23rd September 2019

Submission by email to:
Equipment Energy Efficiency (E3) Program
Department of Environment and Energy Australia
Commonwealth of Australia

Subject: E3 Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances, August 2019

SA Power Networks welcomes the opportunity to respond to the Equipment Energy Efficiency (E3) Program's consultation paper on the proposal to mandate 'smart' demand response capabilities for selected appliances.

At a high level, SA Power Networks' position on this proposal is as follows:

- We support the intent of this proposal, namely to encourage the uptake of 'smart' appliances based on common, open standards. Smart appliances will enable customers to optimise grid consumption in response to future tariffs, increase utilisation of their own rooftop solar, and value-stack by subscribing to demand aggregation schemes. Well-defined open standards are an enabler for the emergence of new markets for load flexibility and new offerings to customers. At a system level, as the energy mix shifts increasingly towards distributed and intermittent generation, increasing the level of demand-side flexibility will help to reduce the need for new investment in distribution, transmission and generation infrastructure, for the long-term benefit of all customers.
- We support encouraging smart electric vehicle chargers, and the establishment of appropriate standards before the Australian EV market takes off. A widespread uptake of non-smart EV chargers would be a significant missed opportunity.
- We understand there are legitimate concerns around whether mandating AS4755 is the best approach, including
    - that AS4755 is not a global standard;
    - that the standard has not been widely used outside of trials and Queensland's air-conditioning DR programs; and
    - that key improvements to the current AS4755 that are proposed for AS4755.2, namely the ability to use appliances' standard communications capabilities (e.g. Wifi) rather than requiring a dedicated physical DRM port, and the potential to accommodate other protocols such as OCPP for EV chargers as options for compliance, are not yet finalised.
- We consider that further consultation with industry and consumer advocates will be beneficial in assessing alternative approaches to achieve the intent, particularly around
    - The extent to which the proposed AS4755.2 addresses industry concerns with AS4755;

- The potential to mandate specific capabilities but not prescribe a single standard, instead allowing for a range of industry standards to enable these; and
- the relative merits of mandatory standards vs incentives to promote uptake of smart devices.

We also have some specific concerns with the cost/benefit analysis presented in the discussion paper in relation to the method of calculating benefits from avoided network augmentation, including:

- The calculation appears to be based on a $/kW figure derived from total forecast augmentation expenditure (from recent network regulatory proposals) divided by total demand growth over the period to 2025. However, in SA Power Networks' case at least, only a small portion of our total forecast network augmentation expenditure is directly associated with peak demand growth[1]. This aspect, therefore, appears to be over-stated for South Australia, and the same may also apply to other regions.
- In general, demand response does not fully avoid augmentation expenditure, but rather only defers it. Thus, the benefit would normally be calculated as the annual deferral value rather than the total capital.
- The analysis assumes that large hot water loads in South Australia are active at peak times. In practice, we believe there is almost no large hot water load active during afternoon peak demand, as large element hot water systems in SA are almost exclusively operated on a time-switched off-peak controlled-load circuit. We expect the most material opportunity for hot water load control exists in matching heating loads with times of low wholesale price or excess solar PV generation.

In light of the above, we consider that further work is required on the benefit analysis, in consultation with distribution networks, given the materiality of the value of avoided distribution network costs in the context of the overall benefits assumed.

Some further responses to the specific questions raised in the consultation paper are included as Attachment 1, where we have provided responses where we have a view.

Should the E3 committee require further clarification of any of our comments, please contact Bryn Williams, Future Networks Strategy Manager, on (08) 8404 5502.

Yours sincerely,

Brendon Hampton

Manager, Network Strategy

[1] This is explained in Table 5-18 of SA Power Networks – 2020-25 Regulatory Proposal – Attachment 5 – Capital expenditure, available online on the Australian Energy Regulator (AER) web site.

Attachment 1 – responses to specific questions raised in the consultation paper

1. *Do you support the proposal to mandate compliance with AS/NZS 4755 for the nominated priority appliances? Please give reasons.*

   We support the intent of this proposal, namely to encourage the uptake of 'smart' appliances based on common, open standards. We consider further consultation is required with industry to determine whether mandating AS4755 is the best approach to achieving this.

