



Steering towards  
a clean energy future

# State Electric Vehicle Strategy for Western Australia





#### Department of Water and Environmental Regulation

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Cleaner, more sustainable transport energy for our future  
**The increased adoption of electric vehicles in our state will reduce greenhouse gas emissions and improve our urban air quality.**

## Ministers' foreword

The McGowan Government is committed to delivering a cleaner, more sustainable environment and supporting the industries of the future that will drive economic strength and create long-term jobs. The electrification of transport through the increasing adoption of battery electric and plug-in hybrid vehicles, as well as hydrogen fuel cell vehicles, will advance these priorities in our state.



Electric vehicles will improve the air quality in our urban centres, reduce greenhouse gas emissions, and support local industry. They will benefit the community and our economy through their quiet operation, reduced maintenance and operational costs, and through replacement of imported oil with domestically produced, and increasingly clean, electricity.

Global uptake of electric vehicles presents significant opportunities for industry in

Western Australia. We have among the world's largest reserves for all the critical battery minerals and we have the skills, infrastructure and standards to become a key player in the global battery value chain. In recognition of our strengths in this area, the Government of Western Australia released its Future Battery Industry Strategy in 2019.

Our capability and advantage in the resources sector also extends to research and

development. Perth hosts the headquarters of the Future Battery Industries Cooperative Research Centre, with over 58 companies from across the globe participating and providing leveraged funding of \$110 million cash and in-kind.

To complement opportunities in the battery industry, the State Government is actively supporting industry efforts to grow the renewable hydrogen industry. The Western Australian Renewable Hydrogen Strategy,



released in 2019, acknowledges the potential future role for hydrogen fuel cell electric vehicles – particularly in the heavy-vehicle, long-haul sector.

The actions outlined in this State Electric Vehicle Strategy for Western Australia, accompanied by the investment of \$21 million, are an important element of the State Government’s Western Australian Climate Policy. In 2019, the State Government committed to working with all sectors of the economy to

achieve net-zero greenhouse gas emissions by 2050. The adoption of electric vehicles powered by increasing levels of renewable energy will be fundamental to reducing greenhouse gas emissions in the transport sector.

The State Government has developed this strategy to prepare for the transition to low and zero-emission electric vehicles and maximise the benefits to our state. The electric vehicle transition

holds the promise of cleaner, more efficient transportation with a significant role for Western Australian industry. We look forward to supporting its progress through the implementation of this strategy.

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Hon Dave Kelly MLA  
Minister for Innovation and ICT

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Hon Stephen Dawson MLC  
Minister for Environment

## Executive summary

The electrification of transport is emerging rapidly. Improvements in battery technology and reduction in costs, together with stricter vehicle emission standards and targets in many jurisdictions around the world, have led to increasing adoption of electric vehicles. Forecasts show a steep rise in global electric vehicle uptake as price parity with conventional vehicles becomes closer.

This strategy is focused on actions that can assist the local uptake of electric vehicles and ensure that the electrification transition is facilitated in a way that is efficient, coordinated and supports a robust and increasingly decarbonised energy system. Given their advanced state of market development, this strategy is focused primarily on battery electric vehicles and plug-in hybrid electric vehicles. However, hydrogen fuel cell vehicles are also considered.

The increased adoption of electric vehicles in our state will reduce greenhouse gas emissions and improve our urban air quality. They will provide improvements in energy productivity, future transport costs, energy security and amenity. The State Government is preparing for the increased domestic and international adoption of electric vehicles to ensure that we take advantage of these economic, social and environmental benefits.

The State Government is already working closely with businesses and other stakeholders, positioning the state to leverage economic opportunities presented by electric vehicles, the future battery industry and emerging hydrogen industry.

This strategy outlines the international and national context and drivers for electric vehicle adoption. It discusses the reasons for State Government action and outlines the initiatives that will be implemented. Developments in electric vehicle technology, policy and markets are progressing rapidly. Therefore, this strategy will be subject to regular review to ensure the most effective pathways to support the uptake of low and zero-emission vehicles in our state are considered and implemented.

