

# MAINSTREAMING SOLAR HOT WATER

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## ABSTRACT

Water heating in Victorian households is responsible for approximately 20% of the residential sector's greenhouse gas pollution. To assist Victoria to move towards a solar water heating future, a suite of programs have been introduced. One aim of these programs is to improve the capacity of the industry to deliver solar solutions.

These programs include:

- › a performance based rebate program that provides an incentive to households to install solar water heating systems and manufacturers to improve cost effectiveness of these products,
- › a training program for installers to ensure that trades persons have the competencies to size systems and the skills to install them correctly,
- › a regulation for new houses that has resulted in approximately 50% of all new dwellings installing solar water heaters.

This comprehensive suite of programs in Victoria have resulted in making up an estimated 30% of the current Australian sales for solar water heaters, which is a higher growth rate than in any other jurisdiction. It is expected that in the future these programs will drive an even greater uptake, which will go some way to insulating Victorian households from price increases that may result from any future increases in the cost of energy.

## INTRODUCTION

There are two major barriers to solar water heater sales: high capital cost compared to conventional water heaters and lack of awareness which results in householders not considering the solar option when deciding which type of water heater to install.

A support program can address either or both of these barriers. Rebate programs primarily address the capital cost barrier. Guthrie (2004) proposed that in order to effectively address the cost barrier, support programs needs to have the following attributes:

- › **Continuity:** A successful support program needs to be in place for sufficient time for industry to be able to invest in new products and channels to market.

Short term programs do not provide the confidence for industry to make planned investments.

- > **Simple, user-friendly process:** The purchasers must be able to easily understand the requirements to get the rebate, be able to purchase without delay for approval, and where possible not be out of pocket awaiting a refund.
- > **Performance based:** The most effective rebates provide an incentive for manufacturers to provide improved products and for purchasers to buy the best performers.

Incentives clearly have a part to play but this is just one tool of many which can support the uptake of solar hot water heaters. When used in concert the impact can be far greater.

There are two broad approaches to mainstreaming solar: to increase consumer demand and to improve industry capacity in manufacturing, distributing and installing systems. Within each of these approaches there are several tools which can be employed. Figure 1 below depicts the components of each.

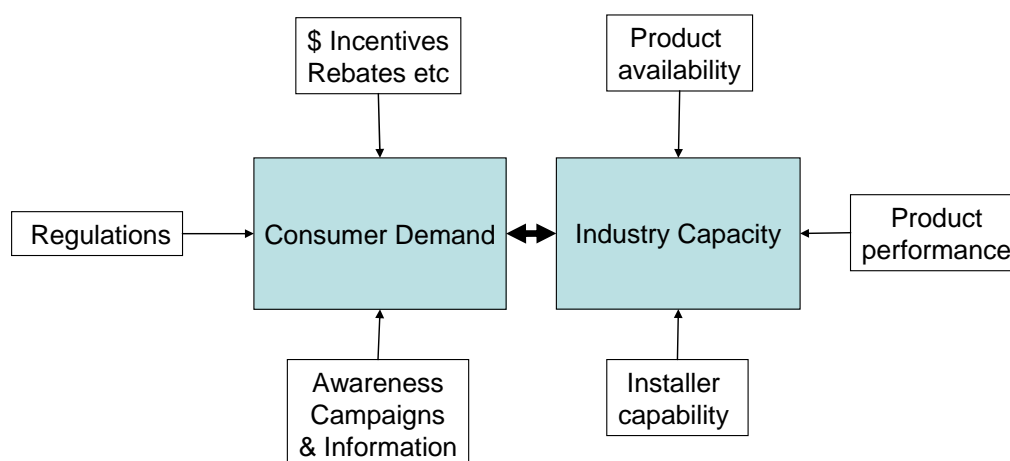


Figure 1 Solar hot water market influences

## CONSUMER DEMAND

Consumer demand is influenced by product costs, consumer knowledge and the allowable options available to consumers. The *Green Light Report: Victorians and the Environment in 2008* was commissioned by the Victorian Government to provide an insight into the environmental attitudes and behaviours of the Victorian community in 2008. The report found that, of the 2,151 households surveyed, 39% said that they would be likely to replace their existing hot water system with solar. Of these households, 11% said that they would 'definitely' install solar and 10% said that they would 'probably' install solar systems, with the remaining 18% saying 'maybe'.

