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23rd September 2019
To: COAG Energy Council's Energy Efficiency Advisory Team
Re: 'Smart' Demand Response Capabilities for Selected Appliances

To whom it concerns,

The Australian Electric Vehicle Association (AEVA) is a not-for-profit, volunteer-run association dedicated to promoting electric vehicle (EV) technology. Established in 1973, we seek to educate and inform the public about all forms of electric mobility including cars, bikes, buses, boats, trucks, trains and aeroplanes. We represent EV end-users and enthusiasts, and over advice on all matters concerning electric mobility. We wish to respond to the Demand Response Capabilities call for submissions as follows.

We do not need a new standard imposed. One already exists (OCPP), is widely adopted and is fit for purpose.

1. AEVA agrees that demand management in some form for EV charging will be required to avoid adding to peak demand or creating new peaks. AEVA appreciates the opportunity to respond to this Consultation Paper and to actively work to take advantage of the benefits that EVs can provide to make a stronger, more stable and lower cost electricity supply.
2. EV chargers, termed Electric Vehicle Supply Equipment (EVSE) in the industry, interact with EVs. The two must work together and ensure compatibility and avoid control conflicts.
3. AEVA supports the establishment of open standards, but not the proliferation of standards. There are existing standards for controlling charging sessions for EVs: Open Charge Point Protocol (OCPP), IEC 15118 and IEC 61850-90-8 which include 'smart' charging functionality. These are internationally agreed upon and recognised. Because of the evolving nature of EV technology, they are under continuous development with engagement by vehicle OEMs and EVSE manufacturers. These existing standards offer far greater control and flexibility than proposed DRED standards for all DREMs as well as features such as enabling billing and fleet management. Standardisation based on the DRED approach would be a backward step, putting Australia, a very minor player in the international EV scene, out of sync with global practice for no apparent advantage.
4. EVSEs with OCPP capacity are currently about $300-$500 more expensive than EVSEs without this feature. Most EVSEs are still in limited volume production, and those with OCPP more so. This cost gap will likely reduce with volume manufacture but remain significant.
5. Experience to date suggests that uptake of level 2 EVSEs in domestic situations is limited, with most private EV owners using Level 1 Mode 2 EVSEs in a 10 amp or 15 amp power point. If additional costs are added to Mode 3 EVSE equipment, the uptake will be further inhibited.
6. Charge sessions may be initiated or controlled by either the EVSE or the vehicle (assuming that the vehicle has been plugged in to an EVSE). EVs generally come equipped with inbuilt

timers for managing charging times. Some also have remote access to control charging built in. It is not clear whether control by the vehicle or by the EVSE will dominate in the long run. Given the low level of Mode 3 uptake, control by the vehicle may be most effective.

EVs have a massive degree of discretion about when and how fast to charge at home

7. EVSEs are not air conditioners. There is no need for charging sessions to coincide with peak network demand. Most of the characteristics of EV charging are noted in the report but little consideration is given to two features:
    a. The very high level of discretion for the timing of charging, even at low charge rates, to meet typical daily levels of use.
    b. The implications of the large potential for vehicle battery discharge to contribute to addressing peak demand issues arising from other electrical appliances.
8. EVs generally only need to charge for a few hours per day. A charging time of about four hours is sufficient to replace the energy from average daily use of 50 km even at a low charge rate of 2.4 kW (10 amps). Higher charging rates permit faster recharging after longer trips but are more exceptional than common for most users, most of the time. Given that cars are typically parked 96% of the time, there is a lot of discretion over when charging takes place. There is seldom any urgency to charge during peak electricity demand times.
9. Such urgency as may exist will be increasingly allayed by the combination of larger battery sizes and greater availability of public fast charge locations.
10. Experienced owners of EVs are aware of these factors. Potential future purchasers are not, and they are likely to hold poorly informed opinions of what is required for charging at home.
11. Most experienced EV owners are unlikely to resist being flexible in charging at times that support rather than stress the network, given adequate information on the benefits and pricing that rewards this behaviour. AEVA would be prepared to conduct a survey of EV owners in conjunction with DEEA or others to test this premise.

EV owners are encouraged by AEVA to minimise charging costs

12. AEVA encourages EV owners to adopt time of use (TOU) tariffs and to charge during off-peak periods to save money as well as to reduce impacts on the grid.
13. AEVA also encourages the adoption of rooftop solar and the integration of solar generation with charging where practical. This is both economically advantageous and environmentally preferable, given the carbon intensity of the national electricity supply. A number of products are in the market **that divert excess solar to charge an EV** that otherwise would be exported to the grid. If insufficient solar capacity is available, the remaining energy can be supplied during off peak times at night. Even without sophisticated controls, simply timing charging within the daytime off-peak window where available, and charging at a rate well below the solar panel peak capacity can achieve a substantial part of this effect.
14. There is a risk that dependence on TOU tariffs alone, particularly if coupled with higher power chargers, could result in a new peak at the beginning of the TOU price step down period. However, this effect is likely to be diminished due to diversified demand with some charging occurring from solar during the day, many vehicles charging only once or twice per week and many vehicles charging at relatively low rates (10 amps) overnight.
15. Any new peak that may occur due to clustering of start times at the beginning of the off-peak time slot is expected to be brief, of the order of 30 to 90 minutes. This could be ameliorated by staggering starting times across a 2 hour window, perhaps with late starters

getting some discount, while still leaving ample time for fully charging vehicles. Vehicles regularly travelling long distances and requiring more recharging would size their EVSE to suit or may pay full price to access the full time period. DC fast chargers on intercity routes will also service these EV drivers, and are outside the scope of this inquiry.

