Solar Hot Water & Heat Pump Study

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Clean Energy Council

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Acknowledgments

The Clean Energy Council gratefully acknowledges the support of the following colleagues in completing this study, as participating Members in the Clean Energy Council's Industry Directorate for Solar Hot Water and Heat Pumps:

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Mr. Manny Larre, Mr. Chris Blogg - Rinnai Australia Pty Ltd

Mr. Phil Sidney - Quantum Energy Pty Ltd

Mr. David McCallum - Conergy Pty Ltd

Glossary

AS/NZS	4234 Australia New Zealand 4234: Heated water systems – Calculation of energy consumption.
ABCB	Australian Building Codes Board
ABS	Australian Bureau of Statistics
AUSWHIP	Australian Water Heater Industry Panel
BCA	Building Code of Australia
CO2-e	Carbon Dioxide equivalent emissions (a product of combustion)
COP	Coefficient of performance
COAG	Council of Australian Governments
CEC	Clean Energy Council
CPRS	Carbon Pollution Reduction Scheme
DHW	Domestic hot water, Hot water used for showers, hand washing, and dishwashing, etc
DEECC	Department for Energy Efficiency and Climate Change
DEWHA	Department for Environment Water Heritage and Arts
ENA	Energy Network Association
GJ	Standard abbreviation for Giga-Joule, A unit of energy, equal to 1,000 MJ
HP	Heat Pump system
HERS	Home Energy Rating Scheme
IRR	Internal Rate of Return
IEA	International Energy Agency
kW	Standard abbreviation for kilowatt(s). A unit of power, equal to energ use at the rate of one kJ per second kWh Standard abbreviation for kilowatt hour. A unit of (normally electrical), equal to power of 1 kW for 1 hour
LNG	Liquefied Natural Gas
LPG	Liquefied Propane Gas

Glossary

MEPS	Minimum energy performance standard Solar Hot Water Industry Study
MRET	Mandatory Renewable Energy Target (current)
NPV	Net Present Value
NFEE	National Framework for Energy Efficiency
LRET	Large Renewable Energy Target (new)
OGSV	Office of Gas safety of Victoria
ORER	Office of Renewable Energy Regulator
RECs	Renewable Energy Certificates
RIS	Regulation Impact Statement
SHW	Solar Hot Water system
SRET	Small Renewable Energy Target (new)

1. Executive Summary

The Clean Energy Council (CEC) commissioned this study to review the current status and future trends of the Australian Solar Water Heater and Heat Pump industry, to help inform its members and to assist them in planning for their current and future business. Mito Energy, a specialist clean energy advisory firm, was commissioned to undertake this study in close partnership with the CEC.

Industry main Issues

The following is a summary of the main issues highlighted from this study;

1. Enhanced Renewable Energy Target (eRET)

- Bill has been passed in Parliament; uncertainty affects business revenue planning.

2. Heat Pump eligibility within the RET

- Investment in research and development has been disrupted by the debate on Heat Pump's continued eligibility in the RET. The Enhanced RET Legislation has confirmed Heat Pump's role in delivering low emission, low running cost domestic hot water.

3. Definitions of products

- Limited understanding and areas of confusion exist within the industry, government and customers.

4. Electric Water Heaters phase out

- Requires a properly resourced and timed transition plan to phase-out greenhouseintensive water heaters
- Electric water heaters make up nearly 50% of total systems currently installed in approximately 4 million homes
- Ensure Solar Water Heaters and Heat Pumps are preferred, based on running costs and greenhouse savings.

5. Standards and quality

- Imported products must meet mandatory requirements for safety and quality.

6. Education and training

- Retailers, installers, TAFE courses developed
- Raise customer awareness of water heater product selection and running costs over life.

7. Energy and greenhouse performance

- Energy and greenhouse performance labelling
- MEPS standards for Solar Water Heating and revise for Heat Pumps.8. Innovation
- Encourage innovation and investment in product development of Solar Water Heating and Heat Pump technologies.
- This will encourage and support the development (within Australia) of new micro "Heat to Electricity" generator systems, and Hybrid applications including air conditioning.

9. Industry support

- The Clean Energy Council and its Solar Water Industry Directorate fulfil the role of providing policy support for the advancement of the Solar Water Heating industry.

10. Social and Rental Housing retrofits

- A split incentive exists for retrofitting homes, between the Water Heater purchaser and the tenant.

1. Introduction

The following section describes the background to the study and the approaches and methods adopted.

1.1 Background

The Clean Energy Council (CEC) commissioned this study to review the current status and future trends of the Australian Solar Water Heater and Heat Pump industry, to help inform its members, and to assist them in planning for their current and future business. CEC commissioned Mito Energy, a specialist clean energy advisory firm, to undertake this study, working in close partnership with the CEC team.

Solar Water Heating has proven to be an effective method for reducing Australia's greenhouse gas emissions, while saving money, energy, and helping stimulate domestic manufacturing business and jobs.

The CEC has recognised, in consultation with its members, a growing need to identify and address some key issues facing the industry at present. These issues range from the need for certainty in the new Renewable Energy Target (RET), to concerns around occupational health and safety and product quality.

The report recognises that current issues are relevant to today's context (political, technical etc), and will change over time. The report therefore has a structure that may be reviewed and updated each year, or as necessary.

This study sets out to provide a high-level review of information, including the following general scope:

- Technology descriptions
- Current market status
- Future prospects
- Overseas experience
- Opportunities for the industry.

The purpose of this study includes its use as a general reference paper for CEC Members, and as a position paper to support Solar Water Heating Industry Directorate Members in policy and advocacy issues. The study is limited in its inclusion of individual company statistical information, to protect confidentiality and competitive advantage of industry participants in their marketplace.

1.2 Methodology

The approach used for the conducting this work included the following methods:

- High level desktop literature research of available Australian and international reports and website information
- Interview conversations with major industry participants to gain feedback on main issues and obtain supporting technical information
- Review final draft content and findings of report with major industry participants and other key stakeholders, to ensure accuracy of information
- Finalise as Clean Energy Council report.

The study included eight CEC Member companies, which together making up the vast majority of the Solar Hot Water and Heat Pump manufacturing and supply industry in Australia, including:

I. Stiebel Eltron

II. Saxon Solar, Peter Sachs Industries

III. Hills Solar

IV. Dux Hot Water (includes EcoSmart Solar), GWA International

V. Rinnai Australia (includes Beasley brand)

VI. Rheem Australia (includes Solahart and Edwards brands)

VII. Quantum Energy

VIII. Conergy.

Interviews

The set of questions to industry participants was fairly general in nature, with broad categories, each with generic questions to invite discussion around areas that affect particular industry participants, e.g. main issues, and market forecasts. A copy of the template for interviews is shown in Appendix C.

The industry participants are regarded in the main as knowledgeable and expert in their field. This study has been constrained to interviews with the relevant CEC Members willing to be involved, and thus have an interest in, and focus on, solar water heating and environmental benefits.

