The Australian Industry Group
51 Walker Street
North Sydney NSW 2060
PO Box 289
North Sydney NSW 2059
Australia
ABN 76 369 958 788

16 April 2021

Department for Energy & Mining
11 Waymouth Street
Adelaide SA 5000

By email: dem.smartappliances@sa.gov.au

Consultation on: *Proposed Demand Response Capabilities for Selected Appliances in South Australia* and *Proposed Amendments to Local Energy Performance Requirements for Water Heaters*

Ai Group is a peak employer organisation representing traditional, innovative and emerging industry sectors. We have been acting on behalf of businesses across Australia for nearly 150 years.

Ai Group is representative of Australian industry. Together with partner organisations we represent the interests of more than 60,000 businesses employing more than 1 million staff. Our members are small and large businesses in sectors including manufacturing, construction, engineering, transport & logistics, labour hire, mining services, the defence industry, civil airlines and ICT.

Our vision is for thriving industries and a prosperous community. We offer our membership strong advocacy and an effective voice at all levels of government underpinned by our respected position of policy leadership and political non-partisanship.

OVERARCHING COMMENTS

Industry welcomes the opportunity to comment on the consultation paper *Proposed Demand Response Capabilities for Selected Appliances in South Australia and Proposed Amendments to Local Energy Performance Requirements for Water Heaters*.

Ai Group represents businesses of all sorts and sizes in South Australia and nationally. Overall, business has a strong interest in a secure, reliable, affordable and clean electricity system, and we mindful of the potential of demand response to contribute to this. However this submission conveys the recommendations of Ai Group's most directly affected members: suppliers of electric vehicle products, air-conditioning, and hot water systems.

Industry very strongly prefers approaches to technical regulation that are nationally consistent within Australia and avoid a fragmented market with increased compliance costs and confusion. Australia also operates in global markets, and industry generally prefers adoption of global standards where consistent with local needs and conditions. Imposition of unique Australian standards carries risks to the cost and range of products supplied in Australia. However, we also recognise that Australian electricity systems in general, and South Australia's especially, are currently at the leading edge of global trends:

- growth of variable renewable energy (including a volume of rooftop photovoltaic (PV) generation that at times pushes the wider power system towards zero net demand);
- closure of older dispatchable and synchronous generation capacity (with bulk energy replaced by renewables, and new flexible resources of various sorts needed as complementary capacity); and
- increasing extreme weather (with associated extreme peaks in energy demand).

There are quite distinct issues involved in managing regular daily cycles in supply and demand; seasonal minimum demand challenges; and seasonal or semiannual peak demand and supply failure events.

Efficiently managing and responding to those trends requires many kinds of flexible energy resource; demand response is one of them. South Australia has a more urgent need than other economies to grow its demand response capability, but others will have the same needs in time. Ai Group has argued for some time that Australian policy and standards should be developed with an eye to this international context.

Realising Australia's demand response potential requires many conditions to be met, including both technical capacity and motivation to use that capacity.[1] There are many ways of motivating demand response (DR) – markets, tariff structures, community reward programs and more. Similarly, there are multiple options for ensuring relevant products are capable of demand response.

Ai Group's members involved with the manufacture and supply of air-conditioning, hot water systems and electric vehicle charging equipment have raised concerns with some elements of the scope of the proposed South Australian mandate of AS/NZS 4755. They recommend that South Australia take a more cautious approach, with a slower timeline, more national alignment, and the exclusion of some product categories or subcategories until and unless critical concerns can be answered.

It is important that these concerns are answered and that technical capacity for demand response grows. Electricity distribution businesses are increasingly interested in accessing demand response to defer network investment. Cost-reflective network tariffs are becoming

[1] Other important elements include supporting infrastructure (such as smart metering), tools to ensure DR value is realised for customers (such as competitive wholesale and retail markets and effective network regulation), and measures to establish confidence in DR (including customer protections, cyber security, education). All elements operate together to unlock, or limit, the potential of DR.

more common, and electricity retailers are offering more small customers either exposure to the wholesale spot price of electricity or incentives that mimic it while limiting customer risk.

The Senior Officials attending the late 2019 COAG Energy Council accepted a Determination RIS[2] requiring that a GEMS determination mandating national compliance with AS/NZS 4755 be drafted by 1 July 2021. Whilst the SCO ratified this decision, we understand that Minister Taylor did not accept the decision based on analysis by the Commonwealth Office of Best Practice Regulation that found that the determination was flawed:

> *A draft Decision RIS was prepared for this proposal, however the OBPR assessed the level of analysis in the RIS as not adequate nor commensurate with the potential economic and social impacts of the proposal. As the decision to introduce demand response capability requirements for selected appliances was based on this draft Decision RIS, the Energy Council is non-compliant with the COAG best practice regulation requirements[3].*

The OBPR and the Minister's positions were informed by feedback from industry participants that the unsophisticated approach to demand response outlined in 4755.3 was not suitable for Australia.

