



Government of Western Australia
Energy Policy WA

Electric Vehicle Action Plan

Preparing Western Australia's
electricity system for EVs

Summary

August 2021



Distributed Energy Resources Roadmap
Action 16: Electric Vehicle Action Plan

Electric Vehicle Action Plan – Overview

The world is rapidly electrifying transportation to reduce carbon emissions.

This has major implications for power grids globally, including here in Western Australia. Electric Vehicles (EVs) present a significant opportunity to the electricity system if their integration is well-managed. They can help smooth demand on the power system and improve overall network utilisation, which reduces costs for all consumers.

Conversely, uncoordinated EV charging could add to peak demand and power system costs.

There are major gains to be made for Western Australians from early and coordinated action supporting the integration of EVs.

The EV Action Plan provides an integrated set of actions designed to deliver a future where EVs contribute to a safe, reliable and efficient electricity system while accelerating our transition to a low-carbon future.

The WA EV Action Plan:

- outlines the Western Australian context for EV uptake and its relationship to the State EV Strategy and Distributed Energy Resources (DER) Roadmap;
- outlines the opportunities created by EVs including improved utilisation of the power system and their role in supporting the integration of renewable energy within the power system;
- describes the risks to Western Australian power systems that may result from the rapid uptake of EVs in the absence of planning;
- identifies “no, or least regrets” steps that can be taken now and over the medium-term to minimise these risks; and
- allocates 26 actions to Energy Policy WA, Western Power, Horizon Power, Synergy and the Australian Energy Market Operator (AEMO).



The need for specific actions on electric vehicles

Widespread electrification of transport vehicles (light commercial, freight, and transport vehicles) will lead to a significant increase in demand for electricity over the coming decades.

Charging of EVs occurs deep within the distribution system, often at homes and businesses where EVs are parked for long periods. The location and timing of EV charging has the potential to have material impacts on the operation of the electricity system.

EVs present an opportunity to improve the utilisation of the electricity network and to support the power system. For instance, the very high level of rooftop solar in Western Australia is increasingly creating challenges to the stability of the grid in the middle of the day. If EVs can reliably increase demand in the middle of the day, they can help soak up this excess solar, allowing more rooftop solar to be accommodated within the system.

In the coming years, EVs could store excess output from rooftop solar and provide it back to households, or even onto the grid, helping to meet evening peaks and complementing batteries at households and businesses. However, for this to be achieved, further work is required with respect to infrastructure and policy settings.

Advanced metering and smart charging infrastructure that can respond to signals from the network operator or power system operator, likely via an aggregator or electricity retailer, can benefit everyone. Retail tariffs that incentivise efficient behaviour have proven very effective in other places in influencing when EVs are charged.

The mobility of EVs makes them unique as a DER. As the number of EVs grows, the unpredictability of where and when these large, energy-consuming devices will be charged is one of the most challenging issues facing the network and operators. New systems and processes are required to give the operators insights into where, when and how EV charging points (be it at home or a fast-charging station) are located and used.