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?*

   Options include mandating the *capability* for demand response in a way that allows for alternative implementations, e.g. use of international standards like OCPP for electric vehicle chargers and alternative communications pathways. It is not clear to what extent this could be accommodated under the umbrella of AS4755.2. The relative merits of incentives rather than mandatory standards to promote the desired outcome could also be considered.

   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?

   We don't have any data on the effectiveness of labelling.

   The risk of voluntary compliance is that the desire for customers to procure compliant equipment may only arise when there are tariffs, demand-response aggregation schemes, home energy management systems, etc able to take advantage of them, but this may not occur until there is a critical mass of compatible equipment – a chicken-and-egg problem, particularly in a new market like EV chargers. Mandatory standards are one approach to resolving this, as are government incentive schemes like the SA Government Home Battery scheme, which offers a subsidy for systems that are 'smart capable' but does not prescribe a specific implementation standard.

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)?

   We support non-physical/software implementations of demand response as we believe they will lessen product development timelines, implementation and compliance costs, and decrease region specific hardware being developed.

We believe all modes that can practically be implemented by the product should be implemented and there should not be a subset of modes specified.

4. *Do you agree with the scope of the proposal:*
a. air conditioners: up to 19 kW cooling capacity;[2]
b. pool pump-unit controllers;
c. electric storage water heaters (excluding solar-electric and heat pump water heaters);[3] *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?

Yes, we support the scope of residential-sized products. Large or commercial-sized products tend to be connected to dedicated network assets and have cost-reflective tariffs which naturally encourage demand management.

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?

We're aware of several Home Energy Management Systems which optimise behind-the-meter devices using a range of communications protocols including AS4755 DRM modes. Companies like Combined Energy Technology and SwitchDin are such examples. We believe HEMS provide significant value for customers and can provide similar benefits to traditional demand response programs.

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?*

[2] The 2013 Consultation RIS proposed a limit of 30 kW cooling capacity, but this was revised to 19kW following the previous consultations.
[3] The 2013 Consultation RIS proposed that solar-electric and heat pump water heaters should also comply, but this was revised following the previous consultations.

We would expect this to vary according to the appliance type, and is best answered by product manufacturers. Inverter manufacturers and air-conditioning manufacturers have direct experience with compliance to the current standard, and will be best placed to advise on the extent to which the proposed changes in AS4755.2 reduce the cost of compliance.

7. *Are the data and assumptions used in the cost-benefit estimates reasonable? Do you have information or data that can improve these estimates?*

SA Power Networks is currently experiencing a relatively flat demand growth period in which very limited augmentation expenditure is forecast. Of the project expenditure contained within the 2020-25 reset proposal, on average, 93% are independent of the load forecast. In our reset proposal augmentation for continued real estate developments and general demand growth are the only two categories for which capacity-based augmentation is forecast.

Furthermore, in general demand response does not fully avoid augmentation expenditure, but rather only defers it. Thus, the benefit would normally be calculated as the annual deferral value rather than the total capital.

Due to these reasons we believe the benefits forecast are likely to be overstated.

8. *Do you think the estimates of activation rates and costs are reasonable? Do you have information or data that can improve these estimates?*

We note the forecasts for EVs appear higher than the latest AEMO ESOO forecasts and hence the activation rates for EVs are potentially high.

As augmentation in South Australia is limited to very specific areas, these specific areas need to be assessed to determine the population available for activation and the level of demand response which is achievable in practice. It's not clear whether this has been considered in the current cost benefit analysis.

9. *Do you think the estimates of annual participant costs are reasonable? Do you have information or data that can improve these estimates?*

Our experience is limited to small-scale trials where the cost to manage customers is relatively high. We believe air conditioning demand response programs in Queensland would be a good guide for physical DRM implementation costs and customer participant costs at scale.