Measures in the strategy will facilitate electric vehicle adoption in Western Australia through State Government leadership within its own fleet, increasing the availability of charging and hydrogen refuelling infrastructure, developing and updating standards, guidelines and planning approval requirements, and improving levels of consumer awareness and knowledge.

These measures will be supported through an Electric Vehicle Fund of \$21 million.

Key areas of action include:

- electric vehicle uptake
- charging and refuelling infrastructure
- standards, guidelines and planning approval requirements
- industry development.

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Photo: Tourism Western Australia



Cleaner, more sustainable transport energy for our future

The global transition to low and zero-emission vehicles is well underway.



## Electric vehicle fundamentals and international context

The global transition to low and zero-emission vehicles is well underway. A number of countries have committed to banning the sale of new petrol and diesel vehicles with timeframes ranging from 2025 to 2040.

Automobile manufacturers are following the direction of these jurisdictions by investing billions of dollars in the development of electric vehicle and battery technology and announcing plans for the rollout of increasing numbers of electric vehicle models.

This strategy covers battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV) and hydrogen fuel cell electric

vehicles (FCEV). Because of the market penetration and availability of BEVs and PHEVs, this technology is the focus of this strategy. Hybrid electric vehicles that don't have the ability to be recharged from a plug are not included in the strategy.

BEVs are fully powered by an onboard battery that may be recharged via an electrical power source. BEVs currently on the

market in Australia tend to have a range between 250 km and 650 km.<sup>1</sup>

As battery technology improves and reduces in cost, the range of BEVs is steadily increasing.

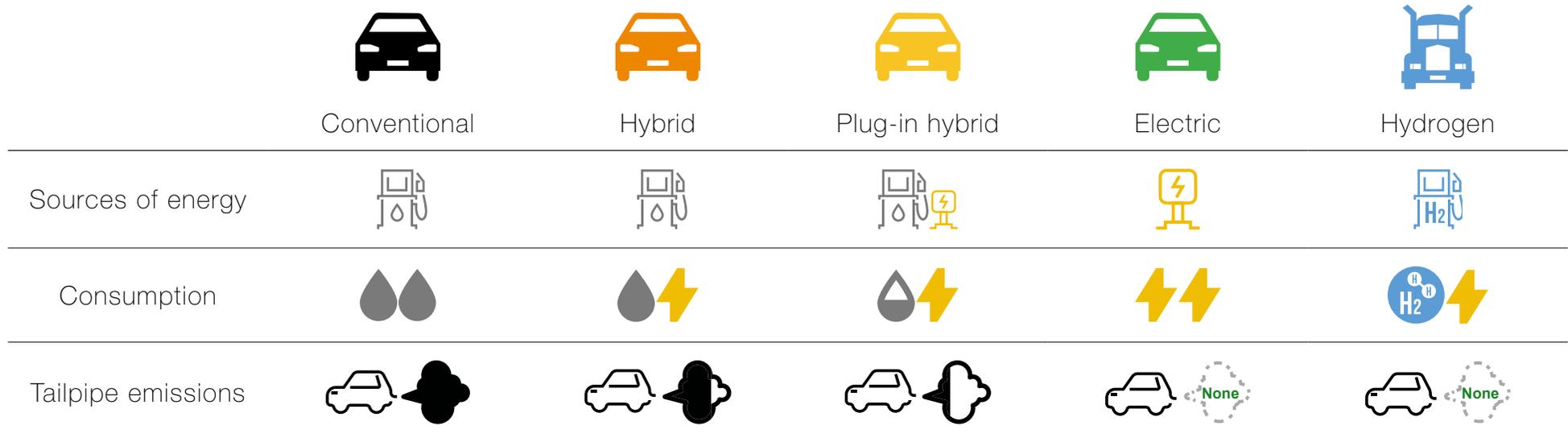
PHEVs are powered by the combination of a battery that may be recharged via an electrical power source and a petrol or diesel internal combustion engine. PHEVs don't

achieve the same emissions, maintenance and operational savings as BEVs; however, they can achieve greater ranges and are not reliant on charging of the battery to operate.

