charging station cost	$
Trenching distance (m)	
# of bollards	
Total site costs	$
Total option 2	**$**

Charging stations - Option 3

Number of stations	0
Charging type	24-25kW DC
3G/4G modem capability (Y/N)	
Branding (Y/N)	
Total EV charging station cost	$
Trenching distance (m)	
# of bollards	
Total site costs	$
Total option 3	**$**

Electrical infrastructure review

Has an electrical infrastructure review been undertaken by the SDL/electrician?
Is the electrical infrastructure less than 5 years old?
Is there sufficient spare supply and electrical capacity?
Has the asbestos register been checked for electrical infrastructure (switchboards/ distribution boards) and there is no known asbestos?
Has the electrical meter data form been completed to request electricity maximum demand data?
If any of the above questions are "N/Unknown", it is recommended these are investigated prior to requesting budget approval
If an electrical supply or infrastructure capacity upgrade has been identified, what is the estimated cost (if known)?

South Australian Government—
Electric Vehicle charging station cost estimator

Site	Example site
Panorama site #	1234
Completed by	John Smith
Date	10/04/2022

Cost summary

Number of charging stations	3
Total indicative cost	$26,200
10% contingency	$2,620
Total charging station budget	$28,820
Eletrical infrastructure upgrade cost	$ -

Charging stations - option 1

Number of stations	1
Charging type	7kW AC Single
3G/4G modem capability (Y/N)	Y
Branding (Y/N)	N
Total EV charging station cost	$4,400
Trenching distance (m)	10
# of bollards	1
Total site costs	$2,750
Total option 1	**$7,150**

Charging stations - option 2

Number of stations	2
Charging type	7kW AC Dual
3G/4G modem capability (Y/N)	Y
Branding (Y/N)	N
Total EV charging station cost	$15,800
Trenching distance (m)	10
# of bollards	2
Total site costs	$3,250
Total option 2	**$19,050**

Electrical infrastructure review

Has an electrical infrastructure review been undertaken by the SDL/electrician?	Y
Is the electrical infrastructure less than 5 years old?	Y
Is there sufficient spare supply and electrical capacity?	Y
Has the asbestos register been checked for electrical infrastructure (switchboards/ distribution boards) and there is no known asbestos?	Y
Has the electrical meter data form been completed to request electricity maximum demand data?	
If any of the above questions are "N/Unknown", it is recommended these are investigated prior to requesting budget approval	
If an electrical supply or infrastructure capacity upgrade has been identified, what is the estimated cost (if known)?	$

The tables are an example of site which is proposing to install a total of 5 charging points with 1 x 7kW AC single station and 2 x 7kW AC dual stations, 10m from the building, 1 bollard in front of each station, 3G/4G connectivity and no branding.

Next steps:

1. **Contact the Service Delivery Lead (SDL) to investigate existing site conditions that may increase the cost of installing EV charging stations.**
2. **If a supply upgrade is required, include the indicative cost (if known).**
3. **Complete the below tables including number and type of charging stations, branding and monitoring, trenching and bollard requirements.**

Case studies

SA Water

To facilitate the first EVs entering the SA Water fleet, a total of 6 x 7kW AC single charging stations were installed at SA Water House as part of a collaborative agreement with Origin Energy. Origin installed the chargers at no cost and SA Water agree to share charging data. The Schneider EVlink Wallbox 7kW solution has been used which provides approximately 40km of range per hour of charging.

To support the rollout of additional charging stations, electrical infrastructure upgrades were undertaken to provide a new distribution board with capacity for an additional 48 charging stations. Due to these electrical works the installation of additional EV charging stations is expected to cost $2,500 per charger.

The EVs are being trialled over three years, with charging stations installed in regional locations to support trials at longer distances.

SA Water have procured eight Hyundai Kona's due to their range tested as fleet vehicles to gain a greater understanding of charging requirements, test EV performance, increase awareness and knowledge of EVs and provide marketing opportunities. To fully charge an EV such as the Hyundai Kona using this solution takes approximately 8-10 hours.

SA Police Headquarters

In December 2020, SA Police installed 5 EV charging stations and procured 5 EVs to begin their EV transition. ABB 7.4kW AC single charging stations were installed with an overhead cable management system to allow the vehicles to be charged at the front or rear. The building also incorporates a 100kW solar PV system on the roof, reducing emissions and costs associated with charging the EVs.

The electrical upgrades included spare capacity for 18 charging stations to be installed progressively as SAPOL transitions their fleet to EVs.