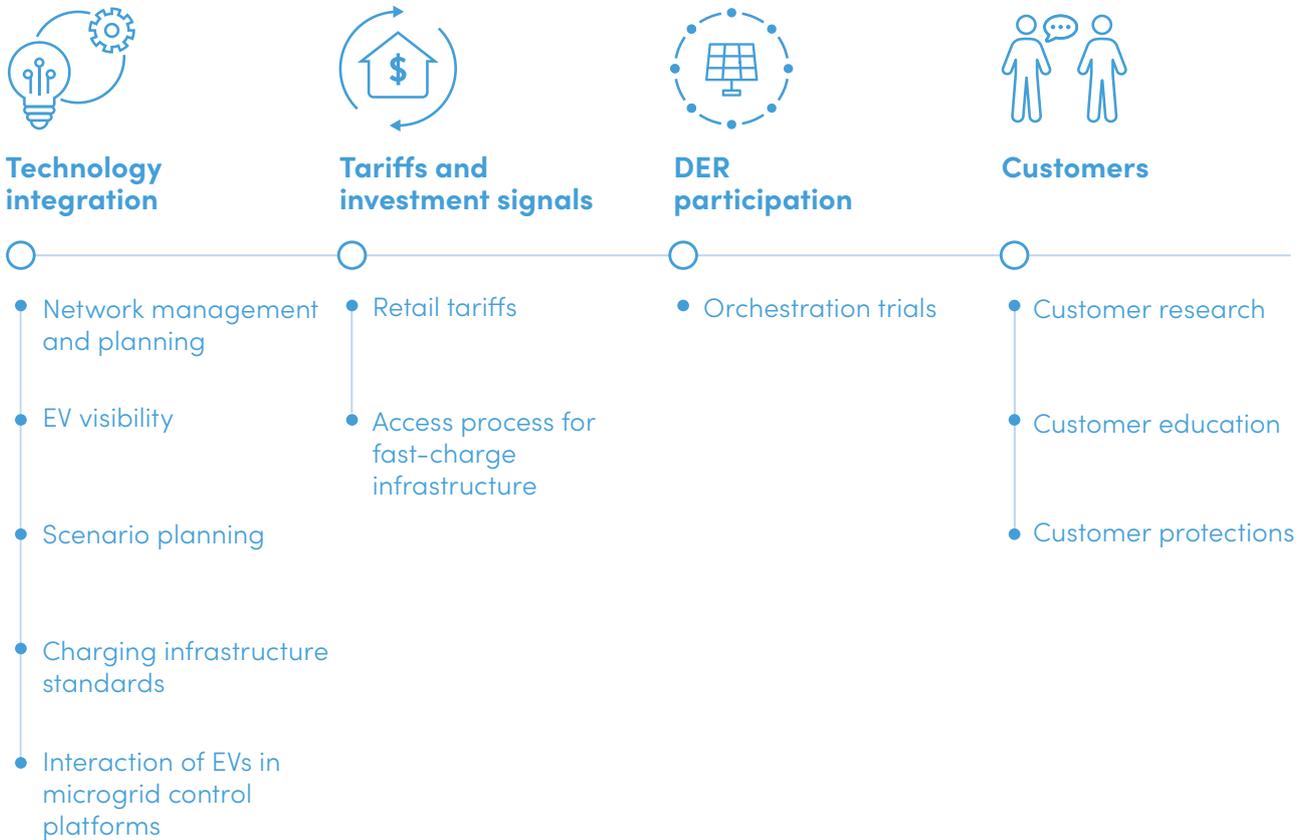
It is also important that consumers are engaged throughout the development of these systems and processes. EVs have the potential to benefit the entire community, by managing charging speed or timing to better use distributed rooftop solar – placing downward pressure on the overall costs of electricity supply.

Underpinning these changes must be a clear framework of customer protections, ensuring customers retain control over key decisions such as the maximum and minimum level of charge for their EV battery when they connect.

The following actions are designed to provide the capability for Western Australia to respond in a prepared manner to a range of EV uptake scenarios.

EV Action Plan

Actions have been grouped under the following four themes, consistent with the DER Roadmap:



The full list of actions and further detail can be found in the EV Action Plan: Preparing Western Australia's Electricity System for EVs at www.brighterenergyfuture.wa.gov.au.





Technology integration

EV risks first manifest on the distribution network, where the additional demand from charging EVs at peak times could overload network equipment or breach technical limits, such as voltage. The Action Plan addresses these challenges by focussing on the following five areas:

Network management and planning

Residential EV charging is likely to have significant implications for some network feeders if not managed appropriately, particularly in older overhead networks. These risks are increased by very limited visibility of EV chargers and the inability to put in place 'operating envelopes' to ensure demand from an EV charger stays within network constraints.

Managing risks will require detailed understanding by network operators of the location and scale of EV charging. Western Power will continue to develop its network modelling capabilities to increasingly focus on EV impacts. As part of this work, Western Power will identify opportunities to lower the cost and potentially accelerate the installation of EV charging points, during conversion of overhead to underground power in metropolitan areas.

