SUBMISSION ON SMART DEMAND RESPONSE CAPABILITIES FOR SELECTED APPLIANCES

23 SEPTEMBER 2019

Introduction

The Air Conditioning and Refrigeration Equipment Manufacturing Association (AREMA) welcomes the opportunity to comment on the Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances. AREMA strongly supports the approach followed based on effective consultation and consensus building in developing GEMs regulations.

AREMA represents the air conditioning industry. We have around 30 members who provide in excess of 80% of the air conditioners sold across Australia. AREMA has been intimately involved in developing the GEMs requirements for ACs less than 65 kw and is currently engaged in helping COAG establish requirements for ACs greater than 65 kw and chillers.

Overview

AREMA acknowledges that demand response may be a necessary component to energy policy in order to manage demand. We would observe, however, that demand response should be a plank in a larger strategy managing energy demand issues and not dealt with as a component of energy efficiency measures. We further contend that the GEMs Act is an inappropriate means to address the potentiality of demand response: it is designed to support energy efficiency.

AREMA observes that the proposed approach is inconsistent with every other demand response policy and regulation globally. Accordingly, we would support voluntary measures based on the 2012 standard. We think an appropriate trigger for a future review of this policy would be an agreement of an international demand response standard under either ISO or IEC.

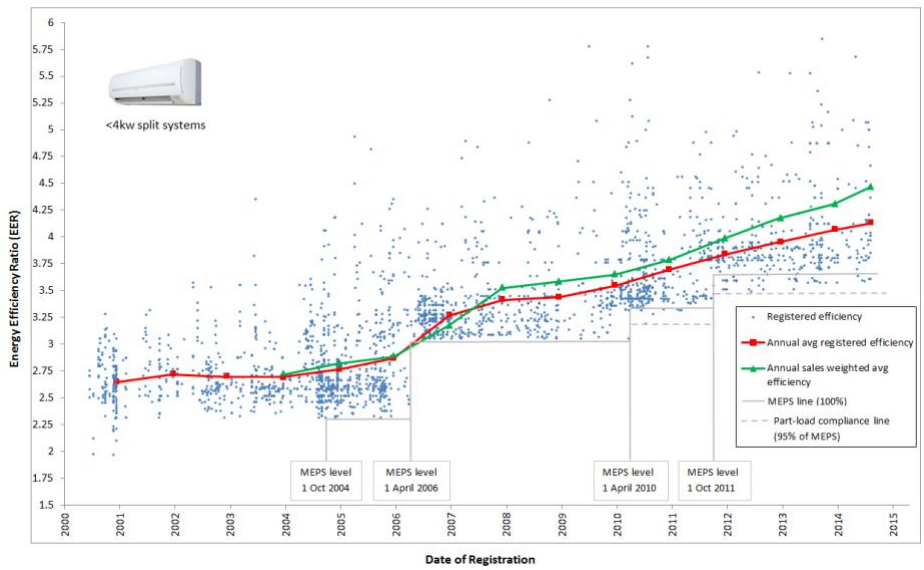
AREMA would lastly observe, that much has changed since the consultation RIS was completed (and not supported) in 2013. We believe it is necessary for more care, better consultation and engagement to occur before any proposed regulation is tabled. We would be keen, accordingly, to meet with the proponents and work through issues in detail before final decisions are contemplated.

An historical perspective – what has the last 12 years demonstrated

The rationale for the proposal is based, in part, on the perceived need "to contribute to reducing the future investment requirements for electricity network, generation and transmission infrastructure due to growth in peak electricity demand." Air conditioning is obviously as key driver in this issue as increased electricity demand happens as a result of high temperature conditions driving increased air conditioning and ,therefore, electricity use.

There is an implied message in the analysis that air conditioning manufacturers have not addressed this issue and that demand response is necessary to ensure better outcomes. This sentiment is incorrect. As analysis conducted for the Department of Environment and Energy's work in setting new MEPs levels, which were just formalised this year, it was shown that the efficiency of air conditioners has improved phenomenally over the past 20 years.