Further complicating the issue is that the Commonwealth received legal advice at the end of 2020 to the effect that demand response requirements could not be mandated under the current GEMS Act, and that the legislation would need to be amended to allow this to occur.

The delay to plans for a federal mandate of demand response capability has evidently inspired South Australia's proposal to "go-it-alone" with a 4755 mandated architecture for demand response. But there are new risks in a single-state approach, and an accelerate approach, that go beyond those concerns already raised in relation to a national mandate.

This submission covers the perspectives of:

1. electric vehicle and related equipment suppliers from our EV Member Reference Group;
2. electric hot water systems supplier perspectives from our Australian Water Heating Forum; and
3. air conditioning supplier perspectives.

We have not provided specific comment on the "Swimming pool pump controllers" product category.

---

[2] Regulation Impact Statement for Decision: 'Smart' Demand Response Capabilities for Selected Appliances October 2019.

[3] Smart Demand Response Capabilities for Selected Appliances | Regulation Impact Statement Updates (pmc.gov.au)

SPECIFIC COMMENTS

1. Electric Vehicles

Summary

Electric vehicle uptake is embryonic in Australia and Australia's ability to drive compliance with unique standards is very limited given this tiny market. Australia already has access to fewer models of EV than other economies with more developed EV infrastructure and supporting policies, and a unique national standard for chargers could further restrict this range. EV charger suppliers have raised concerns that the costs of compliance may be much higher than currently estimated. The EV component of AS/NZS 4755 is much less advanced than other components and relevant international standards are developing (including Open Charge Point Protocol (OCPP), IEC 15118 and IEC 63110).

Ensuring that EV charging is managed to avoid network-level peak demand impacts, and indeed to help the electricity system to work better, is an important problem given the potential of EVs to alter the pattern and profile of demand. But given the low and slow uptake of EVs to date it is also a medium-term problem in Australia, and one which many parties are already working on.

Ai Group and others are arguing for coherent support policies to encourage faster uptake of clean vehicles, and against the early introduction of policies such as EV-specific taxes that would discourage takeup.[4] In the meantime, faster regulation in individual states cannot deliver improvements to network outcomes, because there is no meaningful controllable EV load and the standards aren't ready. Faster regulation in this space can certainly deliver higher cost and confusion to consumers, and challenges for equipment suppliers and manufacturers.

Benefits of accelerating EV charger DR standard are negligible

EV charger suppliers believe that there is negligible benefit associated with accelerating the COAG Decision RIS provisions with respect to EV charging in South Australia. This viewpoint aligns with the GWA report on which the DEM proposal to accelerate the imposition of the COAG decision RIS is based, and has been acknowledged by DEM in response to this query being put in the consultation session. This is essentially because the number of EVs on the road will still be very small through to the commencement of the original COAG timeframe (the base case).

In terms of energy (as opposed to calculated dollar value benefit), the difference in outcome in the GWA report between base case (original COAG timeframe) and accelerated case is identified as being 1 MW of DR capability associated with EV charging, irrespective of activation levels being low, medium or high.

[4] See Ai Group's media release of 12 April 2021.

Given that South Australia's projected maximum operational demand in 2025 is around 3,300 MW; and that projected minimum demand of 95 MW in the same year reflects 1,184 MW of rooftop PV output; a 1 MW DR resource from EVs would not make a significant contribution to the system.

However on closer examination, suppliers believe that even 1 MW may be significantly overstated.

The reality is that there will be minimal EVs joining the SA vehicle fleet over the next 5 years unless we see an immediate and massive change in federal and state government policy in the direction of offering substantial subsidies for buyers. Of those EVs in the market, to participate in a demand response event, the driver/consumer needs to:

- be using a DR compliant EV charger (rather than a General Purpose Outlet (GPO) or a non-compliant charger);
- activate their EV charger to a DR scheme; and
- be otherwise likely to charge their EV at the time that a DR request goes out; this currently appears quite rare:
    - for minimum demand events, typically around midday, vehicles will generally be away from home, and overseas evidence suggests most charging will take place at home; and
    - for peak demand events, typically in late afternoon and early evening, vehicle owners are already incentivised by existing peak tariffs to avoid charging at these times (and the onboard systems of popular EVs enable them to select overnight charging easily).