In general the comments or data used are not attributed to any specific industry participant (unless specifically referenced). The general consensus options of those interviewed were used to build up a picture of the current and future Australian market.

The study focuses on the Residential market for Solar Water Heating, and although consideration is given of relevant stakeholders in the gas industry and other renewables industries, the study does not make comment or review.

2. Description of solar hot water and heat pump technology

The following section provides a basic technical description of each main technology and the key benefits of each in terms of cost, greenhouse gas, geographical areas etc.

This study considers the following solar technology options:

- Solar Hot Water – standalone, gas or electric boosted
- Heat Pump – ambient air source, uses electric pump

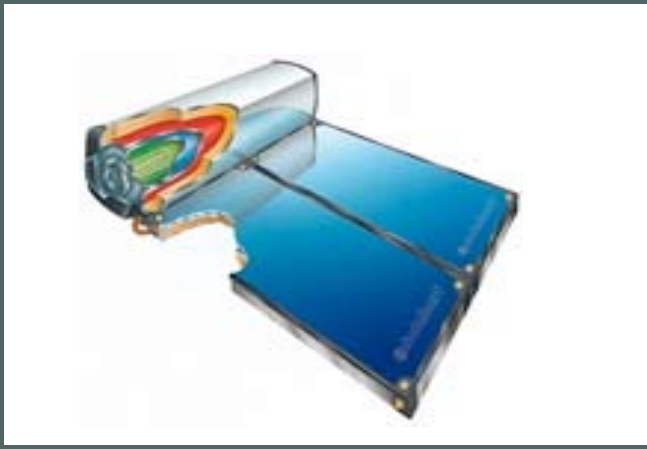
The other main technology options are recognised in this study, including:

- Electric – Grid, usually off peak storage
- Natural Gas – Mains, storage or continuous, and
- Liquefied Propane Gas (LPG) – Bottled, usually continuous

2.1 Technologies

A solar water heater uses energy from the sun to heat water.

Figure 1a: Plate Solar Water Heater illustration



Source: Choice

Figure 1b: Picture

Source: DEWHA

The water is heated by the sun as it passes through solar collector panels on the roof of a house, and stored in a tank. Solar hot water systems come in three main types:

1. Flat Plate Thermosiphon systems:

This is the most common Solar Water Heater system on the market.

These have both the collector panels and the storage tank mounted on the roof. The liquid in the panels circulates into the tank via the thermosiphon effect (as water heats up, it becomes lighter and rises into the tank). In warm climates, the panels can heat water directly. However, in frost-prone areas, the water can freeze and damage the panels, so frost-tolerant panels which use a heat-ex-change fluid with a freezing point lower than water are used. The panels heat the fluid, which then heats the water in the tank.

Pumped or split systems:

These have solar panels on the roof but the tank is located at ground level (or elsewhere in the building). Hot water is pumped from the panels to the tank. The pumps are generally small, and the electrical energy used in pumping is included in the annual energy running costs.

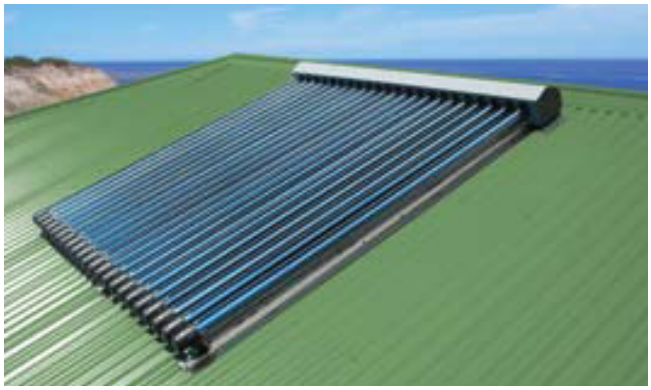
Boosters are needed in solar hot-water systems to keep up the hot water supply when there's not enough sunlight to do the job. Boosters can be either electric or gas-powered, and are usually incorporated in the water tank, or by using a continuous flow gas heater designed to accept varying inlet temperatures.

2. Evacuated tube

With evacuated tube installations, metal-oxide coated glass tubes concentrate the sun's heat, which turns water into steam within a small sealed copper tube, which runs up the centre of a larger, partially evacuated glass tube. At the top of the array these fine tubes protrude into a heat exchanger, where heat is transferred to water being circulated by a small pump. This water then flows to a hot water storage tank.

The vacuum acts like a thermos flask, retaining up to 97% of the thermal energy, resulting in an increased efficiency. This system cost approximately 15% more than the flat panel system.

Figure 2: Evacuated tube flat plate



Source: Hills Solar

3. Heat Pumps

Figure 3a: Heat Pump installation

Source: Steilbel Eltron

Figure 3b: Heat Pump installation

Source: Solahart

Heat Pumps use solar energy in the form of surrounding ambient air, and do not rely on direct sunlight. They are classed with direct solar systems for rebates and other government incentives. Installation is generally similar to installing a conventional hot water system. Heat pumps draw energy from the surrounding air and convert it to heat in much the same way as an air conditioner or refrigerator. Heat Pumps use the reverse of a refrigeration process, transferring heat from air to water stored inside the hot water tank, whilst using at minimum 60% less electrical energy than a conventional electric hot water system.

The basic process is as follows:

i. Air is drawn into the unit through an evaporator, where a cold refrigerant absorbs the air's heat.