More than 2 million electric cars (BEVs and PHEVs) were sold globally in 2019, bringing global stocks to over 7 million.<sup>2</sup> The heavy-vehicle market is also showing development.

<sup>1</sup> Electric Vehicle Council, 2019, State of Electric Vehicles August 2019, Available: [electricvehiclecouncil.com.au/wp-content/uploads/2019/09/State-of-EVs-in-Australia-2019.pdf](https://electricvehiclecouncil.com.au/wp-content/uploads/2019/09/State-of-EVs-in-Australia-2019.pdf)

<sup>2</sup> International Energy Agency, 2019, Tracking Clean Energy Progress – Electric Vehicles, [www.iea.org/reports/electric-vehicles#tracking-progress](https://www.iea.org/reports/electric-vehicles#tracking-progress), accessed: 4 June 2020.



**Figure 1: Comparison of conventional internal combustion engine vehicle, hybrid vehicle, plug-in hybrid electric vehicle, battery electric vehicle, and hydrogen fuel cell electric vehicle.**

Medium and heavy-duty battery electric trucks are being trialed in many jurisdictions, including Western Australia, and numbers of electric buses are increasing rapidly. There are now about 400,000 electric delivery vans

and trucks, and 500,000 electric buses on the road worldwide.<sup>3</sup>

FCEVs are powered by hydrogen converted to electricity by an onboard fuel cell. ‘Zero emissions’ hydrogen can

be produced using electrolysis of water powered by renewable energy, or hydrogen can be produced from fossil fuels including natural gas or coal. FCEVs can achieve 500-600 km on a tank of hydrogen. Global

stocks of FCEVs at the end of 2019 were over 23,000, with nearly half of these registered in 2019.<sup>4</sup>

<sup>3</sup> BloombergNEF, 2020, Electric Vehicle Outlook 2020. May 2020.

<sup>4</sup> International Energy Agency, May 2020, World Energy Investment 2020, [www.iea.org/reports/world-energy-investment-2020/rd-and-technology-innovation](http://www.iea.org/reports/world-energy-investment-2020/rd-and-technology-innovation), accessed: 4 June 2020.



## Why Western Australia is taking action on electric vehicles

The electrification of transport will reduce greenhouse gas emissions as well as provide air quality, amenity, fuel security and potential electricity grid benefits for Western Australia.

Supporting the uptake of BEVs, PHEVs and FCEVs also aligns with key Western Australian industry development and economic diversification goals.

It is anticipated that BEVs will reach price parity with comparable internal combustion engine vehicles about the mid-2020s, differing somewhat depending on the vehicle type and jurisdiction. Some calculations estimate that total cost of ownership of BEVs

is already close to internal combustion engine vehicles given their lower maintenance and operational costs.

As the upfront purchase price of electric vehicles decreases, they are expected to become a common consumer choice because of their advantages of driving performance, efficient energy conversion, reduced running costs, lack of tailpipe emissions and quiet operation. One forecast is that by 2040,

BEVs and PHEVs will make up 58 per cent of global passenger vehicle sales and over 30 per cent of the global passenger vehicle fleet.<sup>5</sup>

Electrification will also increasingly interact with other developments and transformations in the transport system such as automation, connectivity and ride-sharing. The extent to which the benefits of these transformations are realised, and any challenges

are minimised, will depend on how we guide the adoption and coordinate the integration of these technologies.

The State Government is facilitating the change towards electric vehicles so that there is a smooth transition and opportunities for efficient, clean and safe transport are harnessed. The issues outlined in the next sections have guided the State Government's direction in supporting the uptake of electric vehicles.

5. Bloomberg NEF, 2020 Global Electric Vehicle Outlook 2020, [about.bnef.com/electric-vehicle-outlook/](https://about.bnef.com/electric-vehicle-outlook/)

## Future vehicle technologies

The State Government is working to make future vehicle technologies available in our state to improve safety and liveability, and to increase productivity. This includes automated, connected, and electric vehicles, as well as related technologies.