An example calculation taking into account these factors is:

- 60,000 new vehicles sold in SA in 2025, 3% of which are plug-in electric (up from 0.6% today);
    - For context, California achieves ~8%, with a package of subsidies worth up to ~USD$10k per vehicle;
    - By comparison, South Australia is considering a new road user charge on EVs, rather than a subsidy.
- 50% of consumers elect to use GPOs, rather than EV chargers, for domestic EV charging (common practice in developed markets, because it's the cheapest solution);
- 50% of EV chargers are DR compliant (because achieving compliance will take time);
- Average EV charger is 7kW (normal today);
- DR activation rate is 15% (on the high side for a newly launched program of this type, but plausible);
- Incidence of EV chargers actually presenting load when DR is called for, 10%, because:
    - Anyone sufficiently interested to participate in a DR scheme is probably already charging their vehicle off peak, or with their own solar, as a matter of course; and
    - Daily recharging needs of a typical EV will be met in ~90 minutes on a 7kW charger.

This would create a total nominal DR outcome of a little under 50 kW. To lift this number to the 1 MW claimed in the report, multiple ambitious assumptions would need to be made.

In short, whether we accept the stated 1 MW estimate or a more realistic lower figure, it is difficult to understand how benefits in energy terms that are this small could justify the work required in accelerating the creation and/or adoption of standards and regulations for EV chargers two years faster than is currently planned under the COAG decision RIS.

Alignment with international standards

AS 4755 does not currently address Electric Vehicles. An attempt was made in 2012-2013 to create AS4755.3.4 (essentially a DRED interface built into the EV charger), but following industry feedback, the process was halted. The current document (AS 4755.3.4) is not fit for purpose in the view of industry.

AS 4755.2 could potentially incorporate EV charging in future but does not include it at this time. Any work of this nature would need to be considered in a revision to the existing draft of AS4755.2, at some time after publication of the current work in progress.

There has been significant work done internationally around standardising remote communication to and control over EV chargers. This includes functionality not just for demand response, but also for user authentication and billing purposes. OCPP is the *de facto* standard currently in place for communications to EV chargers and is supported by the majority of global manufacturers of EV charging equipment. IEC63110 is the formal IEC standards-based successor to this *de facto* standard and is currently in draft; direct text adoption of this standard would be a possibility for the Standards Australia committee EM-001 to consider in due course.

The EV industry is very much aligned around the benefits of adhering to global standards where possible, rather than creating our own unique Australian requirements. It is important to note that while Australia is at the forefront of the transformation of the electricity system (and thus may need to pioneer responses in advance of many countries), we are at the back of the pack in the transition to electric vehicles (and thus can and should learn from others and adopt consistent approaches where they are suitable for Australian conditions)

Probable consumer responses

For the early adopters buying $100k+ Teslas, spending $2k-$3k procuring and installing an EV charger at the time of buying the car is a non-issue. A relatively small hardware cost difference will make no difference to their decision in the majority of cases.

Where consumer behaviour changes significantly is when the cars enter the mainstream price brackets, and the buyer is shopping in the $20k-$45k range, either for low priced new EVs like the recently launched MG, or second hand mid-range EVs like the Outlander PHEV, Nissan Leaf, Hyundai Ioniq/Kona, etc. Surveys taken in Norway (of thousands of mainstream EV adopters) indicate that about two thirds of drivers just use a standard

existing GPO (a normal 10A power point) at home to charge their car on a regular basis.

For the consumer looking to save money, the relevant cost difference isn't a choice between a ~$2000 install for a 'basic' EV charger and a ~$2300 install for a 'smart' charger that has secure connectivity and control capabilities of the type covered in AS4755.2, OCPP, and IEC63110. The choice is between ~$2000 and $0, because the cable that connects the car to a GPO is an accessory supplied as standard with the car, and the GPO is already on the garage wall.

It is difficult to see how it would be financially viable for the DR aggregator to close this gap, because DR control over a 7kW EV charger is not worth $2000. As a reference point, the "Peaksmart" program offers an incentive of $200 for air-conditioning equipment at this size, and the air-conditioning asset is far more likely to be operational during a DR event than the EV charger.

The consumer bias towards using existing GPOs can be expected to be strong in SA, because the housing mix is biased strongly towards standalone dwellings with off-street parking, as opposed to a mix including lots of inner city dwellings where there's no convenient existing GPO to use, such as high rise apartments in Melbourne and Sydney. The cost-conscious consumer is the one who is most likely to accept external DR control in exchange for an incentive, however they are also the least likely to actually install an EV charger.

