

Are electric cars a likely option for Australia?

What they said...

'One of the big reasons we see low sales of electric vehicles is their high up-front purchase price'

Dr Benjamin Beard, an economist and Fellow at Resources for the Future

'Bloomberg Energy Finance estimates that electric and conventional vehicles will be of a similar price by 2025'

Josh Frydenberg, former federal Minister for the Environment and Energy

The issue at a glance

In October 2019, data released by the Federal Chamber of Automotive Industries (FCAI), the peak body for the automotive industry in Australia, indicated that overall new car sales were down 9.1 per cent compared to the same month last year, and year-to-date sales are down eight per cent over the same period in 2018. <https://thedriven.io/2019/11/06/australia-fossil-fuel-cars-sales-slump-again-but-evs-and-hybrids-up/>

Hybrid (combination electric and fossil fuel cars) sales, meanwhile, were up, and so were electric vehicles (EVs), although off a low basis. Surveys suggest that many car owners are retaining their current petrol and diesel vehicles until an EV they like and can afford comes onto the market, while others simply seem uncertain.

<https://thedriven.io/2019/11/06/australia-fossil-fuel-cars-sales-slump-again-but-evs-and-hybrids-up/>

In December 2019, it was reported that Victorian and New South Wales governments are considering a new tax for EVs. This follows a report by Infrastructure Partnerships Australia which recommended a per-kilometre tax for EVs. This potential move has been condemned as likely to discourage the uptake of these vehicles which other nations are giving motorists financial incentives to purchase. <https://www.abc.net.au/news/2019-12-24/a-proposed-new-tax-on-electric-vehicles-is-a-bad-idea/11813630>

Australian governments and consumers do not appear to have a clear view as to whether electric cars are the future of private transport in this country and, if so, how to respond to them. Confusion seems to exist around the environmental impact of EVs, while operational questions such as availability of charging depots are not yet fully determined. Governments do not seem resolved on whether they will promote their uptake.

Background

(The information presented below has been abbreviated from a Wikipedia entry titled 'Plug-in electric vehicles in Australia'. The full text can be accessed at https://en.wikipedia.org/wiki/Plug-in_electric_vehicles_in_Australia)

Electric vehicles in Australia

The adoption of plug-in electric vehicles (EVs) in Australia is driven by customer demand due to the lack of government policies or monetary incentives to support the adoption and deployment of low or zero emission vehicles.

The Australian stock of EVs totalled over 6,000 units by early 2018. The Mitsubishi Outlander P-HEV was the country's top selling plug-in electric vehicle, with over 2,906 plug-in hybrid SUVs sold through March 2018. The electric Tesla Model X and Model 3 are Australia's second and third safest cars.

Victoria is Australia's most important EV market with the most electric vehicle purchases between 2011 and 2017 with a total of 1,324 car sales. Victoria also had the most electric vehicle chargers in the country. Similarly, Victoria's capital city Melbourne, had the highest concentration of electric vehicle chargers in Australia in 2017. Victoria had 403 electric vehicle depots in 2019 with another 31 expected to be constructed by the end of 2020. Victoria almost doubled its electric vehicle charger network between 2018 and 2019. Victoria also manufactures electric vehicles with a commercial electric vehicle manufacturing facility to be established in Victoria in 2021, producing 2,400 vehicles per year. The Victorian company SEA Electric also manufactures electric trucks and other vehicles for domestic and international markets. Overall, Victoria, Australian Capital Territory, New South Wales, South Australia and Tasmania represent the largest markets in the country for electric car sales.

Growth and availability of electric vehicles

Electric vehicle sales doubled in Australia in 2019 compared to 2018. In 2019, the Electric Vehicle Council expected EV model choices to continue to expand which would promote a significant increase in EV sales in Australia. Model choice is expected to grow from 22 all-electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) available in 2019 to 31 by the end of 2020.

A National Electric Vehicle Strategy by the federal government is also being developed which is set to be released in mid-2020. The Coalition federal government has its carbon abatement policy anticipating electric vehicles to make up 50 percent of sales by 2030. Furthermore, government analysis in 2019 forecasted 50 percent of all new cars sold in Australia by 2035 will be electric on the current path. Another government forecast indicated the uptake of zero emissions vehicles in Australia would at least be at 27 percent by 2030.

Government incentives

As of July 2019, the Australian government offered a higher luxury tax threshold for qualifying low emissions vehicles and the state of Victoria and Australian Capital Territory offered incentives for purchasing and owning electric vehicles e.g. stamp duty exemptions and registration discounts.

The Victorian Government encourages the use of electric cars as part of its strategy to tackle climate change with a long-term target of net zero greenhouse gas emissions by 2050. The Victorian Government is also preparing a Zero Emissions Vehicle Roadmap to be released in mid-2020 to support the adoption of electric vehicles. However, the ACT offers the most financial and non-financial incentives for purchasing electric vehicles of any state in Australia.

Federal and state incentives to purchase EVs have been criticised as low compared to those available in many other countries.

Internet information

On December 24, 2019, The Conversation published a comment by Jake Whitehead, Research Fellow, The University of Queensland Dow Centre for Sustainable Engineering Innovation, titled 'Wrong way, go back: a proposed new tax on electric vehicles is a bad idea'.

Dr Whitehead criticises proposals from the Victorian and New South Wales governments to place a tax on EVs.

The full text can be accessed at <https://theconversation.com/wrong-way-go-back-a-proposed-new-tax-on-electric-vehicles-is-a-bad-idea-127608>

On November 25, 2019, The Guardian published a comment by Hans-Werner Sinn, professor of economics at the University of Munich, titled ‘Are electric vehicles really so climate friendly?’

The professor argues that in a country such as Germany whose electricity generation relies substantially on fossil fuels, EVs may have a larger carbon footprint than diesel fueled vehicles.

The full text can be accessed at <https://www.theguardian.com/environment/2019/nov/25/are-electric-vehicles-really-so-climate-friendly>

On October 31, 2019, The Guardian published a report titled ‘Electric cars could be charged in 10 minutes in future, finds research’ which refers to research developments in faster-charging batteries.

The full text can be accessed at

<https://www.theguardian.com/environment/2019/oct/30/electric-cars-could-be-charged-in-10-minutes-in-future-finds-research>

On October 28, 2019, The Sydney Morning Herald published a news report titled ‘Australians worry about the environment, but are wary of electric cars: report’

The article dealt with a report released by Nielsen titled ‘Caught in the Slow Lane’ which demonstrates that despite Australians’ environmental concerns they have a range of reservations about EVs.

The full text can be accessed at <https://www.smh.com.au/politics/federal/australians-worry-about-the-environment-but-are-wary-of-electric-cars-report-20191027-p53415.html>

On October 16, 2019, The Conversation published an analysis by Md Arif Hasan, PhD candidate, Te Herenga Waka-Victoria University of Wellington and Ralph Brougham Chapman, Associate Professor, Director Environmental Studies, Te Herenga Waka-Victoria University of Wellington titled ‘Climate explained: the environmental footprint of electric versus fossil cars’.