In recent years, the State Government has worked with trial proponents and local governments to facilitate pilot tests of automated electric vehicles in South Perth, Busselton and the campuses of Curtin University and the University of Western Australia. These trials have demonstrated the effectiveness of the technologies and also their challenges in Western Australia.

The State Government will continue to support and facilitate further automated vehicle trials in Western Australia.



The RAC automated, electric Intellibus®, has been trialled on public roads with the support of the State Government and City of South Perth.





## Low-carbon transport

In 2019, the State Government announced its commitment to working with all sectors of the economy to achieve net-zero greenhouse gas emissions by 2050. The State Government is taking action to reduce the need for private vehicle travel by making significant investments in public transport through METRONET, as well as urban planning, walking and cycling initiatives. However, in order to limit growth in greenhouse gas emissions, our vehicles must also become cleaner.

A BEV charged from renewable energy such as rooftop solar panels and a FCEV powered by renewable hydrogen will create no greenhouse gas emissions through their operation. An average BEV charged using electricity from Western Australia's main grid – the South West Interconnected System – generates almost 30 per cent less greenhouse gas emissions than an average internal combustion engine vehicle in Australia.<sup>6</sup> This emissions benefit will grow as the amount of renewable energy supplying the grid increases over time.

## Air quality

Countries across the world working to increase the uptake of electric vehicles are doing so not only to reduce greenhouse gas emissions but also to address worsening urban air quality.

BEVs and FCEVs have zero tailpipe emissions of nitrogen and sulphur oxides, particulates and carbon monoxide – providing important amenity and health benefits.

## Future battery industry development

Western Australia is in a unique position to benefit from the increased demand for battery materials used in electric vehicles and stationary energy storage systems. In recognition of the opportunities for our state, the State Government launched its Future Battery Industry Strategy in January 2019. Western Australia is the world's largest producer of lithium<sup>7</sup> and a leading producer of other battery metals including nickel, cobalt, manganese, vanadium and alumina. The Future Battery Industry Strategy sets a pathway for our state to build on its excellence in mining and strong industrial base to attract more investment into diversifying mineral production and increasing the scale of domestic processing industries.

Perth hosts the headquarters of the Future Battery Industries Cooperative Research Centre, with over 58 companies from across the globe participating and providing leveraged funding of \$110 million cash and in-kind.

Accelerating the uptake of electric vehicles in Western Australia will provide public health benefits of over \$20 million each year by reducing air pollution.

6. ClimateWorks, June 2018, The State of Electric Vehicles in Australia – Second report: driving momentum in electric mobility.

7. Western Australia's lithium sector was valued at \$1.55 billion in 2018–19. Government of Western Australia, Department of Mines, Industry Regulation and Safety, Western Australian Mineral and Petroleum Statistics Digest 2018–19. [dmp.wa.gov.au/Documents/About-Us-Careers/Stats-Digest\\_2018-19.pdf](https://dmp.wa.gov.au/Documents/About-Us-Careers/Stats-Digest_2018-19.pdf)

## Renewable hydrogen industry development

The State Government's focus on creating jobs and driving future diversified economic opportunities is a key foundation of the Western Australian Renewable Hydrogen Strategy, released in July 2019. As the world moves to a lower-carbon future, renewable hydrogen has the potential to play a key role in energy systems. Applications may be in the export market, remote mining and industrial processes, blending in natural gas networks, as well as transport. Transport opportunities may particularly suit vehicles that require longer ranges, shorter refuelling times and are weight-constrained.

## Fuel security and grid benefits

Reduced reliance on imported oil and its replacement with domestic electricity represents a further benefit of electric vehicles. The transport sector makes up about 75 per cent of our total liquid fuel demand and about 90 per cent of the fuel we use in Australia is derived from oil that is sourced overseas.<sup>8</sup> Decreasing this, and using additional electricity produced from within

Western Australia, provides a substantial domestic economic benefit and improved fuel security.<sup>9</sup>

Electric vehicles also present an opportunity to help stabilise energy systems into the future. With vehicles already containing battery packs up to 100 kWh in capacity, and only being used a fraction of the time, there is the potential that

the stored energy can be used for other functions such as providing vehicle-to-home or vehicle-to-grid energy services.

