EVC response to the AEMO DRAFT 2024 Forecasting Assumptions Update

February 2024

With reference to:

AEMO | 2024 Forecasting Assumptions Update Consultation

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Preamble

The Electric Vehicle Council (EVC) is the national body representing the electric vehicle industry in Australia. As the market is emerging in Australia, our work is particularly aimed at increasing certainty for investment through policy, knowledge sharing and education.

The Australian Energy Market Operator (AEMO) started producing Integrated System Plans (ISPs) on a two-yearly basis in 2018 and the Forecasting assumptions update (FAU) feeds into that. The ISP is a 'whole of system plan' that offers a roadmap for development in eastern Australia's electricity system.

Our previous submission to the Inputs, Assumptions and Scenarios report (IASR) can be found here.

EVC submission to AEMO IASR - Electric Vehicle Council

Introduction

The EVC understands that developing the ISP and it's IASR are extended pieces of work. Some of the industries it concerns are moving at such a rate that the inputs and assumption for the 2 years prior are no longer serving by the time the ISP is finally published. Therefore, it is important to update the inputs and assumptions wherever possible, as closely to publication as possible and use actual data when it is in hand.

EV uptake

Underlying consumption in the NEM is forecast to be about 200TWh in 2030. The Draft 2024 FAU Detailed EV workbook[1] states about 7TWh of this will be from EVs under the step change scenario. A 3.5% increase in required generation for EVs alone over the next 6 years is a not insignificant feat to try to achieve, and therefore requires careful consideration to ensure it's accurate.

The FAU EV workbook appears to be forecasting about 3.9 million EVs to be on the road by 2030-31 for the NEM in the step change scenario, up 200,000 from the already unlikely figure forecast in the 2023 ISP EV workbook. EV sales nationally were around 33,400 in 2022 and 87,400 in 2023 for a total of around 180,000 on road by year end 2024. The assumptions employed appear to be that EV uptake will emulate solar uptake in Australia, which proved very difficult to forecast accurately. This caused problems for AEMO through underestimates of new generation not allowing for proper network planning. Solar uptake proceeded in Australia at such a rate off the back of heavily subsidised PV modules from the large- and small-scale renewable energy target schemes (up to 100% of the wholesale cost of the modules) and China's government subsidising manufacturers of PV modules and inverters. Compounded with increasing costs of electricity, gas and electricity price volatility, state based solar rebates, the collapse of poly-silicon prices and strong solar resources in Australia, growth has been at times exponential.[2]

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[1] AEMO | 2024 Forecasting Assumptions Update Consultation

[2] https://www.statista.com/statistics/750016/australia-installed-capacity-of-rooftop-solar-pv/

The concern appears to be that the same problems could arise around EV uptake. EVs do not enjoy the same level of support (Qld, SA, Tas, WA have rebates up to 5% of the purchase price), and it can reasonably be assumed they will continue not to have the same level of support – state government programs in Victoria and NSW to subsidise purchase have been wound back, rather than extended.

Assuming option B in the proposed NVES[3] is effectively implemented, EVs at the more affordable end of the market are not predicted to reach price parity with fossil fuel cars until 2028, though there may be some price wars yet to play out, pushing parity further into the future.[4]

