

## **THE FUTURE OF ELECTRIC VEHICLES (EV) IN AUSTRALIA**

### **Introduction**

The adoption Electric Vehicles (EV), particularly passenger vehicles, is well on the way all around the world, with Norway out in front. Virtually all manufacturers have or are changing to production of EVs, with Tesla leading the way.

Here in Australia, the pundits and critics, in typical Australian fashion, are complaining how we are dismally behind the rest of the world in a change to EVs, neglecting to mention that we cannot be equitably compared with countries like Norway, which is compact, wealthy and abundant renewable energy. In spite of the gripes, EV sales in Australia are picking up fast, with sales tripling from 2020 to 24,000 in 2021.

With a federal election due before the end of May 2022, the major parties – Australian Labor Party (ALP) and the Liberal Party/National Party Coalition have released policy statements in respect of EVs.

This paper addresses the EV policies of each party and whether feasible.

### **Factors**

EVs have undoubted advantages over internal combustion powered vehicles (ICV), namely:

- They are much kinder to the environment in respect of direct greenhouse gas (GHG) emissions, being some 80 per cent efficient<sup>1</sup> compared to 20-30 per cent efficiency of ICVs;
- are considerably cheaper to maintain (except for eventual battery replacement), mainly because of the much simpler drive train; and
- they help reduce our dependence on imported liquid fuels.

However, they are not without disadvantages, some of which proponents neglect to mention:

- They still suffer from a considerable cost disadvantage, although this should diminish in due course, possibly aided by subsidies that some political parties would provide.
- In respect of GHG emissions, it is important to recognise (but rarely done) the lifecycle emissions of an EV and not just its operating emissions. A life-cycle emissions footprint needs also to include all emissions generated by building production facilities, mining and shipment of component materials, production itself (using grid power) and by the eventual disposal of recyclable and non-recyclable material.
- EVs will reduce the need for imported liquid fuels but, unless the raw materials and manufacture of batteries are in-country, we would be replacing reliance on imported liquid fuels with dependence on imported batteries. At least, liquid fuels come from friendly countries unlikely to boycott supplies. Could the same be said for reliance on China for batteries. Note this downside also applies to our dependence on China for wind turbines and solar panels. Given that turbines and solar farms have replacement lives of some 20 to 25 years, are we not, in effect, exporting our energy sources to a potentially dangerous supplier?
- Lithium-iron batteries present some risks, in being prone to spontaneous combustion under charging; presenting toxic pollution in the event of vehicle accidents; and being toxic to dispose of. These may be overcome in time by developments in battery technology and repurposing use of batteries no longer suitable for use in vehicles.
- EVs still suffer from a perception in Australia of limited range. This will ease with the roll-out of infrastructure, but, given Australia's wide-open, largely empty spaces, recharging infrastructure cannot be everywhere. EVs are ideally suited for urban use, where most adoption will be, given Australia's high level of urbanisation.
- There will be massive investment needed in recharging infrastructure, which political parties have under consideration, as discussed later. Not all 20 or so million EVs by 2050 would be chargeable at home.
- EVs will still need the same investment in road infrastructure because the number of vehicles will not decrease with an ever-increasing population. Governments will need to make up the loss of fuel excises

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<sup>1</sup> Energy expended by wheels to road, compared to energy consumed in recharging batteries.

(\$10 billion by 2040)<sup>2</sup> one way or the other, probably by higher electricity charges, especially at times of peak grid usage, and other measures. EV motoring will not necessarily be any cheaper, in the long run, than for ICVs today.

### **Renewable Energy and EVs**

EVs are a reality and numbers will inevitably grow as infrastructure permits.

A big unknown at present is whether electricity from renewables will ever be able to keep up with traditional demands for power (domestic and industry) as well as replacing the consumption of petrol and diesel by ICVs.<sup>3</sup> The full potential of EVs will not be realised unless they are powered by renewable energy, and we are a long way off that state, given that 79 per cent (%) of electrical power in Australia is generated from fossil fuel. However, even if powered off a fossil-fuelled grid, EVs can still result in lower CO2 production than ICVs, because of relative efficiencies.