Key findings in the first six months of using EVs includes:

- staff engagement and uptake of EVs has been excellent
- cars are always left plugged in and charged, ready for the next user
- the EVs are a great marketing opportunity to demonstrate leadership
- the Hyundai Ioniq and Kona were selected due to their range and capabilities

APPENDIX A

EV charging decision trees

Option one: Capital installation

Electric Vehicle charging station to be purchased upfront by the agency.

SA GOVERNMENT OWNED FACILITY

- Agency owned facility
- Leased facility (DIT owned)

Raise a job in Panorama to:

- engage the Service Delivery Lead (SDL) to work with the EV charging company to provide access for site visits
- confirm project scope and plans for the SDL to prior to commencement of works
- check works are approved to proceed in accordance with Agency and protocols
- provide the SDL with the electrical certificate of compliance of completion of the work
- update Panorama plans and asset information with the EV charging location

Complete the electricity meter data authority form to provide to the EV charging station company.

Car parks <10 spaces	Install changing provisions (conduits and electrical capacity) for 2 x dual 7kW AC changers (4 car parks). Install 1x dual 7kW AC charger now
Car parks <30 spaces	Install changing provisions (conduits and electrical capacity) for 3 x dual 7kW AC changers (6 car parks). Install 1x dual 7kW AC charger now
Car parks >30–<50 spaces	Install changing provisions (conduits and electrical capacity) for 3 x dual 7kW AC changers + 1 x 25 kW DC fast charger. Install 1x dual 7kW AC charger now
Car parks >50 spaces	Install changing provisions per 30–<50 spaces + 1 x 7kW AC charger for every additional 8 parking spaces and 1 x 25kW DC fast charger for every additional 50 spaces. Initial install of EV chargers to be determined on a case-by-case basis.

PRIVATELY OWNED FACILITY

- Leased facility(privately owned)
- Private car park facility

Gain approval from the building owner to install an EV charging station. Negotiate whether the owner can/ will contribute funding due to the infrastructure becoming an asset to the owner at the end of the lease.

Complete the electricity meter data authority form to provide to the EV charging station company.

Request a quote from EV charging station companies (in accordance with relevant procurement requirements/ thresholds).

Negotiated with private car park operations to install EV charging as a fee for service option. If the car park operator will not provide EV charging investigate alternative parking locations in a reasonable walking distance.

Option two: Leased installation

EV charging station to be leased by agencies with EV Lease Plan.

SA GOVERNMENT OWNED FACILITY

- Agency owned facility
- Leased facility (DIT owned)

Choose a leased option when procuring the EV through LeasePlan:

- engage the Service Delivery Lead (SDL) to work with the EV charging company to provide access for site visits
- confirm project scope and plans for the SDL to verity prior to commencement of works
- check works are approved to proceed in accordance with Agency and Ventia protocols
- provide the SDL with the electrical certificate of compliance of completion of the work
- update Panorama plans and asset information with the EV charging location

Complete the electricity meter data authority form to provide to the EV charging station company.

Car parks <10 spaces	Install changing provisions (conduits and electrical capacity) for 2 x dual 7kW AC changers (4 car parks). Install 1x dual 7kW AC charger now
Car parks <30 spaces	Install changing provisions (conduits and electrical capacity) for 3 x dual 7kW AC changers (6 car parks). Install 1x dual 7kW AC charger now
Car parks >30–<50 spaces	Install changing provisions (conduits and electrical capacity) for 3 x dual 7kW AC changers + 1 x 25 kW DC fast charger. Install 1x dual 7kW AC charger now
Car parks >50 spaces	Install changing provisions per 30–<50 spaces + 1 x 7kW AC charger for every additional 8 parking spaces and 1 x 25kW DC fast charger for every additional 50 spaces. Initial install of EV chargers to be determined on a case-by-case basis.

SA GOVERNMENT OWNED FACILITY

Leased facility(privately owned)

Gain approval from the building owner to install an EV charging station based on the current fleet transition requirements.

Choose a lease option when procuring the EV through LeasePlan.

Request the building owner complete the electricity meter data authority form to provide the EV charging station company.

APPENDIX B

EV charging specifications

The following specifications should be used for all EV charging stations installed at SA Government owned properties and can be provided as part of tender or quote specifications to ensure consistent installations are achieved across SA Government facilities.

