Submissions:
Consultation Paper
'Smart' Demand Response Capabilities for Selected Appliances
By email: smartappliances2019@sa.gov.au

16th September, 2019

Thank you for the opportunity to provide feedback on the consultation paper.

We appreciate that state authorities are seeking measures to reduce future investment in electricity generation, transmission and network to cope with a small number of peak events and offer solutions for periods of negative demand.

We believe the proposed model outlined in the consultation paper prepared by George Wilkenfeld and Associates (GWA) contains flaws that significantly overestimate benefits and underestimate costs. DR control of electric storage water heaters is unlikely to reduce energy prices for consumers or manufacturers who will bear all the additional costs outlined in its model.

We embrace the opportunity to debase incorrect assumptions detailed in the GWA consultation paper before the government mandates DR controls on electric water heaters.

About Dux Hot Water

First established in 1915, Dux Hot Water is the oldest water heater manufacturer in Australia with almost 90 per cent our revenue derived from products locally manufactured in our Moss Vale factory in the NSW Southern Highlands.

As the largest commercial employer in the Wingecarribee Shire, we remain the last manufacturer of large appliances in regional Australia. We manufacture and/or market a comprehensive range of water heaters, including electric storage, gas storage, gas continuous flow, solar, heat pump and commercial water heaters.

After Noritz Group acquired Dux in 2014, it became part of one of the largest water heater manufacturers in the world, with sales exceeding well over two million units annually.

Assumption 1:
DR controls should be mandated for electric storage water heaters.

Dux rejects moves to mandate DR controls for electric storage water heaters.

Mandatory controls are unnecessary because the majority of large electric water heaters already operate exclusively outside the peak (off peak periods), rendering them unsuitable candidates for smart appliance schemes.

"Most larger units are already on controlled load off-peak (OP) tariffs meaning they **do not heat during peak periods"**[1]

"The current **OP water heating tariff is already well developed**"[2]

"Products suitable for smart appliance schemes are **large contributors to peak demand**, or will be in the future"[3]

"Water heaters on controlled tariffs **make no contribution to peak load**"[4]

Detail
Dux has surveyed the largest water heater specialists in Australia, who among them, install tens of thousands of electric storage water heaters annually. Our results show:

- Circa 97% of the 250L to 400L electric storage water heaters connect to off-peak tariff
- 250L-400L electric storage water heaters comprise nearly half the entire market in unit sales (46%). However, in terms of storage capacity, 250L-400L electric storage water heaters comprise nearly three-quarters (74%) of the market's available capacity. Consider 1 x 400L electric storage water heater is equivalent to 20 x 25L units.

Controlled load, off-peak, ripple control technology now manages more than 1.5 million large electric storage water heaters connected to directly household meters rather than appliances.

Adding more technology **would only increase costs** to manufacturers and consumers alike.

Electric storage water heaters act as latent batteries that readily store energy during negative load periods. The ripple control technology can be used to divert excess electricity generation to electric storage water heaters without increasing costs.

Recommendation:

The existing OP tariff is already working effectively. Energy retailers should expand the use of existing ripple control technology in periods of negative demand. Incentives for voluntary DR control adoption should also be considered for those not currently on off peak tariffs

Assumption 2:
Consultation paper model based on inflated annual electric storage water heaters sales

The consultation paper relies on the following incorrect assumptions:

Overstating Australian electric storage water heaters sales **by more than 50 per cent**

It states approximately 530,000 electric storage water heaters are sold annually in Australia[5]

The true sales figure is no more than 350,000 units

Detail

The 530,000 figure represents a doubling of the 270,000[6] units reported in the *2013 Regulation Impact Statement*. The 100,000 units per annum market share in New Zealand is roughly correct. GWA admits that the consultation paper relies on data provided by another consultant for all jurisdictions other than NSW. This data is incorrect.

Recommendation:

The consultation paper relies on unreliable sales data that significantly overstates sales records and the stated benefits are based on incorrect data.