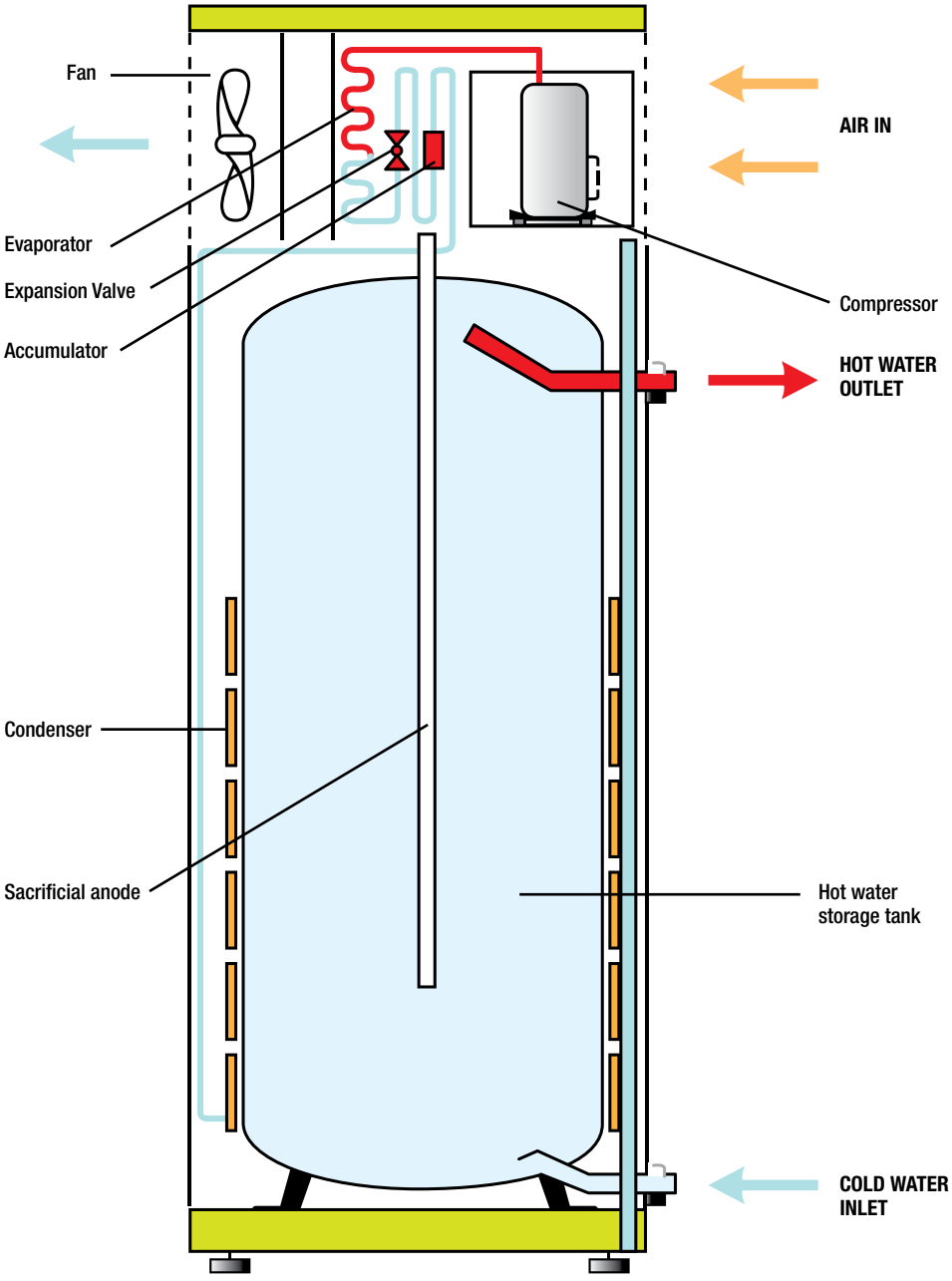
ii. The refrigerant then flows into a compressor, where it's converted to a highpressure, high-temperature gas.

iii. The heat from the gas is then used to heat the water using a variety of "heat exchange" technologies (see below).. The refrigerant gas cools down and is cycled back to the evaporator. Or

iv. The water from the tank is directed past a heat exchanger where the temperature from the refrigerant gas passes to the potable water.

There are different methods of heat exchange - via direct immersion, from pipework around the tank or via a plate heat exchanger. Heat pumps tend to work best in warmer climates, such as coastal regions, but there are models (such as the Dux Airoheat Subzero, Stiebel Eltron, and Quantum Energy) designed to operate in colder climates, and all year round conditions, with ambient temperatures below 0ºC.

Figure 3c: Exploded diagram representation of a Heat Pump system



1. Fan draws air through the evaporator
2. Refrigerant in the Evaporator absorbs the heat from teh air as it's passing through
3. Compressor raises the temperature of the gas and pushes the hot refrigerant around the Condenser
4. The Condeser (heat exchanger transfers the heat from the refrigerant through the tank into the water
5. Process is complete

Source: Stiebel Eltron

2.2 Benefits

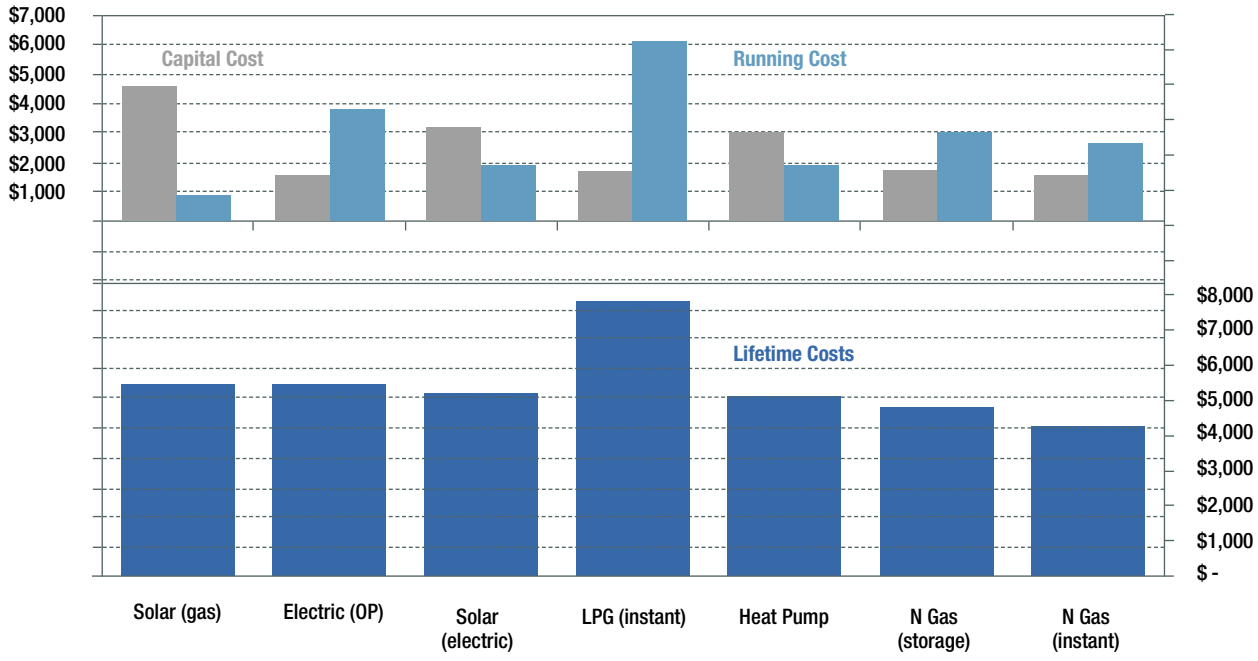
Water heating is the largest single source of greenhouse gas emissions from the average Australian home, accounting for around 23 per cent of household emissions.

Installing an environmentally friendly hot water system can save a family hundreds of dollars off their energy bills each year.

Costs and savings comparison

The total cost of a water heating system, over a typical 10 to 15 year system life, is a combination of purchase costs, installation costs, and running costs. Indicative costs without subsidies are shown in Fig 4 below.

Figure 4: Relative capital, running and lifetime costs of hot water units



Source: Commonwealth Regulatory Impact Statement – Phase out of Electric Water Heaters Jan 2010 (excludes state and federal rebates)

Although the initial cost of a Solar Water Heater is relatively higher than electric or natural gas water heaters, the payback period is typically five to 10 years depending on the climate and the type of system installed. Rebates are available from the Australian Government and several State Governments to assist with the initial purchase cost.

These incentives and programs are reviewed further in the next Section 3.

