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

Thank you for the opportunity to comment on the above consultation papers.

As the largest Australian manufacturer of water heaters, Rheem markets a wide range of solar, heat pump, high efficiency gas and electric water heater models to the domestic water heating market. Our brands include Rheem, Solahart, Vulcan and Aquamax. Additionally, we are now the number three supplier of photo voltaic (PV) systems in the country via our Solahart channel. Over the last three years we have also commenced the manufacturing and installation of smart electric water heaters, controlled remotely by a technology partner.

Rheem welcomes the Department's acknowledgement that electric water heaters have a significant role to play in addressing the instability and unreliability issues associated with the South Australian grid. 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.

Rheem does not, however, support the proposal to require electric water heaters installed in South Australia after 1 July 2021 to be compliant with AS/NZS 4755. The reasons for this position include our long standing support for consistent national regulations rather than state based appliance initiatives, our belief that the proposed timing for the availability of compliant product (in both 2021 and 2023) is unachievable, our estimation that likely activations rates of the appliances have been overstated, and our knowledge that the costs to consumers of both product and activation will be significantly more than has been estimated in the report underpinning the initiative.

Support and justification for these positions have been expanded upon in the following four points:



1. No Alignment with National Regulations

The South Australian proposal is predicated on the DEM's expectation that all Australian States and Territories will be subject to a GEMS demand response determination within the next 2 years, based on a decision made by COAG in late 2019. This assumption is not correct and hence decisions and financial calculations based on this assumption are incorrect.

The Senior officials attending the late 2019 COAG Energy Council accepted a Determination RIS¹ requiring that a GEMS determination be drafted by 1 July 2021 that mandated, amongst other things, that all electric water heaters 50L and above would need to comply with the until then voluntary standard, AS/NZS 4755, for products registered after 1 July 2023:

Compliance with demand response mode 1 (DRM1) to be required, for electric storage water heaters of 50 to 710 litres (inclusive) nominal capacity subject to MEPS (excluding heat exchange water heaters), registered after 1 July 2023.

Whilst the SCO ratified this decision, Minister Taylor refused to 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 requirements².

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.

As a result of the above, and based on further consultations on the issue, the Commonwealth agreed to participate in the development of a more sophisticated standard, 4755.2, and to delay the preparation of the draft determination until after this was complete. 4755.2 has yet to be finalised by EL-054 and therefore, no determination has yet been drafted, and there is no timeline for its implementation.

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. As plans for a federal mandate of demand response are now delayed, many of the assumptions underpinning the South Australian proposal are now questionable.

Not least of these are any of the assumptions made around incremental product cost. As South Australia only represents less than 10% of the national market for electric water heaters, any

¹ Regulation Impact Statement for Decision: 'Smart' Demand Response Capabilities for Selected Appliances October 2019.

² [Smart Demand Response Capabilities for Selected Appliances | Regulation Impact Statement Updates \(pmc.gov.au\)](https://pmc.gov.au/smart-demand-response-capabilities-for-selected-appliances-regulation-impact-statement-updates)

assumptions that the cost of additional design, testing, tooling and equipment could be amortised across the entire Australian market are not valid. Additionally, any assumptions regarding the potential cost savings associated with buying components in bulk from suppliers are similarly misplaced.

2. An Unrealistic Timetable for Change

The proposed timing of the initiative is not realistic in relation to industry capability, industry investment procedures, the lack of black letter law and a disregard for well publicised and acknowledged supply chain issues associated in part with COVID-19. If the South Australian regulator was to proceed per the current proposal, 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.

Rheem has not commenced design and testing of electric water heaters to 4755.3 for the reasons outlined above. Primary amongst these issues is the water heater industry's unanimous belief that 4755.3 is a flawed standard and that regulators would be unlikely to mandate it given its significant shortcomings.

If Rheem was to commit to developing a 4755.3 product today, it is likely to take 12 to 18 months to complete the new product development 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 Rheem from being able to supply product from the proposed implementation date of 1 July 2021.

With regard to timings for the mandating of 4755.2, a longer timeframe is likely to be required to have products available to the market, however Rheem already has a significant head start through its existing investment in smart water heating. Whilst we currently supply products with 4755.2 "type" functionality, it is as yet unclear whether these will meet the final requirements of the new standard.

A significant capital expense will need to be incurred to develop compliant product, 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 have been wildly overstated, it is impossible for Rheem to know whether an investment has the potential payback that meets their internal hurdle rates for investment. Any development activity for 4755.2 compliance would therefore only commence once the standard is published, and we have visibility to the details of exactly what is required to meet the new standard.

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

manufacturer 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. As a result, the development and availability of compliant products will be severely impacted by the current global shortage of semiconductors and other electronic componentry. Even basic materials such as stainless steel now 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, Rheem believes that it will not be able to supply product to meet the proposed timeline of July 2021 for 4755.3 implementation, and that it is unlikely that it will be able to meet the July 2023 timeline for 4755.2 implementation unless the standard is published within the next few months.

We are therefore concerned that, if the proposal proceeds as intended, 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.

3. An Overestimation of 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.³

We agree with this premise but believe that the activation rates forecast in the proposal are considerably overstated and that, as a result, the benefits arising from the proposal are also 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 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.

³ 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.

A product compliant with 4755.3 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 aggregators to engage only those households that will not have their amenity impacted by participation in a demand response event.

Further, Rheem is concerned that 4755.3 fails to place a limit on the number of daily or life "switchings" as is prescribed in 4755.2. This shortcoming could lead to aggregators "abusing" the capability of WH to hedge against and respond to wholesale market price fluctuations, such as negative price periods.