The analysis compares the relative carbon dioxide emissions of EVs and fossil-fueled cars in Australia and New Zealand, demonstrating the EVs have a smaller carbon footprint in both countries.

The full text can be accessed at <https://theconversation.com/climate-explained-the-environmental-footprint-of-electric-versus-fossil-cars-124762>

On September 5, 2019, The Conversation published a comment by Dr Jake Whitehead, a Tritium e-Mobility Research Fellow at the University of Queensland’s Dow Centre for Sustainable Engineering, titled ‘Clean, green machines: the truth about electric vehicle emissions.’

The comment defends EVs against accusations that their carbon footprint may be little better than that of ICEVs.

The full text can be accessed at <https://theconversation.com/clean-green-machines-the-truth-about-electric-vehicle-emissions-122619>

On August 14, 2019, The Guardian published a news report titled ‘Half of all new cars sold in Australia by 2035 will be electric, forecast predicts’

The report refers to a federal government forecast on the likely growth in EV ownership over the next fifteen years.

The full text can be accessed at <https://www.theguardian.com/environment/2019/aug/14/half-of-all-new-cars-sold-in-australia-by-2035-will-be-electric-forecast>

On July 12, 2019, the Australian Automotive Aftermarket Association (AAAA) published a comment and analysis titled 'Why Australians won't be plugging into electric cars any time soon' which considered consumer demand, government incentives, manufacturing capacity and infrastructure to conclude that a mass uptake of EVs in Australia is not imminent. The full text can be accessed at <https://www.aaaa.com.au/news/automotive-industry-news/why-australians-wont-be-plugging-into-electric-cars-any-time-soon/>

On July 11, 2019, the Royal Automobile Club of Victoria (RACV) posted on their site the results of a study they had had conducted on the total costs of owning and running an EV in Australia. The report concluded 'the average cost of owning and running a battery electric vehicle (BEV) in Australia is decreasing as more affordable electrified models hit the market.'

The full text of the report can be accessed at <https://www.racv.com.au/royalauto/moving/news-information/electric-vehicle-running-costs.html>

On April 9, 2019, The Guardian published a comment and analysis titled 'Electric cars: separating the facts from the propaganda'

The article argues that many of the negative claims made about EVs are either false or misleading.

The full text can be accessed at <https://www.theguardian.com/environment/2019/apr/09/electric-cars-separating-the-facts-from-the-propaganda>

On March 7, 2019, carsales.com.au published a report titled 'Why are EVs so expensive?' which examined some of the factors behind the cost of EVs and suggested what might lead to reductions.

The full text of the article can be accessed at <https://www.carsales.com.au/editorial/details/advice-why-are-electric-cars-so-expensive-117318/>

On January 21, 2019, The Guardian published a comment by Royce Kurland titled 'Road to nowhere: why Australia lags behind in electric vehicle revolution' in which he criticises the federal government for failing to have policies that promote the uptake of EVs.

The full text can be accessed at <https://www.theguardian.com/environment/2019/jan/31/road-to-nowhere-why-australia-lags-behind-in-electric-vehicle-revolution>

On May 4, 2018, The Conversation published a comment by Dr Anna Mortimer, a lecturer in taxation at Griffiths University, titled 'Australians will not buy electric cars without better incentives' which argues for the need for greater government incentives in order to encourage Australians to buy EVs.

The full text can be accessed at <https://theconversation.com/australians-will-not-buy-electric-cars-without-better-incentives-96104>

On March 13, 2018, goget.com.au published a comment titled 'Australia could go Electric Vehicle-only; But we should just get cars off the road' which argues that despite some of the advantages offered by EVs the country would do more to reduce its carbon footprint by

cutting back the number of vehicles on the road.(Please note: GoGet is a commercial ride share company.)

The full text can be accessed at <https://www.goget.com.au/blog/electric-vehicles-2030/>

On January 12, 2018, the then federal Minister for the Environment and Energy, Josh Frydenberg, noted the advantages of EVs and the opportunities for expansion in the future in a comment published in The Sydney Morning Herald titled 'Stand by, Australia, for the electric car revolution'.

The full text can be accessed at <https://www.smh.com.au/opinion/stand-by-australia-for-the-electric-car-revolution-20180112-h0hazy.html>

On November 9, 2017 The Conversation published a comment and analysis by Graciela Metternicht, Professor of Environmental Geography, School of Biological Earth and Environmental Sciences, University of New South Wales and Danielle Drozdowski, Senior Lecturer in Human Geography, University of New South Wales, titled 'Negative charge: why is Australia so slow at adopting electric cars?'

The article considers a number of factors contributing to Australia's slow uptake of EVs.

The full text can be accessed at <https://theconversation.com/negative-charge-why-is-australia-so-slow-at-adopting-electric-cars-86478>

Arguments in favour of electric cars in Australia

1. Electric vehicles (EVs) produce less greenhouse emissions

Those who support the adoption of EVs in Australia stress that they directly produce no emissions, including greenhouse gas emissions. Battery run electric vehicles have no exhaust emissions. Their emissions are determined by the production and distribution of the energy used to charge them and they are generally claimed to be far less polluting than internal combustion engine vehicles (ICEVs).

Dr Jake Whitehead, a Tritium e-Mobility Research Fellow at the University of Queensland's Dow Centre for Sustainable Engineering has stated as a result of his research, 'The typical Australian petrol vehicle generates 355 grams of CO₂-equivalent per kilometre in real-world fuel life cycle emissions. By comparison, a typical electric vehicle charged using the average Australian electricity grid mix generates about 40 percent fewer emissions, at 213 grams of CO₂-equivalent per kilometre.' <https://theconversation.com/clean-green-machines-the-truth-about-electric-vehicle-emissions-122619>

Dr Whitehead has indicated that irrespective of where in Australia an electric car was run it would be responsible for fewer emissions than an ICEV. Whitehead's work indicates, 'Victoria has the most emissions-intensive [power] grid in Australia due to its reliance on brown coal. However, even in that state, the real-world fuel life cycle emissions of a typical electric vehicle would still be 20 percent lower than a typical petrol vehicle. In Tasmania, which is dominated by renewable energy, electric vehicle emissions would be 88 percent lower than a comparable petrol vehicle.' <https://theconversation.com/clean-green-machines-the-truth-about-electric-vehicle-emissions-122619>

It has been noted by Dr Whitehead and others that many of the claims made regarding the ineffectiveness of EVs in reducing greenhouse emissions are doubtful. A new study by the Centre for Economic Studies (CES) in Munich claimed, 'Germany's current energy mix and the amount of energy used in battery production, the CO₂ emissions of battery-electric vehicles are, in the best case, slightly higher than those of a diesel engine, and are otherwise much higher.' This has been vigorously disputed. Dr. Markus Lienkamp, head of the Department of Automotive Engineering at the Technical University of Munich, has denounced the report as an 'unscientific conspiracy theory'. The CES study has been

challenged for drawing on discredited claims, misrepresenting data and understating the emissions of ICEVs. <https://www.forbes.com/sites/jamesellsmoor/2019/05/20/are-electric-vehicles-really-better-for-the-environment/#3c40a27c76d2>

It has further been argued that as the countries of the world reduce their reliance on power-stations using fossil fuels the greenhouse emissions connected to EVs will drop to an even lower level. Data shows that worldwide coal-fired electricity generation is expected to fall by 3 percent in 2019, or more than the combined coal generation in Germany, Spain and the United Kingdom in 2018. The steepest global slump on record is likely to emerge in 2019 as India's reliance on coal power falls for the first time in at least three decades and China's coal power demand plateaus.