16. The issues arising from EV loads are most likely to become apparent first at the local transformer level in areas with high uptake of EVs and remain localised initially. This can enable local, not national, responses in the short term. Even this is likely to be some years away while EV uptake remains limited.
17. EV uptake is likely to accelerate from about 2023. A clear strategy should be established well in advance to ensure that transition issues arising from fast adoption of EVs does not cause unnecessary problems and adverse publicity/perceptions, thus slowing adoption.

Fundamental need for cost reflective pricing

18. Apart from TOU tariffs, the lack of cost reflective pricing means there is no incentive for EV owners to choose charging times that avoid peaks. Even TOU tariffs are a very rough indication of supply costs and may be insufficient to avoid local transformer loading issues.
19. However even TOU tariffs do not reward absorption of solar surpluses to reduce the afternoon solar output peak other than to manage absorption of the EV owner's own surpluses. EV (and stationary) battery charging may be completed before the solar peak is reached each day. Both information and reward are required if EV/battery owners are to time charging to absorb the peak of solar surpluses rather than only the morning shoulder.

    "The low incidence of time-of-use (TOU) signals in electricity pricing is a regulatory failure that needs to be addressed through the actions of governments, electricity regulators and consumers. However, it is compounded by a market failure in the provision of services and technologies that can contribute to more economically efficient load management, irrespective of the pricing regime." Pg 10 from Consultation Paper

    In the case of EVs, we would argue that the failure is entirely due to "*the actions of governments, electricity regulators".* The controllable hardware exists and will be delivered by the market when the price signals are clear.

Fleets and apartments

20. Locations where multiple EVs are being charged from a single power supply such as apartment buildings and fleets with EVs are already strongly encouraged to incorporate demand management for the site. Control systems using OCPP or other proprietary controls permit vehicles to be charged with power shared across active EVSE/EV charge sessions or in a sequence as determined by the management software limited to the capacity available in the power supply at any time. Most systems have the option to set priority EVSEs that charge 'on demand' for those needing a faster response, with the power to the remaining vehicles reduced accordingly.
21. Demand management within a site is primarily aimed at cost savings, by avoiding the need to increase the power supply capacity to the site or reduce the scale of that increase should this be unavoidable.
22. These systems in general take advantage of time of use periods where applicable, but otherwise are not incentivised to provide a charging regime that specifically benefits the grid (e.g. by soaking up day time solar peaks other than from their own premises). Adding

this additional functionality would be relatively easy and bring the potential for large demand response from a few larger sites compared to individual dwellings.

Longer term

23. EV batteries are becoming larger, and may soon dominate home energy storage in the long run. Battery capacity is likely to range from 40kWh to 70kWh for the majority of EVs. Vehicle electricity export (V2X) capability is likely to become the norm for vehicles within the next 5 years. Commercially available V2X EVSEs are expected to be available from 2020, initially at a high price. In the medium term, this will be a cost effective option for EV owners to offer a variety of services to the grid **given appropriate price signals.**
24. EV batteries can increase off-peak loads, absorb solar surpluses and provide a substantial source of locally delivered electricity during peak periods, both winter mornings in cold climates and summer afternoons in warmer areas. They also have a demonstrated capacity to provide fast response FCAS services. The ability to control and deliver these services is not in question, only the economic incentive to do so.
25. In the absence of incentives to encourage faster uptake of EVs, the capacity of EV batteries with V2X capability is likely to lag well behind the needs of the grid for demand management over the next one to two decades.

Other general comments

Energy efficiency

As noted in the document, energy efficiency is likely to have a limited application (or benefit) for EV chargers.

Incentives

> *Option 2 – Encourage Voluntary Adoption of Demand Responsive Appliances*
> *The means available to government to encourage the voluntary adoption of demand responsive appliances include the funding of trials and demonstrations, mandating the disclosure of the DR capabilities of products and offering* ***cash incentives for the purchase of DR capable products****. The funding of trials and demonstrations through ARENA is already under way, so is part of the BAU option.* Pg 14

Cash incentives are already offered in some jurisdictions to encourage them to install EV chargers at homes and businesses. In many jurisdictions outside of Australia such incentives are only available for equipment that is controllable (smart) and in some cases this specifies OCPP as the control protocol.

At a minimum we should encourage governments and utilities to provide incentives only to chargers with some form of external control to an agreed open standard such as OCPP.