Charging electric vehicles from solar energy during the middle of the day will provide multiple benefits of cleaner-powered transportation as well as soaking up excess cheap electricity generation and potentially reducing the need for network investment.

Integrating distributed energy resources (such as solar PV, batteries and electric vehicles) could deliver more than \$1 billion in benefits to customers across Australia by 2030.  
– Energy Networks Australia

<sup>8</sup> Australian Government Department of the Environment and Energy, April 2019, Liquid Fuel Security Review – Interim Report. Commonwealth of Australia.

<sup>9</sup> According to the Commonwealth of Australia's 2019 Liquid Fuel Security Review – Interim Report, as of December 2018, Australia only held 18 days of consumption cover for petrol and 22 days for diesel.

## Priority areas of action

The State Government has identified four key areas of action to support the adoption of electric vehicles in Western Australia.



Photo: Tourism Western Australia

These are:



### **electric vehicle uptake**

stimulating the electric vehicle market through fleet uptake, increasing awareness and promoting the importance of emission standards



### **infrastructure**

investing in, and facilitating, the provision of electric vehicle charging and refuelling infrastructure



### **standards, guidelines and planning approvals**

developing and updating guidelines, standards and requirements for planning approvals to assist the safe and efficient adoption of electric vehicles and associated infrastructure



### **industry development**

developing areas of industry relevant to our state

## Electric vehicle uptake



Increased adoption of electric vehicles can be supported effectively through State Government targets for its own vehicle fleet. This will have the effect of improving model availability, demonstrating the performance of the technology and helping to establish and stimulate the second-hand market by on-selling vehicles after a period of a few years.

Sources of reliable and easily accessible information on electric vehicles will be important for building confidence and awareness in the community, as well as among vehicle industry stakeholders. Exposure to the technology will allow its benefits to be experienced and will support decisions regarding its operational suitability.

A key measure that could support the adoption of electric vehicles across Australia is the introduction of national vehicle carbon dioxide (CO<sub>2</sub>) emission standards by the Australian

Government. The average emissions performance of vehicles in Australia is currently very poor because of the lack of national fuel efficiency or carbon emissions standards.

### The State Government will:

<ul style="list-style-type: none"> <li>invest funds<sup>10</sup> to achieve a minimum 25 per cent electric vehicle target for all new light and small passenger, and small and medium SUV government fleet vehicles by 2025/26<sup>11</sup></li> </ul>	Department of Finance
<ul style="list-style-type: none"> <li>invest \$800,000 to install electric vehicle charging stations in government buildings to support the State Government electric vehicle fleet target</li> </ul>	Department of Finance
<ul style="list-style-type: none"> <li>trial the introduction of a quota for electric vehicles in the passenger, light commercial, or heavy vehicle fleet of road construction projects including within the immediate supply chain. A pilot trial will be conducted for the Mitchell Freeway Extension – Hester to Romeo major project</li> </ul>	Main Roads WA
<ul style="list-style-type: none"> <li>undertake a trial of battery electric buses on the Joondalup Central Area Transit Service</li> </ul>	Public Transport Authority
<ul style="list-style-type: none"> <li>develop an information resource to provide reliable and accessible information regarding electric vehicles and charging infrastructure in Western Australia</li> </ul>	Department of Transport
<ul style="list-style-type: none"> <li>invest \$80,000 to host events for vehicle fleet buyers, industry and business, to demonstrate and provide information on the features and benefits of electric vehicles, in conjunction with the vehicle manufacturers, industry groups and key stakeholders, such as the Clean Energy Finance Corporation</li> </ul>	Department of Water and Environmental Regulation
<ul style="list-style-type: none"> <li>encourage the Australian Government to introduce vehicle CO<sub>2</sub> emission standards in line with other OECD countries</li> </ul>	Department of Transport; Department of Water and Environmental Regulation

<sup>10</sup> \$20 million has been allocated to support the creation of an electric vehicle charging infrastructure network and a minimum 25 per cent electric vehicle target for eligible government fleet vehicles.

<sup>11</sup> Not including police vehicles or vehicles that attract fringe benefits tax.