Under the EV Action Plan, networks will undertake work to better understand how stand-alone power systems can be used at regional charging locations to minimise local network impacts. Horizon Power's work through the DER Management System in Onslow puts it in an excellent position to test the potential for EVs and charging infrastructure to provide support to electricity networks.

EV Visibility

How, when, and where EV owners choose to charge their vehicles is difficult to predict. The patterns and responses to price signals are important factors to be understood to enable efficient integration of EVs within the power system. By increasing visibility by system operators, it will be possible to improve the integration of EVs into the power system by:

- enabling better monitoring of distribution network impacts; and
- facilitating products and services, such as aggregation and tariffs for EV owners.

EV Charging - Current charging locations



Home charging

Resident uses private in-home charger



Rapid charging

Public locations that provide fast charging



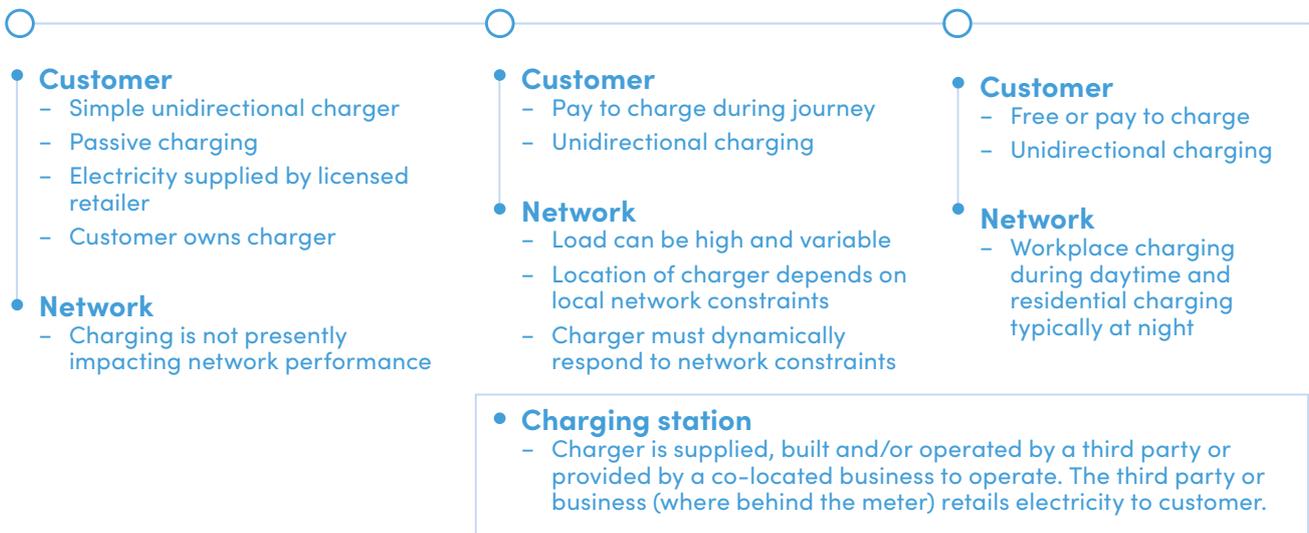
Shared charging

Residential complexes, shopping centres and workplaces

Level 2 AC charging up to 6.6 kilowatts

Fast DC charging or level 3

Level 2 or 3 charging



Scenario Planning

In order to ensure the ongoing security, reliability, and efficiency of the power system, it is important to plan for increasing uptake of EVs.