Unsurprisingly, households earning less than \$40,000 per annum were less likely to consider solar hot water systems.

### **Incentives**

Incentives reduce the cost of the product to the consumer. However, they also have other less tangibles influences. Government funded incentives give a degree of confidence to consumers that they are 'doing the right thing' and an incentive creates increased interest in the product.

### **Solar hot water rebates**

The Victorian Government has continuously provided rebates for solar hot water installations since July 2000.

Whilst there are no reliable statistics available, it is estimated that annual sales of solar water heaters in Victoria in the late 1990's, and prior to any rebate, was in the order of 700 - 800 systems. The sales generally occurred through specialist franchises which operated on a low volume, high margin market model. At this time virtually all solar water heaters sold were electric boosted.

#### **2000-2004**

In 1999, the Victorian Government announced a policy to provide up to \$15 million in rebates to support the sale of solar water heaters beginning in mid-2000. With up to \$1,500, these were the most generous rebates available in Australia. At that time some other Australian jurisdictions had rebates available for solar water heaters, in which the rebate amount was often related only to the number of collectors installed rather than the performance of the system. No support program was provided by the Commonwealth Government at that time.

The Victorian Government rebate was the key driver in developing the Victorian solar hot water market from 2000 to 2004 [Guthrie et al 2005]. The results of this market stimulus were

- > 9,507 systems installed
- > \$40 million of sales generated
- > Development of new gas boosted products that provide very low greenhouse gas emissions
- > Increased rate of system installation of approximately four times as shown in Figure 2.

#### **2004-2008**

In July 2004 the Victorian Government Rebate was extended past its initial stage to support only those purchases that did not qualify for Renewable Energy Certificates (RECs) under the Mandatory Renewable Energy Target (MRET). With the value of RECs reaching approximately \$40 and providing a similar financial incentive as the Victorian Government Rebate, those households that were switching from conventional gas to solar or adding a preheater or retrofit kit to an existing system and were unable to

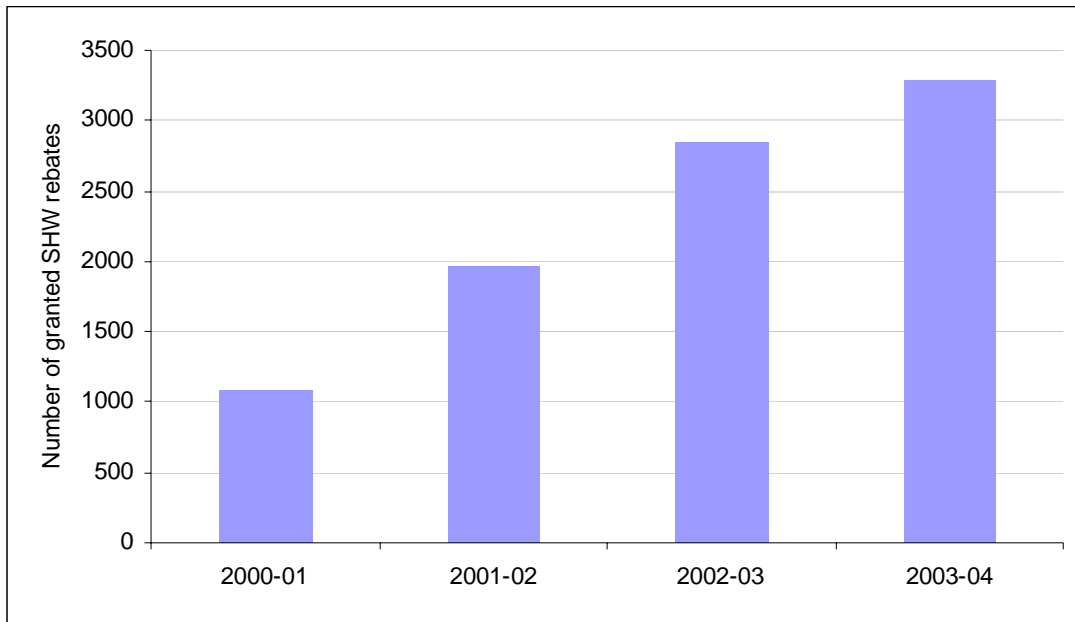


Figure 2 Solar hot water sales in Victoria 2000-2004 (based on rebate numbers)