The most important consideration when choosing a hot water system is the size. To maximise emission and running cost savings, the system should be large enough to provide hot water to meet the household's needs. A system that is too big costs more to buy and run and will generate more greenhouse gas emissions. Hot water professionals can advise on the appropriate size of a system for the household.

Installing water efficient fixtures, such as showerheads and taps and insulating hot water pipes to prevent heat loss will maximize the efficiency of all hot water systems.

Government Initiatives

Federal Government initiatives include the Renewable Energy Bonus Scheme, detailed in Section 3.6.

State government initiatives exist in most areas of Australia, and provide a complimentary incentive to Federal schemes. Both Federal and State schemes are regarded as interim to support the uptake of these new and emerging products.

Solar hot water systems provide the greatest emission savings and account for 60 per cent of the hot water systems installed in NSW in 2007-2008 with the help of the rebate. Switching from an electric hot water system to a solar hot water system saves an average of 3.0 tonnes of greenhouse gas emissions a year. Switching from electric to a heat pump system saves 2.4 tonnes and switching to gas saves 2.9 tonnes a year.

2.3 Greenhouse comparison

Water heating accounts for 25% of energy used in the average Australian home and is responsible for 23% of the total household greenhouse gas emissions (excluding family car).

In order to compare the greenhouse intensity of various solar hot water systems, we convert the electricity consumed, and gas where used, to Tonnes of CO2-e. The ratio used varies from State to State depending on the make up of carbon intensive fossil fuels (primary energy) used to generate electricity (secondary energy).

The following scenario is included to illustrate the greenhouse comparison, by the author:

We may question, why we burn a non renewable fossil fuel in a central power station to make "Heat" to generate electricity (losing a third "Heat"), and then transmit that electricity over long distances to our homes to make "Heat" for hot water use. A better solution is to make the "Heat" locally with renewable "Heat" from the Sun.

On average across Australia this carbon intensity ratio is approximately 1:1, therefore one MWh of solar-derived electricity avoids approximately one Tonne of CO2-e.

On average across Australia this carbon intensity ratio is approximately 1:1, therefore one MWh of solar-derived electricity avoids approximately one Tonne of CO2-e.

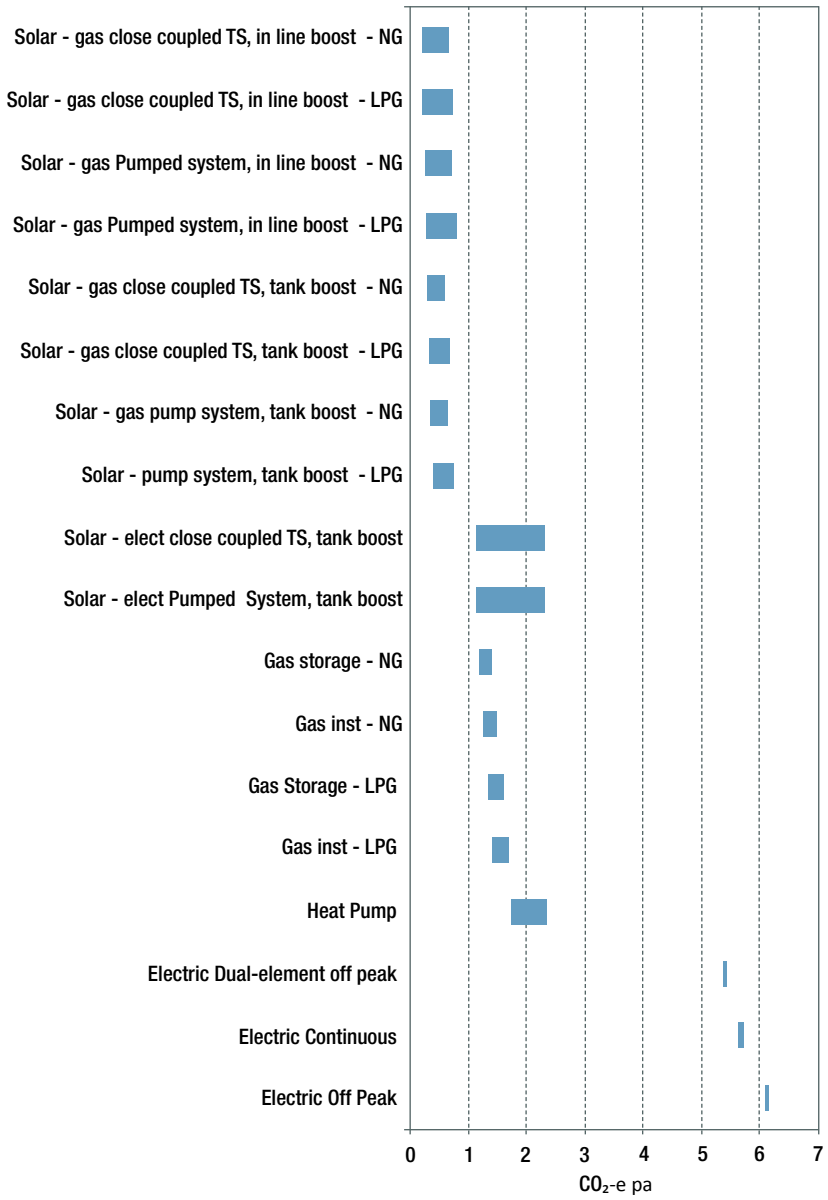
A typical home will save 2.4 to 3 Tonnes of CO2-e, depending on the type of installations. Solar Water Heating, Heat Pumps, and Natural Gas systems all have significantly lower greenhouse intensity against electric systems. However, calculating greenhouse intensity on a national average basis is more challenging. This is due to the high level of self selection for technologies that perform relatively poorly in some locations will be under represented in some locations (refer Fig 5 below).

Further, the technology type and make used in each case may not be of an equal performance standard.

The installation of a solar water heater will reduce the greenhouse gas pollution associated with water heating in the average Australian home between 60 to 90%, depending on the location.

Solar Water Heating is an effective form of greenhouse abatement using renewable solar energy to displace current energy demand in new and existing housing stock.

Figure 5: Hot Water System GHG Emissions (T pa) - Weighted Average for Victoria (example is for Zone 3 and Zone 4)



Source: Sustainability Victoria, 2009

3. Current state of the solar hot water and heat pump market in Australia

The following section outlines the current market for Solar Water Heating and the regulations and issues surrounding the industry.

3.1 Market size

According to the Australian Bureau of Statistics, 7% of Australian households used solar energy for heating water in 2008, representing 600,000 of Australia's 8.2 Million homes.

According to industry participants the proportion of Australian households using Solar Water Heating has now reached 10% in the early part of 2010.

This accounts for a 167% increase since 2005, when only 4% of households had solar hot water or a heat pump installed.

The installed capacity of solar water heaters in Australian households was 429MW in 2005.

The International Energy Agency (IEA), measured solar water heaters to have risen in capacity to 1300MW by end of 2007.