These issues may be manageable with different approaches, including embedding energy management capabilities in vehicles (rather than chargers) or at the whole-of-house level. However, these are not within the scope of the current proposal and would take considerable development.

Probable industry responses

Depending on the nature of the regulatory requirement:

- If there is no regulatory intervention, then the situation will be business as usual. Some EV owners will install unmanaged (non-DR capable) EV chargers.

- If there is a regulatory intervention that mandates charging equipment be capable of OCPP communication, then industry will start supplying OCPP-capable EV chargers into SA. These products typically cost $200-$300 dollars more than basic EV chargers but are readily available in the Australian market from multiple vendors. Industry would expect that the mix of installations in the market will shift slightly in favour of home charging using GPOs, because this will cost less for the consumer.

- If there is a regulatory intervention that mandates that EV charging equipment be compliant to a unique local standard, industry will likely steer consumers toward installing and using 15A GPOs for charging purposes. This will avoid industry bearing the cost of developing a unique product to suit the small Australian market (or the even smaller

South Australian market). For reference, a 15A GPO will deliver a 200km recharge to an EV overnight; registered vehicles are driven an average of around 30km per day, albeit with very wide variation.

- If the regulatory intervention mandates AS4755.2 (assuming AS4755.2 is updated in due course to include EV charging), on the basis that compliance with AS4755.2 can be achieved for EV chargers using industry standard communications protocols such as OCPP and IEC63110, industry would seek to clarify whether OCPP communications capability alone is sufficient to meet the requirements. If there are any additional requirements in AS4755.2 that would require unique localisation, the industry response will likely be to steer consumers toward installing and using 15A GPOs for charging purposes, per above.

Comments on issues raised at DEM consultation session – 17 March 2021

i. Alternative standards

As noted above, OCPP is a de-facto communications protocol standard commonly used by many EV charging equipment manufacturers. It allows for remote start and stop of charging sessions, as well as limitation of maximum charging rate in 1 Amp increments. This delivers the same functional capabilities as DRMs 0 through to 4. OCPP has many other features as well and is designed for implementations of a central control system over geographically distributed charging assets. It is not limited to being a demand response protocol.

As noted in the DEM document, DRMs 5 and 8 are called for in the proposal, but are not actually required unless the EV charger is capable of export to the grid, which the vast majority will not be (based on current local and global trends).

IEC63110 is a draft standard, intended to deliver the same capabilities as OCPP, but as an actual international standard. As noted above, direct text adoption of this standard would be a possibility for EM-001 to consider in due course.

As an alternative solution it is also possible for the DR aggregator to communicate directly with the consumer, who can then exert the control over the loads at their premises. This approach has been demonstrated to successfully work at scale in Australia by United Energy (Summer Saver), Powershop (Curb your Power), and Energy Australia (Power response). Firmness of response has ranged from 50% to 70%, based on various publicly available reports. This approach requires smart meters, but in the presence of smart meters, requires no special additional hardware, and can be retroactively applied across existing installed electrical appliances – it will work with GPOs, as well as EV chargers, as well as any/all other discretionary loads.

ii. Lack of 4755 compliant models

At this stage, there is no published part of AS4755 that manufacturers could design and build EV chargers to.

Per comments above, manufacturers will be highly unlikely to invest in the development of EV chargers compatible with the AS4755.1 / AS4755.3 approach, even assuming that this standard were re-written, successfully published against predictable opposition, and then mandated. It would require a unique design at the hardware layer for the Australian market alone, against a negligible market size that can be served with alternative existing products not subject to this regulation, at lower cost.

The same will be true if the AS4755.2 implementation for EV charging (if/when written and published) has any requirements that go beyond the capabilities of globally standard EV charging products.

If the intent is to utilise AS4755.2 to avoid the need for unique Australian EV charging hardware, then this would likely mean that the compliant EV charging hardware would be leveraging its OCPP communications capability in order to claim compliance today, and potentially IEC63110 capability in future.

Given this, the logical step ***if*** standardised communication/control to the charging asset is needed would be to step away from AS4755 for this use case and require OCPP or (when finalised) IEC63110 communications capability built into the charger.

Recommendations

EV charger suppliers recommend that South Australia:

- Take a wait and see approach in the near term to DR in electric vehicle charging, rather than over-regulate early and potentially disrupt the market. EV is a developing area and time should be taken to observe and determine world's best practice as it emerges. Australian jurisdictions should replicate overseas experiences in jurisdictions like Norway and California by running trials and deriving learnings.