access RECs, were targeted. In 2004, 70% of Victorian households used gas for water heating and were unable to access RECs to switch to solar. For the period from 2004 to 2008, households switching to gas boosted solar systems or installing a retrofit kit or preheater grew significantly in Victoria from 600 to 1,300 as shown in Figure 3. The inclusion of replacing gas water heaters as a REC eligible situation in September 2006 would have contributed to the increased uptake.

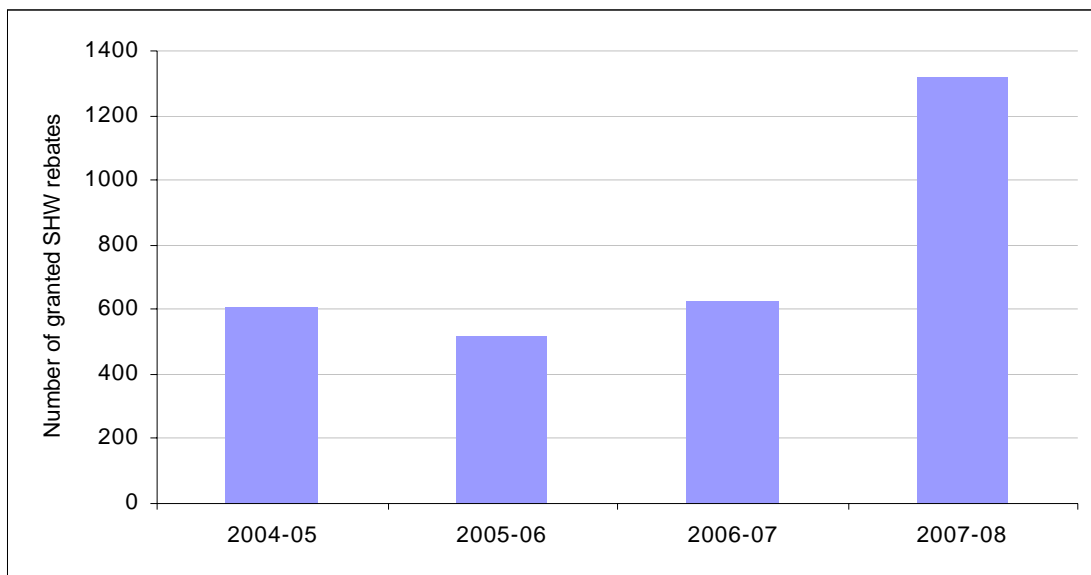


Figure 3 Gas boosted solar, preheaters and retrofit kits rebated in Victoria 2004-

### **Current rebate program**

In March 2008, the Victorian Government announced a \$33 million program to expand the solar hot water rebate program for households located in regional Victoria. A key objective was to further reduce the cost of solar to a level that was comparable to the cost of installing a conventional water heater. This was to provide an added incentive for take up of solar water heating in areas where many consumers do not have access to reticulated natural gas.

Sustainability Victoria's model for providing rebates has three main elements:

1. Households are able to make a purchase for the supply and installation of a product with the rebate amount already deducted. Thus, alleviating the need to find the full purchase cost up front;
2. Readily available suppliers who are able to check customer eligibility and provide a price with the rebate deducted;
3. An efficient process. Sustainability Victoria provides an online tool for participating suppliers to check eligibility, pre-approve the rebate and claim reimbursement from Sustainability Victoria. Verification of eligibility is obtained from each party involved in the transaction.

A major barrier to the uptake of solar hot waters compared to conventional water heaters has been the purchase price of these systems. The Regional Solar Hot Water Rebate Program allows households to install solar systems at a similar cost to a conventional water heater. The rebate process means that customers are able to obtain quotations for the supply and installation of a solar system with the rebate amount already deducted.