Electrical standards

All works must be undertaken in line with the latest version of relevant Australian and International Standards including but not limited to:

- AS/NZ 3000 Electrical Wiring Rules – including all referenced documents relating to electric charging infrastructure
- AS/NZ 3008 Selection of cables
- AS/NZ 4251.1 Electromagnetic compatibility
- ISO/IEC 14443-4:2018
- AS 61439 – Electrical switchboards standard (where modifications are required)
- IEEE 2030.5-2018 - Standard for Smart Energy Profile Application Protocol (optional)
- SA Power Networks Service & Installation Rules

Mechanical and environmental protection

The charging station and associated external electrical infrastructure must be protected from mechanical and environmental elements including but not limited to rain, dust, wind and physical impacts. The following minimum standards must to be met unless alternative standards and appropriate designs (covered EV parking bays) can justify lower rated solutions which must be approved by the relevant delegate:

- Ingress Protection: IP54 (IEC 60529)
- Mechanical Impact: IK10 (IEC 62262)
- Ambient Operating Temperature Range (dry bulb):
  - Summer: +50°C
  - Winter: -10°C (for South Australian conditions -10°C is sufficient installations and in a metro indoor carpark, -5°C.

Charging stations solutions

AC Level 2 7kW:

Provide ground or wall mounted AC Level 2 (7-11kW) charging stations. 22kW stations are only to be provided when specific fleet vehicles with a faster AC charging rate are being procured, however the majority of vehicles will not have the capacity to charge faster the 7.2kW. Where faster charging is required, provide DC charging stations as per the below.

DC 24-25kW:

Provide ground or wall mounted 24-25kW charging stations to service one car park with fixed a CCS2 cable.

Charging station sockets and cables

Provide the following charging sockets and cable types:

- AC charging stations: provide Type 2 Mennekes Sockets (tethered cables are not preferred)
- DC charging stations: provide CCS2 charging cables.

If cables are to be fixed to an overhead cable management system, tethered cables should be installed and if required a separate portable cable for public chargers, should be purchased and stored in the vehicle.

User interface

Each charging station must have the following capabilities:

- dedicated and easily identifiable on/off button (either individual green on/red off buttons, part of a touchscreen display or similar)
- LED indicator light for charging status (not charging, charging, and fully charged)
- if touchscreen, must be readable in direct sunlight

Instructions on how to use the charging stations should be either included in the graphics of the charging station housing, or provided on a dedicated sign which is easy to read and located in a prominent and accessible location. The design of the instructions is to be agreed in consultation with the lead agency.

Cables, cable length and holders

Cables must be robust and suitable for outdoor use in line with the applicable standard IEC 62196 and have a minimum certified IP44 rating.

Dual chargers located in the centre of two car parks should be considered so that the charging station can be accessed when vehicles are parked close to car park walls or fences.

Consideration should also be given to cable security and condition in secure versus public locations and safe and convenient cable access for all persons, including obstacles and cable mounting heights.

Fixed cables must have a compatible holder to house charging cable when not in use/plugged into an EV. The holder must be in close vicinity to the charging station to ensure the cable can be secured neatly and must not create a trip hazard.

Provide appropriate cable holders to ensure the full cable length can be safely and neatly stored on the side of the charging station or on the adjacent wall (if wall mounted). Cable holders must ensure that trip hazards are minimised.

Metering

The SA Government Metering Coordinator is to be used to install smart metering and submeters as follows:

- a NEM Type1-4 smart meter should be installed at the facility to enable remote data monitoring and track total facility consumption (kWh) and demand (kVA)
- a smart submeter which captures 15-min interval data supplied by the Metering Coordinator should be installed on each circuit supplying each individual EV charging station, to ensure individual and consolidated charging data (kWh/kVA) can be tracked across government agencies

Communications

Each charging station and all associated management systems must be compliant with the latest Open Charge Point Protocol (OCPP) as managed by the Open Charge Alliance. The system should be capable of communicating with any onsite Building Management Systems including the TCP/IP Modbus communication protocol.

For non-government sites where a smart meter and submeter is unable to be provided under by the SA Government Metering Coordinator, dedicated ethernet connections to the site's IT network is preferred to enable ongoing communications and monitoring. Mobile communications (e.g. 4G/5G) should only be provided in locations where ethernet connections are not viable due to distance or network connectivity/capacity.

Access controls

The charging stations must have an integrated RFID card reader with ISO/IEC 14443-4:2018 preferred to enable access controls to be implemented.