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 widespread adoption of standards-based smart appliances would increase the opportunity for consumers to participate in DR programs offered in response to schemes like RERT or local network constraints. Smart appliances can also be activated in various ways to add value to consumers beyond enrolment in traditional DR programs for peak demand reduction:

- Customers can shift or shape loads behind the meter to maximise self-consumption of their own rooftop solar or respond to time-of-use tariffs. Hot water and pool pumps are prime candidates for this, as well as some EV charging (e.g. weekday workplace or car-park).
- Loads can be shifted even within off-peak periods to take advantage of low wholesale prices at times of high solar or wind generation, e.g. through retailer-offered aggregation schemes

11. *It is assumed that the cost of communications platforms to support demand response and direct load control services will be low (e.g. through the use of existing electricity supply infrastructure such as ripple controls or smart meters, or general infrastructure such as WiFi or 3G/4G/5G). Do you agree? If not, can you provide estimates of the platform set-up costs?*

In South Australia there is not an existing ripple control network and in the contestable metering market we do not expect communications via the meter will be an option. We believe utilising customer or 3rd party communications will be of lowest cost.

12. *What implications (positive or negative) would the proposals have for your industry, in terms of activity, profitability and employment?*

As a distribution network, increased demand-side flexibility is a positive as it creates opportunities to increase asset utilisation and avoid unnecessary investment in new network capacity.

13. *What can appliance suppliers, installers and energy utilities do to facilitate customer enrolment in direct load control or demand response programs?*

Networks and retailers can create value for customers outside of DR programs through the timely transition to cost reflective tariffs e.g. time-of-use tariffs. These will reward customers who can operate their flexible loads at times that are efficient, and smart appliances will give customers the tools they need to respond to these price signals.

Distribution networks already have established processes to seek non-network solutions to major (high value) network constraints, and we are investigating ways to identify and publish to the market opportunities for smaller and more localised constraints that

might become viable to target with demand-response in future as the penetration of smart appliances grows.

14. *Do you think the proposal would reduce competition among product suppliers, reduce consumer choice or lead to an increase in product prices (beyond what is expected to occur)?*

Manufacturers will be best placed to answer this question. We would expect inverter manufacturers, who already have mandatory compliance to AS4755 via AS4777, to have valuable insights from their experience.

15. *If the measure is implemented, what is the earliest feasible date by which products could comply? How much lead time should there be after publication of the final requirements?*

Again, manufacturers will be best placed to comment on this.

16. *Do you consider that there are any major technical or functional issues related to the proposal? If so, how should these be addressed?*

The main technical issues we see are those that we understand the new draft AS4755.2 is seeking to address, namely how best to leverage the communication capabilities now commonly included with almost all new appliances, to avoid the need for a specific physical interface, and how to accommodate established international standards as a means to compliance.

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 see this as a broader question relating to the effective operation of demand response markets, rather than specific to this proposal.

We do note that the cost/benefit analysis is focused heavily on benefits arising from traditional peak demand reduction. While we recognise that the ongoing transition of the energy system may create challenges in overall supply adequacy at certain times that will be addressed through schemes like RERT, from SA Power Networks' perspective we are entering a period where demand growth on our network is essentially flat and therefore the opportunity to avoid traditional augmentation investment through DR will be very limited, at least in the near term. From our perspective, many of the benefits will be in greater flexibility to match demand to rooftop PV generation and respond to time-based tariffs.

18. *How will the proposal impact on electricity prices and energy network costs and investment requirements?*

In the near term (to 2025), as noted above, we have little demand-driven investment forecast. In the longer term, EV charging does have the potential to have a material impact on network augmentation costs if not well managed. In 2016, CSIRO modelled this impact as part of their work on Energy Network Australia's *Energy Network Transformation Roadmap.* CSIRO's modelling indicated that if EV charging occurs predominantly outside of peak times, customer bills will, on average, be 20% lower in 2050 than they would otherwise have been, as EV charging tends to increase the overall efficiency of the system by achieving greater utilisation of existing network capacity. On the other hand, in an ad-hoc charging scenario CSIRO found that most of this benefit is lost due to the cost of growing peak demand, and customer bills are reduced by less than 4%[4].

However, while the long-term network benefits of charging EVs outside of peak time are material, it is also likely that much of this benefit will be achieved in any event, even without smart chargers. EV owners in South Australia today can already use a dedicated off-peak controlled-load circuit for their home EV charging (e.g. their existing hot water circuit) and have a strong financial incentive to do so via existing tariffs.