Since the commencement of the Regional Solar Hot Water Rebate in June 2008, a total of 400 suppliers have joined the program with Sustainability Victoria. These suppliers are made up of hot water manufacturers, retailers, hot water suppliers, plumbers and plumbing merchant stores.

These participating suppliers have recognised the market advantage of participating in the rebate program and being able to offer a point-of-sale discount to the customer of up to \$2,500 plus other incentives such as RECs.

An online rebate tool has been developed specifically to administer rebate programs. It consists of a front-end that participating suppliers use through the ResourceSmart website and a back-end that allows Sustainability Victoria to interrogate and verify the data input by suppliers as well as fulfilling reporting requirements. Participating suppliers provide the data input including an eligibility check.

The online rebate tool provides the flexibility for timely updates to the rebate program structure including adjustments to rebate values to recognise the availability of new incentives or changes in market conditions

Sustainability Victoria recognises that many of its partners on the program are small businesses that would have difficulties carrying the cost of rebates without prompt reimbursement. Therefore, Sustainability Victoria reimburses participating suppliers within two weeks following the receipt of a complete application.

**Rebate uptake after three months**

The number of granted rebates per week over the first three months of the regional rebate program has risen dramatically and had reached levels of 140 units per week in early October as shown in Figure 4.

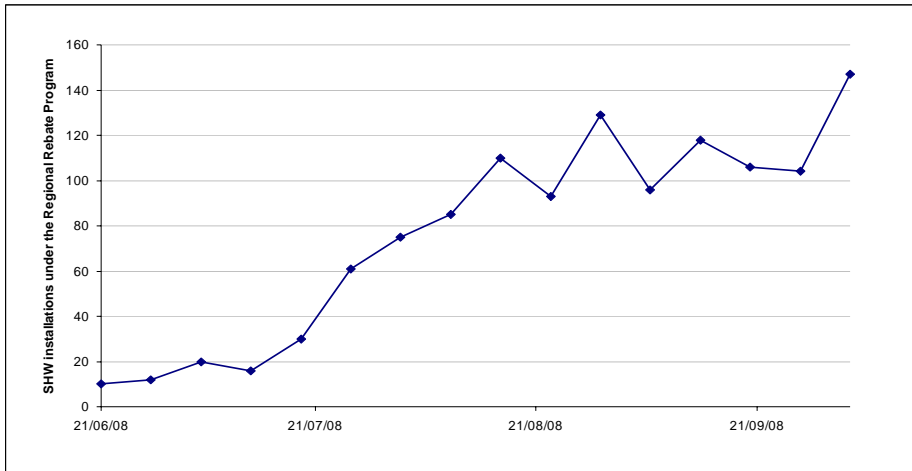


Figure 4 Solar hot water installations in regional Victoria Mid June – October 2008

Figure 5 illustrates the types of water heater installed in the first three months of the rebate. Of the 1,345 water heaters rebated, 35% were conventional electric boosted solar systems, 25% electric heat pumps and 40% gas boosted solar systems.

