



Climate Change Authority

Via email: submissions@climatechangeauthority.gov.au

Friday 14 September, 2012

Dear Sir/Madam,

Response to Renewable Energy Target (RET) Review Issues Paper

The Gas Industry Alliance welcomes the opportunity to respond to the Climate Change Authority's RET Review Issues Paper.

The Alliance has been a strong advocate for change to the Small Renewable Energy Scheme (SRES) component of the Renewable Energy Target and has made previous submissions representing the importance of the role gas does, and can, play in the 'displacement technologies' market segment and why policy adjustments are needed. Jemena and Elgas, as part of the Alliance, represent a typical broader gas industry perspective.

This submission specifically addresses issues associated with the structure and operation of the SRES, in particular those aspects related to water heaters.

In order to further inform the consideration of RET design issues this submission also necessarily covers the broader national policy context relevant to the deployment of low emission water heater appliances in Australia. In doing so the Alliance aims to contribute to the development and implementation of a coherent and effective national approach to providing assistance for water heater installation and assist improved national greenhouse emissions reduction outcomes.

Please find the Alliance's response to the RET Review Issues Paper attached entitled '*Low emissions water heaters: a national policy perspective*' prepared by consultancy **pitt&sherry**.



If you would like to discuss any aspect of this submission please contact Benjy Lee, Manager Energy and Carbon Policy, Jemena on 03 8544 9369 (benjy.lee@jemena.com.au), or alternatively Warring Neilsen, Manager Corporate Affairs, Elgas on 02 8094 3214 (warring.neilsen@elgas.com.au).

Yours Sincerely,

A handwritten signature in blue ink that reads "Benjy Lee".

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Low emission water heaters: a national policy perspective

Prepared for: Jemena Limited and Elgas

Prepared by: Hugh Saddler
September 2012

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Hugh Saddler

Date: 14 September 2012



Summary

Australian governments at the national, State and Territory levels have, for many years, been providing financial assistance to encourage households to install low emission forms of water heating. Although many of these assistance schemes have now been terminated, a number remain in place, showing wide variations in the level of assistance available and the eligibility criteria for access. The basis for a coherent and consistent national approach to providing assistance for water heater installation now exists in the form of the December 2010 agreement by the Australian government, and all states and territories except Tasmania, to phase out greenhouse intensive (electric) hot water systems.

The Small Renewable Energy Scheme (SRES) is the major national source of financial assistance for residential water heaters. It is a program which provides financial assistance towards the cost of installing renewable electricity generation (solar photovoltaics, wind or microhydro) of up to 100 kW capacity and also solar and heat pump water heaters. The Scheme operates as an obligation on electricity retailers and the cost of the financial assistance provided is recovered from electricity consumers through the price of electricity.

Solar and heat pump water heaters do not generate electricity, but are assumed to displace electricity which would otherwise be used by electric resistance water heaters. Gas water heaters also displace electricity if installed instead of electric water heaters, as do many other energy efficiency technologies delivering other types of energy service, but none of these receives financial assistance through the SRES. On this basis, the continued support for solar and heat pump water heaters through the SRES is inherently arbitrary. The inclusion of these types of water heater goes back to the original enactment of the Mandatory Renewable Energy Target in 2000. Its real justification at that time was to support the sale of products which were then a niche market product almost wholly manufactured by small companies in Australia, embodying technologies developed in Australia. The water heater market is now much changed, with a wide variety of solar and heat pump systems, including many imported systems, available in different price brackets. There is no continuing justification for “infant industry” support through the SRES.

Replacing an electric resistance water heater with a solar or heat pump system will reduce greenhouse gas emissions, as will replacing it with a gas water heater. This reality is the basis of the decision to phase out electric resistance water heaters. However, while the phase out is generally occurring in new houses, almost no progress has been made on the much larger project of phasing out electric water heaters in existing houses by replacement of a failed electric resistance water heater with a non-electric resistance alternative. A major barrier to implementation is the higher up-front cost of alternative, low emissions water heating options.

The most effective way of overcoming this barrier would be to remove water heaters from the SRES and establish a new low emission water heater support scheme. All types of low emission water heaters, including instantaneous and storage gas water heaters, would be eligible for support, with the level of support depending on the emissions abatement achieved, relative to an electric water heater. Unlike the current SRES, support would only be available if the new water heater is a replacement for an electric system. Existing State retailer obligation schemes in Victoria and South Australia (and, from January 2013, the ACT) already provide financial assistance for replacement of electric water heaters on precisely the basis proposed here for a national scheme. The benefit of a national scheme is that support would be available on a consistent basis throughout Australia, most notably in NSW, which has a much large number of electric water heaters than any other State.