The percentage of total sales made in 2008 by technology type is shown in Table 1 below:

Table 1: Percentage of Total Sales by Technology in 2008

Water Heater Type	Percentage of total sales 2008 (%)
Grid – electric heater	44
Solar – natural gas boosted	6
Solar – LPG boosted	1
Solar – electric boosted	5
Solar – Heat Pumps	6
Gas – natural	35
Gas – LPG	3

Source: Rheem submission to Senate Economics Inquiry into the Renewable Energy Amendment Bill 2009

According to estimates from a number of industry participants, around 750,000 water heaters were installed in 2009, and of this, around 180,000 (25%) were solar hot water and heat pump systems. This represented a peak in installed units due to Government rebate programs, only to return again to more normal numbers as rebates reduced. According to industry participants supply has reduced to a level of around 80,000 units per year during the early part of 2010.

The Australian Bureau of Statistics has not collected information for hot water and solar hot water heating systems in recent years, making it difficult to report statistical progress.

3.2 Market penetration

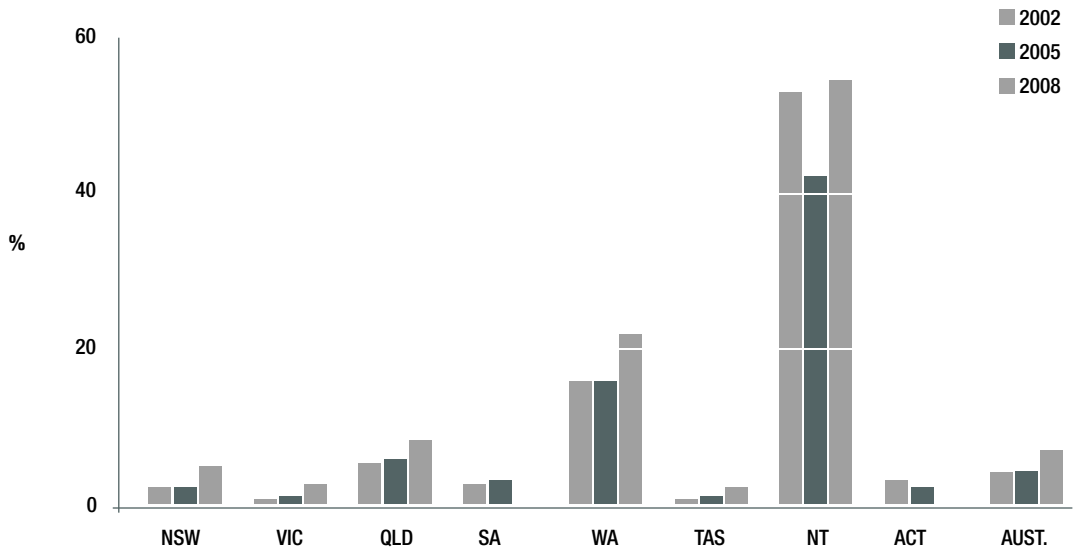
The industry participant interviews conducted for this study have revealed that most companies have been tracking well against the overall industry growth rate through 2009. Most companies are comfortable to share discussions on common industry issues and opportunities, however remain guarded of marketing information and sales numbers which could be used to erode a competitive advantage in a particular area.

According to respondents, the majority of the Solar Water Heater sales are to the residential sector with 30-40% new installations and 60% replacement sales. The majority of new installations are Solar Hot Water systems, and a significant proportion of replacement sales are Heat Pump systems due to their more simple retrofit installation.

The Solar Water Heating industry has moved from being a niche market to a mainstream high volume, low margin product. The potential exists for Solar Hot Water and Heat Pumps to provide 100% of Australia's hot water needs (temperatures less than 250ºC).

There has been a noticeable increase in the use of Solar Water Heaters (SWH) since 2005. In 2008, 54% of households in the NT utilised SWH, up from 42% in 2005. Households in WA using SWH grew from 16% in 2005 to 21% in 2008. The use of SWH doubled between 2005 and 2008 in NSW (2.5% in 2005 to 5% in 2008) and increased in Victoria (1% in 2005 to 3% in 2008), albeit from a small base. The market share of SWHs by state is affected by inverse proportion to the natural gas infrastructure currently available in that State. For example, Victoria has a high proportion of gas infrastructure, whereas Queensland and Northern Territory have relatively small gas infrastructure coverage.

Figure 6: Solar hot water heating - use in dwellings



(a) Solar hot water and solar photovoltaic

Note: 2008 figures for SA and ACT are not available for publication

3.3 Sources of supply for Australian systems

Manufacturers and/or Suppliers (Importers)

According to respondents, Australian manufacturers and/or importers of Solar Water Heaters with combined annual domestic sales of about 150,000 units valued at AU$400 Million and export sales of 25,000 units earning almost $40 million in value added export revenue. Major manufacturers in Australia include Rheem, Dux Hot Water, Saxon, Rinnai, Solar-Mio, Solco Industries, Coenergy, Stiebel Eltron, and Everlast Hydro Systems.

Some of these companies have a significant percentage of their product from a combination of sources from Australia and overseas, e.g. Rinnai use panels manufactured in Rinnai's Adelaide factory, a mix of stainless steel storage tanks manufactured in the Adelaide factory and imported vitreous enamel tanks. The gas boosters are manufactured in Japan, Stiebel Eltron imports their 100% German manufactured product.

Some companies manufacture overseas, e.g. Quantum Energy, manufactures in China, and supply from its Australian base to the local market and internationally.

Employment

The Solar Water Heater industry supports an estimated 1,200 jobs across manufacturing and an estimated 6,000 jobs across distribution, sales and installation.

3.4 Market leaders in sales

Two leading manufacturing participating companies account for around 80% of total annual Solar Water Heating and Heat Pump sales of approximately 120,000 units (Rheem Australia and Dux Hot Water).

Some companies specialise in particular product types, e.g. Hills Solar provide around half of the evacuated tube type solar water heater.

Heat Pump sales currently represent approximately 25% of the combined total. Stiebel and Quantum supply solely in the Heat Pump product type.

According to respondents, the above companies supply around 5% of their product to new homes, due to the relatively high cost of the heat pump, with the remainder 95% going to the replacement market, due to the relative ease of install.

Quantum Energy additionally provides the majority of commercial scale heat pumps systems in Australia.

Although the commercial market sector is not the focus of this study, we highlight a growth opportunity for companies to supply solutions for commercial and industrial solar water heating applications.

3.5 Breakdown of sales by state

Data in Table 2 is estimated from the REC registry of installations in each State of both residential and commercial units in Australia in 2010.

Table 2: Number of systems installed by State (2010)

State	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
No. systems installed	649	27,724	753	22,622	4,359	846	14,767	9,646	81,366

*2010 year data incomplete – expected to be higher by December 31st.
Source: Warwick Johnston, SunWiz 2010

Figure 7 shows the estimated data from the REC registry from 2001 to 2010 by State.