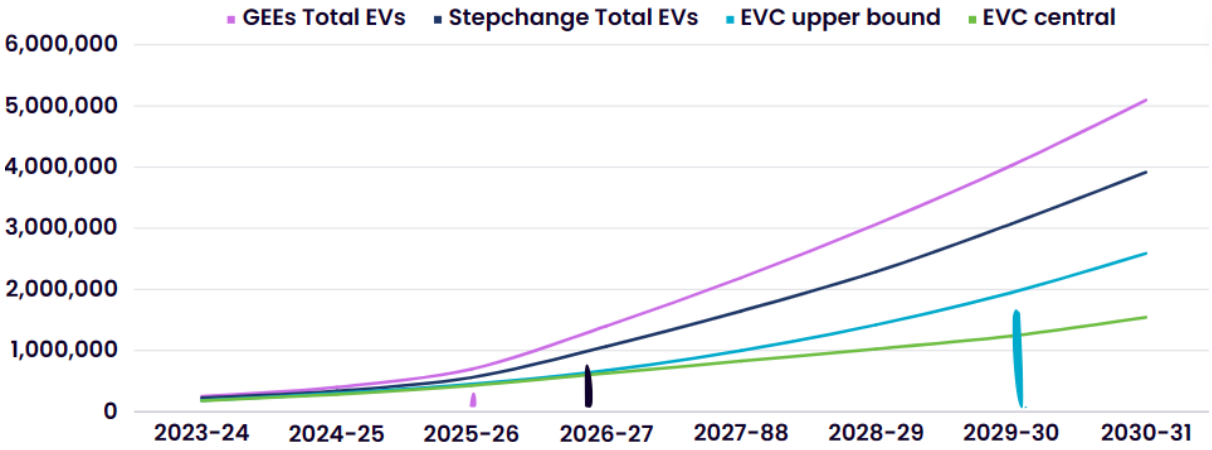

Fig 1: IASR EV workbook vs. EVC expectation with 50% EV uptake markers.

EV uptake is currently exponential, but we expect it to taper as an S-curve.

If in addition to the effective implementation of the NVES at federal level, we assume that announced state government electric vehicle uptake targets are met, there may be up to 2.5 million EVs on the nation's roads by the end of 2030. This is our upper bound case. If we assumed incomplete success of these measures in bringing about EV uptake (for example, large auto OEMs meeting the requirements in the NVES by increasing the supply of mild-hybrid vehicles to Australia, rather than battery electric vehicles), we would expect around 1.5 million EVs on road in Australia at the end of 2030, with approximately 1.35 million in the NEM. This is our central case today, subject to change as the details of the NVES are implemented.

EV sales to date nationally align with the midpoint between the 'no intervention' and 'moderate intervention' scenarios in the ARENA[5] report. The most populous states in Australia (NSW, QLD, VIC, SA) all have EV uptake targets of 50% by 2030. The marks on the graph show when that target would have to be met in order to meet the projected total by 2030. As can be seen, for the AEMO step change scenario case to occur, 50% EV sales would have to be met in 2-3 years' time, 3-4 years ahead of state government targets. We do not see a credible pathway to 3.9 million EVs in the NEM 2030-31.

PHEVs

Whilst PHEVs have smaller batteries than BEVs, many modern day PHEVs have battery

[3] https://www.infrastructure.gov.au/infrastructure-transport-vehicles/vehicles/australian-government-introducing-new-vehicle-efficiency-standard-cleaner-and-cheaper-run-cars

[4] Raising standards, cutting costs (electricvehiclecouncil.com.au) p 14.

[5] australian-ev-market-study-report.pdf (arena.gov.au)

sizes around 13-20kWh, with electric driving range on the order of 80km. Overall, a PHEV will on average use less electricity per year than a BEV travelling the same distance, nevertheless it's worth getting the assumptions and figures as close to accurate as possible. Particularly when there are and will be PHEVs with V2G, which as described below, will have a profound impact on the grid.

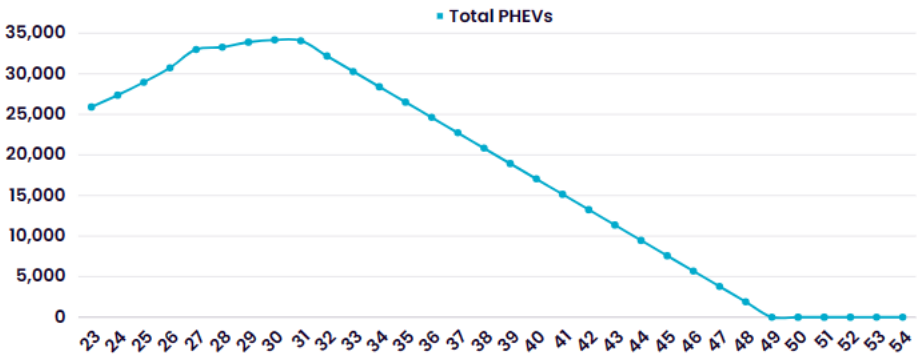

Fig 2. Total PHEVs in FAU EV workbook by year.

