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Essential Energy submission – Electric Vehicle Smart Changing Issues Paper

Essential Energy welcomes the opportunity to provide a submission in response to the Energy Security Board's (ESB's) Electric Vehicle Smart Charging Issues Paper (the Issues Paper). The electricity supply chain is currently undergoing a fundamental transformation as Electric Vehicle (EV) sales in Australia are expected to grow at an increasingly rapid rate across this decade. The earlier that 'fit-for-purpose' smart charging reforms can be integrated across the National Energy Market (NEM), the more optimal the benefits of improved EV related services can be applied to all consumers.

Essential Energy believes that EV charging standards ideally should be coordinated and be consistent nationally across Australia. We also believe there are key differences between mandating the adoption of standards and enacting smart charging itself. In our view, adoption of a technical standard should happen early to ensure that chargers in the market are capable of smart charging. The act of smart EV charging itself can happen at a later date when required, with the knowledge that the capability has already been built within the system. This will allow for a future where dynamic coordination can be easily adopted and where this occurs, customers are appropriately rewarded for their participation.

To that end, this submission outlines the specific requirements that should be promoted in a smart charging standard which promotes a path to low-cost EV uptake.

Challenge facing the Electricity Grid from EV Uptake

As outlined in the Issues Paper, Australia has seen a rapid rise in rooftop solar, with the levels of photo voltaic (PV) penetration being the highest per capita in the world. The forecast uptake of EVs in Australia is therefore within the context of already exceptionally high PV penetration. Without implementing smart charging, the NEM faces the risk of not being able to optimize Network capacity with EV demand and PV generation which would result in the need to spend more on Network capacity upgrades.

There is a growing sense of urgency required to address this looming challenge. There are already a number of short-term EV difficulties being experienced across distribution networks including:

- In some instances, on weaker points in the network, one or more fast chargers installed can risk immediately overloading an 11kV feeder without some form of smart charging capability;

- Solar PV and EV's will have the impact of magnifying peak load (measured through the magnitude of the gap in the duck curve[1]) [2],[3]:. There is a growing need to have a mechanism to co-ordinate both of these impacts consistently. This cannot be achieved without a consistent architecture that manages the two curves; and
- The effect of 'clustering' – this is where a local distribution network risks being quickly overloaded through a concentrated EV uptake in local neighbourhood pockets. In some instances, this can be triggered by only a relatively small number of local neighbours purchasing EVs. This is also at risk of occurring if businesses convert their fleet across to EVs in a short time at one location.

In our view, cost-reflective network tariffs are the key mechanism available to network businesses in signalling congestion and incentivising EV owners to charge outside of congested periods. However, time-based tariffs alone are not enough, as there is a risk of creating new 'timing peaks' just after the end of the peak pricing period. In our view a combination of tariffs and smart charging is therefore required.

With EV's forecast to reach exponential growth in the coming years, each year that basic chargers continue to be installed means that networks will be unable to design efficient and correct solutions now, making the eventual task even harder when the rapid EV uptake does occur. Waiting for this load growth before taking substantive action will mean network operators will not be able to influence the discrete nature of when charging occurs, and will only be able to address the issue through network augmentation and capital expenditure. This will lead to an increase in the $/kw served for all energy users including EV owners.

Finally, we would also encourage consideration of grid system security. In our view, cost reflective tariffs alone will not be enough to allow the market operator to dynamically coordinate and stabilize the grid in a critical event. In the next decade, as coal generators retire, the system will need additional safeguards. An absence of smart charging presents a risk to wider system security.

Why is smart charging capability required as a standard?

There are a number of key reasons why smart charging capabilities for EV's are required over the coming decade:

1. Time-of-use tariffs risk creating new secondary peaks at the beginning of the overnight off-peak period. Domestic and international research shows that customers respond to time based tariffs, but they do not stagger their charging start time, instead charging at the same time, creating a new late evening peak demand on the grid. These new peaks could be expected to drive significant amounts of new capital investment if smart charging is not implemented.
2. Asmart charging protocol would allow dynamic coordination of rooftop solar and EV charging to keep the grid stable, as minimum demand periods are forecast to arise more widely within the next ten years. This could be used for both EV charging and also incorporate PV generation. South Australia is already facing grid stability challenges from minimum demand events. South Australia's Office of the Technical Regulator has recently

[1] The duck curve is a graph of power production over the course of a day that shows the timing imbalance between peak demand and renewable energy production.