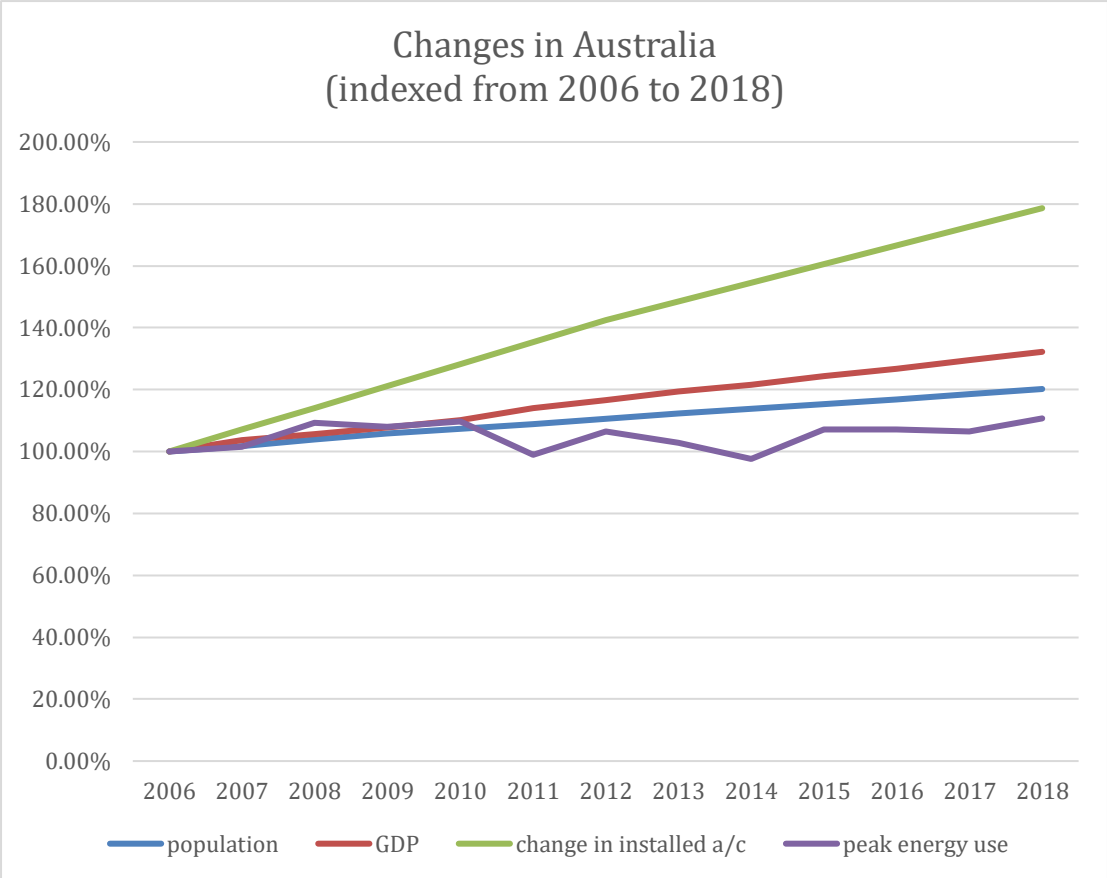
Indeed, as the graph below from that analysis demonstrates, air conditioners are today 60% more efficient than they were in 2004. Most of that improvement occurred in the last decade.



The improvement in energy efficiency was simultaneous with a dramatic increase in the penetration of air conditioners across the Australian community. Sales have continued to be strong with over 1,000,000 air conditioners sold on a year in, year out basis. That penetration is undoubtedly part of the proponent's assessment that demand response is a necessary tool to manage energy demand. Nowhere, however, is that case demonstrated in a compelling fashion by analysing peak energy demand and the uptake in air conditioners across Australia.

The analysis below attempts to put context around changes in peak energy demand since 2006 considering both the growth in air conditioning and the broader demographic factors.[1] To ensure consistency, all of the figures have been indexed to 2006. This analysis includes:

- Change in peak electricity demand.
- Change in population and GDP.
- Change in the numbers of installed air conditioning equipment



There is a variety of lessons that can be drawn from the graph above. Firstly, peak energy demand has not risen strongly since 2006 – particularly when compared with the broader changes in both economic activity and population growth. Indeed, if this analysis had been done on a per capita basis or per dollar of GDP, peak energy demand would have fallen over the 12-year period. This analysis creates some doubt about the justification for demand management measures. Clearly current actions have been successful.

[1] ABS figures were used for population and GDP. AEMO data was used for peak energy demand. Estimates of air conditioning equipment was made usingdata contained in the Department of Environment and Energy's report – Cold Hard Facts 3. The approach was confirmed with Peter Brodribb, the author of the report who indicated that the estimate was more likely to be an underestimate of the penetration of air conditioning than an overestimate.