The shortcomings of the 4755.3 standard include a safety risk (no confirmation that conditions preventing the growth of legionella have been maintained), an amenity risk (no hot water when required), no visibility to the householder (is it connected? is it charged?), durability concerns (potentially limitless switchings), and easy, undetectable disconnection from the remote agent. Once these issues become common knowledge amongst households and plumbers, owners of 4755.3 compliant products will be highly unlikely to initiate and maintain activation of their water heaters, regardless of any financial incentives offered by aggregators.

With specific regard to small electric water heaters, we would expect that activation rates will be extremely low. 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. As the average 5 minute shower will consume more than 50% of the hot water in a 50L tank, the ability of two occupants to have consecutive showers in the morning (as they would expect to do) relies on the water heater commencing its re-heating cycle even before the 1st shower is complete. Interposing a demand response event during this time or limiting access to energy to only those parts of the day when energy is more plentiful, will destroy amenity. Once this issue is commonly understood, activation of small water heaters will drop to minimal levels.

Compared to 4755.3 products, the activation of 4755.2 compliant products may pose less of an issue. This is because, unlike 4755.3 solutions that only add cost for the consumer, 4755.2 solutions can incorporate additional benefits like user apps for temperature settings, warnings, vacation mode etc. Smart water heaters that are compliant to 4755.2 can also form part of a home energy management system that can facilitate PV self-consumption and ToU tariff arbitrage. Importantly, a remote agent can detect when a 4755.2 appliance is offline.

Regardless of the above, Rheem understands that approximately 95% of the existing fleet of large electric water heaters in South Australia are already connected to "off peak" metering. Whilst we understand that there are plans in development for a roll out of smart meters we consider it likely that consumers with ongoing off peak access will continue to connect their new water heaters to these meters, undermining any financial benefits that may arise from the activation of water heaters compliant to any part of the standard.



An Underestimation of Costs

Just as activation rates are important in lowering the costs and increasing the benefits to the community of undertaking this exercise, the additional capital cost of water heaters, how this translates to additional consumer prices, and whether this in turn reduces demand for electric water heaters, is critical in justifying this initiative moving forward.

Unfortunately, it is Rheem's view, based on experience in both developing demand response capable products and activating them in the field, that the cost assumptions that support the proposal are incorrect. As a result, the initiative is unlikely to deliver against its proposed objectives.

If we deal with the costs outlined in the report, it is worthwhile looking at the assumptions of the components of cost that the authors of the report based their estimates upon. To deal with each of these in turn

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 DRM1⁴."

It is Rheem'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.

The calculation also fails to take into account that the incremental price to consumers is likely to be substantially greater amount than the base cost increase. Suppliers will seek to maintain product margins, fund increased warranty issues, meet internal return on sales hurdles and recover the development and capital costs of the new products. Rheem's experience suggests 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's channels to market (ie suppliers, merchants, plumbers). For small water heaters this will add up to 50% to the price of the water heater.

Noting the significant variance between the consultants' estimates and the Rheem's estimates based on experience, we can only assume that the consultant has either a limited understanding of the commercial drivers for supply and manufacture of products, or has failed to differentiate between the incremental cost of demand response compliance on appliances

⁴ 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.

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 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 cost⁵.”

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 normal. 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 DRM 4 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, Rheem 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.

One requirement that we expect will be required under 4755.2 is that the appliance will need to 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. Communication capability alone could absorb the \$50 estimate made in the report.

It is therefore disingenuous to propose that the incremental cost of a DRM 4 compliant water heater compared to one with only a DRM 1 capability will be \$50. It is Rheem’s experience that the true incremental price to consumers of a 4755.2 compliant product is likely to be closer to \$300- \$400, or a 30%-60% uplift in the price they are paying today for a standard electric water heater.

⁵ Ibid 90.

DRED Installation and Activation

The 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 rate⁶.”

Putting aside the likelihood that South Australia cannot expect the Commonwealth to meet the timetable discussed at COAG (see earlier comments on this issue), Rheem believes that the \$30 activation fee is considerably understated. Further, given that there is currently little current aggregation of water heaters, no agreed method of communication with these devices and no market for demand response services - all factors which will influence the cost - we fail to understand the basis for this figure.

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, such as connecting a DRED style device to the switchboard, will require an electrician to be in attendance. Based on a simple service call, this is likely to cost the consumer at least \$150, if not 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 on site for the installation of the air conditioner. Neither of these situations will be in operation for the activation of a water heater, so does not provide a representative comparison.

Given the above, it is Rheem’s view that the only way that the \$30 fee could be achieved would be by subsidisation - either by the state or by a future aggregator. Regardless, these costs must still be borne by the community, and this does not appear to have been recognised by the authors of the report.

With regard to connecting DRM 4, the 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 zero⁷.”

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

⁶ Ibid 87

⁷ Ibid 90.

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, Rheem estimates the additional cost of installation for a 4755.2 compliant heater to be approximately \$400.

In conclusion, we believe that, if the DEM proposal was to proceed, then the resulting lack of compliant, affordable product available to South Australians will have the perverse outcome of driving more consumers to install gas water heating. Alternatively, consumers may attempt to purchase non-compliant water heaters from interstate and install them illegally. Neither of these outcomes would appear to be aligned to the intention of the initiative.

As an alternative solution, Rheem would propose that the following be considered:

- 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 contribution to demand response and the high proportional cost of compliance
- Provide sufficient time (3 years) from the publication of 4755.2 before mandating it as a requirement, to allow product development to occur
- Investigate international demand response appliance standards that may potentially offer a lower cost of compliance than AS/NZS 4755

As always, Rheem would be more than willing to participate in discussions with DEM to identify workable solutions to the issues that it is attempting to address.

If you wish to discuss this response further, please do not hesitate to contact me.

Yours Sincerely



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