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REES Review – Issues Paper

Submission from Harvest Hot Water

Harvest Hot Water is a renewable energy business located in Canberra, ACT. We are suppliers and installers of energy efficient heat pump water heaters to residential households in Canberra, in most cases replacing inefficient electric storage or gas hot water systems. We are currently awaiting the outcome of a Request for Pricing issued by ActewAGL, the main ACT electricity retailer, in partial fulfilment of ActewAGL's obligations under the ACT's *Energy Efficiency Improvement Scheme*.

In the event that heat pump water heaters were included in a REES scheme beyond 2020, we would explore the possibility of establishing an Adelaide office for the purpose of supplying and installing heat pump water heaters in South Australian residences.

Key points

Inclusion of heat pump water heater installations (replacing electric or gas hot water systems) in the REES list of energy efficiency activities would significantly enhance the objectives of the REES scheme.

- This would address four key problems:
    - the existing market failure in relation to efficient hot water systems, where REES could reduce the upfront cost of heat pump water heaters (HPWH) to make them competitive with inefficient alternatives;
    - it would bring substantial financial benefits to residential households by reducing the running cost of water heating by at least 60% compared to traditional electric hot water systems;
    - it could contribute to a shift towards a more holistic approach to residential energy use. That is, a shift towards all-electric households and carbon neutrality, where efficient renewables-based electrical appliances meet the two greatest areas of energy demand (viz. water heating and space heating/cooling), supported by rooftop solar PV; and
    - it would help ameliorate the problem of SA's `peaky' demand profile by shifting water heater energy consumption (the second largest destination for residential electricity) to the lowest demand period, that is, the `hollowed out' period in the middle of the day.

This submission follows the format of the REES Issues Paper of April 2019.

(a) Scheme Objectives

We consider the objectives could be strengthened to reflect emerging holistic ideas about the possibilities for household energy efficiency. We suggest adding the following:

- Encourage a shift (where appropriate) towards an all-electric household profile where the main areas of residential energy demand (water heating and space heating/cooling) are met through efficient renewable-based electrical appliances supported by rooftop solar PV. This would in effect move many households towards net carbon neutrality.

(b) Commercial or Residential

Our view is that while both the commercial and residential sectors may have substantial needs for energy efficiency improvement, the commercial sector is better placed, and should be more motivated through potentially substantial cost savings, to make improvements without government support. We suggest that support to the commercial sector would be better confined to information campaigns aimed at encouraging awareness of the savings available to them.

The residential sector, on the other hand, is a cesspool of market failure, particularly in the area of water heating, which is less amenable to information campaigns. Low levels of understanding of hot water options prevail, and uninformed householders turn to equally uninformed plumbers for advice. This problem has been observed in many reports, for example:

"[A] barrier [occurs] … in the new home market where builders tend to adopt water heating options with the lowest capital cost … without considering the life cycle costs. It also occurs when the home owner defers the choice of water heater to the plumber, which is quite common. The new home owner is responsible for the ongoing operating costs, and the product with the lowest capital cost will typically cost more to operate over its lifetime."[1]

And:

"In the replacement market, purchasers usually make decisions under time and cost pressure, and often delegate the decision to an intermediary such as a plumber. The decision is highly sensitive to replacement times and capital costs. When replacing electric storage water heaters, purchasers often choose like-for-like or the cheapest option, usually another electric resistance water heater. They generally only consider alternatives such as heat pumps if they are forced to (e.g. if electric water heaters are no longer available) or the capital cost differential is narrow."[2]

We recommend, therefore, that a greater focus be placed on residential households. This could be achieved, for example, by one of the following options:

- Discontinue upgrades, and instead launch an information campaign to the commercial sector; or
- Continue to make lighting upgrades available, together with energy audits, accompanied by information campaigns.

[1] Australian and New Zealand Governments 2018, E3, *Policy framework for hot water systems in Australia & New Zealand*, p. 12.
[2] Australian and New Zealand Governments 2012, E3, *Product Profile: Heat pump water heaters, p. 5.*

(c) Lighting Activities

No comment

(d) Priority Group Households

The Issues Paper states that the `priority household' sector is reaching saturation for various activities, such as low glow showerheads, lighting etc.

We endorse the suggestion from some stakeholders that REES should evolve away from low-cost activities to higher cost upgrades. We specifically recommend that REES include replacement of electric (and possibly gas) hot water systems with heat pump water heaters, as set out in more detail under item (h) Deeper Retrofits.

(e) Energy Audits

We don't have any comments on this.

(f) Expanding to Demand Management

We believe that excellent opportunities exist to improve the load profile of South Australia's electricity system, both by achieving energy efficiencies (thus using less electricity) and by shifting demand from peak periods to daytime periods that are currently being hollowed out.