The modelling projects PHEVs to peak at 34,100 in the step change scenario. We would counter that the top 3 highest selling vehicles in Australia were Utes in 2023 (~155,000 vehicles).[6] This cohort which features a broad demographic of owners from inner-city tradespeople, fleet operators, weekend campers to farmers, have not yet been given a viable alternative to fossil fuel only driven vehicles. For this vehicle type, PHEVs are likely to make up a considerable component of future sales, to enable towing, four-wheel driving in remote locations or other edge cases that many Australians perceive that they need the capability. This is also a cohort resistant to change, which will likely need a stepping stone technology before they fully transition to BEVs.

It is desirable that the last of these types of vehicles will be sold by 2030 or 2035 at the latest in order to meet the net zero by 2050 target but this would likely require a ban on fossil fuel cars and vans such as in the UK, notwithstanding that the ban was recently wound back from 2030 to 2035. A ban of this nature is unlikely for Australia in this timeframe; therefore our expectation is for PHEV numbers on road to increase out to at least 2035.

Expected grid impacts

The consequences of over estimating EV uptake in the integrated system plan is to inflate the amount of energy that existing generation will need to provide, as well as the network capacity required to maintain system security during peak demand events. Artificially inflated projected energy requirements could lead to fossil fuel generators planning to stay online longer than they otherwise would, leading to slower decarbonisation and elevated electricity prices.

The EVC appreciates the FAU EV workbook charging profiles names being revised to increase transparency. Unfortunately, the figures do not represent how users will charge certain types of vehicles. The 2024 FAU EV workbook appears to be at times representing EV contribution to the peak demand period (4pm – 9pm) at about 380W on average per EV. People charging on the 'off-peak and solar charging' profile are projected to consume on

[6] Australia breaks all-time new vehicle sales in 2023 | Federal Chamber of Automotive Industries (fcai.com.au)

average 240W/EV during peak demand periods. Both of these figures are much higher than in the studies cited below.

There have been studies carried out in Australia that show contribution to peak demand is actually about 250W/EV.[7] This is before improvements in TOU tariffs take effect. As an example, if networks were to follow the numbers presented in the FAU EV workbook, 3.9 million vehicles by step change 2030 multiplied by 380W would have them preparing for a 1.5GW increase to peak demand. Whereas if you take the more likely number of 1.5 million EVs, multiplied by 250W, then networks will be preparing for a 375MW increase, nearly a 4-fold reduction. The EVC understands ISP numbers are conservative, but augmenting the regulated asset base to 'deal with EVs', at a projected level of impact 4 times higher than is plausible, is not a good outcome for consumers.

The 2024 FAU EV workbook is showing residential unscheduled charging at 69% in Victoria for 2023-24, with higher percentages in other states. We already know from studies in hand that this is not the case, in fact unscheduled charging can be seen to be between 6% for owners with time of use tariffs and 30% for owners with "no incentive on EV charging time".[8] Biasing expected EV charging times towards when many people generally get home from work will skew the predicted impact EV load will have on the network as it coincides with existing peak demand. This will lead to networks building higher capital expenditure into their regulatory resets to handle higher load, resulting in unnecessarily increased prices for all consumers.

There are electricity retailers today, such as Amber, that are offering variable rates for export depending on what is happening in the wholesale market. Normally between 4pm and 9pm, demand is high and cheap renewable energy has reduced, spiking wholesale prices, this incentivises consumers not to charge their EV's during this time. There are also savvy time of use retail plans coming to market such as the AGL night saver plan, Powershop's electric vehicle tariff, Ovo Energy's EV plan, and simply energy's simply EV plan. Thousands of EV-owning Australian consumers have already adopted these plans.