The European Union reported a record slump in coal-fired electricity generation in the first half of 2019 of almost a fifth compared with the same months in 2018. This trend was expected to accelerate over the second half of the year to average a 23 percent fall overall. By the end of August 2019, the United States had reduced coal-generated power by almost 14 percent over the year compared with the same months in 2018.

<https://www.theguardian.com/business/2019/nov/25/global-use-of-coal-fired-electricity-set-for-biggest-fall-this-year>

Even more dramatic reductions in fossil-fuel-powered electricity generation has occurred in the United Kingdom. Zero-carbon energy became Britain's largest electricity source in 2019, delivering nearly half the country's electrical power, outstripping generation by fossil fuels. <https://www.theguardian.com/business/2020/jan/01/zero-carbon-energy-outstrips-fossil-fuels-in-britain-across-2019>

Supporters of EVs in Australia argue that a larger take-up of electric vehicles would prompt the country to turn more rapidly from fossil fuel-powered electricity generation and this would have the huge double advantage of reducing emissions from Australians power-stations for all purposes and of reducing dramatically the emissions associated with road transport.

It has also been noted that many people who drive electric cars also have roof-top generated solar electricity which they use to charge their vehicles, therefore causing no emissions. A survey conducted in 2018 found that 80 percent of EV charging occurred at home, with 73 percent of respondents owning rooftop solar systems. <https://theconversation.com/clean-green-machines-the-truth-about-electric-vehicle-emissions-122619>

2. The cost of EVs can be reduced by government subsidies

Supporters of EVs argue that governments seeking to lower greenhouse emissions need to subsidise electric cars as part of their emissions-reduction strategy. Development and production costs are greater for new technologies. In addition, EVs, as a new technology, inevitably have a more expensive purchase price as their manufacturers have not yet achieved the economies of scale that ICEVs enjoy. Government subsidies are a means of shaping citizens' behaviour in ways which the government considers beneficial.

Dr Benjamin Beard, an economist who is a Fellow at Resources for the Future, has written of the need for governments to subsidise environmentally desirable developments which are initially too expensive to be widely taken up. Beard states, 'One of the best ways to encourage people to do something is to subsidise the behavior. A subsidy lowers the effective purchase price, which is the most important feature of a product. One of the big reasons we see low sales of electric vehicles is their high up-front purchase price.'

<https://www.resourcesmag.org/archives/targeting-subsidies-get-more-electric-vehicles-road/> Norway is often offered as an example of a country which, as part of its endeavor to lower greenhouse emissions, substantially subsidises electric vehicles.

On May 4, 2018, The Conversation published a comment by Dr Anna Mortimer, a lecturer in taxation at Griffiths University. Dr Mortimer noted, 'Norway imposes a high stamp duty on internal combustion vehicles, and exempts battery electric vehicles from both stamp duty and the high 25 percent Value Added Tax. Plug-in hybrid electric vehicles have a lower rate of stamp duty. Such financial incentives are high enough to offset the price differences between electric and combustion vehicles...

Norway also provides total exemption from road tolls, free car ferry travel, free recharge sites, free parking, and access to bus lanes. In effect, consumers in Norway are better off for choosing a battery electric vehicle.' <https://theconversation.com/australians-will-not-buy-electric-cars-without-better-incentives-96104>

These incentives have been highly successful. Commenting on their success, Dr Mortimer has stated, 'It is projected that by 2030, up to 4 million electric vehicles will be on the road in the Nordic states. Norway and Sweden will account for 80 percent of the growth by 2030.' <https://theconversation.com/australians-will-not-buy-electric-cars-without-better-incentives-96104>

Other countries have adopted additional methods of encouraging consumers to purchase electric vehicles. China is the world's largest market for electric cars. There is currently a growth of 117 percent in the Chinese EV market, based on low-cost offers and regulatory incentives. Electric vehicles are not subject to registration restrictions or driving bans on certain days, that apply to vehicles with combustion engines in Chinese megacities. Purchase incentives also contribute to the enormous demand.

<https://www.volkswagenag.com/en/news/stories/2019/05/how-electric-car-incentives-around-the-world-work.html>

Incentives are also offered in the United States. When purchasing electric cars, all federal taxes that depend on fuel consumption are waived. Buyers of electric cars are also entitled to a federal tax credit of up to \$US7,500.

<https://www.volkswagenag.com/en/news/stories/2019/05/how-electric-car-incentives-around-the-world-work.html>

Since the summer of 2016, the German government makes an environmental contribution of 2,000 Euros to the purchase of a pure electric car, combined with the same amount by the manufacturer, corresponding to a total of 4,000 Euros. This bonus is limited to electric cars up to a value of 60,000 Euros. <https://www.volkswagenag.com/en/news/stories/2019/05/how-electric-car-incentives-around-the-world-work.html>

In the Netherlands there are no registration taxes for pure electric cars. Registration tax is based on the CO2 emissions of a vehicle. By way of comparison, a petrol-powered vehicle with CO2 emissions of 100g/km is subject to a registration tax of 2,355 Euros.

<https://www.volkswagenag.com/en/news/stories/2019/05/how-electric-car-incentives-around-the-world-work.html>

Supporters of EVs in Australia argue that their purchase price would not be a factor if the government were sufficiently committed to lowering greenhouse emissions and thus was prepared to subsidise these vehicles at the rate required.

3. The cost of EVs is likely to fall even without government intervention

Supporters of increased EV use in Australia argue that even without increased government intervention, the cost of electric cars is likely to fall.

The former federal Minister for the Environment and Energy, Josh Frydenberg, has noted, 'Of the 16 electric vehicle models on sale in Australia, 13 are over \$60,000. But the next generation Tesla for example, will sell for less than half the cost of existing models and the convergence in price is on the way. Bloomberg Energy Finance estimates that electric and conventional vehicles will be of a similar price by 2025.'