- Encourage cost reflective pricing as a key contributor to medium term solutions. EV drivers already have considerable control over when their vehicle draws energy from the grid, limited by the availability of suitable charging infrastructure at different places they may park in the course of their activities.

  If consumers are incentivised to avoid using energy at typical peak times (now late afternoon and early evening) to charge their vehicles, they will do so, because there is a significant financial advantage and negligible loss of consumer amenity. A typical EV driver will use 3000 kWh of energy per year for their vehicle. The difference between 35c/kWh flat rate and 10c/kWh off peak (or "solar fit") is worth $750/annum. This incentivisation will work whether the consumer is using a smart charger with DR capability, a 'basic' charger without DR capability, or a GPO. The challenge is getting consumers off flat tariffs, and onto time of use tariffs.

Encouraging consumers to charge at typical times of very low demand (now around midday) is more complex, since many people are not at home during the day and this must involve encouraging and supporting away-from-home charging. While that cuts against the grain of typical EV driver behaviour in other countries, it may be a very positive initiative; but it raises difficult issues well beyond the scope of the current proposal and consultation.

2. Hot Water Systems

Summary

This section of the submission reflects the recommendations of suppliers in the Australian Water Heating Forum.

Suppliers welcome the Department's acknowledgement that electric water heaters have a significant role to play in keeping the South Australian grid secure and reliable as it transitions to a very high renewables share and as some other activities electrify. The Department's plans to wind back restrictions imposed a decade ago on the installation of electric water heaters in existing homes brings the state closer to the prevailing regulations across the rest of Australia.

Suppliers do not support the proposal to require all electric water heaters installed in South Australia after 1 July 2021 to be compliant with AS/NZS 4755. The reasons for their lack of support include the importance of consistent national regulations; the unachievable timeline for making compliant product available for both 2021 and 2023; and that the costs to consumers of both product and activation will be significantly more than has been estimated in the report underpinning the initiative.

National alignment

The South Australian proposal assumes that all Australian States and Territories will soon be subject to a GEMS demand response determination, based on a decision made by COAG in late 2019. As noted above this outcome appears unlikely; implementation of the COAG proposal has been at best delayed, and potentially halted, by the reservations of the responsible Minister regarding regulatory best practice and legal advice. Thus an SA mandate may be unique, potentially for an extended period.

If SA goes it alone and imposes a unique requirement, suppliers' compliance costs – additional design, testing, tooling and equipment – could not be assumed to be recovered across the entire Australian market.

Timetable for change

Suppliers advise that if the South Australian regulator was to proceed per the current proposal then there would be no compliant options on the market from 1 July 2021. Thus South Australians would be unable to replace their electric water heater from 1 July 2021, and would be forced to make alternative, less desirable arrangements that will be more

costly for households and which may result in higher GHG emissions.

If industry were to commit to developing a 4755.3 product today, it is likely to take 12 to 18 months to complete the new product cycle of product design, lab and field testing, certification, factory tooling, material sourcing and production that would be necessary for even a simple change for our product range. Obviously, this timeframe will constrain the industry from being able to supply product from the proposed implementation date of 1 July 2021.

Whilst there are some products already on the market that can provide functionality similar to 4755.2, it is as yet unclear whether these will meet the final requirements of the new standard. The proposal, especially as it relates to a requirement for 4755.2, appears to overlook the fiscally responsible approach that business is required to take regarding the development of new products. A significant capital expense will need to be incurred to develop new products, however the allocation of financial and human resources cannot commence until there is certainty about what is required, and certainty around the potential size of any opportunity. As 4755.2 is yet unpublished, and as activation rates are widely variable, it is impossible for manufacturers to know whether an investment has a potential payback that meets their internal hurdle rates for investment.

The two-step approach of mandating 4755.3 in 2021, to be superseded by 4755.2 in 2023 for larger products, will further discourage the development of 4755.3 products. If a supplier is to undertake a significant development of a new product, it is essential that they are given sufficient time in the market to recoup their expenditure. It is highly unlikely that any manufacture would develop a product with a regulatory life of just two years, as it would be impossible to recover their investment in such a short time.

Any water heater that must comply with either 4775.2 or 4775.3 will require the addition of a range of electronic componentry not readily available in Australia, so product development and availability in the near term will be severely impacted by the current global shortage of semiconductors and other electronics componentry. Even basic materials such as stainless steel currently have a 10-month lead time from order to delivery, whilst electronic component suppliers are requesting orders 2 years in advance. This situation must be factored into any regulatory decisions regarding implementation dates.