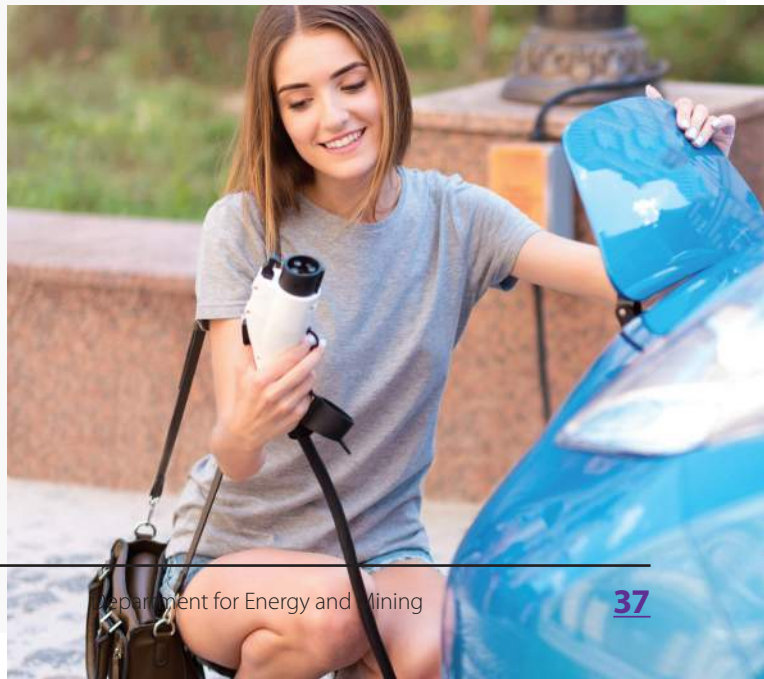
Demand management

The charging stations must have the following demand management capabilities:

- **individual demand management:** the stations must be able to individually limit charge rates to ensure peak demand can be managed in the event communications modules are not functioning
- **networked Demand Management:** the stations must be capable of connecting to a centralised networked demand management system and have the following capabilities with Proportional Charge Reduction the preferred approach
- **proportional charge reduction:** all stations have their charging capacity reduced equally to be the same amount
- **descending charge reduction:** the highest capacity chargers have their capacity reduced first until they reach the same level as the lowest, then reduction becomes proportional
- **privileged charging:** certain charging stations are prioritised over non-essential locations. For example, fleet vehicle charging stations are prioritised over public/general EV charging stations

Insurance and indemnities

The contractor must have suitable current public liability insurance in place. Agencies should include any installed EV charging station(s) when they next complete their annual SAFA insurance questionnaires.



Parking lot and charging station design and signage

To ensure the EV charging locations are clearly visible and protected from vehicle impact, the following should be incorporated into all projects.

Carpark surface and lines

Carpark surface should be painted with an EV charging symbol in accordance with the Department for Infrastructure and Transport (DIT) Pavement Marking Manual:

- **lines:** car park lines to be repainted to identify EV charging space – colour white.
- **symbol:** 1200mm x 1000mm EV stencil with car and plug shown below– colour white.

Signage

Clear signage and/or instructions should be provided to ensure the charging stations are clearly visible and aligned with the agency graphics. Some charging stations allow for the housing to incorporate graphics and instructions which will reduce the requirement for additional signs and posts. The below example of City of Adelaide charging stations.

Note: parking control signage for EV parking bays is currently being developed and will be available in DIT's Code of Technical Requirements in the near future.

Bollards

It is recommended bollards are installed in front of the charging stations to ensure the stations are protected from vehicle damage. The bollards should be selected from the DIT Road Safety Barriers product list (GD 300 – Energy Absorbing Bollard) and be installed in line with the manufacturer's instructions. Sufficient space between the bollard and EV charging station should be allowed to factor in bollard movement in the event of a vehicle collision.

Commissioning

The Contractor must allow for full commissioning of the EV charging stations and associated infrastructure.

Handover and maintenance

The EV charging network will not be accepted for handover until a full defects inspection has been undertaken and all defects have been rectified. The contractor must provide a 12-month planned preventative maintenance program including a final inspection and re-commissioning of the system at 12 months.

Defects liability period

The Contractor shall be responsible for all defects occurring or discovered during the 12 calendar months immediately following Practical Completion.

Operation and Maintenance Manuals

The Contractor shall provide two complete sets of Operation & Maintenance (O&M) Manuals for the EV charging network in hard copy format, and one soft copy in PDF format. As a minimum the manuals must include:

- a description of the EV charging network and summary of the main system components
- specifications, installation and commissioning manuals for all components (e.g. charging station, monitoring and communication systems, user guides, etc.)
- directory of contacts and warranty information
- operating instructions including load management and monitoring
- BMS integration information and operating instructions
- photos of the final install including electrical (switchboards/ distribution boards), communication systems, charging stations, signage and charging bays

For government owned sites, a full draft copy of the manual and all associated documentation shall be presented to the Service Delivery Lead (SDL) for approval. The manual shall be revised to suit SDL and/or agency's comments until approval is obtained.

