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National Electric Vehicle Strategy: Consultation Paper

The Australian Energy Council welcomes the opportunity to respond to the Department of Industry, Science and Resources (DISER) National Electric Vehicle Strategy (NEVS) Consultation Paper. The AEC acknowledges that the widespread adoption of electric vehicles (EV)s will contribute to the alleviation of problems such as environmental pollution, global warming and foreign oil dependency.

The Australian Energy Council (AEC) is the peak industry body for electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. Our members collectively generate the overwhelming majority of electricity in Australia, sell gas and electricity to millions of homes and businesses, and are major investors in renewable energy generation. The AEC supports reaching net-zero by 2050 as well as a 55 percent emissions reduction target by 2035 and is part of the Australian Climate Roundtable promoting climate ambition.

The AEC believes that a better knowledge of Australian consumer preferences for EV charging will make their increasing penetration more effective and efficient by correctly informing EV policy. At present, much of our understanding of charging behaviours comes from overseas, making the work of ARENA in trials of electric vehicle and Virtual Power Plants (VPP's) critical, and their knowledge sharing reports should be studied closely in this regard.

Smart charging

International experience demonstrates a strong correlation between public charging infrastructure and the uptake of EVs.¹ The availability of fast charging has the most influence on EV adoption. Fast charging has a greater impact on both electricity supply and distribution. Policies that encourage EV owners to charge vehicles outside peak demand periods, and to encourage EV charging providers to optimize grid utilization, would be supported by the AEC.

The AEC believe that during the early stages of the EV market in Australia, fast charging infrastructure is likely to present a challenging business model for private sector investment, as EV ownership is low. Grant programs can ensure both sufficient and efficient investment in fast

¹ Roll-out of public EV charging infrastructure in the EU, Transport and Environment, September 2018
https://www.euractiv.com/wp-content/uploads/sites/2/2018/09/Charging-Infrastructure-Report_September2018_FINAL.pdf

charging infrastructure and the Government's agreement with Chargefox is a good example of what can be achieved.² However studies have shown that public charging stations at less than 60km intervals³ are required for drivers to both complete journeys beyond the range of their vehicle and feel secure travelling longer distances and further from their usual charging location. At present the Driving the Nation Fund commits to establish charging stations at an average interval of 150km on major roads nationally.⁴ If the objective is to establish systems and infrastructure to enable rapid uptake of EV's, this 150km target interval of charging stations may need to be further examined.

Aligning EV's with regard to design standards and approvals.

The hypothesis that smart charging can avoid the consequences of the cost of increasing peak demand is quite compelling. More equitable outcomes may be achievable if this cost is avoided. As a result there is an enthusiasm to undertake market and tariff reforms to incentivise EV charging at various times of the day (e.g. middle of the day or during peak solar) and for future vehicle to grid opportunities (e.g. peak demand management). EVs are a unique phenomenon in our time and will transform land transport.

We might take sub optimal approaches now with EV's as we did with solar distributed solar. For example at first it didn't seem to matter how Feed-in Tariffs were structured or for how long, but this quickly became a major issue and changing approaches after a household has made an investment is an issue. What is important is that the sub-optimal approaches are not locked in, given the likely boom in EVs in coming years. What seems like a minor issue now such as road user charges will be substantial with 1 million plus EVs on the road. If there are approaches that are adopted now but we assume may need to change in the future, we need to flag this likely future change to consumers.

From an electricity industry perspective, the questions in the early stages of EV adoption are fairly simply:

1. What should we be doing now?
2. What should we avoid doing too early? And,
3. How to ensure all Australians get access to the opportunities and benefits from the transition?

Minimum standards for smart chargers required now

The AEC believes that the most pressing requirement is establishing minimum standards for EV chargers in Australia in such a way as to avoid limiting present or future consumer choice on EVs. Given the absence of a domestic car manufacturing capability, this is logically achieved by the adoption of international standards.

² Victoria charging ahead with electric vehicles, Department of the Premier, press release, 25 October 2018
<https://www.premier.vic.gov.au/victoria-charging-ahead-with-electric-vehicles/>

³ The Transport and Environment study identified that there are around 2,550 rapid charging sites installed on European main roads with a total of about 5,000 chargers. This is equivalent, on average, to one site with two chargers placed every 60 km on EU motorways for every direction on the highway.
https://www.euractiv.com/wpcontent/uploads/sites/2/2018/09/Charging-Infrastructure-Report_September-2018_FINAL.pdf

⁴ Australian National Vehicle Strategy Consultation Paper, September 2022, p.14, DCCEE.gov.au

To maximise consumer choice, the AEC supports the adoption of international standards for EVs and EV chargers wherever practical. The AEC does not support the creation of discrete Australian Standards, nor does the AEC support State jurisdictions creating these standards. The recent decision by the South Australian Government mandating AS 4755 for EV chargers has disappointed industry stakeholders and will likely have long term implications for the adaption of EV's in South Australia.