As a result of the above, suppliers do not believe they will be able to supply product to meet the proposed timeline of July 2021 for 4755.3 implementation, nor that they will likely be able to meet the July 2023 timeline for 4755.2 implementation unless the standard is published within the next few months. They are concerned that if the proposal proceeds as intended, that South Australians will be unable to legally replace their electric water heaters if their existing heater fails after 1 July 2021.

If existing products are banned from sale and compliant products are unavailable, it is our expectation that households will either install alternative solutions (such as gas water heaters) or resort to buying electric water heaters from Victorian border towns and

undertaking illegal installations. Neither of these solutions would appear to be useful in addressing South Australia's demand response problem.

Activation rates

The EES document supporting this initiative is quite clear in identifying that the project will succeed or fail based on the rate at which consumers will activate their new demand response products.

> *The most important conclusion from the analysis in this report is that the activation rate is absolutely critical to making this policy cost effective.* [5]

Suppliers agree with this premise but fear that the activation rates forecast in the proposal may turn out to be considerably overstated unless there are major changes both to current proposal and wider energy market policies and market settings. If so, the benefits arising from the current proposal would also be overstated.

One of the issues that consumers will consider regarding the activation of a demand response appliance, is whether their amenity (or enjoyment) will be impacted by any demand response event. If demand response events are perceived as likely to impact unduly on a household's access to hot water, it is unlikely that the household will activate their appliance's demand response capability.

A product compliant with 4755.3 potentially poses a significant risk to a consumer's amenity, as the appliance is not able to report back to an aggregator the charge state (amount of hot water available to the home) of the product, and is subject to being switched off even if the charge state is below the volume that is required by the homeowner. The more sophisticated 4755.2 version of the standard addresses this issue via the provision of 2-way communication between the aggregator and the appliance, enabling a range of approaches by aggregators including engaging only those households that will not have their amenity impacted by participation in a demand response event.

Further, suppliers are concerned that 4755.3 does not facilitate a limit on the number of daily or life "switchings" as is prescribed in 4755.2. This gap could allow aggregators to use the capability of water heaters to hedge against and respond to wholesale market price fluctuations, such as negative price periods, with a frequency that is excessive from the perspective of consumers.

These risks could be managed through a combination of consumer protection laws, appropriate contractual terms, sensitive practices in customer management by aggregators, and education of consumers and aggregators. But with small user demand response customer protections still under review, and none of the rest of such a strategy in place, the concern remains.

[5] Pg 11 Review of Residential Sector Hot Water Requirements for South Australia Final Report, October 2020, Prepared by Energy Efficient Strategies with George Wilkenfeld & Associates and Common Capital.

In summary, mandating the 4755.3 standard in its current form and without supporting protections and other strategies in place potentially creates a safety risk (no legionella solution), an amenity risk (no hot water when required), no visibility to the householder (is it connected? is it charged?) and durability concerns (potentially limitless switchings). Unless households and plumbers can credibly be reassured on all these fronts, owners of 4755.3 compliant products will be highly unlikely to activate their water heaters, regardless of any financial incentives offered by aggregators.

Suppliers are concerned that further issues will greatly reduce the likely activation rates and value of activation of small electric water heaters. 50L water heaters, which make up approximately 75% of the “small” category outlined in the consultation, are normally installed in small 2 person households, predominantly located in class 2 buildings. The average 5 minute shower will consume more than 50% of the hot water in a 50L tank, so for two occupants to have consecutive showers in the morning (as is typical) the water heater must commence its re-heating cycle even before the first shower is complete.

Demand response events are most likely around midday (for low demand events) and late afternoon (for peak demand events). Thus the typical usage patterns of these small heaters are unlikely to yield much actual response capacity. Furthermore, if a demand response event did occur during typical shower times, owners of 50L systems would experience an intense loss of amenity. These issues are likely to mean little interest from either consumers or aggregators in activating 50L systems.

The industry also understands that approximately 95% of the existing fleet of large electric water heaters in South Australia are already connected to off-peak metering. Historically this caused a bump in electricity demand after midnight. The shift in pricing and tariff structures to reflect the new reality of mid-day low demand (including the ‘solar sponge’ tariffs) would seem to deliver most of the benefits of hot water controllability – reducing energy use in typical peak times and increasing it in typical times of low demand – without any of the implementation costs.

Underestimation of Costs

The level of additional capital cost of water heaters under an early mandate is critical to the level of net community benefit or detriment from this reform.

Initial supplier cost estimates, and one supplier’s actual experience in both developing demand response capable products and activating them in the field, indicate that the cost assumptions underlying the proposal are too low and that the net benefits will be much less favourable than currently estimated. The cost components in the report are considered in turn below.