The proposed new scheme could continue to operate in the longer term as a scheme for water heaters only. Alternatively, it could be seen as the precursor for the mooted nation-wide Energy Savings Initiative, recommended in 2010 by the report of the Prime Minister's Task Force on Energy Efficiency.

1. Introduction

Australian governments at the national, State and Territory levels have, for many years, been providing financial assistance to encourage households to install low emission forms of water heating. Over the years, various types of water heater have been eligible for assistance. In the past, much of the assistance was provided directly by governments, i.e. sourced from consolidated revenue. As at September 2012, the governments of Victoria, SA and WA continue to offer this type of rebate for certain types of water heater installation in households which meet their various eligibility criteria. Today, most of the assistance is provided through obligations placed on electricity retailers and is therefore ultimately sourced from the prices paid by the generality of consumers for their purchases of electricity. The various assistance schemes currently operating, described later in this paper, differ in the types of water heater technologies they assist and the eligibility conditions applicable to the individual water heater installation. These differences reflect, in part, the original rationale for providing assistance, which in some cases has been support for renewable energy *per se*, in some cases support for small, innovative Australian businesses (“infant industry” support) and in some cases support for actions which reduce national greenhouse gas emissions.

Public assistance for household water heating installation has been and remains today an incoherent and confusing policy muddle. However, the basis for a coherent, nationally consistent approach now exists in the form of the December 2010 agreement by the Australian government, and all states and territories except Tasmania, to phase out greenhouse intensive (electric) hot water systems. This paper explains what form the new approach could take. The most useful point from which to start is the Small Renewable Energy Scheme (SRES), which is the major national source of financial assistance for residential water heaters.

2. The Small Renewable Energy Scheme (SRES)

The SRES came into force with effect from 1 January 2011. It was an outcome of the restructuring of the former Mandatory Renewable Energy Target (MRET) scheme, under which the scheme was separated into two completely separate parts: the Large Renewable Energy Target (LRET) scheme and the SRES. The separation of the two schemes is based on the types of technologies and electricity generating installations which they cover. The LRET covers all type of renewable electricity generators with capacity larger than 100 kW. Technologies covered by the SRES fall into two distinct groups:

- renewable electricity generation systems (solar PV, wind and micro-hydro) up to 100 kW capacity, and
- some types of residential and small commercial scale water heaters.

Both the LRET and the SRES, like the MRET before them, require electricity retailers to acquit specified numbers of renewable energy certificates each year. Certificates are produced by accredited renewable energy generators which sell them, either directly or through the secondary market, to the obligated retailers. In the LRET, one certificate is earned by an accredited generator for each metered MWh of electricity supplied into the electricity network; certificates are called Large Generation Certificates (LGCs). In the SRES certificates are called Small Technology Certificates (STCs).

The common feature of both groups of technologies in the SRES is that the quantity of STCs generated by an installation is based not on the measured output from the installed equipment, but on the deemed lifetime output. An installation becomes eligible for its full lifetime certificate entitlement as soon as it is operational. This approach has the following advantages:

- it eliminates the cost and complexity (verging on impossibility in the case of water heaters) of measuring output over the life of an installation;
- it eliminates the administrative cost and complexity of distributing small numbers of certificates to large numbers of installations on a year by year basis; and
- most importantly, it provides the purchaser of an installation with financial assistance to meet the upfront capital cost of the installation.

The *Issues Paper* prepared for the Climate Change Authority's renewable energy target review states (p. 32) that the last of these advantages was the reason for establishing the SRES.

While similar in that they both use deeming to determine certificate entitlement, the two groups of technologies in the SRES are completely different from each other in another fundamental characteristic. Small scale PV, wind and hydro electricity generation systems produce electricity. Eligible water heaters do not produce electricity. Instead, they are said to displace consumption of electricity, based on the assumption that, if the installation were not made, an electric resistance water heater would be used. For that reason, they are referred to as "displacement technologies".

3. Is it appropriate to include displacement technologies in the SRES?

Inclusion of displacement technologies is not consistent with original policy objective of the RET, as set out by Prime Minister Howard in *Safeguarding the future* in 1997. This was to "accelerate the uptake of renewable energy in grid-based power applications, and provide an ongoing base for commercially competitive renewable energy". The objective is expressed in the REE Act in the following terms.

"The objects of this Act are:

- (a) to encourage the additional generation of electricity from renewable sources; and
- (b) to reduce emissions of greenhouse gases in the electricity sector; and
- (c) to ensure that renewable energy sources are ecologically sustainable.