<https://www.smh.com.au/opinion/stand-by-australia-for-the-electric-car-revolution-20180112-h0hazy.html>

It has also been noted that as more EVs are sold in Australia, there will be more to service the secondhand market, selling for much lower prices. Frydenberg has stated, 'With the purchase of more electric vehicles as part of company and government fleets and fleet cars being turned over on average every 3-5 years, the range of second-hand electric vehicles is also likely to increase exponentially.' <https://www.smh.com.au/opinion/stand-by-australia-for-the-electric-car-revolution-20180112-h0hazy.html>

BloombergNEF (BNEF), a research organisation that advises energy companies, announced in April 2019, that the total cost of ownership of some electric vehicles in Australia could match that of their petrol and diesel equivalents as soon as 2020.

In a report looking at the Australian vehicle market, BNEF stated that the prospect of growing interest in EVs and their rapidly falling costs means that the share of new sales would likely reach 28 per cent on a 'business-as-usual' basis, that is, if there were no further interventions by government.

BNEF analyst Ali Asghar has stated, 'The TCO (total cost of ownership) is the metric likely to influence purchasing decisions of fleet owners and managers. Since TCO parity could start earlier than upfront cost parity of EVs (relative to ICEs), it is likely that fleet purchases in Australia will pick up prior to significant growth in private car purchase.'

<https://thedriven.io/2019/04/30/total-cost-of-evs-in-australia-may-match-petrol-cars-by-next-year/>

By 2030, BNEF predicts, the average cost of a midsize battery electric vehicle will decline from more than \$50,000 in 2018 to near \$37,000 by 2030. That puts it in the middle of the \$20,000 to \$50,000 range that Australians now spend on such cars.

<https://thedriven.io/2019/04/30/total-cost-of-evs-in-australia-may-match-petrol-cars-by-next-year/>

The falling cost of batteries is largely responsible for the declining prices of EVs. For many years, electric vehicle batteries were said to account for half the car's total cost, but that figure has dropped dramatically. In 2015, the battery represented about 57 percent of the cost, in 2019 it was 33 percent and by 2025 Bloomberg NEF predicts it will be only 20 percent.

<https://www.theguardian.com/environment/2019/jun/23/should-i-buy-an-electric-car-all-you-need-to-know-about-prices-technology-and-range>

The BNEF report also indicated that electric vehicle chassis and body costs are likely to drop slightly, while those same costs will rise modestly for combustion vehicles 'as a result of light-weighting and other measures to help comply with emissions targets.' In addition there are likely to be bigger cost improvements in the electric powertrain, as 'large-volume manufacturing is only now beginning for such parts.' By 2030, costs for motors, inverters and power electronics could be 25 to 30 percent lower than they are today.

<https://www.bloomberg.com/opinion/articles/2019-04-12/electric-vehicle-battery-shrinks-and-so-does-the-total-cost>

4. EVs are cheaper to run and maintain

Those who support the general adoption of EVs in Australia argue that they offer significant fuel and maintenance savings to their owners.

On March 7, 2019, Carsales published an advice column which noted 'There are significant fuel cost savings on offer for electric buyers...with the Kona Electric costing just 3.49 cents per kilometre in electricity to run, compared to 9.79 cents for the petrol-powered Elite.'

<https://www.caradvice.com.au/777650/electric-cars-running-costs/>

The same article further noted 'Owners could halve their "fuel" costs again with the right power plan. The RACQ (Royal Automobile Club of Queensland) calculates its figures using

Queensland electricity tariff 11 rates, a flat price of 26.62 cents per kWh that doesn't fluctuate with demand. Charging off-peak could cost as little as 12 cents per kWh for homes with a smart meter, effectively halving the price of charging.'

<https://www.caradvice.com.au/777650/electric-cars-running-costs/>

European research has come to similar conclusions. A study conducted in five European nations and reported on in The Guardian on February 12, 2019, stated, 'The study examined the purchase, fuel and tax costs of Europe's bestselling car, the VW golf, in its battery electric, hybrid, petrol and diesel versions. Over four years, the pure electric version was the cheapest in all places – UK, Germany, France, Netherlands and Norway – owing to a combination of lower taxes, fuel costs and subsidies on the purchase price.'

<https://www.theguardian.com/environment/2019/feb/12/electric-cars-already-cheaper-own-run-study>

It has also been noted that in addition to lower fuel costs, an EV is cheaper to maintain. In an information piece published on November 18, 2016, Ergon Energy (a subsidiary company of Energy Queensland Limited, a Government owned corporation which distributes electricity to around 738,000 customers across the state) stated, 'A battery electric vehicle (BEV) has a lot less moving parts than a conventional petrol/diesel car. There is relatively little servicing and no expensive exhaust systems, starter motors, fuel injection systems, radiators and many other parts that aren't needed in an EV.' <https://www.ergon.com.au/network/smarter-energy/electric-vehicles/benefits-of-electric-vehicles>

With just one moving part – the rotor – BEVs are particularly simple and very strong. Just maintain the brakes, tyres and suspension and that's about it.'

Charging costs for an EV are around 60 to 90% cheaper than fuel costs. With Queensland households spending \$5.8 billion on fuel each year, the fuel savings created by the transition to EVs could be spent elsewhere in the local economy.

The Queensland Government's transport site promotes the fuel-saving advantages of EVs. It states, 'Charging costs for an EV are around 60 to 90 percent cheaper than fuel costs. With Queensland households spending \$5.8 billion on fuel each year, the fuel savings created by the transition to EVs could be spent elsewhere in the local economy.'

Typical fuel costs are reduced from \$1.50 per litre to \$0.50 equivalent-litre when converting from a traditional combustion engine vehicle to an EV.'

<https://www.qld.gov.au/transport/projects/electricvehicles/about/compare>

Looking at overall costs, a study conducted by the Royal Automobile Club of Victoria (RACV) posted on their site on July 11, 2019, stated, 'The average weekly cost of charging an EV (inclusive of some fuel costs for the Outlander PHEV) is \$11.70 per week. Whereas the weekly average fuel costs of a medium SUV (sports utility vehicle), for example, is \$28.37...

As EVs require less frequent servicing and have fewer moving parts to monitor and fix, the cost of servicing is significantly lower for an EV compared to a petrol or diesel vehicle.'

<https://www.racv.com.au/royalauto/moving/news-information/electric-vehicle-running-costs.html>

5. EVs carry sufficient charge to suit Australian distances conditions and recharge facilities are being set up

Supporters of EVs note that their batteries carry sufficient charge to allow them easily to meet average Australian driving distances and that the necessary recharging infrastructure is being set up.

In an analysis published in WhichCar on April 8, 2019, it was noted, 'Most Australians live in big cities and travel less than 20kms both ways for their daily commute. That means even

cars with lesser ranges, such as the Hyundai Ionic Electric with its modest 230km range, will get you to work all week on a single charge.

Another thing about EVs is their efficiency actually increases in city traffic thanks to regenerative braking, which recoups kinetic energy while stopping to top up the batteries.’