For non-government owned sites, handover documentation should be provided to the responsible agency with a copy provided to the building owner.

Training

The contractor shall provide a training session for key agency staff to show how to safely charge EVs.

Warranties

A minimum two-year warranty on the charging station and associated components must be included. If required, extended warranties to two years must be accompanied with an extended warranty certificate.

Operation and maintenance manuals

The contractor shall provide two complete sets of Operation & Maintenance (O&M) Manuals for the EV charging network in hard copy format, and one soft copy in PDF format. As a minimum the manuals must include:

- as built electrical line drawings, including communications and civil infrastructure
- a description of the EV charging network and summary of the main system components
- specifications, installation and commissioning manuals for all components (e.g. charging station, monitoring and communication systems, user guides, etc.)
- directory of contacts and warranty information
- operating instructions including load management and monitoring
- BMS integration information and operating instructions
- photos of the final install including electrical (switchboards/ distribution boards), communication systems, charging stations, signage and charging bays

For government owned sites, a full draft copy of the manual and all associated documentation shall be presented to the Service Delivery Lead (SDL) for approval. The manual shall be revised to suit SDL and/or agency's comments until approval is obtained.

For non-government owned sites, handover documentation should be provided to the responsible agency with a copy provided to the building owner.

APPENDIX C

Electricity meter data request

This form is to be completed to enable the across government electricity retailer and Metering Coordinator to share metering data with EV charging station installers.

AGENCY CONTACT

NAME	
Position	
Agency	
Agency address	

ELECTRICITY ACCOUNT DETAILS

Electricity retailer	ZEN Energy
Account name	
Account number	
NMI	
Meter number	
Supply address	

THIRD PARTY AUTHORISATION DETAILS

Name of third party	
Address	
ABN	

AUTHORISATION

The following metering data is requested:

Data request	15min electricity meter interval data
Data period	Latest 12 months
Authority period	Once-off data provision
Purpose	Electric vehicle charging infrastructure assessment

I authorise the release of electricity meter data to the third party listed above. This authority remains valid for a period of three months as a once-off data provision request.

Signature	
Name	
Date	

South Australia's EV Charging Network

RAA

Government of South Australia


FUTURE FUELS FUND
FAST-CHARGING STATIONS
IN ADELAIDE
Elizabeth
Modbury
Port Adelaide
Adelaide
Glenelg
Blackwood
Mt Barker
Noarlunga
ARENA
Australian Government
Australian Renewable
Energy Agency
Site locations may change

Glossary

ADI	Australian Driving Institute
AC	Alternating current
AEMO	Australian Energy Market Operator
AGFMA	Across Government Facilities Management Arrangements
ANCAP	Australasian New Car Assessment Program
ARENA	Australian Renewable Energy Agency
BEV	Battery Electric Vehicle
BMS	Building Management System
DC	Direct current
DEM	Department for Energy and Mining
DIT	Department for Infrastructure and Transport
DSNP	Dynamic Service Negotiation Protocol
DTF	Department of Treasury and Finance
EMS	Energy Management System
EV	Electric Vehicle
GHG	Greenhouse Gas
IEEE	Institute of Electrical and Electronics Engineers
LGC	Large-scale Generation Certificate
NEM	National Energy Market
NMI	National Meter Identifier
OCCP	Open Charge Point Protocol
PANORAMA	Ventia's client portal that provides secure access to all property portfolio data, reports and analytics in real time.
PHEV	Plug In Hybrid Electric Vehicle
PM	Preventative Maintenance
RFID	Radio-frequency identification
SA	South Australia
SAG	South Australian Government
SAFA	South Australian Financing Authority
SAPN	South Australian Power Networks
SAPOL	South Australia Police
SDL	Service Delivery Lead
SUV	Sport Utility Vehicle
SWCN	State Wide Charging Network
BMS	Building Management System
DSNP	Dynamic Service Negotiation Protocol
EMS	Energy Management System

Acknowledgement of Country

The Department for Energy and Mining acknowledges Aboriginal people as the First Nations Peoples of South Australia. We recognise and respect the cultural connections as the traditional owners and occupants of the land and waters of South Australia, and that they continue to make a unique and irreplaceable contribution to the state.

Further Information

Department for Energy and Mining
electricvehicles@sa.gov.au

Supported by

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Department for Infrastructure and Transport

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