Hon Dave Kelly MLA, Minister for Innovation and ICT, and Pat Donovan, Chief Executive Officer of the Water Corporation, stand beside a Water Corporation electric vehicle.

## Fleet transition

Government agencies and government trading enterprises are already incorporating electric vehicles into their fleets. The Water Corporation will transition up to 40 per cent of its metropolitan fleet to electric vehicles over the next five years.



# Infrastructure



The limited availability of public charging and hydrogen refuelling infrastructure is both a perceived and an actual barrier discouraging consumers and commercial fleets from transitioning to electric vehicles. Although most electric vehicle charging is carried out at home or in the workplace, the existence of public fast-charging infrastructure is essential to help overcome range anxiety and enable inter-regional or long-distance travel.

Planning for the provision of slower destination charging associated with buildings is also important. The incorporation of adequate electrical infrastructure at the time of building construction – particularly for multi-use dwellings, apartments and workplaces – will significantly reduce the cost associated with installing charging stations at a later date.

The additional electricity demand from electric vehicles as numbers increase is an important consideration for governments and utilities. Pricing signals can be used to encourage charging at times that benefit the electricity grid and do not contribute to peak load. Synergy currently

provides a reduced electric vehicle tariff for off-peak charging. Electric vehicles can also have the capability to provide grid services by directing power back into the grid.

The State Government is investigating the most effective ways to harness the benefits that electric vehicles can provide for the electricity grid and avoid undesirable impacts. This work is being conducted as one element of Western Australia's Distributed Energy Resources Roadmap, with Energy Policy WA, Western Power and Synergy collaborating closely with other stakeholders such as the Australian Energy Market Operator.

## The State Government will:

<ul style="list-style-type: none"> <li>invest up to \$20 million to support the creation of an electric vehicle charging infrastructure network facilitating travel north from Perth to Kununurra, along the south-west coast to Esperance and east to Kalgoorlie<sup>12</sup></li> </ul>	Synergy, Horizon Power, and Energy Policy WA
<ul style="list-style-type: none"> <li>invest \$3 million to install two hydrogen refuelling stations – the two stations will generate renewable hydrogen, one station will be in Jandakot and provide hydrogen for fleet vehicles and another at Christmas Creek Mine, in the Pilbara, will power hydrogen buses</li> </ul>	Department of Jobs, Tourism, Science and Innovation
<ul style="list-style-type: none"> <li>include a requirement for the provision of electric vehicle charging infrastructure in new public building capital works projects, including government office accommodation, hospitals, schools, TAFE colleges, sports facilities and a range of other building types to make them 'EV ready'</li> </ul>	Department of Finance
<ul style="list-style-type: none"> <li>implement actions outlined in the State Government's Distributed Energy Resources Roadmap that will assist the integration of electric vehicles, including consideration of incentives to promote daytime charging to help make best use of the midday solar generation peak and assessment of vehicle-to-grid technology forecasts. Buyback payments will be extended to energy exported to the grid from electric vehicles in the same way as rooftop solar</li> </ul>	Energy Policy WA
<ul style="list-style-type: none"> <li>undertake scenario modelling of electric vehicle uptake and charging behaviour over the next 30 years and investigate charging models to support grid benefits</li> </ul>	Western Power
<ul style="list-style-type: none"> <li>plan for the integration of electric vehicles in the electricity grid, including the deployment of charging points (household and fast charge) and trials to better understand the capabilities of vehicle-to-grid technology</li> </ul>	Western Power

<sup>12</sup> \$20 million has been allocated to support the creation of an electric vehicle charging infrastructure network and a minimum 25 per cent electric vehicle target for eligible government fleet vehicles.



Electric vehicle charging station at DevelopmentWA's East Village, Knutsford housing development in the City of Fremantle.



## Sustainable housing

East Village, at Knutsford in the City of Fremantle, is a sustainable housing development collaboration between DevelopmentWA, Power Ledger, Curtin University, Murdoch University, BT Energy and CleanTech Energy. It incorporates energy-efficient design, renewable energy and innovative technologies. Homes will be equipped for electric vehicle chargers and a shared, strata-owned electric vehicle fast-charge station will serve residents and guests.