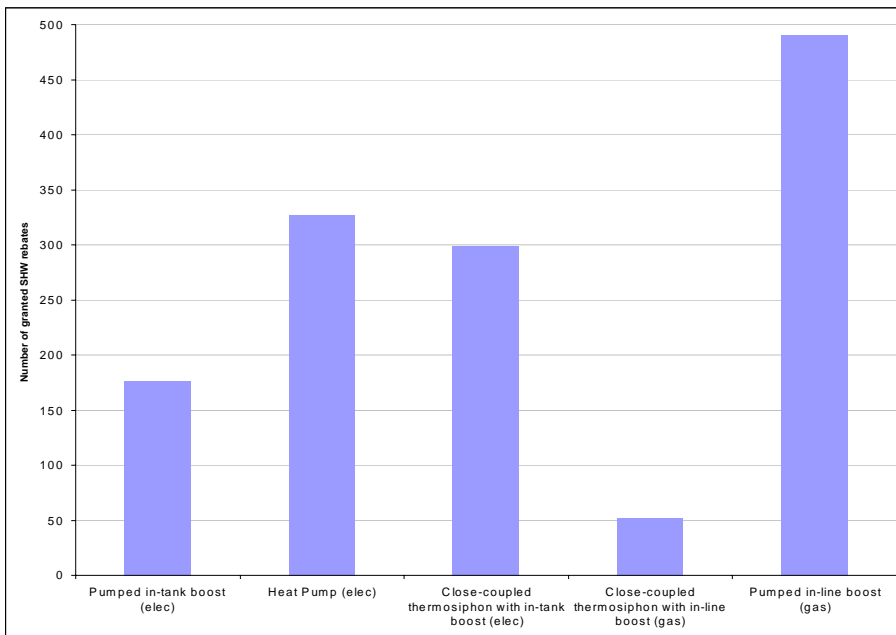


Figure 5 Types of water heater installed in the first three months of the rebate

### **Mandatory Renewable Energy Target (MRET)**

In 2001, the Commonwealth of Australia introduced the MRET scheme in order to tackle climate change and reduce greenhouse gas emissions. The aim of MRET is to encourage the development of renewable energy technologies and supply annually 9,500 gigawatt hours of electricity generation from renewable energy sources by 2010. This is achieved through a market-based certificate trading scheme which is administered by the Office of the Renewable Energy Regulation (ORER). Owners of registered solar water heaters are also eligible to create certificates under the MRET scheme. The amount of certificates created by solar hot water systems represents the number of

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In 2007, the Commonwealth of Australia expanded the MRET scheme and increased the target of renewable energy to 20 per cent of the total electricity generation in Australia by 2020 which is forecast to be around 45,000 gigawatt hours.

### **Victorian Energy Efficiency Target (VEET)**

The new VEET scheme will set energy saving targets for the residential sector and will commence in 2009. Energy retailers have to acquire certificates through energy efficiency actions for households such as providing households with energy savings products and services. Eligible energy saving actions, such as the replacement of a conventional water heater with a solar water heating system, creates certificates which the householder may sell to an energy retailer. The amount of certificates created by the installation of a solar water heating system depends on the solar savings of the solar system. The Sustainability Victoria database of solar water heating systems will be used to list VEET certificate levels for each product.

### **Regulation**

The Victorian State Government has recently enacted regulations to reduce greenhouse gas pollution and save water in new houses. All new houses and single storey units designed since 1 July 2005 have been required to meet a minimum energy efficiency standard and include one of two sustainability options:

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- > a solar water heater system or
- > a rainwater tank connected to all sanitary flushing systems.

At the same time the plumbing regulations have been revised to establish the standards required for the installation of solar water heaters. This includes setting the minimum energy saving compared to a conventional water heater at 60%. Initial analysis indicates that over 50% of Victoria's new homes are installing solar water heaters.

### **Awareness**

Consumer awareness that solar is a viable option is critical in breaking down any perceived barriers to sales of solar – particularly in a cooler climate such as Victoria. Several consumer awareness programs are underway:

#### **Solar report**

Promotion of the benefits of using solar for water heating is a significant part of the regional rebate. Satellite derived solar radiation data from the Bureau of Meteorology is used to estimate the solar savings using an algorithm developed by Morrison [2007] for all regional local government areas.

Sustainability Victoria publishes a weekly Solar Report on the ResourceSmart website which shows the greenhouse gas emissions and running cost savings of solar compared to conventional systems for households in Melbourne and other regions. Potential statewide percentage savings in greenhouse gas emissions are based on the weekly greenhouse gas indicator published by the Climate Group.

#### **Retail chains**

Solar hot water sales are generally through intermediaries, such as plumbers, and not through stores. However, there are increasing numbers of retail outlets selling solar hot water systems.

The Victorian Government *Right Advice at the Right Place* program provides retail stores with point-of-sale information and training for their sales staff to help them to confidently advise their customers about energy and water efficiency of products. Major retail chains are now participating in the program representing over 300 stores located across the state.