These offer easy to follow tariff structures with competitive day time rates and very cheap offpeak rates, encouraging EV owners to charge at night, or during the day if they have excess solar. We anticipate the same types of offerings will come about for export tariffs, like that in the WA distributed energy buyback scheme where export between 9pm and 3pm earns 2.25c/kWh and export between 3pm and 9pm earns 10c/kWh. These kinds of plans will encourage V2G owners to export during peak times.

Studies in Australia have indicated that EV targeted time of use tariffs can reduce peak demand contribution to 100W/EV in residential settings.[9],[10]. The EVC has substantial additional data around this point that it does not have permission to share in this public submission but would be happy to present to AEMO.

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[7] Home-EV-charging-2030.pdf (electricvehiclecouncil.com.au)

[8] 2206.03277.pdf (arxiv.org)

[9] https://arena.gov.au/knowledge-bank/agl-electric-vehicle-orchestration-trial-final-report-pdf-678kb/

[10] https://arena.gov.au/knowledge-bank/origin-energy-smart-charging-trial-final-report/

Buses, trucks and commercial vehicles are projected to use unscheduled charging 96% and 95% of the time respectively, in NSW, 2023-24 step change. This tapers down to 93% and 90% by 2030-31. Vehicles like this operated in fleets will be highly scheduled, because failure to schedule them will create massive capex requirements for electrical infrastructure in their depots. A suggestion that 90%+ of bus charging (for example) will not be scheduled is not remotely credible.

Compounding this, many buses and trucks will be in operation (ie, driving around) during network peak demand times and so won't contribute to it. These vehicle types are not given a category for V2G whereas we expect these fleets will find extra revenue opportunities in exporting power when the vehicles don't need it. Depots will be built especially for managing the charging of these fleets at great expense, to assume that effort will not be made to save money on fuel costs and make money by selling energy to the grid is likely to be incorrect.

V2G uptake

The FAU EV workbook has vehicle to grid (V2G) in the step change scenario at 0% until 2030-31 for most states (Fig 3).