## Standards, guidelines and planning approvals

As with the emergence of any significant new technology, the development of consistent standards and guidelines regarding electric vehicles and charging infrastructure is important to assist the efficient, safe and effective rollout of the technology. The State Government is already acting to support the use of electric vehicle technology through enabling regulation – for example, allowing e-bikes to be used on footpaths.

### The State Government will:

- ✔ in collaboration with other states and territories and national working groups, consider:
  - the adoption of current market-based standards for electric vehicle plugs for charging infrastructure to guide councils, companies and charging infrastructure installers
  - the development of national operability standards for charging infrastructure, such as common open-payment platforms and motorist accessibility
  - the development of guidelines to support installation of electric vehicle charging and refuelling infrastructure
  - the development of guidelines to make buildings and other accommodation ‘EV ready’ – ensuring that new buildings cater for electric vehicle charging
  - encouraging the Australian Building Codes Board and Standards Australia to produce guidance material on options to retrofit electric vehicle charging points in existing buildings
  - supporting national work to develop data sharing and exchange standards for vehicle charging and energy data, while preserving personal privacy and commercial confidentiality
  - reviewing land use planning guides and standards related to fuel and service stations to support establishment of electric vehicle infrastructure

Main Roads Western Australia
Department of Mines, Industry Regulation and Safety
Department of Planning, Lands and Heritage
Energy Policy WA
Department of Transport

- ✔ support amendments to the National Construction Code to include a requirement that new buildings are EV-ready, with consideration of electrical infrastructure to support the installation of electric vehicle charging equipment
- ✔ consider updating planning guidelines to encourage the design of new residential buildings, precincts and parking to incorporate infrastructure that supports emerging technology such as the installation of electric vehicle charging facilities
- ✔ undertake a comprehensive review and consult on the future regulation of electric vehicle charging stations (currently exempt from requiring a licence to sell and distribute electricity) – the review will consider whether providers of electric vehicle charging stations should be regulated under the modernised regulatory framework being developed that will facilitate businesses providing alternative electricity services, while ensuring customers have access to appropriate protections
- ✔ update the Road Traffic (Vehicles) Regulations 2014 to include a requirement for electric vehicle signage on vehicle licence plates



Western Australian Department of Transport employees using conventional and electric bikes.

## e-bikes ownership

A recent National Cycling Participation Survey revealed that Western Australia has the highest rate of e-bike ownership across Australia. In 2016, the Department of Transport led a change in WA enabling all bikes (including e-bikes) to be ridden on footpaths, vastly expanding the available network for bike riders. The Department of Transport also has a number of e-bikes for staff to use in place of car trips. (Australian Cycling Participation, 19 September 2019, Austroads)



## Industry development and commercial vehicles



While passenger vehicles are responsible for the greatest share of transport greenhouse gas emissions, commercial and freight vehicle emissions are growing rapidly. A number of companies are trialling the use of battery electric trucks in sectors such as food delivery and waste collection. The advantages of these trucks include zero tailpipe air pollution emissions, reduced greenhouse gas emissions and quiet operation.

The reduction in noise from these vehicles opens up the potential for the trucks to be operated in urban areas at times when conventional vehicles have been restricted for amenity reasons – resulting in improved operational efficiency for businesses and reduced road congestion.

Mining companies are also increasingly looking to electric vehicles to reduce diesel vehicle emissions that are harmful to workers' health. The use of electric vehicles in mining applications will serve to decrease the costs of underground ventilation and, in addition, reduce greenhouse gas emissions associated with operations.

The demand for electric vehicles is stimulating the rapidly growing battery industry and creating

further interest in the emerging hydrogen industry. Western Australia has a significant competitive advantage and opportunity to benefit from these industries, which is highlighted in the state's Future Battery Industry Strategy and Renewable Hydrogen Strategy.<sup>13</sup>

In addition to the vast mining and mineral processing sector opportunities, there are further industry prospects presented by the global battery chain, including the recycling and repurposing of batteries. Western Australia has ambitious targets that require 75 per cent of waste generated in Western Australia to be reused or recycled by 2030. Electric vehicle batteries can be repurposed for use as home or other stationary energy batteries, significantly extending their lifetime and value.