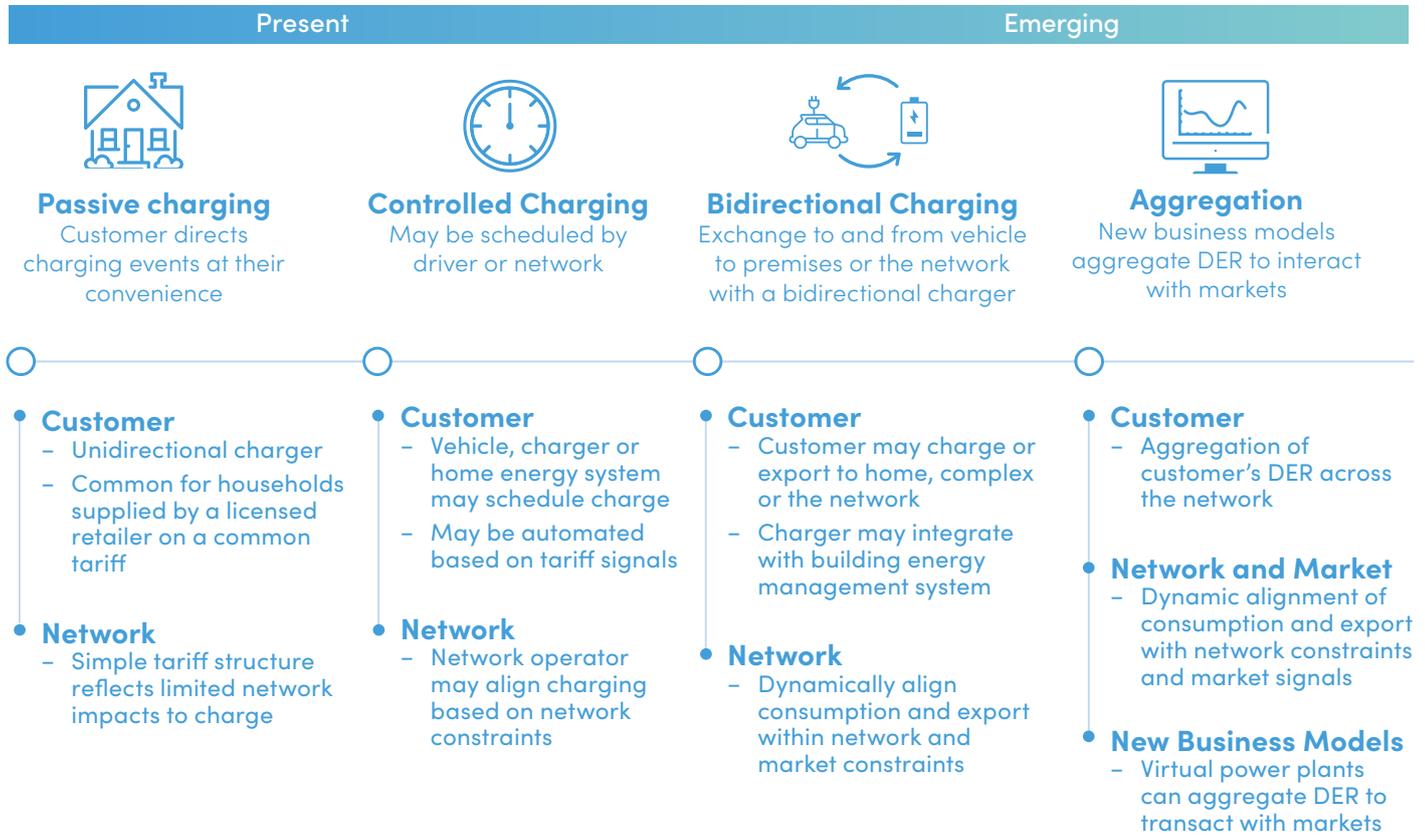
The assumptions used to underpin system planning processes – such as those used to determine where upgraded network infrastructure will be required – must be further standardised and agreed upon by relevant stakeholders.

Charging Infrastructure Standards

Requirements and standards applying to EV chargers are currently limited in respect of their interoperability, controllability, and performance, which in turn restricts their ability to provide network support. Actions under the EV Action Plan are intended to fill the gaps in these standards to streamline installation of future infrastructure. This will be done in a coordinated way that ensures consistency with the development of national standards.¹

¹ Situations may exist where Western Power and Horizon Power need to set specific requirements or settings to flexibly address local system security needs.

EV Charging types



Integration of EVs in microgrid control platforms

The ability for the network operators to actively manage power flows to resolve network constraints on microgrids (such as small, regional towns) is reliant on the development of DER management capabilities.