In keeping with the sequencing of policy reforms for EVs in a logical way, the AEC would prefer that the electrical safety requirements for EV chargers should be settled before any standards for remote management, are introduced. However, the AEC would support requirements that new EV charging equipment includes Open Charge Point Protocol (OCPP) 1.6J communications capability or higher. The AEC further notes that OCPP 1.6J works with ISO 15118, and if OCPP 1.6J is adopted then charger to vehicle communications in the domestic charging context does not really warrant further consideration.

Grid impacts of EV's and EV charging⁵ should not be concluded too early.

There will undoubtedly be an impact on the grid from EV charging as EV take-up grows. However, it need not be a problem. The goal will be to encourage charging to take place at off peak times where possible. Given typical commuter patterns, there will be plenty of flexibility for EV users to top up at any time between, say, 6pm and 6am. Since residential peaks are typically in the early evening, the key is to encourage or incentivise households to defer charging for a few hours.

Fast chargers will draw a lot of power, and so in some locations this may require grid reinforcement. But these will largely be commercial chargers and will be located based on the economics of whether it's worth paying for grid improvements or finding a location that can already handle large power flows (for example, at a shopping centre).

EVs may even be beneficial to the grid and if charging can mostly be directed to off peak times, then they will improve utilisation of existing networks, and this could bring down the cost per KWh for everyone.⁶ Whilst it is possible that vehicle to grid (V2G) technology will allow car batteries to provide support back to the grid, given their primary purpose is to power a car and personal convenience, and that owners will mostly want to reserve their cars capacity for that purpose, we should be cautious not to expect too much from V2G.

The AEC understands that as EV take-up increases, so could the demands on electricity grids. CSIRO's forecasts for 2050 are for between 7-24 million electric vehicles charging from the NEM and 1-3 million charging from the SWIS in Western Australia. In 2035, assuming one of the higher take-up scenarios, EVs could add around 40,000GWh annually to NEM demand, or roughly 20 per cent of current total demand in the NEM.⁷

But to put this into perspective, this is around a 1 per cent increase per year. This rate of demand increase should be manageable, noting of course that electrification of other energy processes, such as heat, may also be adding to demand. Given CSIRO's analysis is an input to the Integrated System Plan (ISP) and as such these changes are already baked into the ISP output they will not come as a surprise to system planners. In the forecast period technological improvements are also likely to increase efficiency and mitigate demand growth in any case.

⁵ Australia's Energy Future: 55 by 35, Australian Energy Council Discussion Paper, p.13
<https://www.energycouncil.com.au/media/luvmyfcd/decarbonising-transport.pdf>

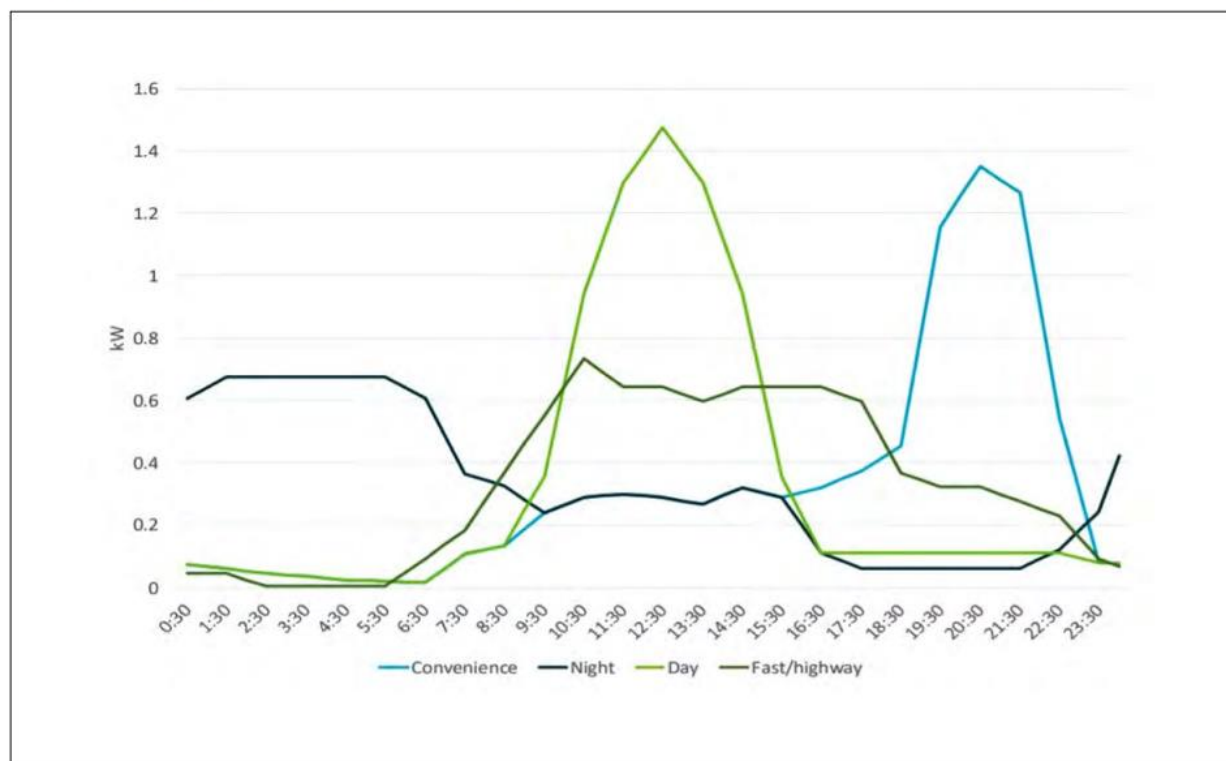
⁶ This direction does not have to come from changing consumer behaviour. Home energy management systems and load control applications may in the future more readily make this available and invisible to a customer whose behaviour is likely to be driven by convenience than over grid capacity.