<https://www.whichcar.com.au/car-advice/electric-vehicles---dispelling-the-myths>

The WhichCar analysis further noted that the capacity of EV batteries is being increased. The article states, ‘With the “new norm” for range now being about 450kms, EVs are approaching the point where they can easily provide more than enough range for weekly driving duties.’

<https://www.whichcar.com.au/car-advice/electric-vehicles---dispelling-the-myths>

It has been noted that most EVs can be charged in between six and ten hours, which makes charging overnight the most suitable option. It has further been noted that if the owner charges every day or every second day and does not allow the battery to go flat, then charging times are much shorter. <https://electricvehiclecouncil.com.au/top-10-electric-vehicle-myths-busted/>

The federal Minister for the Environment and Energy, Josh Frydenberg, has noted, ‘With regards to range and recharging, the Chevrolet and Renault models already travel around 350 kilometres without needing to be recharged and using the increasingly prominent DC recharging stations, an electric vehicle can be recharged in less than 30 minutes. Indeed, it's the view of Australia's Chief Scientist that by 2025 there might be electric vehicles in production that can drive 1000 kilometres on a single charge.’

<https://www.smh.com.au/opinion/stand-by-australia-for-the-electric-car-revolution-20180112-h0hazy.html>

It has also been noted that the infrastructure which will allow for recharging during a trip is rapidly increasing. Frydenberg has stated, ‘The infrastructure of electric vehicles is also rapidly becoming more feasible for long distance journeys. In Western Australia, the Royal Automobile Club recently rolled out 11 fast charging stations in the south-west, in Queensland the state government is creating a superhighway of charging stations between the Gold Coast and Cairns, in NSW the NRMA is building 40 fast charging stations suitable for a range of car types and Tesla has built a network of fast-charging stations between Adelaide and Melbourne, Sydney and Brisbane. While Australia's 476 public charging stations are just a fraction of the more than 60,000 you can find across Europe, it will quickly grow over time.’ <https://www.smh.com.au/opinion/stand-by-australia-for-the-electric-car-revolution-20180112-h0hazy.html>

The Victorian government has launched a new map of existing and proposed electric charging stations across Victoria with the latest ultra-rapid charging station opening in Moe in December 2019. The map is intended to help Victorian drivers locate the 403 electric vehicle charging stations across the state, with another 31 expected to be constructed by the end of 2020. <https://www.theage.com.au/national/victoria/victoria-rolls-out-electric-car-charging-stations-to-tackle-range-anxiety-20191226-p53n0f.html>

David Finn, chief executive and founder of Tritium - Australia's only designer and manufacturer of EV chargers – has stated that the expansion of EV facilities is happening quickly. The Brisbane-based company estimates it supplies about 95 percent of the fast-charge infrastructure in Australia and half that of nations such as Norway, where almost 60 percent of new cars sales in March were electric. A 50-kilowatt charger costs about \$30,000, and Australia probably has about 100 such outlets. Dr Finn has explained that super-fast charging could offer drivers 200-km of range for just five minutes waiting.

<https://www.smh.com.au/business/consumer-affairs/australia-s-waking-up-take-up-of-electric-car-charging-points-to-market-shift-20190410-p51cuj.html>

Arguments against the use of electric cars in Australia

1. Electric vehicles are too expensive for most consumers

The cost of electric vehicles is a major factor currently making them not viable for the Australian market.

On March 7, 2019, Carsales published an advice column which opened, 'Plenty of objections have been raised against EVs, chief among them the purchase price.' The piece went on to claim, 'No one cares about the environment if doing the right thing is going to cost the consumer big bucks.' <https://www.carsales.com.au/editorial/details/advice-why-are-electric-cars-so-expensive-117318/>

A Nielsen survey released on October 28, 2019, indicated that about 50 per cent of those who said they would buy an EV would only pay between \$20,000 and \$30,000 for a new car. This puts an EV outside their acceptable price range even for a vehicle at the lower end of current prices, such as a Hyundai IONIQ, which retails from \$45,000.

<https://www.smh.com.au/politics/federal/australians-worry-about-the-environment-but-are-wary-of-electric-cars-report-20191027-p53415.html>

A study released by the Royal Automobile Club of Queensland (RACQ) in July 2019 found that although electricity is a significantly cheaper fuel than petrol or diesel on a per-kilometre basis, depreciation and the high purchase price of pure-electric vehicles mean they are significantly more expensive to own over the first five years.

<https://www.caradvice.com.au/777650/electric-cars-running-costs/>

According to the report, a Hyundai Kona Electric Highlander would cost owners \$13,431 annually – assuming the car covers around 15,000km – compared to just \$8501 for a front-wheel drive Kona Active, or \$11,384 for a larger Tucson Active SUV.

The Hyundai Ioniq Electric Elite is Australia's cheapest pure-electric vehicle at \$44,990 before on-road costs, but it still was \$1441 more expensive per-year to run than the base Kona in the RACQ's calculations. <https://www.caradvice.com.au/777650/electric-cars-running-costs/>

News Corps reporter and columnist Sam Clench has noted that high prices have been a long-standing feature of EVs offered for sale in Australia. Clench has stated, 'The Mitsubishi iMiev arrived in 2010, with a range of just 150km and a hefty price tag of \$49,000. The Nissan Leaf was about three times as expensive as a comparable petrol-powered car. The Holden Volt cost \$60,000. Only the super-rich could hope to afford the more glamorous Tesla Roadster at more than \$200,000.'

<https://www.news.com.au/technology/innovation/motoring/huge-problem-with-car-prices-too-few-affordable-electric-vehicles-in-australia/news-story/64a87eb32a4a8d8c2fdc9664420058eb>

The former federal energy minister – and the current Treasurer – Josh Frydenberg has indicated that price is one of the key obstacles preventing widespread uptake of EVs in Australia. Frydenberg stated, 'The reason why Australia has such a poor level of take-up rate for electric vehicles is because they are expensive compared to other cars, thirteen out of sixteen of EVs that are on sale in Australia cost more than \$60,000.'

<https://www.smh.com.au/business/the-economy/electric-cars-continue-push-into-australia-despite-lack-of-government-support-20181127-p50iky.html>

This high barrier for buyers was compounded by a lack of federal subsidies, which have acted as a key driver for the uptake of EVs in other countries.

<https://www.smh.com.au/business/the-economy/electric-cars-continue-push-into-australia-despite-lack-of-government-support-20181127-p50iky.html>

2. EVs do not have sufficient charge and there are insufficient charging stations

Those who dispute the practicality of EVs for Australian conditions refer to consumers' concern that an electric car will not have a large enough charge to reach the desired destination and that charging infrastructure will not be available.