Assumption 3:
Consultation paper model based on inaccurate sales estimates of large and small heaters

The consultation paper relies on the following incorrect assumptions:

Overestimates annual sales of **large electric storage water heaters**

Underestimates annual sales of **small electric storage water heaters**

Details
Large electric sales in NT, ACT and WA are overestimated by circa 90%. All markets have significant variations. In fact, large electric sales and existing stocks in the Northern Territory are more than 20 times the actual amount.

Case study:
Northern Territory 2018 large electric storage water heaters (160L-400L)

	GWA model estimate	**Dux estimate**
Stock levels	56,575 units	<2,700 units
Annual sales	5,272 units	<270 units

Assumption 4:
Consultation paper model based on overstated electric storage water heaters stock levels

The consultation paper relies on the following incorrect assumptions:

The reported 5.1 million electric storage water heaters units in stock in 2018 represented a **grossly-inflated figure**.

Details
The consultation paper applied flawed sales data to determine the existing stock levels of electric storage water heaters. The model proposes a lifespan of approximately eight years for small units and ten years for larger units in Australia.

If the annual market figures are corrected, there are approximately **two million less electric water heaters in stock** than the GWA model proposes.

Hot water specialists and low after-market anode sales reveal few homeowners maintain electric storage water heater to extend longevity despite manufacturers' recommendations.

We believe industry-wide enamelling and welding technology improvements combined with recent anode size increases will likely extend large electric storage water heater lifespans beyond 10 years. However, even with improved longevity, the model stock levels remain overstated by approximately 1.5 million units, thereby rendering the predicted cost benefits unreliable.

Recommendation:

The consultation paper relies on significantly overstated levels that fail to reflect accurate quantities of electric storage water heaters in stock.

Assumption 5:
Inadequate analysis of SMD and WMD water heaters peak load contribution estimates

No detailed analysis conducted on:

Summer Maximum Demand (SMD)

Winter Maximum Demand (WMD)

SMD and WMD estimates for electric storage water heaters in the 2013 Regulation Impact Statement was based on limited personal communication[7]. Although the estimate in the 2019 Consultation Paper changed, it was still based on 2013 EnergyAustralia data[8]

Details
Dux believes the SMD and WMD estimates for electric water heaters is significantly overstated. The GWA model, however, applies overstated peak load contribution estimates to all jurisdictions, despite limited detailed analysis conducted outside of NSW.

Recommendation

More detailed and up to date analysis is required on WMD and SMD for all jurisdictions.

Small electric storage water heaters heat for only short periods

Small electric storage water heaters only consume electricity for relatively short time periods. The rapid heat up time limits effective mass control measures during peak periods. It is highly improbable that the bulk of small electric water heaters could be controlled during High Energy Price Events.

Capacity	Temperature rise	Heating time
25L with 3600 watt element	Inlet water temperature 15°C with a 45 °C temperature rise	24 mins
50L with 3600 watt element	Inlet water temperature 15°C with a 45 °C temperature rise	48 mins

AEMO pricing event reports

Three-quarters of High Energy Price Events (>$2,000/MWh) occurred in summer during the past two years.[9] For every winter event, there were eight summer events. The higher ambient water temperatures and less hot water demand in summer time means further reduced heat up times for electric water heaters.

Demand response for water heaters will be far less effective in reducing summer peak demand[10]

Assumption 6:
Consultation paper model significantly underestimated additional appliance costs

GWA estimates additional appliance costs for electric storage water heaters at $70-$80[11]

The 2013 Regulation Impact Statement estimated those same costs at $5[12]

Details
Although GWA found additional appliance cost on large electric storage water heater had increased significantly since the 2013 Regulatory Impact Statement, its modelling incorrectly estimates additional cost falling over time.