Our comment here relates not to demand management technologies as such, but rather to the opportunity for load shifting without necessarily using such technologies in relation to water heating.

As a matter of course, Harvest Hot Water's water heater installations always set heat pump timers to daytime operation. We do this for two reasons. Firstly, if the residence has rooftop solar, then it is best to deliver hot water using the electricity generated by solar PV. (If it doesn't, we encourage them to get rooftop solar). Secondly, whether or not the residence has rooftop solar, the ambient temperature will be highest, and hence the heat pump will operate most efficiently, during the middle of the day.

Given that water heating contributes around 24% of household energy consumption[3] (the second highest household energy use after space heating), and given that traditional electric hot water systems are extremely inefficient (using more than twice the electricity of a heat pump water heater), it is clear that heat pump water heaters can play a valuable role in reducing peak demand and mopping up available daytime energy.

It certainly makes economic sense to transition away from electric hot water heaters. An Australia/New Zealand energy efficiency study estimated that the combined benefits for Australia and New Zealand over a 10-year period of shifting to energy efficient water heaters amounted to some $A1,355 million at a cost of $A850 million. This would be accompanied by substantial greenhouse emissions savings.[4]

We recommend that REES includes heat pump water heaters among its approved activities.

[3] Australian and New Zealand Governments 2018, E3, *Policy framework for hot water systems in Australia & New Zealand*, p. 9.

[4] Australian and New Zealand Governments 2018, E3, *Policy framework for hot water systems in Australia & New Zealand*, p. 9.

(g) Funding

(h) Deeper Retrofits

We agree that the REES would be improved by an integrated approach to home energy efficiency.

We recommend that the REES scheme encourages the goal of all-electric households powered by rooftop solar PV, with renewable-based electrical appliances meeting the two greatest areas of energy demand (water heating and space heating/cooling). Accompanied by upgrades of insulation and window treatments, many households could become carbon neutral, while sharply reducing energy costs.

The economic and financial benefits of shifting to all-electric households were demonstrated by the Alternative Technology Association in a 2018 modelling study of household fuel choices across 18 cities and towns (including Adelaide). They found that across Australia, new homes that went all-electric with solar PV were $9,000 - $18,000 better off over a 10 year period than houses that used both electricity and gas, and which did not have rooftop solar.[5]

In existing houses, under many scenarios, the ATA found that replacement of end-of-life gas appliances with renewables-based electrical appliances was financially advantageous. However in the case of Adelaide households with several gas appliances it was financially better to stay with gas.[6]

Turning to water heating, substantial financial, economic and environmental benefits result from switching from a traditional electric hot water system to a heat pump water heater, given running costs are at least 60% less for heat pumps. Harvest Hot Water demonstrated this in the case of western Sydney, where we showed that for a typical household, the full cost of an electric hot water system over a 10-year period (taking in upfront purchase and installation costs, and 10-year running costs) came to $11,000 and involved 28 tonnes of carbon emissions. By contrast, the lifetime cost of a heat pump water heater was $5,000 - $6,000, or just $3,500 if powered by rooftop solar, with just 1 tonne of carbon emissions.[7]

In a more recent study we undertook in Canberra,[8] we showed that an electric hot water system would use around 3,500 kWh/year while a heat pump would use 1400 kWh/year. However, a heat pump operating by day using mainly rooftop solar would draw just 140 kWh/yr from the grid.

In that case, the 10-year running cost of an electric hot water system would be around $6,000 - $8,750 (off-peak vs day tariff), while a heat pump would cost around $3,500 or just $350 if largely powered by rooftop solar.

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[5] Alternative Technology Association 2018, *Household fuel choice in the National Energy Market*, p. 6.
[6] Alternative Technology Association 2018, *Household fuel choice in the National Energy Market*, p. 5.
[7] See Table 4 in this post on our website: https://harvesthotwater.com.au/how-much-your-hot-water-system-costs/

[8] https://harvesthotwater.com.au/buying-an-electric-hot-water-system/

What do these figures suggest for South Australia? The day tariff in Canberra is just 25c/kWh at present. For South Australia, the benefits of switching from an electric hot water system to a heat pump hot water system would be significantly greater, given South Australia's much higher electricity charges.

We therefore strongly recommend that the REES scheme include replacement of electric hot water systems with heat pump water heaters.

Given that the full `life of system' cost of an electric hot water system is around $11,000, while the lifetime cost of a heat pump system is between $3,500 - $6,000, a rebate of around $1,000 would be an eminently sensible economic, financial and environmental decision.

In the case of the ACT's Energy Efficiency Improvement Scheme, the rebate comprises $1200 for priority low-income households and $750 for other households. This may be a useful reference point.