Further, and more importantly related to air conditioners, it is reasonable to conclude that energy efficiency measures have been particularly significant in keeping downward pressure on peak energy demand. The number of air conditioners installed across Australia has risen strongly. This has been due to a number of factors including increases in population and GDP, lower prices, as well as increased temperatures and heat waves. Despite this very strong growth, massive improvements in energy efficiency have managed to strongly limit the increase in peak energy demand. These improvements have come at a cost to industry and through a collaborative working relationship between government and industry where there was transparent communication about what could be done at what time. It would be unfortunate for this positive relationship to be impacted by a proposal not supported by the industry.

Specific Responses Related to Air Conditioners

AREMA makes the following comments in relation to the proposal to include demand response on air conditioning.

Impact of Air Conditioning on Peak Demand

The discussion paper indicates that

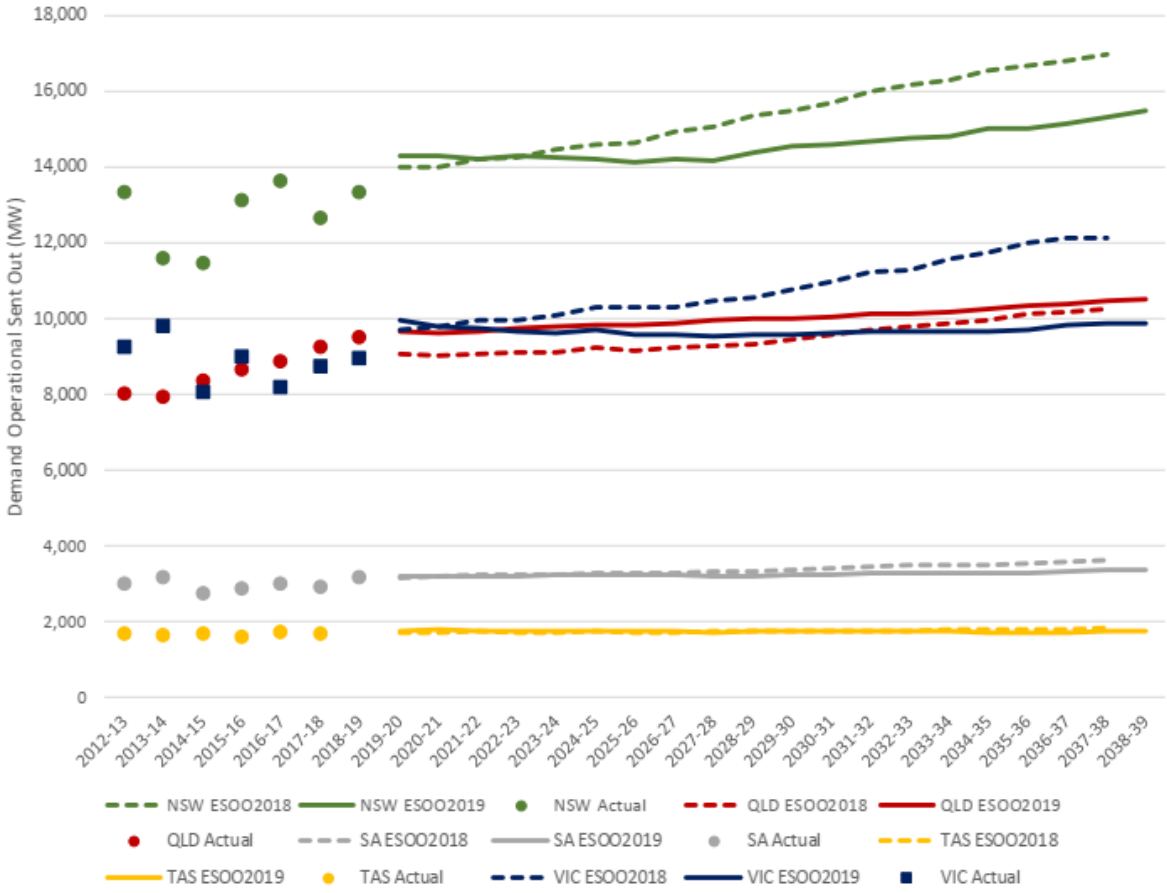
> Since the 1990s, the main driver of summer maximum demand has been the rising ownership of air conditioners (ACs). The rate of increase in ownership is slowing, but AC numbers will continue to rise due to population growth.