Horizon Power is already planning a trial of commercially available EVs, and will test the ability to incorporate EVs into DER orchestration platforms, without impacting customers. Completion of this trial will provide important information on potential options to remotely manage EV integration.



Tariffs and investment signals

Retail tariffs

Residential electricity tariffs present an opportunity to promote charging at times that support the electricity system and maximise use of renewable energy. Daytime tariffs could encourage charging at home or at work during the day, particularly on weekends, and would align with low emission exports from rooftop solar, which can otherwise present system challenges. Initial results from Synergy's current EV tariff pilot and other national trials indicate that a time-of-use tariff can be effective at encouraging charging at off-peak times.

Access process for charging infrastructure

Even small changes in the location of EV charging facilities can result in significant variations in network connection costs. Providing greater transparency for applicants on cost inputs and application processes will help in decision making and planning for investment by third parties.

In future, installers will have better guidance on the costs of installing EV charging equipment. Decisions on locating public or shared charge points will be balanced between keeping network connection costs low and proximity to customer needs. This will be especially important as the number of applications increases over time.



DER Participation

Orchestration trials

Optimising charging behaviour to spread the impact of demand from EV charging will reduce costs to the power system and avoid risks to system security. Longer term, vehicle-to-home and vehicle-to-grid technologies hold potential to unlock additional capability and services for EV owners and the electricity system.

Key to full integration and participation of EVs is the development of capabilities within the equipment, rules, guidelines, and processes of network and market operators. Full technical trials involving EVs and charging facilities may be required to understand and test integration. Where possible, trials will leverage the learnings coming from Virtual Power Plant trials including the Onslow DER Management System project and the Project Symphony pilot in Southern River.





Customers

Customer research, engagement, and protections

There is limited community understanding of the potential impacts of mass EV uptake on power systems in Western Australia.

Engagement with EV owners will be important in shaping customer norms and behaviour around charging.

Uptake rates for EVs and charging infrastructure may change rapidly based on shifts in corporate and government fleets and Commonwealth Government policy.

Ongoing research is required to ensure these trends are monitored and included within system planning processes.

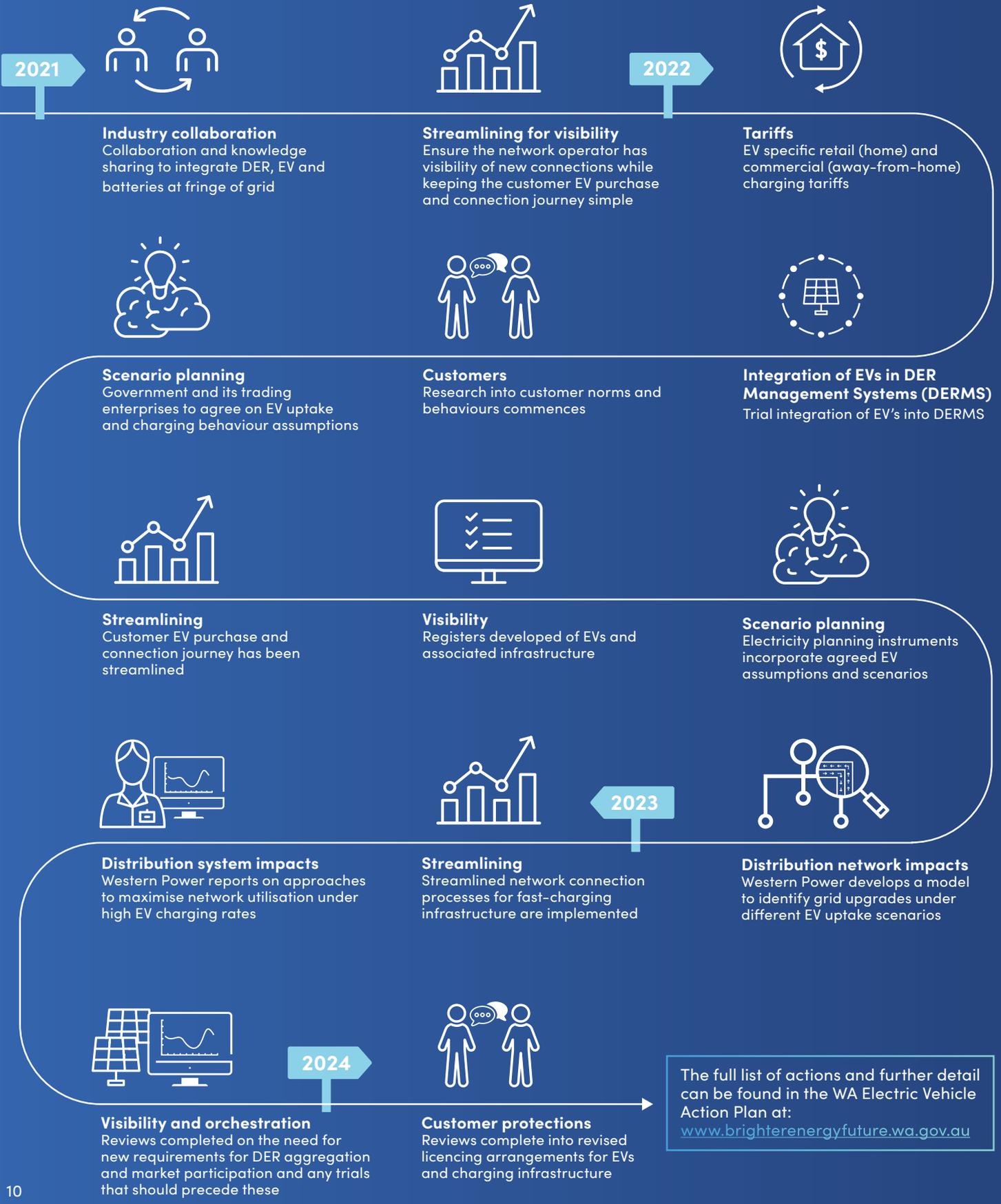
Customer protections also need to be maintained as new products, vehicles, charging options, and pricing become available.