Smart charging does, however, enable additional benefits beyond network augmentation reduction, through enabling greater solar self-consumption, responding to wholesale market price variations, and enabling system wide DR schemes like RERT.

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?*

No, we believe cost reflective pricing is independent but complementary to market led demand response programs.

20. *In regard to the regional aspects of the proposal do you consider that it would provide significantly more benefits in certain regions? If so which ones? Will any regions be largely unaffected? If so which ones? What causes these differences in impacts between regions?*

To reduce or replace network augmentation demand management will need to be highly targeted. In South Australia the areas in which network augmentation is forecast are outlined in our distribution annual planning report.

21. *(To electricity network service providers, electricity retail companies and DR aggregators specifically).*

[4] *Efficient capacity utilisation: transport and building services electrification*, CSIRO report for the Energy Networks Association, Australia, 2016

a. Is it your company's intention to offer tariff or other incentives for customers to have demand response capabilities on the appliances in question activated and to participate in demand response programs? Are there any specific barriers (or lack of incentives) that would prevent your company from offering and promoting such programs?
b. Would you offer tariff or other incentives to customers to participate in demand response programs using "smart home" device functionality? (if so, please specify the type of functionality/ies). Are there any specific barriers (or lack of incentives) that would prevent your company from offering and promoting such programs?
c. In your opinion, what proportion of householders with appliances with the above type of "smart home" device functionality/ies will participate in demand response programs? Do you have survey or other evidence to support your view?
d. What would be the total MW of appliance demand response capability (or number of participating appliances) required to defer the need for network investment to manage peak demand in your area/s of operation?

In general, we are moving toward more cost-reflective tariffs. In the 2020-2025 period we have proposed time-of-use tariffs being the standard offering for residential customers. We see these cost-reflective tariffs being complementary to any demand response program. We have used demand response in targeted areas previously to defer network augmentation and plan to in the future where feasible.

22. *In your opinion, what proportion of householders with AS/NZS 4755-compliant appliances will have the demand response capabilities activated and will participate in demand response programs? Do you have survey or other evidence to support your view?*

We believe the demand response programs in Queensland would be a good guide.

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?*

No comment – question for consumer and welfare organisations.

24. *(To electricity market regulators). Do you consider that the regulatory arrangements provide utilities and potential DR aggregators with sufficient incentive to offer (or commission) small-consumer demand response as a means of reducing investment in supply-side infrastructure?*

We note that one area that small-consumer demand response can provide benefits is in increasing network hosting capacity for embedded generation. Beyond tariffs, there are no means within existing regulation for networks to provide incentives for this.

25. *How do existing electricity market rules which enable and encourage DNSPs and TNSPs to invest in demand response programs impact on, or interact with the proposal?*

Refer to our answer to question 13.

26. *a. How would changes to electricity market rules (the Retailer Reliability Obligation and the wholesale market demand response mechanism draft determination announced by the AEMC) impact on or interact with the proposal?*
b. Would a new class of DR aggregators make use of AS/NZS 4755 DR platform? If so, why. If not, why not?
c. Would the potential AEMC wholesale demand response mechanism be material to the benefits of mandating AS/NZS 4755 for the four selected appliances? Why or why not?
d. Would the benefits of deferring investment in network capacity from the wholesale demand response mechanism changes announced by AEMC also reduce the network investment benefits attributable to mandating AS/NZS 4755?

This would depend on the assumptions made in the calculation of benefits attributable to mandating AS4755 and the extent to which these overlap with the network expenditure deferral benefits assumed for the wholesale demand response mechanism.

27. *Could an option for Government to require utilities or independent DR service providers to offer incentives, or have the Government fund these incentives, achieve the same benefits as the mandatory standard but at a lower overall cost to the community?*

We believe there is merit in considering incentives for consumers to adopt smart appliances as an alternative to mandatory standards.

28. *(To manufacturers and distributors of the products in the scope of this proposal). What percentage of the products you sold in Australia and in New Zealand in the last year:*
a. Meet the minimum requirements of the relevant part of AS/NZS 4755;
b. Meet additional requirements (e.g. additional DRMs); and
c. Comply with other published DR standards (please state which)?

No comment.