Would renewable energy generation into the national grid be able to cope? How feasible is all this for renewables and EV adoption, given the political mess on energy and EVs at present?

It is problematic but solvable and for EV adoption to be accommodated. However, no matter what Australia does with EVs, it will have negligible effect on the world climate. By all means have EVs, but let them evolve as economic sense dictates. Government subsidies would be largely wasted (even if attractive politically).

### **Australian Labor Party (ALP) Policies for EVs**

The ALP's policy for EVs is taken from its website (Annex B, Box 1) and from *The Economic Impact of The ALP's Powering Australia Plan - Summary of Modelling Results, December 2021* (Annex B, Box 2).

From the content of Box 2, the ALP is not giving actual numbers of EVs that it will achieve by 2030 or 2050, but chooses to achieve numbers above Government predictions, which the ALP policy neither offers nor cites – nor which can be easily found if at all.

The ALP policy does give two specific figures, namely:

- *EV sales are expected to increase ...raising the EV share ... to 89 per cent of new car sales in 2030,*
- *with EVs making up 15 per cent of all vehicles on Australian roads by 2030.*

How these percentages might be represented in numbers and the feasibility of that has been modelled and results discussed under 'Passenger Vehicles in Australia'.

While these numbers are expectations and not policy targets, one can expect that they could transmogrify into more definite numbers during the election campaign.

Readers may have noticed also the lack of commentary about the ALP policy, compared to the prevalent negative Media coverage against the Coalition policy.

### **Coalition policies for EVs**

The Federal Coalition policy for Electric Vehicles (EV) is represented formally by the *Prime Minister's Media Release of 9Nov21*, based on the report *Future Fuels and Vehicles Strategy - Powering choice*, 9Nov21, Department of Industry, Science, Energy and Resources. The essence is summarised at Annex B, Box 3.

Note that while there is no mention in either Government reference of specific targets for the numbers of EVs to be on the road by 2030 or 2050, the Media seems to have hidden sources for its reported figures, attributed to the Prime Minister or Coalition. See Annex B, Box 4.

The statements in Boxes 3 and 4, constitute the sum total of the Coalition's policy on EVs and what is being attributed to it by the Media. If readers were to take time to read the Government references cited, they would find a very rational and sound policy for the future of EVs in Australia. Thus, this paper leaves the Coalition policies without comment

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<sup>2</sup> The Australian, 11Apr19

<sup>3</sup> An article in The Australian (5Apr19) discusses whether the EV roll-out is a 'threat to the power grid'.

Reports by much of the Media and the many lobby groups and blogs on the Internet are predominantly negative to the Coalitions policy, as could be expected.

### **Passenger vehicles<sup>4</sup> in Australia**

This section discusses the ALP expectation of the EV share of new car sales to be 89 per cent in 2030 and making up 15 per cent of all vehicles on Australian roads by 2030.

Several tables resulting from modelling by ALSC are given at Annex A.

Table 1 gives the current and projected figures for registered vehicles in Australia, out to 2030 and 2050, as determined from the cited reference and the assumptions at Table 4. The relevant figure is the number of expected registered passenger vehicles in 2030, namely about 17,143,518.<sup>5</sup>

Table 2 gives the current and projected figures for new sales of passenger vehicles in Australia, out to 2030, based on assumptions at Table 4. Total new cars in 2030 is expected to be about 1,101,700.

Although not accompanied with error bands, the mean data and estimates for 2030, in Tables 1 and 2, are considered to be quite accurate as the basis of estimates in Table 3.

Table 3 give the expected EV sales out to 2030, based on assumptions at Table 4.

Actual EV sales in Australia tripled from 2020 to 24,000 in 2021. This rate of 345% in a year is coming off a very low base and cannot be sustained out to 2030. So, how does one estimate the growth of EV ownership? In essence it cannot be done starting with only a few data points.