"This is done through the issuing of certificates for the generation of electricity using eligible renewable energy sources and requiring certain purchasers (called liable entities) to surrender a specified number of certificates for the electricity that they acquire during a year." (S. 3)

Clearly, the justification for the inclusion of these two "displacement technologies" is contained in the wording of the second object, relating to the reduction of greenhouse gas emissions. But there is a fundamental difference between, on the one hand, reducing emissions by supply side measures to change the mix of electricity generation technologies and, on the other hand, reducing emissions by demand side measures to use electricity more efficiently and/or displace the use of electricity to produce heat by substituting heat derived from solar radiation at the point of use. This difference led the Council of Australian Governments' Review of Specific RET Issues to the eminently sensible

conclusion that demand side measures are “better suited to support under an energy efficiency scheme”¹.

The inclusion of two water heating technologies in the original RET scheme was the outcome of strong lobbying leading up to the enactment of the legislation in December 2000. At that time both solar and, even more strikingly, heat pump water heaters were essentially niche products sold at high margins to premium markets. There was only one brand of heat pump water heater on the market. It was manufactured in Australia by a small Australian-owned business and the technology was in part derived from publicly funded research initiated at the University of Melbourne in the 1970s. Both the then Coalition government and the previous Labor Government had recognised the long term importance of solar and heat pump water heating technology for reducing emissions, and both had found it difficult to design programs which would provide effective support for the wider uptake of the technologies.

Much has changed in the water heating market since that time. A variety of factors have contributed to making these technologies relatively cheaper and more widely available. These include the effect of the MRET and SRES in enlarging the market, thereby providing opportunities for new participants and more competition between suppliers, the additional effect of subsidies and other forms of encouragement/assistance provided by separate programs of the Commonwealth and some State governments, international advances in both solar (especially evacuated tube) and heat pump water heating technologies, and the mass production of many of these in China.

It is not possible to quantify the relative contributions of each of these factors in expanding the market for solar and heat pump water heaters and reducing their cost to consumers. In retrospect, it can be seen that inclusion of water heaters in the MRET was one factor. However, if that form of selective support was needed in the past, its objective has been achieved. Solar and heat pump water heaters are now widely accepted and well understood options for residential hot water supply, which no longer merit selective support for their own sakes.

The current structure of the SRES is inherently arbitrary. The SRES currently includes two distinct displacement technologies - solar thermal energy collection and air source heat pumps - but only if they are used to provide a supply of hot water. The same technologies, in the form of solar hydronic heating and reverse cycle air conditioners, can be and are used in Australia to provide residential scale space heating services. The adoption of passive solar, daylighting and other design and construction practices in buildings similarly displaces electricity. None of these are included in the SRES (for sound and understandable reasons). The Council of Australian Governments' Review, previously mentioned, specifically mentioned two further technologies, ground source heat pumps and active solar thermal cooling, for which proponents sought inclusion in the SRES, and recommended against their inclusion. In this context, the continuing inclusion of solar and heat pump water heaters in the SRES looks increasingly anomalous and arbitrary.

It is therefore concluded that continued inclusion of two displacement technologies for water heating in the SRES is not appropriate and neither it is necessary to support the wider availability and reduced costs of these particular technologies.

¹ Renewable Energy Sub Group, *Report to the Council of Australian Governments' Select Council on Climate Change*, COAG Review of Specific RET Issues (2012), p 11.

4. Reducing the contribution of water heating to greenhouse gas emissions

It is clearly the case that replacement of an electric resistance water heater with either a solar or a heat pump water heater will reduce emissions. If widely adopted, such replacements will make a significant contribution to national emissions abatement. However, depending on location and the size of hot water demand, gas water heaters can deliver roughly similar levels of emissions abatement. If installation of solar and heat pump water heaters is being provided in pursuit of the second of the three objects of the REE Act, "to reduce emissions of greenhouse gases in the electricity sector", there is no logical basis for not also providing some form of support for the installation of gas water heaters in place of electric. This is the particular application, to the case of water heating, of the general principle that any policy or program directed to reducing emissions by changing fuels or technologies should provide equivalent assistance or support to all alternative fuels and technologies at a level based primarily on the amount of abatement they are able to provide.

In December 2010, at a meeting of the Council of Australian Governments, all states and territories except Tasmania agreed to phase out greenhouse intensive (electric) hot water systems. Most jurisdictions now have measures in place which severely restrict or completely prevent the use of electric resistance water heaters in new Class 1 dwellings. As yet, however, only SA and Queensland have started to implement the phase-out in existing dwellings (prohibiting like for like replacement of an existing electric resistance water heater which has reached the end of its operational life), and the prohibition only applies to certain areas in each State (see <http://www.climatechange.gov.au/what-you-need-to-know/appliances-and-equipment/hot-water-systems/phase-out.aspx>).