### The State Government will:

 deliver actions outlined in the Future Battery Industry Strategy to support Western Australia becoming a leading producer and exporter of future battery materials, technologies and expertise	Department of Jobs, Tourism, Science and Innovation
 support the vision outlined in the Western Australian Renewable Hydrogen Strategy to become a leader in the emerging renewable hydrogen industry, with transport-sector goals of a refuelling facility for hydrogen vehicles being available by 2022 and renewable hydrogen being widely used in mining haulage vehicles and regional transportation by 2030	Department of Jobs, Tourism, Science and Innovation
 assess opportunities for the development of a local battery recycling industry in Western Australia	Department of Water and Environmental Regulation

<sup>13</sup> These strategies may be accessed on the Department of Jobs, Tourism, Science and Innovation's website. [www.jtsi.wa.gov.au](http://www.jtsi.wa.gov.au)



Minister for the Environment, Hon Stephen Dawson MLC, and Mike Rowe, Director General Department of Water and Environmental Regulation, stand beside a fully electric SUEZ recycling truck being trialled in the City of Belmont.

## Electric recycling truck in Belmont

SUEZ is trialling a fully electric recycling truck in the City of Belmont. The truck will save about 35,000 litres of diesel and avoid 90 tonnes of greenhouse gas emissions each year. In addition to zero tailpipe emissions, the City of Belmont and SUEZ say the electric vehicle will bring a range of benefits including quiet operation for the city's residents and significantly reduced maintenance. The regenerative braking system on the electric truck will also mean that the brake pads will only need to be replaced every two years, compared with quarterly changes for conventional trucks.



## Next steps and review

Developments in electric vehicle technology and the associated markets, policy and regulatory arrangements are progressing rapidly. Projections in recent years for the global uptake of electric vehicles have been consistently revised upwards. The price and performance of electric vehicle batteries is improving significantly, as is the capability of charging infrastructure. There is also the potential for developments in hydrogen fuel cell technology to progress ahead of current predictions.

The State Government will continue to monitor trends in electric vehicle technology and markets. Given the pace of developments, a review of this strategy will be undertaken within three years to ensure our state is benefiting and keeping pace with the opportunities presented by the transition to cleaner transportation.

This strategy is a product of the Western Australian Electric Vehicles Working Group and was developed in consultation with stakeholders across industry, academia, and non-government associations and organisations.

Further information on the Western Australian Electric Vehicles Working Group, including its membership, may be accessed on the Department of Water and Environmental Regulation's website.<sup>14</sup>

### Western Australian Electric Vehicles Working Group

A Western Australian Electric Vehicles Working Group was formed in 2018 following the signing of a Memorandum of Understanding – Sub-National Collaboration on Electric Vehicles by the Minister for Innovation & ICT, Hon Dave Kelly MLA.

The Working Group, chaired by the Department of Water and Environmental Regulation, will assist in coordinating the implementation of this strategy.



Home electric vehicle charging

<sup>14</sup> [www.dwer.wa.gov.au](http://www.dwer.wa.gov.au)

## Glossary

<b>Term</b>	
Battery electric vehicle (BEV)	Vehicle fully powered by an onboard battery that may be recharged via an electrical power source.
Electric vehicle	For the purposes of this strategy, electric vehicle is defined as a battery electric vehicle, plug-in hybrid electric vehicle, or fuel cell electric vehicle.
Fuel cell electric vehicle (FCEV)	Vehicle powered by hydrogen converted to electricity through an onboard fuel cell.
Hybrid vehicle	Vehicle powered by an internal combustion engine plus a battery that doesn't have the ability to be recharged from a plug.
Internal combustion engine (ICE) vehicle	Conventional petrol or diesel-fuelled vehicle.
Plug-in hybrid electric vehicle (PHEV)	Vehicle powered by the combination of a battery that may be recharged via an electrical power source and a petrol or diesel internal combustion engine.



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