Energy Policy WA will undertake a review to identify changes required to the licensing arrangements that govern the sale and supply of electricity through EV charging stations.



EV Action Plan pathway

The EV Action Plan provides an integrated set of actions designed to deliver a future where EVs contribute to a safe, reliable and efficient electricity system that accelerates our transition to a low carbon future.



The full list of actions and further detail can be found in the WA Electric Vehicle Action Plan at:
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How we got here

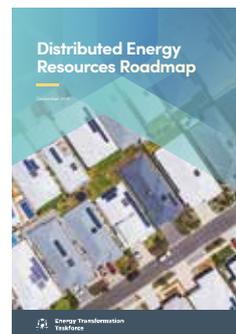
In April 2020, the Western Australian Government released the DER Roadmap. The Roadmap includes a suite of actions to unlock potential and ensure the safe and efficient integration of DER, such as rooftop solar systems, batteries, and EVs on the South West Interconnected System (SWIS). This work is focussed on delivering a future where DER plays a central part in a safe, reliable and efficient electricity system.

Action 16 of the DER Roadmap called for further work with respect to the potential impact that increasing EV uptake may have on Western Australia's electricity systems.

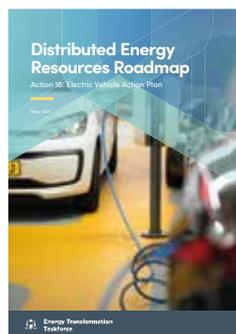
The EV Action Plan delivers this, through a roadmap developed in consultation with industry stakeholders. It includes actions to manage potential risks and maximise the potential benefits to electricity systems. The EV Action Plan also delivers on a commitment within the *State Electric Vehicle Strategy for Western Australia* (State EV Strategy), which considers how all sectors in Western Australia can work together to facilitate the increased uptake of EVs. This is also an important element of the Western Australian Climate Policy.



The State EV Strategy



The DER Roadmap



*Action 16 -
Electric Vehicle Action Plan*



This document provides a summary of the EV Action Plan: Preparing Western Australia's Electricity System for EVs. The full list of actions and further detail can be found in the full length Action Plan at: www.brighterenergyfuture.wa.gov.au.

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