One method tried was to assume the same rate of growth as that achieved and reported by Tesla (mostly in the USA), being an annual growth rate of 54.2 per cent. However, applying this rate results in a figure in excess of the total new car sales by 2030.

The approach taken was to assume the ALP figure of 89% of new sales in 2030 was feasible and to see what annual growth figure would be required to reach that point. As seen in Table 3, this approach gives an annual growth rate (assumed constant) of 45.9 per cent. This figure could be seen as comparable with the Tesla rate, but, as may be expected, the rate is less. Note that estimated figures for EV sales are very sensitive to the assumed growth rate.

The ALP policy also says that EV sales in 2030 would be 15 per cent of total registered vehicles. As may be seen in Table 3, given the annual growth rate of 45.9 per cent, the number of EVs in 2030 (2,571,378) would be within 3.54 per cent of the predicted registrations, in Table 1 ( $15\% \times 17,142,518 = 2,663,300$ ), which would be within an acceptable error band. Thus, one can conclude that the ALP figures for 2030 seem feasible.

The ALP policy 'to create an environment for 3.8 million EVs on the road by 2030' is not possible. Accepting ALP's claim of EV numbers by 2030 as feasible, 15% of all passenger vehicles in 2030 would be 2,663,300 cars maximum, NOT 3,800,000.

ALP policies appear feasible but depend, in part, on direct or indirect subsidies to EVs, like exempting them from Fringe Benefits tax and import duties (see Annex B).

Other ALP claims made in relating some estimates to Coalition figures is considered improper and pure politics, rather than rational policy. Such figures cannot be commented on and would need clarification, given no knowledge of detailed Coalition modelling (except by the ALP).

Coalition policy concentrates on creating the infrastructure to permit EV growth, without direct subsidies to purchase of EVs, and does not estimate EV numbers in 2030, let alone for 2050.

General conclusions drawn from this discussion are shown in Table 0.

### **Conclusion**

Adoption of EVs is well under way in Australia and will increase as market forces, subsidies and government policies for development of the necessary infrastructure permit.

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<sup>4</sup> This section discusses EVs as passenger vehicles and excludes comment of other EVs, such as buses and light commercial vehicles.

<sup>5</sup> These figures appear to be accurate but are as modelled, based on assumed averages.

The ALP policy of aspiring to 89 per cent of new car sales in 2030 being accounted for by EVs seems to be feasible, if not predictable with any accuracy at this time. Likewise, its aspiration that EVs in 2030 should account for 15 per cent of all cars registered in 2030, also seems feasible.

The ALP policy 'to create an environment for 3.8 million EVs on the road by 2030' is not possible.

Other ALP claims made in relating some estimates to Coalition figures is considered improper and pure politics, rather than rational policy.

Coalition policy concentrates on creating the infrastructure to permit EV growth, without direct subsidies to purchase of EVs, and does not attempt to estimate EV numbers in 2030, let alone for 2050.

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4 February 2022

Annxes:

- A. ALSC Modelling Tables
- B. EV Policies – Political Parties

ALSC MODELLING TABLES

EVs in Australia  
Table 0 - General Conclusions

SN	Conclusion	Value %	Comment
1	Tesla annual growth rate is too high for Australia to sustain.	54.20%	Tesla growth rate shown is based on figures published by Tesla (mostly for USA)
2	ALP policy EVs accounting for 89% of new car sales, requires a constant annual growth rate less than Tesla's rate	45.90%	Probable maximum sustainable in Australia
3	The rate of new EV sales in 2020 (6,900) and 2021 (24,000) cannot be sustained but will settle to a relatively constant rate after a few years.		
4	ALP figure of 89% for EVs of new annual car sales By 2030, seems feasible at current take-up rate.		
5	ALP figure of 15% for EVs of all car registrations in 2030, seems feasible at current take-up rate and correlates closely with the 89% result		Within 3.54% of estimated registrations in 2030