DRM 1 capability:

The report states that:

> *"…an accelerated timetable for South Australia (Policy Options B2, B4 and B5) will have a slightly higher initial costs, estimated at $100 per unit, falling to an equivalent cost by 2025 as the impact of the South Australian acceleration dissipates and all water heaters are shipped with DRM1[6]."*

It is the industry's view that the cost of $100 per unit additional cost is fairly accurate, however this is likely to be the long run incremental cost to manufacturers, not a short-term cost that will reduce as volumes increase. The process of manufacturing products suitable only for the South Australian market is likely to drive this $100 cost even higher as manufacturers attempt to recover the costs of increased complexity on their manufacturing and logistics operations. South Australia may anticipate that a State mandate would lead suppliers to build compliant capability into all product supplied into Australia. However SA is not a large market and supplying only to other States would be a viable strategy, particularly for imported products. This competitive tension would prevent suppliers from making all national product compliant with SA requirements, and thus from spreading development costs across all customers, until and unless there is a national mandate.

The calculation also fails to take into account that the incremental price increase to consumers is likely to be substantially greater than the base production cost increase. Suppliers will seek to maintain product margins; fund increased warranty issues (due to potentially increased thermal cycling with DR), meet internal return on sales hurdles and recover the development and capital costs of the new products. The industry estimates that the $100 cost uplift will likely result in a long-run $150-$200 uplift in consumer prices once these increased costs wind their way through the industry and its channels to market (ie suppliers, merchants, plumbers). For small water heaters this will add up to 50% to the price of the water heater.

The lower estimates in the report may reflect lack of consideration of the commercial drivers for supply and manufacture of products; or a failure to differentiate between the incremental cost of demand response compliance on appliances that are already electronically sophisticated, such as air conditioners, and those such as traditional electric water heaters that respond only to power availability.

DRM 4 capability

The GWA report states that:

> *"…the recent South Australian report on demand response capabilities in appliances (George Wilkenfeld and Associates 2020) has revised this cost to $40 falling gradually to $5 by 2036.In the accelerated timing scenarios for South Australia, this cost increases to $50 per unit for the first two years before dropping back to the base case cost[7]."*

[6] Pg 87 Review of Residential Sector Hot Water Requirements for South Australia Final Report , October 2020, Prepared by Energy Efficient Strategies with George Wilkenfeld & Associates and Common Capital.

[7] Ibid 90.

DRM 4 differs from DRM 1 as it requires the water heater to "Commence operation or increase load". For a water heater that is already fully charged, the requirement to continue to heat will require both an override of the device's thermostat and a change to the product's components to ensure that the product is capable of operating at higher temperatures than are pre-set at the factory. At the very least a higher grade of enamel lining, which will come at a considerable incremental cost, is likely to be required. The alternative solution is to develop a "smart" water heater that can report its readiness and capacity to respond to a DRM 4 event.

DRM 4 therefore requires a much different water heater than one that purely responds to DRM 1. We have assumed that this is the reasoning behind the proposal to require only water heaters compliant with AS/NZS 4755.2 to meet DRM4 requirements.

AS/NZS 4755.2 will go some way to detailing the basic functions that will be required of "smart" water heaters in the future. As this standard is yet to be finalised, and the compliance requirements of water heaters yet to be detailed, the industry is at a loss to understand how an estimate for the incremental cost of a compliant product was calculated by the authors of the report.

It is clear that 4755.2 will require that the appliance be able to engage in two-way communication between itself and the remote agent/aggregator, which will in turn require a substantial increase in electronic sophistication including accessible memory chips, motherboards and communications boards. Depending on how much suppliers can rely on other local devices versus built-in capability, communication capability alone could absorb the $50 estimate made in the report.

As a result we cannot yet be confident that the incremental cost of a DRM 4 compliant water heater compared to one with only a DRM 1 capability will be as little as $50. The industry fears (supported by the experience of one business) that the true incremental price increase to consumers of a 4755.2 compliant product could be as much as $300- $400, or a 30%-60% uplift in the price they are paying today for a standard electric water heater. It will not be possible to narrow the range of these clashing estimates until 4755.2 is finalised.

DRED Installation and Activation

The GWA report states that:

> *"An accelerated timetable for South Australia would most likely incur a higher cost for the first few years (estimated at $30 per installation connected), compared to a lower cost ($20 per site) under the COAG timetable. Note that these are one off costs associated with each installation to connect the DRM control to a suitable communications gateway and the costs are proportional to the assumed activation rate[8]."*

[8] Ibid 87

Putting aside the likelihood that South Australia cannot expect the Commonwealth to meet the timetable discussed at COAG (see earlier comments on this issue), the industry believes that the $30 activation cost is considerably understated. Further, given that there is currently little aggregation of water heaters and no agreed method of communication with these devices it is hard to be confident in any cost estimate.