Besides the actual interface, the additional costs that need to be considered include:

- electronic control development costs
- significant retooling costs
- plant modifications
- additional labour and production time
- significant increases in enamel thickness due to DRM4
- weatherproofing
- higher FX dependence
- new drawings, new literature, testing of all products and warranty provisioning

Recommendation

More than double projected additional appliance cost estimates to $200.

Assumption 7:
Consultation paper model significantly underestimated additional appliance prices

GWA estimated increased appliance prices for large electric water heaters at $80[13]

The 2013 Regulation Impact Statement estimated it would add $10 to appliances[14]

Details
Dux rejects GWA's assumption that any additional appliance cost would simply be passed on to consumers at, or below, actual cost.

Recommendation

Increase the projected additional electric storage water heater prices by >$200.

Assumption 8:
Consultation paper model lacks detailed analysis on water heater activation costs

Initial $120 - $140 average activation costs based on AS4755 compliant technology

Details
Modelled activation costs are based on Energex's experience with air-conditioners only.[15] Water heater activations, being mostly external in Australia, are likely very different.

In Australia, licensed plumbers typically install water heaters. Some possess additional restricted electrical licenses to perform like-for-like electrical connections. It is unclear whether existing regulations would allow plumbers to install AS4755 water heaters, which will result in unacceptable delays to consumers and higher activation costs.

Recommendation

Investigate whether current regulations even permit plumbers with restricted electrical licences to install AS4755 modified water heaters and actual activation costs for electric water heaters must be determined

Assumption 9:
DRM4 mode will be applied to electric storage water heaters

The model assumes DRM4 has no impact on electric storage water heater longevity

Details
Dux consulted with A.O. Smith Water Heaters (AOS), the world's largest water heater manufacturer, on the proposed impact of superheating electric storage water heaters in possible DRM4 events. They warned that such events would have a significant impact on enamel solubility and would reduce tank longevity.

Depending on material selection, Dux also believes the longevity of plastic plumbing fittings within electric storage water heaters could be compromised.

Recommendation

Testing needs to be conducted on the impact of DRM4 events on the longevity of storage electric water heaters with results incorporated into modelling.

Dux recommends Business As Usual option for electric storage water heaters

GWA's proposed model will benefit major energy retailers at the expense of consumers and manufacturers, who are likely to incur the majority of additional costs. Energy providers will benefit by deferring generation capex and could exploit the technology for financial gain when wholesale electricity prices are high[16]. The model ignores warnings issued by peak industry bodies for governments to take action on lowering escalating consumer energy prices.[17]

Dux strongly urges the SA Government to avoid making decisions based on the flawed analysis and assumptions about electric storage water heaters detailed in the GWA paper. In short, electric storage water heaters offer no tangible solution to reducing future investment requirements for electricity network, generation and transmission infrastructure.

Thank you again for the opportunity to submit a response to the consultation paper. Please contact me should you have any queries about the recommendations outlined in our submission.

Yours sincerely,

Simon Terry
Chief Executive Officer
Dux Manufacturing Limited

References

1. E3 Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances. August 2019 p23
2. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p48
3. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p13
4. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p161
5. E3 Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances. August 2019 p23
6. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p14
7. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p162
8. Response to Dux information request from George Wilkenfeld and Associates through SA Government Smart Appliances RIS Team on 4th September 2019
9. https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Market-notices-and-events/Pricing-event-reports
10. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p12
11. E3 Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances. August 2019 p23
12. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p72
13. E3 Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances. August 2019 p23
14. E3 Consultation Regulation Impact Statement -Mandating Smart Appliance Interfaces for Air Conditioners, Water Heaters and Other Appliances p72
15. Response to Dux information request from George Wilkenfeld and Associates through SA Government Smart Appliances RIS Team on 4th September 2019
16. E3 Consultation Paper: 'Smart' Demand Response Capabilities for Selected Appliances. August 2019 p23
17. Grattan Institute 2019 – Australia's Energy Transition: A Blueprint for Success p6