EVs in Australia  
Table 1 - Registered vehicles

Total Registrations (Year)	2019	Growth pa			% of Total	Comment
		0.01390	Years to 2020	Years to 2030		
Total vehicles	19,768,518	20,043,363	23,010,996	30,329,486		2019-2020 figures from www.abs.gov.au
Passenger	14,726,967	14,931,719	17,142,518	22,594,579	74.50%	Assumes 1.39% pa growth
Light Commercial	3,412,459	3,459,903	3,972,178	5,235,503	17.26%	Assumes 1.39% pa growth
Total (Pass + Light)	18,139,426	18,391,622	21,114,696	27,830,081	91.76%	Assumes 1.39% pa growth

<https://www.abs.gov.au/statistics/industry/tourism-and-transport/survey-motor-vehicle-use-australia/latest-release>

EVs in Australia  
Table 2 - Passenger vehicle sales

Variable	Constants	0 2020	1 2021	10 2030	comment
Passenger Cars (actual sales)	Average	916,968	1,016,221		
% Actual/Total registered	6.43%	6.14%	6.71%		% of total
Total registered passenger cars	0.01390	14,931,719	15,139,317	17,142,518	Constant percentage of population
Total new cars	6.43%	959,627	972,969	1,101,710	Constant percentage of all cars
Cumulative new cars		959,627	1,932,596	11,321,174	Also number deregistered
Cumulative oldcars				5,821,344	

EVs in Australia  
Table 3 - EV Sales

EV Sales pa	Index i	- 2012	1 2013	7 2019	8 2020	9 2021	18 2030	Comment
Tesla growth rate (mostly USA) is too high for Australia to sustain.					24,000 well ahead of statistical increase			
EV sales Australia		253	293	6,718	6,900	24,000	-	
Assumes Tesla growth (starting 2012)	0.542	253	435	11,242	19,330	33,236	4,366,138	
Assumes 89% in 2030 (starting 2012)	0.459	253	400	6,289	9,953	15,750	980,522	ALP's 89% New sales
Cumulative (starting 2012)	Very sensitive	53	653	16,651	26,603	42,354	2,663,300	ALP's 15% all vehicles (3.54% error)

<https://www.budgetdirect.com.au/car-insurance/research/electric-car-sales-australia.html>

EVs in Australia  
Table 4 - Assumptions

Assumption	Value %	Comment
Population growth per annum is constant (x% per annum)	1.39%	Average change 2015-2021
New car sales a constant % of population (y% per annum)	3.91%	Ratio in 2021
Growth rate EV sales pa is constant	45.90%	Assumes ALP's 89% of new sales in 2030
Ratio: passenger to all vehicles is constant	6.43%	Based on 2020-2021 actuals
All EVs sold are still operating in 2030	100%	Average life of 10 years

## EV POLICIES – POLITICAL PARTIES

**Australian Labor Party (ALP) Policy**

The Labor Party's policy for EVs is taken from the ALP website (see Box 1) and from *The Economic Impact of The Alp's Powering Australia Plan - Summary of Modelling Results, December 2021* (Box 2).

From the content of Box 2, the ALP is not giving actual numbers of EVs that it will achieve by 2030 or 2050, but chooses to achieve numbers above Government predictions, which the ALP policy neither offers nor cites – a bit of obfuscation here but typical of politicians to muddy the waters.

However, the policy does make two specific predictions expectations promises, namely:

- EV sales are expected to increase ...raising the EV share ... to **89 per cent of new car sales in 2030**,
- with EVs making up **15 per cent of all vehicles on Australian roads by 2030**.

How these percentages might be represented in numbers and the feasibility of that has been modelled and results discussed under 'Passenger vehicles in Australia'.