[2] Nacmanson, William & Zhu, Jing & Ochoa, Luis(Nando). (2022). Milestone 8 "EV Management and Time-of-Use Tariff Profiles"; p45. Downloaded from https://www.researchgate.net/publication/360887067_Milestone_8_EV_Management_and_Time-of-_Use_Tariff_Profiles.

[3] Bitar, E.; Polina A.; *Achieving Reliable Coordination of Residential Plug-in Electric Vehicle Charging: A Pilot Study*, Published on arXiv:2112.04559v2, April 2022. Downloaded from https://arxiv.org/abs/2112.04559 on 25/02/2022.

adopted Australian Standard AS4755 to dynamically coordinate PV inverters so that SA Power Networks can curtail or switch off customers rooftop solar systems. This became urgent for South Australia as the state is forecast to hit zero minimum demand this year. In response to this minimum demand problem AEMO have identified that smart dynamically coordinate of EVs is an effective solution to the challenge of minimum demand, reducing the need for Electricity Distributors to curtail PV and increase solar spillage.

3. There is an opportunity to shift EV charging load to match the profile of renewable generation. There could be some avoidance of curtailing generation capacity in summer if a portion of EV charging load in the late evening could be moved into the peak solar generating period. In addition, workplace charging (employee and fleet), coupled with solar and storage assets will increase renewable alignment and reduce minimum demand events.

   This could be achieved with dynamic coordination of EV charging – via smart charging tariffs that consumers voluntarily adopt – and which is likely to reliably shift more load compared to reliance on time-based tariffs alone. There is already a precedent for this type of arrangement in the 1950s with the roll-out of off-peak hot water tariffs, otherwise known as controlled load tariffs. Controlled load tariffs optimise the heating times of consumer's hot water tanks and are offered on a voluntary basis through a reasonable discount to consumers. The heating takes place outside of peak periods and is dynamically coordinated by the local distribution network but in such a way that it does not affect consumer's comfort levels. The adoption of EV smart charging can therefore follow the same uptake path.

4. Finally, it is worth noting that deferring a decision on adopting a smart charging standard in Australia risks creating a growing inventory of expensive to dynamically coordinate EV charging equipment, that will remain in the market for up a decade and beyond. Adopting a smart charging standard will reduce the likelihood of legacy problems arising.

In light of the above, we are supportive of the ESB actively canvassing policy options to adopt a technical standard for smart charging capabilities. Essential Energy is also supportive of the ESB promoting policy change to promote network operator flexibility to facilitate the installation of charging equipment on the network. As mentioned above, slow charging infrastructure for long stay parking (streetlights on poles) can assist in mitigating the 'super peak' occurrence of many 32amp home chargers starting at 10pm (from off peak). The ESB can promote this approach in collaboration with the AER.

What Standard should be adopted?

As noted within the Issues Paper, all the key EV charging standards worldwide are still in a process of revision and update. Nonetheless, this should not preclude the ESB considering adoption of a technical standard. This is because while each standard exhibits gaps today, these gaps can be expected to be addressed in the future, so the choice of one particular standard today does not 'lock in' the ESB to a certain standard into perpetuity. The standard can be influenced and changed as needed in the future (within certain limits).

Essential Energy supports the adoption of the IEEE2030.5 standard as it generally provides broader functionality against most other competing standards. IEEE2030.5 currently provides the most complete solution for a full consumer energy resources (CER) communications platform and is therefore recommended as the preferred protocol for introduction. We also note the OCPP 1.6J open standard is attractive from the perspective of a suitable minimum requirement.

We would also encourage the ESB to consider alignment of standards architecture with countries that have the largest markets for EVs. There will be a natural bias in the future to implement standards to

where there are the greatest number of technical issues being caused in those fleets on their local grids. To that extent, close consideration should be given to the Chinese and US markets, and the standards currently being considered by the respective networks and regulators.

Consumer choice

Importantly, we believe customers should always have full discretion to opt in and out of their participation in any smart charging standard. Voluntary tariffs should be offered to complement the availability of smart charging standards. That is, while a smart charging protocol would be implemented for all EVs, it would predominantly be used through consumer choice, or in emergencies when load needed to be shed from the grid. EV smart charging should be the default behaviour with easy and consumer friendly override available for convenient charging as required. Tariffs should reflect an advantage to the customer by allowing smart charging to occur. As EV tariffs are taken up, those consumers would shift the perception of the dynamically coordinated charging of EVs, and more customers will be persuaded by the savings. This discretion should therefore be maintained in any ESB final recommendation.

If you have any questions in relation to this submission, please contact Adam Young, Regulatory Strategy Manager at adam.young@essentialenergy.com.au or via phone 0414 926 406.

Yours sincerely,

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