An article published in FinFeed on September 18, 2019, stated, 'The lack of a robust charging infrastructure is a major concern for most Australians, fueling "range anxiety" – the fear that your EV doesn't have enough charge to cover your trip or make it to the next charging station. While Australians see the benefits of EVs - 79 percent feel they have a responsibility to set a good example for future generations - three in four consumers feel there is a lack of public charging infrastructure.' <https://finfeed.com/opinion/the-green-keeper/ev-vital-to-australian-tourism-to-relieve-range-anxiety/>

It has been claimed that although the average Australian driver covers only moderate distances in daily journeys to and from work or meeting other basic transport needs, Australia is a very large country and when travelling for holidays and other recreation purposes the charge of an EV will not be sufficient and there may be no depot at which to recharge.

This point was also made within the FinFeed article which states, 'The challenge comes when we go on holidays, when we go down the coast, up the mountains, out in the bush. How do we ensure we have enough charge? This is where investment in infrastructure is required on our highways, in our outer-suburbs and in our country towns. We are looking then for fast charging, rapid charging.' <https://finfeed.com/opinion/the-green-keeper/ev-vital-to-australian-tourism-to-relieve-range-anxiety/>

A similar point was made by David Sullivan, head of Electrification Products divisions at ABB (a Swiss company specializing in robotics, power, heavy electrical equipment, and automation technology), in a comment published on September 19, 2019 in Ocean Road Magazine. Sullivan stated, 'Long distance drivers need super rapid charging infrastructure on our highways, to allow us to drive the distances we have in Australia comfortably and feel reassured that we will never run out of charge.'

<https://www.oceanroadmagazine.com.au/single-post/2019/09/19/EV-Vital-to-Australian-Tourism-to-Relieve-%E2%80%98Range-Anxiety%E2%80%99>

There have been numerous claims that the assurances now being given about the range of new EVs and the availability of charging depots cannot be relied upon. In a letter from the editor of Wheels magazine published on January 20, 2019, Alex Inwood stated, 'Wheels has driven more electric cars in the past two months than it has in the last decade and the overall experience has been fraught. It's true we drove them much further than 32km a day, but the issues have been numerous. Cars have thrown up catastrophic system errors and refused to move, software glitches have drained batteries at fearsome rates, charging stations have been non-responsive or equipped with the wrong type of plugs, cars have arrived with no charging cables at all, and the overarching experience has been one of real-world driving seeing most fall disappointingly short of their claimed ranges.'

<https://www.whichcar.com.au/opinion/editors-letter-range-anxiety-is-not-dead>

The letter continued, 'This magazine's EV mega test, which as far as we can tell is the first of its kind in Australia, was especially ambitious and challenging. It did, however, cement one irrefutable fact: 'range anxiety' is a truly appropriate label. Multiply the above problems across six cars over four days and it's little wonder that deputy editor Enright returned to the office a broken man, his face painted with the strange, grim expression of someone who has spent the last four hours in the left-hand lane on the Hume, his speed dropped below 90km/h, his nose tucked in behind a truck, his eyes glancing furtively at the battery gauge.'

<https://www.whichcar.com.au/opinion/editors-letter-range-anxiety-is-not-dead>

Inwood concluded that Australians should not yet surrender 'range anxiety' as there are still a number of circumstances in which EVs will not have sufficient charge and there will be no

opportunity to recharge. He stated, 'There's still a way to go before Australia feels properly EV ready'. <https://www.whichcar.com.au/opinion/editors-letter-range-anxiety-is-not-dead>

3. The availability of component metals and the ethics and environmental impact of battery manufacture are uncertain

It has been claimed that as car manufacturers ramp up production of electric cars, metals used to make the vehicles' batteries may face a supply crunch by the mid-2020s, according to a recent report. <https://www.cnn.com/2019/07/26/electric-car-production-rises-supply-crunch-for-battery-metals-looms.html>

A report from energy consulting and research firm Wood Mackenzie has indicated that lithium, cobalt, and nickel supplies are likely to be hardest hit. In July 2019, Gavin Montgomery, research director at Wood Mackenzie, indicated, 'Getting the quantity of nickel that (electric vehicles) will need by the mid-2020s will be a challenge ... with lead times often up to 10 years, investment needs to happen now.' The same conclusion has been drawn by metals company CleanTeQ's chief executive officer, Sam Riggall, who has stated, 'It's dawning on North America and Europe that there's a raw materials issue that needs to be addressed here.' <https://www.cnn.com/2019/07/26/electric-car-production-rises-supply-crunch-for-battery-metals-looms.html>

One of the world's major EV developers and manufacturers, Tesla Inc, has made similar predictions. Sarah Maryssael, Tesla's global supply manager for battery metals, has indicated that the automaker sees a shortage of key EV minerals coming. Of particular concern are copper, nickel and lithium. <https://www.reuters.com/article/us-usa-lithium-electric-tesla-exclusive/exclusive-tesla-expects-global-shortage-of-electric-vehicle-battery-minerals-sources-idUSKCN1S81QS>

Sarah Maryssael warned that, after years of under-investment in mining, materials used to make the batteries could soon be in short supply. <https://www.fleetnews.co.uk/smart-transport/news/battery-shortages-could-stifle-electric-vehicle-adoption>

Electric cars use twice as much copper as internal combustion engines. 'Smart-home' systems - such as Alphabet Inc's Nest thermostat and Amazon.com Inc's Alexa personal assistant - will consume about 1.5 million tonnes of copper by 2030, up from 38,000 tonnes in 2018. <https://www.reuters.com/article/us-usa-lithium-electric-tesla-exclusive/exclusive-tesla-expects-global-shortage-of-electric-vehicle-battery-minerals-sources-idUSKCN1S81QS>

It has been noted that sourcing materials for batteries takes more time compared with internal combustion engines, and this situation has been exacerbated as global demand for BEVs grows. <https://www.fleetnews.co.uk/smart-transport/news/battery-shortages-could-stifle-electric-vehicle-adoption>

It has further been noted that limiting factors are not only the supply of component metals. The manufacturing process is complex and there is currently a lag in supply.

Roel de Vries, corporate vice-president, global head of marketing at Nissan, has stated, 'Batteries are not a commodity that you can just buy from somewhere else. They are part of the development of the car so, it is not something you can switch on and three months later you have it. They are a relatively big investment and they take two years to come into play.' <https://www.fleetnews.co.uk/smart-transport/news/battery-shortages-could-stifle-electric-vehicle-adoption>

Additional concerns have been expressed about the conditions under which many of the world's EV batteries are produced, in terms of the ethics of employment practices and their environmental impact.

The scientific group, Security of Supply of Mineral Resources (SSMR), which includes geologists from Exeter, Southampton and Leicester universities as well as the Natural History Museum and British Geological Survey, has indicated that more than 60 percent of the

world's cobalt comes from the Democratic Republic of Congo, where production controlled by Chinese traders partly relies on child labour and low pay.

<https://www.fleetnews.co.uk/smart-transport/news/battery-shortages-could-stifle-electric-vehicle-adoption>

In 2016, a Dutch advocacy group called the Centre for Research on Multinational Corporations (including those involved in component manufacture for EVs), known as SOMO, and Amnesty International put out reports alleging improprieties including forced relocations of villages and water pollution.