AREMA agrees with this analysis but points out that – as described previously – that the increased efficiency of air conditioners has severely limited the increase in peak energy demand over the past 12 years. During the first decade of the century there was significant concern about peak demand and all of the projections indicated strong linear growth in electricity demand – particularly peak demand. The paper does not acknowledge the recent past where this growth did not occur and again repeats previous analysis suggesting strong and continuous growth in peak demand. AREMA contends that this analysis is biased, does not reflect the recent past and needs to be more comprehensive.

The latest AEMO estimate[2] of future peak demand (see figure below) show that while peak demand is expected to rise over the coming years, the rate of the increase is only marginal. This graph further makes the case that the most up to date data should be used in policy research h and formulation.

[2] AEMO, Electricity Statement of Opportunities, August 2019

Figure 25 Regional summer (winter for Tasmania) 10% POE maximum operational demand (sent out) comparing 2018 ESOO vs 2019 ESOO



Labelling

The paper proposes to require an element to be added to the label of a product to demonstrate that it meets demand response need. AREMA would observe that the air conditioning label is in the process of being changed now to meet the new MEPs requirements. Significant work has been undertaken in the design, testing and outreach needed to ensure the label meets the community's understanding and needs. AREMA does not support changing the label given that those activities are still ongoing, and particularly as the idea to amend the label is untested, untried and poorly considered.

Availability of equipment

The paper acknowledges that

> Mandating compliance with AS/NZS 4755 in ACs and other appliances would mean that the majority of models would need to be redesigned, or packaged and supplied with additional components, to comply with the proposed regulation. The stock of DR-capable appliances would build up at a predictable rate to the thresholds at which it becomes cost-effective for utilities and DRSPs to market commercial offerings to consumers.

There is an assumption that all models currently available will be fitted with demand response capacity. As Australia – a small market in global terms – is the only jurisdiction globally pursuing this approach further consideration is needed. Industry advice is that the 2012 standard can be – and typically is – met by manufacturers in Australia. However, no major manufacturer meets the 2014 standard requirements and advice is it would be difficult and expensive to do so. Given the size of the Australian market, it seems likely that manufacturers would limit their investments to those models which sell the most. These models are typically the ones that just meet MEPs. The result of this is that the Australian market would meet – over time – the demand response requirements but would have less choice particularly when it came to smaller selling highly efficient models.

Demand Response would act to reduce the positive impact of MEPs.

Impact of Demand Response on consumers

The discussion paper states that

> In the case of ACs, which are the largest contributor to summer maximum demand,[33] many consumers have already shown their willingness to accept a reduced level of service at times of high demand in return for financial incentives. DR programs and trials in Australia have shown that most consumers will tolerate interruptions to air conditioner operations, and that reduced levels of cooling for short periods cause little or no discomfort. Indeed, the majority of participants are not even aware when a DR event has occurred (see Appendix 1).

AREMA observes that it is not clear in the Appendix that consumers did not experience discomfort. It is likely that this outcome was one recorded in the Energex trial. We would note, however, that the conditions on the day in question were only 29 to 30 degrees C, with moderate humidity. Perceived impact might be different with heightened conditions. Further the paper neglects to consider the health and productivity losses that have been shown to occur in higher temperatures and humidity and to model the impact of these on Australians. There is a risk that those less well-off will see demand response as a means to save money without recognising the genuine risks this can pose to them, particularly if the are elderly or chronically ill.

Pricing

The discussion paper states that

> There is no evidence that any of the AS/NZS 4755 compliant models currently on the market are priced higher than similar non-compliant models. Nevertheless, it is conservatively assumed that making all AC models compliant would increase average retail prices by $5-15 per unit. Given that the installed cost of a typical 5 kW household AC is about $2,500, this represents well under 1% of the installed cost.

AREMA notes that the authors of the paper fail to differentiate between cost and price. Of course, there is no difference in price between models, as the public currently does not value demand response. This is not proof that it does not have a commercial impact. Secondly, the authors undertook no consultation directly with manufacturers on the cost of meeting the 2014 standard. They simply made a price estimate without this input.