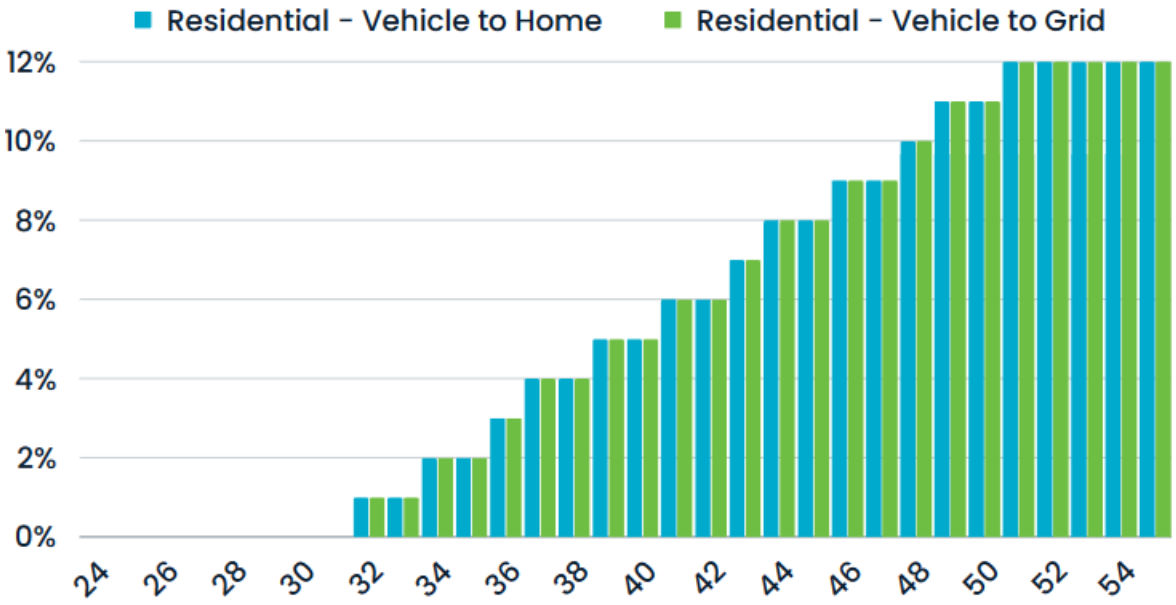

Fig 3: FAU EV workbook expected V2H and V2G uptake.

V2G is already being used in SA and will start in earnest across the country from late 2024. There are a handful of V2G inverters already connected in SA outside of trials[11] and about 50 connected as part of trials around the country. The reasons there are so few in country today include:

- There was only one V2G inverter product in market, priced at about $10,000, which has since been withdrawn from sale,
- Only one state (SA) permitted the use of the product (through an exemption provided by the DNSP, SAPN). This state accounts for about 6% of new vehicle sales.
- The product only worked with Chademo compatible vehicles, which is about 3% of the EV fleet.

This speaks to a huge pent-up demand for the technology that will certainly make its presence felt when CCS2 compatible V2G vehicles arrive in Australia later this year, and regulatory changes enable V2G in the other states and territories.

The standard AS/NZS4777 that will allow for V2G and V2H inverters to be listed on the Clean Energy Council (CEC) list that many DNSPs use for connections, is currently at public comment stage and will be published by mid-year. The CEC are looking at the detail of the changes they'll need to make to their inverter categories, in order to list V2G/H inverters.

Small numbers of V2G connected inverters have a large impact. When diversified contribution to peak demand is 250W per EV, one V2G connected EV exporting 5kW can offset 20 EVs. It is not wise to express the number of V2G inverters as a percentage which

[11] EV owners could save $2000 a year charging vehicle-to-grid and help reduce the risk of blackouts (afr.com) Winemaker among first in SA to use V2G | Autotalk Australia

is rounded to the nearest whole number. Actual figures based on what we know so far should be expressed so that networks may plan accordingly.

If we assume that 60,000 of the 1.5 million EVs in 2030 (a conservative 4%) will be connected for export at peak times via V2G inverters, and they're exporting on average 5kW, 5 days per week, during the evening peak, the feed-in to the grid is approximately 215MW. This is sufficient to offset approximately 60% of the 375MW contribution to evening peak demand that EVs will create, if we assume 1.5 million vehicles, and the 250W/EV contribution that is typical driver EV charging behaviour *without* the effects of tariff-based incentives.

If the 1.5 million EVs in the EVC central case were drawing 100W per EV on average (per above), then a contribution of 150MW of load would be expected to be presented to the grid at peak time from the vehicles charging at home. Per above, if 4% of these vehicles are engaging in V2G, exporting at 5kW, 5 days per week, then 215MW of supply would be fed back into the grid, more than cancelling out the 150MW EV load.

The EV workbook also has vehicle to home (V2H) in the step change scenario at 0% until 2030-31 in all NEM states, which is not realistic, given the underpinning technology is already here, in active use, and being covered in the media[12].

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[12] https://www.theguardian.com/environment/2024/jan/01/amazing-queensland-mum-uses-electric-car-to-save-sons-life-with-dialysis-during-power-outage

Recommendations

AEMO should;

- Revise down the expected EV uptake to credible figures.
- Revise the projected EV charging profiles, based on the results of ARENA studies and consumer uptake of EV-driver-targeted ToU retail products.
- Revise up the level of V2G participation expected from 2025.
- Factor in the effect V2G participation will have in offsetting EV charging load.

The EVC is happy to discuss any of the above and contact can be made at office@evc.org.au