⁷ Ibid , p14, 15

The real big unknown is not if, but where and when charging will take place. It is hard to predict this but there are potential ways that we may be able to influence these where and when. EV drivers will likely to a greater extent charge their vehicles based on convenience and to a lesser extent on cost.⁸

Designing costs (tariffs) that consumers can and will respond to, and ensuring they are aware of their options is complex. It involves multiple parties, including networks, retailers, consumer representatives and market bodies. It's not necessary that end consumers themselves face particular tariffs, but the AEC agrees that someone along the supply chain has to be exposed to the costs in order to have the incentive to design services that will influence consumer charging patterns. A more rigid approach is to treat EV charging as a controlled load, but customers typically are (and should be) rewarded for accepting load control, so this is effectively an element of tariff design too. Figure 8 shows a range of potential charging profiles with very different impacts on the grid.

Figure 8 Average passenger EV charging profiles



Source: CSIRO, Electric vehicle projections 2021, May 2021

The goal with tariff design is not necessarily to achieve a particular outcome, but to ensure that the right signals are sent about when it is cheap and when it is expensive to use energy, like charging an EV. Networks will be concerned about the coincident peak whenever it occurs. In residential areas, this is normally in the evening (since rooftop PV depresses daytime demand), so network tariffs will likely seek to encourage charging at other times. Wholesale markets appear to be heading for a daily price profile of very low prices in the daytime due to solar output, so this is likely to be the best time to charge from that perspective too.

⁸ This is no different to petrol for ICV's. In a 2017 survey by Australian Petroleum Marketers on consumer attitudes whilst forty eight percent (48%) of survey respondents ranked price the number one factor in deciding where to fill up that despite their view on price, the majority of consumers (71%) remain loyal to one of a few service stations. Convenience rules. <https://acapmag.com.au/wp-content/uploads/2017/11/ACAPMA-2017-National-Monitor-of-Fuel-Consumer-Attitudes-Report-V1.0.pdf>

It's probable though that convenience will outweigh cost for many EV users, especially with commercial vehicles where the business need will usually be paramount. But with cost reflective tariffs the incidence still falls on the EV user and not on the rest of the consumer base. System planners will need to be able to respond to these signals so that system capacity (network and generation) can keep pace with any growth in peak demand. But in practice there is significant underutilised capacity most of the time in many parts of distribution networks, there are also likely to be a variety of customer responses and therefore a significant network build out should be avoidable and peak demand growth should be manageable even without early cost reflective tariffs.⁹

Making sure all Australians get access to the opportunities and benefits from the transition.

Each year, the Department of Industry, Science, Energy and Resources (DISER) publishes a ten-year projection for Australia's emissions trajectory. The most recent projections, Australia's Emissions Projections 2021, show that the electricity generation sector is doing almost all of the heavy-lifting, both now and for the course of this decade, to drive Australia's emissions reductions.¹⁰ Emissions in the electricity generation sector are expected to fall by over 55 percent on 2005 levels by 2030. Despite the enormity of this effort, the estimate may even be conservative given previous forecasts have been revised upwards.¹¹

While these projections provide a good news story for the electricity generation sector, the outlook of other sectors is less positive. Key sectors like transport and stationary energy are projected to *increase* their emissions by 2030 and will respectively become the two largest sources of emissions. The inaction in these sectors to date has some silver lining as it means there is immense opportunity for "low-hanging fruit" emissions reductions that can be immediately taken. The AEC recently published a research paper that explores how [transport](#) can efficiently reduce emissions now.