There are a number of additional issues in relation to this proposal which need to be considered. These are not air conditioning specific, so are dealt with here under a general policy section. This list is not comprehensive – a full audit of the proposal is outside the scope of AREMA given the timeframe – but hopefully raises a few additional issues worthy of further consideration

Engagement by Utilities

AREMA noters with some concern that it has not seen engagement by electricity suppliers. Given the slow and ineffectual rollout of demand response to date (and certainly it is possible at least in southeast Queensland), there is a concern that if demand response were to be mandated that there would be little take-up by utilities. Requiring a difficult and expensive inclusion by equipment manufacturers and then have that capacity not be utilised would be a significant waste.

Equity between consumers

AREMA is concerned that there has not been careful consideration of the equity issues between consumers should demand response be move. Imagine a housing development with identical houses and the following examples:

1. Family 1 comes home at 5pm and turns on their air conditioner (100%) to cool their property.
2. Family 2 is at home all day and has their air conditioner on 100%.
3. Family 3 is at home all day and has their air conditioner on 50% and has managed to keep cool in with shades and window furnishings.
4. Family 4 has solar, isn't at home until 7pm and has their air conditioner on at 100% to precool.

Now let's assume a demand response at 4:50 pm. This would be the result.

1. Family 1 would need to wait until the demand response period ended before using their air conditioner.
2. Family 2's air conditioner would be reduced to 50% output.
3. Family 3 would find their air conditioner severely throttled back to 25% (if it could run that low) and would lose thermal comfort.
4. Family 4 air conditioner would throttle back to 50%. When they get home, however (after the sun has set), they would turn their air conditioner on to 100% increasing their electricity bill, as well as increasing greenhouse gas emissions.

These examples are meant to be illustrative. More analysis must be done on the consumer impacts to ensure demand response is equitable and there are no perverse outcomes.

Who benefits from Demand Response?

The discussion paper makes the case that demand response will reduce costs for all consumers, regardless of whether they participate in the mechanism or not. At its most basic, this claim is based on the idea that if there is a reduction in peak energy demand than the savings will pass through the systems and reduce prices.

That assumption needs to be tested in relation to commercial realities. As described in relation to demand response components within air conditioners, there is a difference between cost and price. We agree that using less high cost peak electricity will reduce costs on the supply system. What is not clear is if these will result in reduced consumer prices or allow electricity supply companies to profit-take. This is not just a theoretical concern, as the costs of implementing a demand response measure are not being borne by the electricity supply companies. They are carried by equipment manufacturers and consumers. For demand response to proceed both equipment suppliers and consumers should have certainty that taking these steps will benefit them commensurately with their investment. No such mechanism is included in this proposal.

Finally, AREMA would contend it is unjust to compel equipment makers to be required to design and produce a component which use is only voluntary by both consumers and utilities.

Consultation Process

While AREMA appreciates that South Australia is eager to progress this measure, we are concerned about the process of consultation. There are 2 main elements to this issue:

1. Work conducted in 2013 should not be used for a consultation RIS in 2019. Quite simply circumstances have altered, technology has changed, and consultation needs to begin refreshed. It is just inappropriate to use data that – for air conditioners for example – was collected before the consultation process for the current MEPs levels were even commenced.
2. Consultation needs to be more than a discussion paper, presentation and a call for submissions. For example, the cost-benefit analysis has numerous assumptions which should be tested. AREMA is not convinced the conclusions are reflective of the current state of play. Given the short process followed here, we are unable to provide the detailed comments that this work warrants. If the process had been less rushed and more collaborative the consultants and AREMA would have been able to sit down and work through the issues with the South Australian Government and the consultant giving them the time and care they deserve.

Appropriateness of GEMs as a mechanism to agree a Demand Response Measure

AREMA does not think that GEMs is an appropriate means to consider demand response. The purposed of GEMs is to enable the increased use of equipment that is more energy efficient. Demand response is not about energy efficiency. It needs to be considered as part of a suite of measures looking at better policy for energy demand.

AREMA notes. That the GEMs Act allows for "other" issues to be considered. We note, however that when industry has raised topics for consideration we have been told to keep to energy efficiency issues. We think it is important that this principal be applied evenly to both industry and governments.

Next Steps

AREMA appreciate the enthusiasm of the consultant and the South Australian Government to address energy issues. We agree that this energy has been a contested policy space and that further clarity would be useful for both energy suppliers and users. However, we do not think that the desire to see progress should result in the agreement to a measure that – at best – is not fully thought out and worked through. If South Australia wishes to proceed with developing a demand response mechanism we would strong encourage them to take more time, conduct more detailed research and consult with industry in a more meaningful fashion.