Figure 7: Annual installations of Solar Water Heaters / Heat Pump

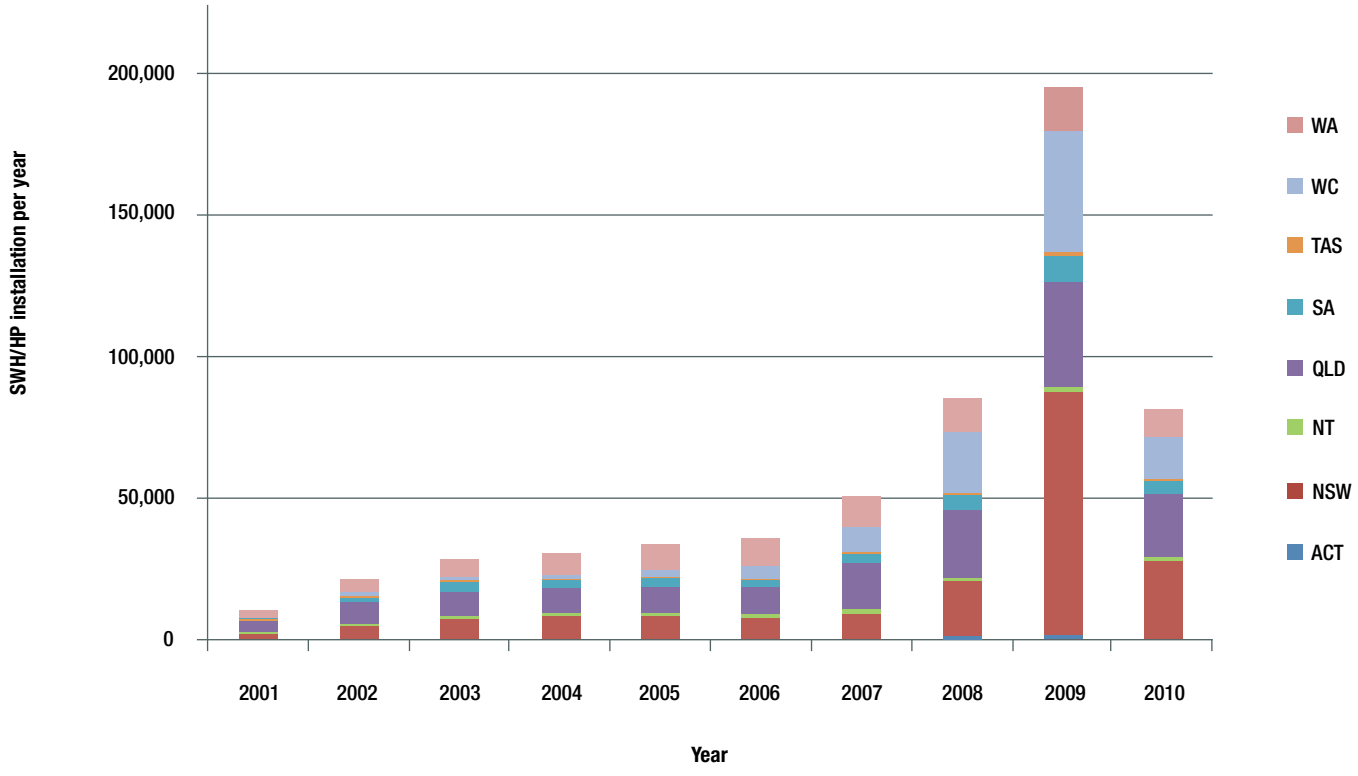
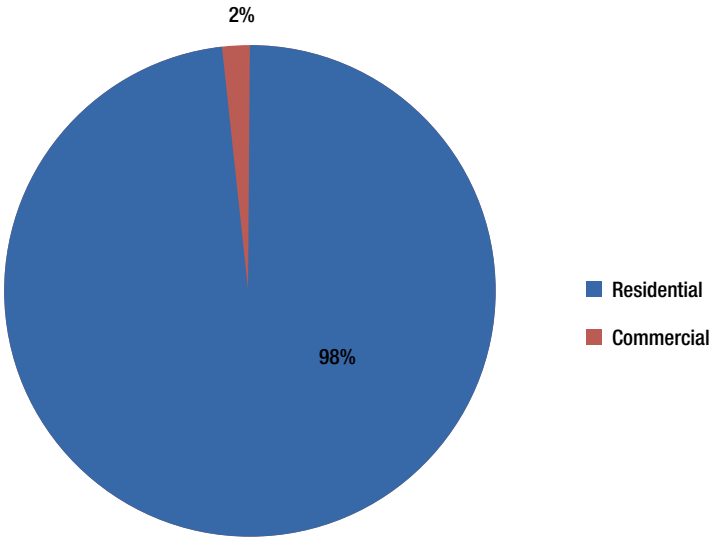


Figure 8 shows the percentage of residential installed systems compared with commercial installed systems as estimated from the REC registry from 2001 to 2010.

Figure 8: Residential vs Commercial Scale installations of SWH/HP since 2001



Source: Warwick Johnston, SunWiz 2010

3.6 Regulatory changes and status of industry market

3.6.1 Current Federal Government schemes

The following summarises current Federal Government schemes.

a) Renewable Energy Bonus Scheme - solar hot water rebate

On 19 February 2010 the Government announced the household Renewable Energy Bonus Scheme to replace the Solar Hot Water rebate scheme to assist households to save money on power bills and reduce their carbon emissions. This new Scheme is available to help eligible home-owners, landlords or tenants to replace their electric storage hot water systems with solar or heat pump hot water systems.

This Scheme replaces the Home Insulation Program and the Solar Hot Water Rebate Program. Eligible households can claim a rebate of $1,000 for a solar hot water system or $600 for a heat pump hot water system through the Renewable Energy Bonus Scheme - solar hot water rebate.

The rebate is offered for systems installed on, or after 20th February 2010 until June 2012, subject to the availability of funds. This measure will mean households can save money and reduce their greenhouse gas emissions. The Owner or tenant will need to apply directly to the Federal Government to receive this rebate.

To be eligible for the rebate, a hot water system must:

- Replace an electric storage hot water system
- Be purchased and installed on, or after 20th February 2010
- Be a solar or heat pump hot water system that is eligible for at least 20 Renewable Energy Certificates (RECs) at the time and place of installation
- Be installed by a suitably qualified person (for example a plumber and/or electrician).

Eligible households:

- The dwelling where the hot water system is installed must be a principal place of residence
- The household must not have already accessed the rebate for the insulation offer under the Homeowner Insulation Program for the same home.

b) Renewable Energy Target

In 2007 the government committed to expanding the original Mandatory Renewable Energy Target (RET) to ensuring that 20 percent of Australia's electricity supply would come from renewable energy sources by 2020 by establishing the expanded Renewable Energy Target (RET) scheme. The expanded RET legislation was implemented in mid 2009 and commenced 1 January 2010.