<https://www.washingtonpost.com/graphics/business/batteries/congo-cobalt-mining-for-lithium-ion-battery/>

In November 2016 the World Economic Forum noted the environmental damage caused by the unregulated practices of many of those either mining for component metals or producing EVs' batteries. It stated, 'Battery production causes more environmental damage than carbon emissions alone. Consider dust, fumes, wastewater and other environmental impacts from cobalt mining in the Democratic Republic of the Congo; water shortages and toxic spills from lithium mining in Latin America, which can alter ecosystems and hurt local communities; a heavily polluted river due to nickel mining in Russia; or air pollution in northeastern China.'

<https://www.weforum.org/agenda/2017/11/battery-batteries-electric-cars-carbon-sustainable-power-energy/>

Opponents of the use of EVs in Australia argue that the ethical and environmental concerns which would prompt many Australians to consider an EV are not being met by the way the vehicles batteries are produced.

4. EVs may not lead to a reduction in greenhouse emissions

It has been claimed that driving an electric car may result in more greenhouse gas emissions than driving a vehicle powered by a conventional internal combustion engine fueled by petrol or diesel.

Advanced Benchmarking Reporting Consulting (ABMARC) released a report prior to the last federal election which claims that greater use of EVs may cause an increase in greenhouse emissions as a result of 'Australia's continued reliance on coal-fired power stations.'

ABMARC found that, on average, in New South Wales, Victoria, ACT and Queensland petrol vehicles 'provide less CO₂ than electric vehicles.'

<https://www.theaustralian.com.au/nation/politics/electric-vehicles-have-higher-carbon-emissions/news-story/1d64815feb92b2d5a81324971fa96547>

The concern is that as Australia's electricity generation is substantially fueled by polluting coal-fired power stations, driving an electric powered car simply transfers the source of the emissions to the power station rather than the car.

This point was made regarding the use of EVs in Germany by Hans-Werner Sinn, professor of economics at the University of Munich in an opinion piece published in The Guardian on November 25, 2019. Professor Sinn stated, 'Electric vehicles also emit substantial amounts of CO₂, the only difference being that the exhaust is released at a remove – that is, at the power plant. As long as coal- or gas-fired power plants are needed to ensure energy supply during the "dark doldrums" when the wind is not blowing and the sun is not shining, EVs, like ICE vehicles, run partly on hydrocarbons. And even when they are charged with solar- or wind-generated energy, enormous amounts of fossil fuels are used to produce EV batteries in China and elsewhere, offsetting the supposed emissions reduction.'

<https://www.theguardian.com/environment/2019/nov/25/are-electric-vehicles-really-so-climate-friendly>

Professor Sinn further claimed, 'Earlier this year [2019], the physicist Christoph Buchal and I published a research paper showing that, in the context of Germany's energy mix, an EV

emits a bit more CO₂ than a modern diesel car, even though its battery offers drivers barely more than half the range of a tank of diesel. And shortly thereafter, data published by VW confirmed that its e-Rabbit vehicle emits slightly more CO₂ than its Rabbit Diesel within the German energy mix.’ <https://www.theguardian.com/environment/2019/nov/25/are-electric-vehicles-really-so-climate-friendly>

The Austrian thinktank, Joanneum Research, has published a large-scale study commissioned by the Austrian automobile association, ÖAMTC, and its German counterpart, ADAC, that confirms Sinn’s findings. According to this study, a mid-sized electric passenger car in Germany must drive 219,000 km before it starts outperforming the corresponding diesel car in terms of CO₂ emissions. <https://www.theguardian.com/environment/2019/nov/25/are-electric-vehicles-really-so-climate-friendly>

It has been noted that EVs are only an environmentally friendly alternative in those countries that, unlike Australia, do not rely substantially on fossil fuels for their electricity generation. In an analysis published by the University of Sydney’s Business School on May 6, 2019, it was stated, ‘Many European countries, such as Austria, Croatia, Luxembourg, Portugal and Sweden use renewables to generate over 50 per cent of their electricity for home and industrial use. Utilising renewable energy makes electric cars a greener transport alternative in those countries than in Australia.’ <https://sydney.edu.au/business/news-and-events/news/2019/05/06/how-green-are-electric-vehicles-.html>

5. There is an inadequate range of models and insufficient maintenance available

Critics of the potential use of EVs in Australia frequently condemn the limited range of vehicle types from which Australian consumers can choose.

It has been noted that worldwide there is a limited range of EVs being made available to potential consumers. In an article published in The Guardian on February 28, 2018, Adam Vaughan noted that carmakers have launched only a small number of fully electric models. There are just 20 battery electric vehicles on sale in Europe against 417 conventional petrol and diesel ones, according to lobby group Transport & Environment. Some of the electric models, such as the Opel Ampera-E – known as the Chevy Bolt in the US – are on limited supply and have months-long waiting times.

<https://www.theguardian.com/environment/2018/feb/27/lack-of-models-not-charging-points-holding-back-electric-car-market>

However, though the range of vehicle choice for EV consumers is limited internationally, commentators on the Australian situation have noted that it is far worse here.

In Australia, there are currently 22 electric vehicles on the market. Only nine of these are battery electric vehicles (BEVs) and 13 are plug in hybrids (PHEVs). Six of these vehicles are under \$65,000 AUD. The largest vehicle segment is the SUV (sports utility vehicles). By 2020, it is expected that nine more electric vehicles will be available: six BEVs and three PHEVs. <https://electricvehiclecouncil.com.au/wp-content/uploads/2019/09/State-of-EVs-in-Australia-2019.pdf>

However, there have been criticisms that this is insufficient and that too few of the models which are available internationally have been introduced into Australia.

Despite many car manufacturers releasing new EV models, very few of them are available here.

Chris Jones, national secretary for the Australian Electric Vehicle Association, an organisation which seeks to promote EV use in Australia, has stated, ‘The main reason there is low take-up is you can’t buy them... Sure, EVs have been here since 2010, but always in limited numbers. Car companies need to do more than dip a toe in the water from time to time.’

In 2019/20. high-end brands like Mercedes-Benz, Volvo, Porsche, Jaguar, Aston Martin, Audi and BMW are all bringing pure electric models to Australia. However, Jones says it will be the more affordable vehicles from mass market brands like Mazda, Hyundai, Holden, Ford or Toyota that will really kick-start EV sales. https://rac.com.au/car-motoring/info/future_slow-charge

Anne Still, the Royal Automobile Club's (RAC) general manager of Public Policy, has claimed that while interest in EVs remains high, the lack of choice at a variety of price points is slowing down adoption. Still has noted, 'Certainly, there's more work to be done enticing [Australians] and encouraging manufacturers to make sure those vehicles come to Australian shores and consumers have access to those vehicles.