#### **Consumer campaigns**

The Victorian Government has an ongoing and successful campaign to raise awareness of the greenhouse impacts of using energy. The program utilises the symbolism of a black balloon to make greenhouse pollution from appliances visible thereby encouraging householders to purchase products that use less energy to provide services including water heating.

## **INDUSTRY CAPACITY**

### **Industry Training**

46% of households nominate their plumber as their initial point of contact when choosing a new hot water system (BIS Shrapnel 2008). To ensure that the increase in

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solar water heater installations could be realised Greenplumbers have been contracted to provide 35 training sessions for plumbers in regional Victoria. These are provided as an introduction so that plumbers have the basics, which can be backed up by manufacturer support networks. This provides enough confidence to sell solar, rather than avoid the option.

In the three months to October 2008, 16 training sessions have been held throughout Victoria and 700 plumbers have been trained.

### **Product quality**

In mainstreaming a product the reliability and performance will influence consumer choice. Whilst industry standards can influence incremental performance, how incentives and regulations are designed will have a major influence on the quality of products which are supplied.

The rebate requires thermal performance evaluation to the Australian Standard so that purchasers can evaluate the relative savings. VEET and MRET require “AS/NZS 2712:2007 Solar and heat pump water heaters - Design and construction” approval for each product listed so that purchasers can be assured that the product is designed and built to last.

The thermal performance evaluation method in “AS 4234:1994 Solar water heaters - Domestic and heat pump - Calculation of energy consumption” is used to evaluate the energy savings and the amount of hot water that can be delivered. Note that the new version of the same standard “AS/NZS 4234:2008 Heated water systems - Calculation of energy consumption” will be used after a period that will allow industry time to carry out the assessment.

### **Product performance**

The amount of the Victorian rebate is based on the performance of solar hot water systems which is made up of two components: firstly the amount of hot water the system is capable of supplying and secondly the solar savings provided under standard conditions. The level of rebate is given in Table 1.

The database of product performance is used for the listing of products that comply with the 5 Star Standards for new houses. It will also be used to derive the number of certificates for VEET

Table 1 Rebate levels as at October 2008 (Levels relate to boost fuel, amount of hot water that can be supplied and system performance) in regional Victoria

Rebate levels		Solar savings AS4234 1994			
Boost Fuel	Daily Hot water use in Zone 4	60%-64.9%	65%-69.9%	70%-74.9%	>75%
Electricity	25 MJ ~120 litres	\$1,900		\$2,000	\$2,100
	42 MJ ~200 litres	\$2,100	\$2,300	\$2,500	
Gas	25 MJ ~120 litres	\$1,900		\$2,100	\$2,100
	42 MJ ~200 litres	\$2,100		\$2,300	\$2,500

### **5 Star requirements**

Solar water heating systems must meet the 5 Star Standards for new residential homes, which requires that solar water heaters must be tested under Australian Standard AS4234: 1994 and provide solar savings of at least 60% in the Melbourne climate (Zone 4). A list of all solar water heating systems that meet the 5 Star Standards are published on the Sustainability Victoria website.

### **Installation audits**

In Victoria, the Plumbing Industry Commission (PIC) monitors the compliance to current plumbing regulations through audits and inspections. In addition, Sustainability Victoria is developing an audit program with the PIC to specifically ensure that a sample of all installations that receive a Victorian Government rebate are inspected.

The inspection program will confirm rebate eligibility, that components match the rebate application (including model and serial numbers), collectors are correctly orientated, supported and without overshadowing as well as compliance with the plumbing regulations.

### **Product availability**

Rebates can help in influencing availability of product. This has been the case in regional Victoria where many small retailers have joined the program to service the increase in the number of customers purchasing solar hot water.

Since the start of the program 400 retailers/plumbers have signed up to be a participating supplier and installer of solar hot water systems.

## CONCLUSIONS

The Victorian Government has developed a comprehensive suite of programs that improve the capacity of industry to deliver solar solutions at the same time as building consumer demand.

Industry capacity has been increased by training installers, maintaining product standards and increasing product availability.

Increased consumer demand has resulted from information, incentives and regulatory requirements.

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