This scheme is to deliver 45,000 GWh of renewable energy by 2020. The expanded RET legislation maintained the same eligibility criteria as the MRET scheme, with SWHs remaining eligible with a 10-year deeming period through to the end of the scheme in 2030. At the time of conducting this study, the price of Renewable Energy Certificates (RECs) dropped significantly on the spot market, causing the Federal Government to undertake significant changes to the legislation, compiling and passing the enhanced RET scheme. This legislation announced the LRET (Large-scale RET) and the SRES (small-scale renewable energy scheme) and is due to commence on 1 January 2011.

The small scale technologies, predominantly solar hot water systems and solar photovoltaic systems, will form part of the SRES. The SRES does not provide a rebate. The purchase of a Solar Water Heater (SWH) or air-sourced heat pump water heater may entitle the customer to RECs if the SWH is eligible. These certificates are then sold and transferred to liable parties on a market based online system called the REC registry.

RECs under the SRES are capped at a price of $40 each.

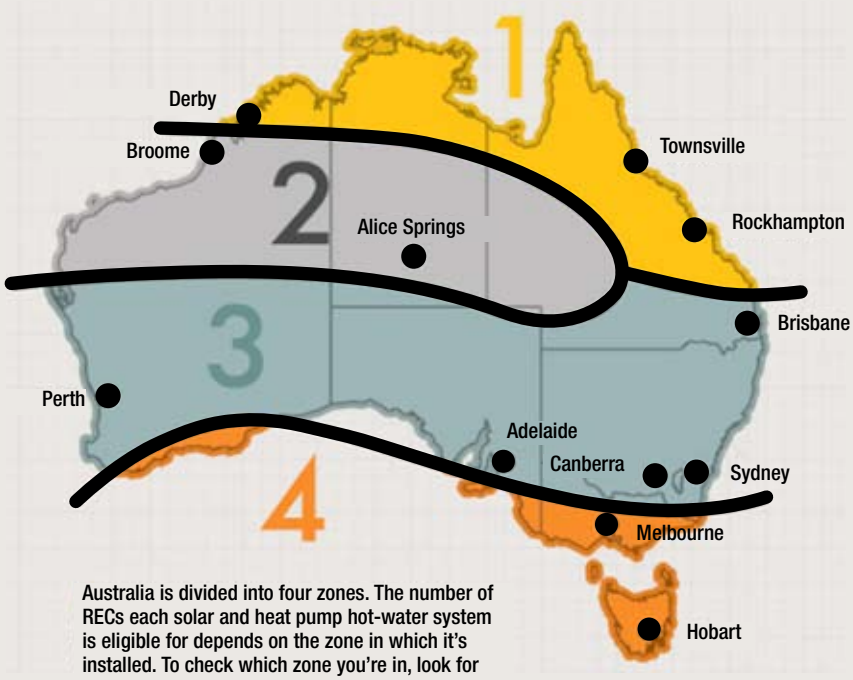
The Renewable Energy Regulator will establish a voluntary 'clearing house' as a central point for the transfer of small-scale RECs at $40. There will be no cap on the number of small-scale RECs that can be created.

Importantly, to ensure the $40 clearing house price in the SRES remains relevant over time, the legislation establishes a process to review the price. The Minister may make a reduction in the $40 price, after considering independent advice. This may include changes in the costs of solar PV and solar water heaters, the extent to which owners of solar PV and solar water heaters contribute to the upfront costs of those systems, and the impact of the clearing house price and the levels of installation of solar PV and solar water heaters on the electricity market, including the impact on electricity prices.

The Regulations for the SRES are not expected until September/October 2010.

It is anticipated SWH will contribute to the achievement of the target somewhere between 1.8% and 18% of the RET. Participation of SWH will prove crucial technology in the cost effective achievement of the target providing liquidity to the market and balancing the risk of the large renewable energy projects which may experience industrial, network and planning delays and constraints.

Figure 7: REC Zones



Australia is divided into four zones. The number of RECs each solar and heat pump hot-water system is eligible for depends on the zone in which it's installed. To check which zone you're in, look for the Postcode Zone Table at www.orer.gov.au

Source: www.ORER.gov.au

c) National Strategy for Energy Efficiency

The Australian Government as part of its National Strategy for Energy Efficiency has announced a phase out of greenhouse intensive electric hot water systems from new buildings commencing in 2011.

Over the last 5 years most state governments have moved to require either high efficiency gas, solar or heat pump products to be installed in new Class 1 homes.

The Australian government has announced a phase out of greenhouse intensive electric hot water from Class 1 homes in gas reticulated areas by 2010 and all other Class 1 homes by 2012. In non reticulated areas adopting Solar Water Heating will be the householder's only protection against high LPG running costs.

3.6.2 Status of industry market

SKM MMA consultants have undertaken modelling for the CEC which shows that RECs created from solar hot water units in 2010 have had a significant fall in volume in all states, although the numbers for the June 2010 quarter are slightly above those of the March 2010 quarter (MMA Australian Energy Market Quarterly Review, June 2010).

3.6.3 Current Standards

The Office of Renewable Energy Regulator (ORER) is the national government agency which enforces minimum design and construction standards as outlined in the Australian Standards (AS 4234) for Heat Pumps and Solar Water Heaters.

4. Future prospects

The following section provides an overview of the future market for Solar Water Heaters and Heat Pumps.

4.1 Future Potential Overview

There is evidence to suggest that with only 7% of Australian homes having solar water heaters fitted in 2008, there is considerable potential for market growth. It is important that the SWHs and HPs remain in the RET legislation.

As awareness levels increase towards the benefits of installing Solar Water Heating and Heat Pumps, the proportion of Australians adopting the technology will increase.

Industry participants, who offered a future forecast, typically estimated a doubling of supply capacity, providing market incentives and level of certainty improves.

The changes made to the RET legislation have brought a guaranteed REC price of $40 for small scale technologies. At the time of writing the regulations for the running of the clearing house have not been completed, however there is uncertainty around the ability for the industry's cash flow due to the unknown frequency of the clearing of the clearing house and the Minister's ability to change the REC price over time.

4.2 Identification of future market in Australia for solar hot water and heat pumps

This section considers available evidence, trends and issues relating to the future market.

Protection from Energy Poverty

Over the coming years Australian households are likely to experience significant increases in electricity prices due to various carbon reduction programs. Natural gas prices are also set to increase as the demand for LNG puts pressure to move to world parity pricing. Both of these issues are set to impact on household costs, with a particularly heavy impact on low income earners.

Solar Water Heaters have higher upfront costs; however they deliver lower running costs and lower greenhouse emissions. Over the working life of a SWH it represents the most cost-effective water heating option; however the high upfront cost acts as a barrier, particularly to those in disadvantaged groups or where a "split incentive" exists. Landlords and builders tend to be driven by lowest cost compliance, resulting in the installation of systems with the lowest capital cost. Perversely these systems will often coincide with the highest running costs. This is a common example of a split incentive.

Solar Water Heating will pay for itself through the energy savings within a few years, including incentives and rebates. Solar Water Heating provides an effective solution to protect those most vulnerable from rising energy prices and energy poverty.