Responses to selected questions as numbered:

1. Do you support the proposal to mandate compliance with AS/NZS 4755 for the nominated priority appliances? Please give reasons. No (see detailed response above)

2. a. Is there any viable alternative options for meeting the objectives of the proposal, apart from the BAU case or mandating compliance with AS/NZS 4755? Yes (see detailed response above) b. Do you agree that

including demand response capabilities on energy efficiency labelling and voluntary compliance with AS/NZS 4755 is not a viable alternative option?

3. Do you support: a. permitting compliance with *either* AS/NZS 4755.3 *or* (DR) AS 4755.2? b. requiring compliance with all Demand Response Modes (DRMs)? None of these

4. Do you agree with the scope of the proposal: a. air conditioners: up to 19 kW cooling capacity;[70] b. pool pump-unit controllers; c. electric storage water heaters (excluding solar-electric and heat pump water heaters);[71] and d. charge/discharge controllers for electric vehicles (SAE Level 2 or IEC Mode 3). e. If not, what products (or capacity limits) would you propose be included or excluded, and why? Definitely not for EVs; no comment on the other appliances

5. a. Do you have information that demonstrates the ability of so-called "smart home" devices and systems to achieve automated demand response for the appliances within the scope of this proposal? Is so, please provide this information and specify which particular "smart" devices? (Please be specific with regard to the capabilities you envisage for such devices or systems, and whether you would expect them to conform to any particular standards). b. Would adoption of proprietary "smart home" systems undermine the benefits of peak demand reduction into the future? c. How many products currently on the market have the ability to connect to demand response programs? If so, which or what type of programs? d. Is there a risk that a mandatory AS/NZS 4755 standard may become obsolete as new technologies/innovative products achieve the same objectives without using AS/NZS 4755? This already is obsolete for EVs

6. What is your estimate of how much complying with the requirement will increase the price of each product? If a product complies with DRM 1, are there any additional costs incurred for a product to comply with the other DRM modes? OCPP enabled EVSEs are currently about $300-$500 more than those that are not. We expect this cost to decrease with increased volume. Control capacity may come built in to EVs as standard but may or may not be fully OCPP compliant.

7. Are the data and assumptions used in the cost-benefit estimates reasonable? Do you have information or data that can improve these estimates? There is insufficient detail to be confident. A number of assumptions do not seem realistic including that EVs will necessarily charge during peak periods.

8. Do you think the estimates of activation rates and costs are reasonable? Do you have information or data that can improve these estimates? The biggest flaw is the assumption of Mode 3 charging. Activation rates will be driven by the size of any economic benefit to users.

9. Do you think the estimates of annual participant costs are reasonable? Do you have information or data that can improve these estimates? No specific information but they seem low.

10. Is lack of demand response capable products a barrier to the introduction of demand response programs for small consumers? Do you think that mandating demand response capability for these products will lead to their activation and to consumer enrolment in DR programs? The main issue is regulatory barriers and lack of cost reflective pricing.

12. What implications (positive or negative) would the proposals have for your industry, in terms of activity, profitability and employment? The proposals to mandate DREDs would be significantly adverse, albeit hard to quantify

13. What can appliance suppliers, installers and energy utilities do to facilitate customer enrolment in direct load control or demand response programs? Education, but this will only be effective with appropriate opportunities to make savings on costs

16. Do you consider that there are any major technical or functional issues related to the proposal? If so, how should these be addressed? It fails to address the existing interplay between EVSEs and EVs.

17. How should the changes in demand or energy during DR events involving AS/NZS 4755-compliant products be measured? What would should be the notional "baselines?" Is the estimation of baselines more or less reliable than for other DR approaches? We do not support this framing of the problem.

18. How will the proposal impact on electricity prices and energy network costs and investment requirements? A well designed demand management approach should indeed result in lower costs for all network users, as the infrastructure build need not be as extensive.

19. Do you think that the effectiveness of the proposal depends on the implementation of more cost-reflective pricing, e.g. time-of-use (TOU) tariffs? **Absolutely depends on cost reflective pricing**, but TOU only addresses part of the issues

23. (To consumer and welfare organisations). In your opinion, what measures should be taken to ensure that consumers are adequately informed of the potential costs, as well as the benefits, of entering contracts that enable the demand response capabilities on their appliances to be activated? A transition to cost reflective pricing should be in several steps, not one big change. It should be supported by education campaigns and each step should be designed to provide a net benefit and lower costs overall. A portion of the savings should be used to ensure that disadvantaged consumers are no worse off (generally low volume customers anyway). We believe such a transition is achievable.

Concluding remarks

The AEVA sees the inevitable wave of EVs being a net gain for Australia – from improved terms of trade and fuel security, to improved grid stability and reduced transport emissions. If managed properly, EVs pose no major threat to grid stability in the short to medium term. EVs are a highly discretional load, and the timing of EV charging may be deferred to a more convenient time using existing protocols. If the committee has any further questions or queries, or would like the AEVA to contribute in further detail, please feel free to get in touch using the details on this letterhead.

Sincerely,

Clive Attwater, Acting President, AEVA.