A fascination with new technologies amongst governments and regulators frequently leads to overestimating their value and underestimating their weaknesses. In addressing the transition, policy makers need to first acknowledge that the prospects for biofuels or hydrogen in transport are inversely correlated with the likelihood of electrification. That is, transport modes that are harder and costlier to convert to electrification are more likely to see biofuel/hydrogen penetration. This roughly correlates to the size/mass of the transport mode – the heavier the mode, the bigger a battery has to be to power it and so the less likely or early a commercially viable battery electric solution is. It is highly likely though that the passenger fleet will be almost entirely battery vehicles. There's another reason for this trend too. Michael Hutchison is the CEO of Fortescue Future Industries (FFI) Australia's largest hydrogen developer and in listening to him talk of the opportunities for hydrogen, the one thing he appears entirely certain about is that for residential Australia "if you can make the electrons and you have a cable that's the simplest way (to decarbonisation)".¹²

⁹ ENA/CSIRO modelling found that electric vehicles could play a very significant role in improving network capacity utilisation. They also observed that the additional consumption of electricity is in any case proportionally greater than the impact on peak demand in their worst case scenario, meaning electric vehicles remain beneficial to network utilisation even if reform proceeds at a slower pace (that is, no real change until post 2030).
<https://www.energynetworks.com.au/resources/reports/economic-benefits-of-the-electricity-network-transformation-roadmap/>

¹⁰ Department of Industry, Science, Energy and Resources (DISER) 2021, 'Australia's Emissions Projections 2021', https://www.industry.gov.au/sites/default/files/October%202021/document/australias_emissions_projections_2021_0.pdf.

¹¹ For example, emissions from the electricity sector in 2020 projections were forecasted to be 111 million tonnes in 2030. This has now been revised down to 88 million tonnes.

¹² Ibid

Hydrogen still represents an amazing opportunity for Australia, even if not for the national passenger vehicle fleet. By 2030 Fortescue Future Industries (FFI) is contracted to supply Hydrogen To EON, Germany's biggest utility, sufficient to provide 10% of Germany's power.¹³ FFI is the vehicle by which the Fortescue Metals Group (FMG) proposes to morph from a mining giant to a global energy company.¹⁴ Hutchinson makes the point that FFI are making a product you can ship, a "big battery" to "transport power". He explains that there may be some future local applications in transport and industry (clearly FFI plans to power FMG), but that the export market is massive.¹⁵

It is not hard to deduce that the same problem with export prices as has endured in natural gas will beset any future Australian users of hydrogen, and that given the scarcity of hydrogen and the accelerated European approach to transition the replacement of Russian natural gas that Australian small consumers will likely not be better off with hydrogen in their pipes or their passenger cars. Nel¹⁶ chief executive Hakon Volldal agreed¹⁷ that it was more efficient for Australia to feed renewable power directly into a society built around electrified devices rather than use that renewable power to make "green" hydrogen and then burn hydrogen to power cars, (homes) and other points of urban consumption.¹⁸ "We're a hydrogen company, but I'm not a hydrogen fundamentalist," Volldal said. Governments should start to pay closer attention to those like FFI and Nel who are investing directly in a hydrogen future.

Like FFI and Nel, the AEC maintains that a conservative approach to hydrogen readiness for small customers and passenger cars is well justified. In a green hydrogen hungry world, especially in those places not blessed with Australia's renewable resources, it's hard to see hydrogen being competitive in passenger transport locally. This makes the prospect of stranded infrastructure loom large if the refuelling network for passenger vehicles is duplicated (to include hydrogen) now. There are few "low cost" or "no regrets" options to simply just exploring the possibilities for hydrogen in the passenger fleet.

The AEC supports a sensible transition as decarbonisation of the economy progresses, along with pursuing the alternatives that best meet the long-term interests of consumers with respect to price, quality, and reliability of transport that are the most cost-effective permanent solutions to decarbonisation.

Please contact the undersigned at David.Markham@energycouncil.com.au should you wish to discuss.

Yours sincerely,

¹³ Tackling Transitions, Fortescue's Green Hydrogen Plans, ABC Radio National, Mark Hutchinson, CEO FFI, <https://www.abc.net.au/radionational/programs/saturdayextra/tackling-transitions/101512646>

¹⁴ Ibid

¹⁵ Ibid

¹⁶ Nel is a global, dedicated hydrogen company that produces, stores and distributes hydrogen created using renewable energy. <https://nelhydrogen.com/about/>

¹⁷ Rewiring Australia chief scientist Saul Griffith says Australia should abandon plans to use hydrogen for energy and focus on the household. <https://www.afr.com/companies/energy/an-investment-opportunity-the-likes-of-which-we-ve-never-seen-20221012-p5bp77>

¹⁸ Nel chief executive Hakon Volldal agreeing with the argument proffered by Dr Griffith at The Australian Financial Review Energy and Climate Summit in October 2022.

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