Solar verses Gas Water Heaters

Industry respondents highlighted the benefits of using renewable water heaters verses gas, especially in non reticulated areas, where Liquefied Petroleum Gas (LPG) is used. LPG is approximately double the cost of Natural Gas, and is more expensive to run.

Electric Solar Water Heaters and Heat Pumps currently have similar greenhouse gas emissions verses gas. However this will improve as grid electricity uses more low emission sources in future years. By comparison, gas will remain fixed at current emission levels.

4.3 Expected future changes to regulations to drive the deployment of solar hot water and heat pumps

The following section reviews the key regulatory changes impacting on the industry.

Phasing Out Greenhouse-Intensive Water Heaters

This report considers the Commonwealth Government's decision under new Australian Building Code regulations; that from 2011 electric storage water heating systems will not be installed in new homes. Electric storage systems currently represent nearly 50% of the total systems installed in approximately 4 million homes.

The phase out of greenhouse intensive electric hot water heating systems from Class 1 homes in gas reticulated areas by 2010, and all other Class 1 homes by 2012.

In non reticulated areas adopting Solar Water Heating will be the householder's only protection against running Liquefied Propane Gas (LPG) Water Heating systems, with the associated high running costs of LPG.

The water heating market is therefore set to dramatically change over the next decade, as electric systems are progressively replaced.

Installation and Running Cost of Solar Water Heating

While Heat Pumps have lower installation cost, the installation cost of a Solar Water Heating system is about 40% and 60% manufacturing cost. Over the last 10 years significant increases in labour and materials have impacted the local manufacturing industry.

Despite these changes, prices have been held reasonably steady by the introduction of lower cost products and technology breakthroughs.

Industry has been able to invest in these products due to the certainty of market access defined through the Australian Government's RET and State Government building codes.

These regulations to date have provided the certainty that industry has needed to invest in new or expanded manufacturing capacity.

The inclusion of Solar Water Heaters (SWH) in the expanded RET scheme meant that retailers could provide a "Point of Sale" discount. This went a long way to addressing the barrier of higher upfront costs. While it is important SWH remain in the new enhanced RET scheme, due to commence 1 January 2011, the unknown frequency of the clearing house being cleared and the ability of the Minister to change the price of the RECs brings a period of uncertainty to this industry.

5. Overseas market experience

The following section provides an overview of relevant experiences from overseas.

5.1 Overseas market overview

Solar hot water heating technologies are becoming widespread and contribute significantly to the water heating markets in China, Turkey, Israel, and parts of Europe. Many other countries have relatively smaller markets.

According to the International Energy Agency, solar heating capacity was 145,000 MW globally at the end of 2008, representing a doubling of capacity in 2004.

5.2 Market penetration in key markets

A number of the industry participants, particularly in the Heat Pump product type, estimate and increased level of export sales into new markets, including South Africa, and Asian countries.

Australian companies with an International parent (e.g. Stiebel Eltron) will face competition from its own European manufacturing base, and new local manufacturing established.

5.3 Policy drivers in key overseas markets

General

Internationally, governments are both mandating or supporting Solar Water Heater and Heat Pumps for many reasons, varying from industry development, energy security, greenhouse pollution reduction, infrastructure and energy cost savings.

The European Union (EU), has recently recognised Heat Pumps as renewable energy technology, acknowledging the potential of:

- "aerothermal" (stored in air),
- "geothermal" energy (stored in the ground), or
- "hydrothermal" energy (stored in standing water) as sources of renewable energy.

The Heat Pump also receives relevant carbon credits and energy feed-in tariffs. The European Union has set a heat target; 50% of heating requirements (in the commercial, industrial and residential sector for less than 250 deg Celsius) to be met by renewable energy by 2030.

Zero Carbon Policy

Solar Water Heating policy drivers are generally incorporated in overall policy for using renewable to reduce carbon.

For example German Federal Environment Agency announced recently that by 2050 Germany could get all of its electricity from renewable energy. Currently, Germany gets 16% of its energy from solar, wind and other renewable power sources, and it is the largest producer of solar power and the second-largest wind power producer after the United States. The German government's goals of reducing greenhouse gas (GHG) emissions by 40% from 1990 to 2020 and by 80 to 85% by 2050 are achievable if it transitions to renewable energy sources by 2050. The transition would have economic benefits for Germany in that it would create jobs and help Germany's manufacturing industry.

5.4 Innovative and emerging technologies

Solar Water Heating and particularly Heat Pump technology advancement supports other clean technologies, and hybrid solutions.

These emerging technologies/applications are mainly being developed in/and for overseas markets.

Examples include:

1. "Micro-generation" systems providing electricity, hot water, space heating and cooling (e.g. fuel cells, sterling engines etc.).

- These systems mainly use non-renewable natural gas; however provide a high efficiency low carbon electricity supply.

2. Direct solar hot water as a supply source for "Heat to Electricity" generators, mainly using low temperature Organic Rankine Cycle (ORC) technology.

- Enabling technologies, such as solar thermal batteries, can be used to optimise the generator operation. These systems mainly use renewable solar energy, and can utilise sources of waste heat.

6. Further comments and suggestions

The following section discusses further observations raised by participants, and suggested areas for further investigation.

6.1 Observations

Resulting from interview conversations with industry participants, the main issues appear to include the following:

1. Renewable Energy Target

- Bill recently passed in Parliament, required for business certainty and cash flow.

2. Heat Pump eligibility

- Industry requires certainty for investment in research and development.

3. Electric Water Heaters

- Transition plan to phase-out greenhouse intensive water heaters.

4. Definitions of products

- General confusion at many levels; Federal and State Government, retailers, customers etc.

5. Standards and Quality

- Safety and testing for imported and Australian manufactured products.

7. References

1. **AUSWHIP -** Australian Water Heater Industry Plan, 2009

2. **Commonwealth government, DEWHA, DEECC -** website pages.

3. **Clean Energy Council -** Clean Energy Fact Sheets, All about Solar Water Heating, 2009.

4. **Australian Bureau of Statistics, ABS, Australia's Environment -** Issues and Trends, 2010.

5. **Australian Bureau of Statistics, ABS, Environmental Issues -** Energy Use and Conservation, 2008.

6. **Choice.com.au -** Solar Water Heaters, 2009.

7. **Australia New Zealand Standard 4234 Heated water systems -** Calculation of energy consumption, 2008.

8. **Sustainability Victoria -** Estimated Hot Water System Running Costs in Victoria, 2009.

9. **Department of Environment and Climate Change -** Annual Report 2007 – 2008.

10. **Connection Research, Familiarity with Rebates -** Presentation to Plumbing Supply Forum, May 2009.

11. **Rheem Australia -** Submission to the Senate Economics Committee inquiry into the Renewable Energy Amendment Bill 2009.

12. **National Framework for Energy Efficiency Consultation Stage Regulation Impact Statement (RIS) on Phasing out Greenhouse-Intensive Water Heaters in Australian Homes -** George Wilkenfeld and Associates with National Institute of Economic and Industry Research and Syneca Consulting, December 2009

13. **Johnston, Warwick** (SunWiz Innovative Solar Consulting)

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