As a generalisation, electric resistance water heaters have a lower capital (up front) cost than all other types of water heater. The most appropriate comparison is with off-peak electric water heaters. Smaller continuous tariff electric water heaters, while they have a lower capital cost, are by far the most expensive form of water heating in terms of operating cost and are therefore not an economically optimal choice in any situation where there is some alternative. Between an off peak electric water heater and a gas water heater where a dwelling is already connected to gas, the cost difference is quite small. The capital cost of a heat pump water heater is higher and of a solar water heater higher again. The cost of a new gas connection may also, depending on location, be significant. There can be little doubt that the higher up front cost of alternatives to electric water heaters is contributing to the delay in implementing the phase-out of electric water heaters in existing dwellings. Obviously, there is particular concern about the impact of any mandatory phase-out requirement on low income owner occupiers.

A program which provided financial support to help address this high up front cost barrier would greatly assist the implementation of the phase-out of high emission electric resistance water heaters. Dealing this issue should be the principal consideration in designing any scheme to provide support for the installation of low emission water heaters when that is no longer delivered through the SRES. It is important in this context that any support scheme should extend to the full range of low emission water heaters, and not be confined, for historical or other reasons, to solar and heat pump systems. In particular, some makes and models of heat pump water heaters display a sharp drop-off of coefficient of performance as ambient air temperatures fall below about 10°C. Consequently, they are unable to deliver an acceptable hot water service during the winter

months in many parts of southern and inland Australia. Providing financial assistance for the installation of gas water heaters will significantly widen the range of acceptable alternatives to electric resistance water heaters in these areas.

A separate consideration is the impact of high electricity prices on households which use electric resistance water heating. Whether or not it is mandated by regulation, replacement of a failed continuous tariff electric water heater by a gas, solar or heat pump system will result in a significant reduction in the cost of purchased energy. Thus any source of financial assistance for the higher up front costs of non-electric water heaters will be of particular assistance in helping low income households to reduce the impact of rising electricity prices. This could be of particular importance in the private rental sector, where continuous tariff electric water heaters predominate, precisely because of their low up front cost, but where householder financial hardship is also widespread.

5. Other benefits of replacing continuous tariff electric resistance water heaters

Continuous tariff electric resistance water heaters do not include any form of sophisticated load control. Almost every hot water draw-off, unless very small, leads to the element switching on. Consequently, with these types of water heater, the timing of electricity demand coincides with the timing of hot water demand. Data on the volume and timing of hot water consumption in Australian households is extremely limited, so it is not possible to say what proportion of demand occurs at times of peak electricity demand. However, it is probable that many households, particularly households with young children, use a significant proportion during the morning and evening peak periods. This affects the required capacity of electricity networks, with obvious implications for capital expenditure. The problem is likely to be most severe in Queensland and NSW, which have winter peaking electricity supply systems and a higher proportion of electric water heating than other States, where gas is more widely used.

Replacing continuous electric resistance water heaters with a gas system will obviously eliminate any on-peak electricity demand (other than the very small amount of electrical energy used by the electronic ignition system of instantaneous systems). Electric boosted solar water heaters will reduce on-peak demand, though, depending on the hot water draw-off pattern, much less on very cloudy days. Heat pump water heaters will also reduce peak electricity demand, in proportion to the coefficient of performance of the heat pump (and again depending on the draw-off pattern).

Replacing an off-peak electric water heater on a tariff which allows a supplementary boost during the day (often marketed as an Offpeak 2 tariff) with a gas water heater should also make a small contribution to reducing the total cost of electricity, by reducing demand for electricity at times when the wholesale price is often higher than it is during the overnight off-peak period.

6. Restructuring support for low emission water heating

Having regard to the issues discussed above, support for low emission water heaters should be removed from the SRES. Continued support should be provided, for the reasons discussed, but it should be done through an alternative scheme, designed to reduce emissions attributable to residential water heating. All types of low emission water heaters should be eligible for

support, with the level of support determined solely on the basis of the quantity of abatement they provide, relative to electric resistance water heating.

The structure and operation of the new scheme should in many respects be similar to the SRES:

- it should take the form of an obligation on retailers,
- certificates should be defined in tonnes of CO₂-e abated, not MWh of electricity consumption avoided,
- entitlement should be calculated on the bases of deemed lifetime abatement (“deeming approach”), and
- there should be no cap on the number of certificates earned by any individual technology in a year (other than a possible indirect effect of the overall cap of a broad energy efficiency target scheme).