Australians' intentions to buy a new car appear to have declined through 2019. This has been in part attributed to the slow arrival of new EV models on Australian shores. It has been claimed that the relative delay in making electric vehicles available on the Australian market and therefore lack of choice is one reason behind the desire to wait to purchase. This delay of the arrival of EVs in any great numbers also gives manufacturers time to offload ICE vehicles before electric vehicles become fully accepted among Australian car buyers.

<https://thedriven.io/2019/03/20/aussies-stave-off-buying-new-cars/>

In an opinion piece published in The Guardian on January 31, 2018, Royce Kurmelovs argued that in the absence of a car manufacturing industry in Australia, the country's potential EV drivers are dependent on imports and importers are unlikely to risk their vehicles in a country where there is no clear government support for EVs.

Kurmelovs stated, 'With Australia now wholly reliant on imports, the country is at the mercy of global markets. And as there are currently only a finite number of electric cars manufactured worldwide each year, car companies must think carefully about where to sell their cars, how many to send and how to price them.

This means Australia must compete for a share of global production against countries that have clear policy positions on climate change and electric cars.

Around the world, China, Austria, Denmark, France, Germany, India, Ireland, Japan, the Netherlands, Norway, Portugal, South Korea, Spain, New Zealand and the UK have all acted with various degrees of intervention to encourage their take-up.'

<https://www.theguardian.com/environment/2019/jan/31/road-to-nowhere-why-australia-lags-behind-in-electric-vehicle-revolution>

Though the partial cause of the limited EV choice in Australia may be a lack of vigorous government support for the vehicles, this lack of choice is serving to dissuade Australians from deciding to move toward electric cars.

Further implications

With regard to the adoption of EVs in Australia, the primary impediment appears to be a lack of government support. Criticisms levelled against EVs regarding their unacceptable carbon footprint, their cost and the inadequacies of supporting infrastructure such as charging depots are all impediments that only governments can address or that it is within the power of governments to address.

The primary issue regarding EVs carbon emissions is the fuel that is used to produce electricity within the region in which the vehicles are being used. In October 2019, an analysis by Md Arif Hasan, PhD candidate, Te Herenga Waka-Victoria University of Wellington and Ralph Brougham Chapman, Associate Professor, Director Environmental Studies, Te Herenga Waka-Victoria University of Wellington revealed that EVs offer huge advantages in countries where electricity generation is not largely dependent on fossil fuels. The researchers found 'In 2018, Australia's share of renewables in electricity generation was about 21 percent...In contrast, the share of renewables in New Zealand's electricity

generation mix was about 84 percent... Using these data and estimates from a 2018 assessment, electric car upstream emissions (for a battery electric vehicle) in Australia can be estimated to be about 170g of CO₂ per km while upstream emissions in New Zealand are estimated at about 25g of CO₂ per km on average. This shows that using an electric car in New Zealand is likely to be about seven times better in terms of upstream carbon emissions than in Australia.' <https://theconversation.com/climate-explained-the-environmental-footprint-of-electric-versus-fossil-cars-124762>

Though studies have shown that over the life of the vehicle, EVs will have a smaller carbon footprint than ICEVs, large-scale reduction in emissions occurs where EVs are powered using electricity that does not rely on fossil fuels. The implications appear to be that EVs are most effective as part of a total set of strategies designed to reduce carbon emissions, including the clean production of electricity. Clean electricity production has been a bitterly contested political issue in Australia for decades and until that is achieved the use of EVs cannot bring about the desired result. However, the problem rests with government inaction in addressing Australia's power generation, not with EVs.

In December 2018, ABC science reporter Nick Kilvert, wrote, 'The beauty of an electric car is that once it's charged, there are no emissions being pumped out of the exhaust pipe and into the atmosphere. And if you can charge your car from a renewable source, like solar during the day, you're effectively driving an emissions-free car. Most Australians though, if they want to charge their car overnight, will be plugging into the grid... If we've got a chance of meeting our modest 2030 Paris target of 26-28 percent emissions reduction on 2005 levels, greening our grid could have the two-fold benefit of greening our transport.'

<https://www.abc.net.au/news/science/2018-12-08/electric-cars-revolution-environment/10589270>

It has similarly been noted that the cost of a newly developed EV will not be comparable to that of established ICEV models without significant government intervention, either in the form of taxes on ICEVs or financial incentives, including reduced taxes, on EVs. These measures have not been employed in Australia in any significant way.

The Australian Automotive Aftermarket Association has compared Australia's relative lack of government action with the policies employed in Norway. It states, 'Norway is the world's biggest per capita market for EVs. Half of all new cars sold to Norwegians are fully electric or hybrid vehicles due to the generous Government incentives on offer, including exemption from a 25 percent sales tax. Without a similar program of incentives, we are unlikely to see Australian EV sales matching Norway's example anytime soon.'

<https://www.aaaa.com.au/news/automotive-industry-news/why-australians-wont-be-plugging-into-electric-cars-any-time-soon/>

In addition, Australia has been criticised for failing to establish a policy framework that seeks to promote the uptake of EVs. Part of the issue is that without such policies there is no encouragement for EV manufacture to begin in Australia, nor for overseas manufacturers to export a variety of vehicles in significant numbers to Australia.

Electric Vehicle Council chief executive Behyad Jafari has claimed that the lack of affordable options was due to investors' uncertainty. Jafari has stated, 'The rest of the world has developed policies to support the transition to electric vehicles. Australia hasn't. That lack of policy has created uncertainty for investment. We've had less deployment of particularly lower price electric vehicles. There hasn't been a comfort that this industry will be supported in Australia as it has been elsewhere.'

<https://www.news.com.au/technology/innovation/motoring/huge-problem-with-car-prices-too-few-affordable-electric-vehicles-in-australia/news-story/64a87eb32a4a8d8c2fdc9664420058eb>

It has also been claimed that the lack of emissions standards has acted against the uptake of EVs. Anne Still, the general manager of Public Policy for the Royal Automobile Club, has stated that the lack of federally mandated CO2 emissions standards for new cars is hampering EV market penetration, as well as low emissions vehicles more broadly.

https://rac.com.au/car-motoring/info/future_slow-charge

In March 2019, The Guardian reported, 'Cuts to carbon emissions from vehicle efficiency standards have been left out of government projections for meeting Australia's Paris climate commitments, indicating the policy has been shelved.

The office of the transport minister...said the government had not made a decision on "how or when" standards to cut carbon pollution from vehicles might be implemented.

After almost five years of submissions, a spokesman said the government "is not going to rush into a regulatory solution" with regards to vehicle emissions.'

The Guardian concluded, 'Australia lags behind the rest of the world in setting vehicle efficiency standards, with most countries in the OECD adopting policies to reduce emissions and improve the efficiency of cars.'

<https://www.theguardian.com/environment/2019/mar/31/government-accused-australia-failure-cut-vehicle-emissions>

The difficulties impeding EV uptake in Australia appear to be part of a more general government failure to act to reduce greenhouse emissions.