Answers to Questions

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

   Not as described in the paper. AREMA contends that, at this point, demand response should be voluntary.

   AREMA would point out that – according to CSIRO and industry intelligence - there are no air conditioners in Australia that meet the 2014 standard. There would be significant costs and time involved in implementing the technical requirements at such a level, particularly as the standard (2014 version) is not followed in any market globally. Further there is a genuine risk that should the standard be mandated manufacturers would choose only the equipment sold in the highest volume for solutions and they might withdraw more niche (and more highly efficient) products.

   See other sections of the submission

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?*
   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?

   Yes. Energy Australia runs a program which offers incentives directly to consumers who reduce their electricity use at time of high demand. This does not require requiring manufacturers to invest in demand response capacities, which might not be used, as well as other perverse outcomes as described elsewhere.

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)?

   AREMA supports voluntary compliance (which is assessed as very high in the discussion paper) with AS/NZS4755.3.1 2012.

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?

   AREMA agrees that any action on demand response should be limited to air conditioning equipment under a rated capacity of 19kw.

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?

   AREMA does not have any input to provide on this issue.

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?*

   AREMA does not have – and for trade practice law reasons - would be unlikely to ever have information on specific costs associated with meeting any new requirements. We can, however, make the following observations in general.

   - Analysis of price impacts is not the same as costs. There has been no consultation on the cost impact of measures with manufacturers.
   - Australia is the only country globally proposing to require air conditioning manufacturers. There is a real issue with costs and if expensive redesign is required for the globally very small Australian market, we will like see a reduction in the number of models on the Australian market. This trend would result in those models with small sales being reduced – mostly the highest efficiency models.

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

   No. Further consultation is required with equipment manufacturers.

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

   AREMA does not have any input to provide on this issue.

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

   AREMA does not have any input to provide on this issue.

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?*

    As described in the paper, air conditioning equipment currently has a high rate of equipment meeting the 2012 standard. There is no barrier for consumers who desire this feature. At the same time, AREMA would observe there is no evidence that demand response is a feature that consumers are requesting.

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?*

    AREMA does not have any input to provide on this issue.

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

    If the 2014 standard was made mandatory there would be profit and job loss in the industry, as the number of models on the market would decline. Just as importantly, it is likely that high efficiency models with smaller sales data would be removed from the market resulting in increased electricity demand and associated greenhouse gas emissions.

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

    AREMA does not have any input to provide on this issue.

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)?*

    Yes. As described above, if the 2014 standard is used there will be a decrease in competition with a resulting increase in costs, electricity use and greenhouse gas emissions.

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?*

    Three years after black letter law is released. The current proposal is completely unworkable. The capacity to meet the 2014 standard is not met by any major manufacturer, particularly as the Australian regulations would be the only ones like it globally. The need to design and incorporate new features into equipment is a significant undertaking that is not understood by the authors. Further, companies will not make the investments required in new design and plant until they are 100% certain that it is required.

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

    Yes. Manufacturers currently cannot meet the 2014 standard

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?*

    AREMA does not have any input to provide on this issue.

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

    If the mandatory proposal with the 2014 standard is followed electricity demand would be expected to increase leading to higher costs.

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?*

    AREMA does not have any input to provide on this issue.

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?*

    AREMA does not have any input to provide on this issue.

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

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?

AREMA does not have any input to provide on this issue.

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?*

    AREMA does not have any input to provide on this issue.

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?*

    There is the assumption in the paper that air conditioning is merely for comfort and that demand response involves sacrificing a bit of that comfort for a greater good. This analysis underplays the significant role provided by air conditioning in maintaining health and productivity. No analysis has been provided on the impact of demand response in increased deaths, illness or reductions in productivity. At the very least, consumers will need to be made more aware about these potential impacts than they have been in trials to date and this will have a negative impact on uptake.

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?

AREMA does not have any input to provide on this issue.

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?*

    AREMA does not have any input to provide on this issue.

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?

    AREMA does not have any input to provide on this issue.

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?*

    AREMA does not have any input to provide on this issue.

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)?

    Please see the attached CSIRO report which demonstrates that a large majority of equipment meets the 2012 standard and no major manufacturer meets the 2014 standard.