It is significant that the Victorian Energy Efficiency Target (VEET) scheme and the South Australian Residential Energy Efficiency Scheme (REES), as well as the imminent ACT Energy Efficiency Improvement Scheme, which starts on 1 January 2013, provide precisely this form of assistance for specified emissions abatement activities. Moreover, all three schemes include a variety of water heater upgrade options, including upgrades to solar, heat pump or gas water heaters, as activities eligible to earn certificates under the respective schemes. The NSW Energy Savings Scheme, by contrast, does not include water heater upgrades/replacement. The NSW Scheme places stronger emphasis on electricity consumption in the commercial sector, and in the residential sector the only qualifying activities are some types of lighting upgrades and the replacement of old refrigerators, freezers, clothes washers and dish washers.

All three of the schemes which include water heaters specify that the activity which earns certificates must involve the replacement of a high emission electric resistance water heater with one of the eligible lower emission alternatives. This requirement is in marked contrast with the SRES, which provides assistance for solar and heat pump water heaters regardless of the context in which they are installed. In some circumstances, e.g. installation of a new solar water heater in place of an old one at the end of its life, this will yield no emissions benefit. In other circumstances, e.g. installation of a heat pump water heater in a cool climate area in place of a gas system, it may actually increase emissions. Given these outcomes (which are not merely hypothetical – they are actually occurring), it is obvious that inclusion of solar and heat pump water heaters in the SRES is an industry/technology support measure, not an emissions abatement measure. Equally obvious, given the level of maturity now achieved by these technologies, there is no policy justification for industry support.

All three State/Territory schemes also use the deeming approach to specify the number of certificate earned by a specified upgrade. This is necessary on the grounds of administrative practicality and economy. Another major advantage of deeming is that it provides assistance to households installing solar water heaters as an upfront capital payment, which is the most appropriate and effective way of helping to overcome the principal economic barrier to wide adoption of these technologies, which is the high up-front capital cost. The RET Review *Issues Paper* identifies this as the major reason for establishing the SRES. The main reason for restructuring water heater support along the lines suggested in this paper would be to overcome the up front cost obstacle to implementation of the electric water heater phase out.

7. Implementation options

In the long run, the most effective way to achieve the desired objective on a nationally consistent basis would be to include electric water heater replacement as an action in the mooted national Energy Savings Initiative. Depending on how any program was designed, this could have several benefits for delivery of the phase out. It could remove the mandatory aspect by providing a sufficiently strong financial incentive through the scheme. It could also ensure that low income households (and possibly privately tenanted houses subject to certain conditions) benefit by imposing quotas on electricity retailers, following the approach used in the UK.

However, the *National Energy Savings Initiative Progress Report*, published in August 2012, states: “It is important to note that no conclusions have been made on whether a national Energy Savings Initiative is in the public interest at the current time.” It goes on to detail the extensive work program required to be completed before such conclusions could be reliably reached.²

These words suggest that an operational National Energy Savings Initiative may be some years in the future, if ever. It would be most undesirable to wait until some indefinite future date to restructure the SRES along the lines suggested in this paper. It is also unnecessary. A much simpler and quicker option would be to remove solar and heat pump water heaters from the SRES and include them, together with gas water heaters in a new national water heater replacement scheme. The scheme would have similar characteristics to the current treatment of water heaters in the SRES, as summarised above, with the level of assistance based on emissions abatement relative to an electric resistance water heater, as at present. The major additional piece of work to be undertaken would be thermal simulation modelling of the performance of all gas water heater models, so as to establish their certificate entitlement.

As with the current SRES, and unlike the State energy efficiency schemes, there would be no need for an annual target or cap on the number of low emission water heaters installed. Unlike the operation of the two State schemes (at least up till now) householders would have to contribute the majority of the cost of the water heater replacement, as they do at present under the SRES. This requirement will automatically limit the ability of suppliers to flood the market, sometimes with poor quality or badly installed items, as has happened with several schemes in recent years when householders were able to receive “free” upgrades. Thus the new scheme could operate precisely as the SRES does at present, with an annual “low emission water heater percentage” set for retailers and a certificate clearing house. Some work would be required to determine how to allocate the current certificate surplus between water heaters and small electricity generation technologies. When the surplus clears and the price of certificates in the secondary market converges with the clearing house price, the government would be able to exert some control on the level of uptake by varying this price. By this means, effective control could be exercised over the rate at which electric resistance water heaters are phased out.

² Department of Climate Change and Energy Efficiency, and Department of Resources, Energy and Tourism, 2012. *Progress Report: National Energy Savings Initiative*, p. ii.

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