**Box 1:** From: [www.alp.org.au/policies/powering-australia](http://www.alp.org.au/policies/powering-australia)

Labor's Powering Australia plan will:

- Upgrade the electricity grid to fix energy transmission and drive down power prices.
- **Make electric vehicles cheaper with an electric car discount** and Australia's first National Electric Vehicle Strategy.
- Adopt the Business Council of Australia's recommendation for facilities already covered by the Government's Safeguard Mechanism that emissions be reduced gradually and predictably over time, to support international competitiveness and economic growth – consistent with industry's own commitment to net zero by 2050.
- Protect the competitiveness of Emissions Intensive Trade Exposed industries by ensuring they will not face a greater constraint than their competitors.
- Allocate up to \$3 billion from Labor's National Reconstruction Fund to invest in green metals (steel, alumina and aluminium); clean energy component manufacturing; hydrogen electrolyzers and fuel switching; agricultural methane reduction and waste reduction.
- Provide direct financial support for measures that improve energy efficiency within existing industries and develop new industries in Regional Australia through a new Powering the Regions Fund.
- **Roll out 85 solar banks** around Australia to ensure more households can benefit from rooftop solar.
- Install **400 community batteries** across the country.
- Demonstrate Commonwealth leadership by reducing the Australian Public Service's own emissions to net zero by 2030.
- Invest in 10,000 New Energy Apprentices and a New Energy Skills Program.
- Establish a real-world vehicle fuel testing program to inform consumer choice.
- Work with large businesses to provide greater transparency on their climate related risks and opportunities.
- Re-establish leadership by restoring the role of the Climate Change Authority, while keeping decision-making and accountability with Government and introducing new annual Parliamentary reporting by the Minister.

**Box 2:**

**Extracts on numbers: pp29-30 National Electric Vehicle Strategy**

Employment will be created via sales, charging infrastructure development, and opportunities to develop new manufacturing jobs specialising in batteries, EV components or charging infrastructure technologies 5 960 new jobs are modelled to be created, associated **with 2 15 million more EVs on the road in 2030 than under Government projections** 16 500 indirect jobs are forecast to be created attributed to the manufacture and installation of necessary charging infrastructure.¶

**EV sales** are expected to increase by **600 000 vehicles (208%) above Government projections in 2030** raising the **EV share** from 29 per cent to **89 per cent of new car sales in 2030** with **EVs making up 15 per cent of all vehicles on Australian roads by 2030**.

*The Economic Impact of The Alp's Powering Australia Plan - Summary of Modelling Results, December 2021*



### **Coalition Policy**

The Federal Coalition policy for Electric Vehicles (EV) is represented formally by the *Prime Minister's Media Release of 9Nov21*, based on the report *Future Fuels and Vehicles Strategy - Powering choice*, 9Nov21, Department of Industry, Science, Energy and Resources. The essence is summarised at Box 3.

#### **Box 3**

The expanded Future Fuels Fund, will focus on four key areas of investment, including:

- Public electric vehicle charging and hydrogen refuelling infrastructure
- Heavy and long-distance vehicle technologies
- Commercial fleets
- Household smart charging

The Government will deliver the Strategy with an expanded \$250 million Future Fuels Fund, including \$178 million in new funding. The Strategy is expected to result in more than \$500 million of combined private and public co-investment directed into the uptake of future fuels in Australia and the creation of more than 2,600 new jobs.

*Prime Minister's Media Release of 9Nov21*

While there is no mention in either Government reference of specific targets for the numbers of EVs to be on the road by 2030 or 2050, Media sources have reported some figures (actual sources unknown). See Box 4.

#### **Box 4**

The government projects battery-electric and plug-in hybrid electric vehicles will make up 30% of new car sales by 2030, but has explicitly rejected the introduction of incentives to help people buy EVs and vehicle emissions standards to require a gradual shift to cleaner cars. It has not committed to the introduction of Euro6 standards on fuel quality.

[www.theguardian.com/environment/2021/nov/09](http://www.theguardian.com/environment/2021/nov/09)

The prime minister anticipates \$250 million in federal "future fuels" funding will be matched by private investment to reshape Australia's transport sector and put up to 1.7 million electric vehicles on roads by 2030.

[7news.com.au/politics/federal-politics/plan-seeks-to-spark-up-electric-car-use-c-4482496](https://7news.com.au/politics/federal-politics/plan-seeks-to-spark-up-electric-car-use-c-4482496) 9Nov21