As electric water heaters are “declared” devices, plumbers with restricted electrical licenses are limited to re-connecting only those electrical connections already in existence from a previous installation. Making further changes to the water heater’s electricity supply will require an electrician to be in attendance. Depending on the nature of the water heater and the DRED, if a simple electrician service call is required to connecting a DRED style device to the switchboard, this would cost $150 or more.

If the estimate of $30 has been based on the activation costs associated with the Ergon “Peaksmart” program for air conditioners, we would point out that this program’s activation was built on an existing ripple control network, and that activation was made whilst an electrician was already on site for the installation of the air conditioner. Neither of these conditions will necessarily apply to the installation or activation of a water heater.

The GWA report states:

> *“The cost of activation is assumed to be zero for DRM4 as the same activation system would be used for DRM1 and DRM4 and any water heater connected to DRM4 would also be connected to DRM1, so the marginal cost is zero*[9]*.”*

As indicated above, DRM 4 compliance will only be required on water heaters that are compliant to the yet to be finalised AS/NZS 4755.2 standard. These will be more sophisticated products that will need to be connected to a home’s router, by wi-fi or comms cable, or capable of communicating directly with an aggregator over the mobile data spectrum. Such capability will require a dedicated continuous power supply at the water heater. The process of undertaking such an install is likely to be beyond the capability and licensing of most plumbers, and the product’s installation and connection will need to be undertaken by a specialist provider.

Given the additional complexity that is expected to be required under 4755.2, the industry estimates the additional cost of installation for a 4755.2 compliant heater to be approximately $400.

Recommendations

If the DEM proposal proceeds in its current form and timeline, then there is a serious risk of a lack of compliant, affordable water heating products available to South Australians, particularly in the small heater category. This in turn risks two perverse outcomes that would undermine the State’s policy objectives:

[9] Ibid 90.

i. more consumers install gas water heating; or
ii. consumers may attempt to purchase non-compliant water heaters from interstate and install them illegally.

To avoid these risks, water heater suppliers recommend that with respect to water heaters South Australia:

- Align the timing for the introduction of any new South Australian water heater regulations with those that occur at a national level.

- Avoid the stranded assets that 'dumb, one-way communication' 4755.3 compliance will deliver to consumers.

- Exclude electric water heaters less than 125 litres in size from any demand response requirements, due to their limited potential contribution to demand response and the high proportional cost of compliance.

- Allow three (3) years from the publication of 4755.2 before mandating it as a requirement, to allow sufficient time with a finalised standard for product development to occur.

- Investigate international demand response appliance standards that may potentially offer a lower cost of compliance than AS/NZS 4755.

3. Air - conditioning systems

Ai Group air-conditioning members prefer a national approach to DR prepared with thorough consultation and careful consideration of all of the issues. This will lead to better outcomes for both Australians and South Australians particularly

Air conditioning suppliers' greatest concern is the risk that regulatory approaches are fragmented across different jurisdictions. Subject to that overriding concern, suppliers prefer voluntary adherence to the 4755.3.1:2012 version of the standard. They are worried that the significant compliance costs of a mandatory standard – especially the 4755.3.1:2014 version – would limit the range of models in the market to the highest-selling and least energy-efficient or potentially extremely small amount to no compliant products into SA.

Recommendations

Air conditioning suppliers recommend that South Australia:

- Provide sufficient time three (3) years from the publication of 4755.2 before mandating it as a requirement, to allow product development to occur. Particularly given the cyber security concerns here the amount of transition time needs to fully take the challenges

into account. Compliance to 4755.3.1:2012 are to remain until 4755.2 becomes mandated.

- Reconsider its approach and engage in further consultation, given the lack of a finalised industry standard; the fact that currently servers to manage air conditioners are located overseas; and the challenges involved in incorporating demand response into wireless systems.

- Exclude air conditioning units under 4kW, as the costs are many times greater than any potential benefit. In the Queensland trial of demand response, split systems air conditioners smaller than 4kW were precluded as the costs clearly outweighed the benefits.

All supplier sectors would welcome the opportunity to discuss this further with the South Australian Government, please contact James Thomson
Senior Adviser - Standards and Regulation on james.thomson@aigroup.com.au

Yours sincerely

Louise McGrath
Head of Industry Development and Policy
Australian Industry Group