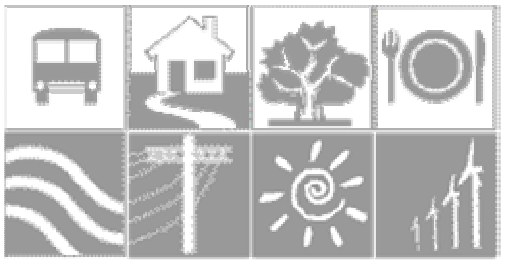
Hot Water Efficiency
Project Report

"Kentish Gets Energy Efficient Hot Water"



By Julie Hargreaves

Kentish Energy Efficiency Network Embracing Renewables Inc

keener inc.

Introduction

The project "Kentish Gets Energy Efficient Hot Water" was initiated to encourage greater take up of renewable energy solutions for heating water as well as to make general efficiency improvements to existing domestic hot water systems and the way they are used.

Evidence to support this project was provided by a feasibility study undertaken by K.E.E.N.E.R. Inc (*"Transition To Energy Efficiency – Initiatives To Drive Community Change", July 2009*). This identified that significant savings could be made to greenhouse gas emissions through making improvements to domestic hot water systems but that there were a number of limiting factors to doing this:

- *price;*
- *availability of renewable energy technology;*
- *availability of trained and qualified installers;*
- *the willingness to change a hot water system that is not broken; and*
- *appreciation by the householder of the value of the long-term cost savings that can be made.*

Through this project K.E.E.N.E.R. Inc aimed to instigate a number of actions that would address the limiting factors listed above and encourage a shift towards more energy efficient hot water systems throughout Kentish.

With funding from a Tasmanian Government Climate Connect grant, additional financial and in-kind support from Kentish Council and others, K.E.E.N.E.R. Inc has been able to implement this project in Kentish with the following benefits:

- *reduced ongoing energy costs for all participating households;*
- *reduction of greenhouse gas emissions as a result of a reduction in domestic electricity usage;*
- *greater awareness and understanding by all Kentish residents about solar hot water and energy efficiency measures;*
- *stimulus to local renewable energy industry sector – suppliers, installers and tradespeople; and*
- *greater awareness and understanding by youth and schoolchildren about the science of renewable energy technology.*

As the visible signs of this project on roofs across Kentish instigate further interest, it is hoped that the project will have long lasting effects through other households switching to solar when their current system needs replacing.

Detailed below is a fuller description of our journey on this project.

What we set out to do

Project Aims

1. *"Targeting energy efficiency improvements for domestic hot water heating - to reduce energy wastage and encourage a changeover to a renewable energy source."*
2. *"Targeting all domestic households in Kentish.*

Rationale

Household Benefits: Heating water typically accounts for a quarter of household energy use, therefore any efficiencies made would make a noticeable difference to domestic energy usage. This would have an immediate benefit to individual

households by reducing their energy bills and help them to improve their home sustainability for the long term.

Climate Benefits: The project would cause a reduction in indirect greenhouse gas emissions as a result of a reduction in the consumption of purchased electricity. For Tasmanian electricity supply, the indirect emission factor is 0.32kg CO_2-e/kWh *[appendix 1]*, however as some of this electricity supply is sourced from other states, this is effectively as high as 1.23kg CO_2-e/kWh.

The targeted savings through a 10% reduction in energy use across an estimated 1,930 Kentish households that use electricity to heat water, therefore represents between 154 and 593 tonnes CO_2-e per year, based on average electricity usage. [25% of 10,000kWh per year – Aurora Energy]

FACTS ABOUT THE TARGET COMMUNITY:

*(**Efficiency measures**) According to a survey by BIS Shrapnel (note 1), only 37% of builders insulated hot water pipes. Another survey conducted by the Waterworks Valley Community (note 2) shows standing losses from domestic hot water cylinders varies from 500kWh to 1200kWh per year. These statistics give an indication of how many homes could make some simple energy efficiency improvements by improving the insulation of their hot water system. This and other energy efficiency measures, such as reducing the temperature of water, fixing drips or changing usage patterns, could be made by every household in Kentish at minimal cost to the householder.*

*(**Switch to solar**) Approximately 80% of Kentish households (note 3) use electricity for heating water and therefore there is considerable potential for energy savings by switching to a renewable energy source. The initial target for the project was for 50 households to switch to solar, with an expectation that the momentum would continue as domestic hot water systems age and need replacing and as a result of seeing other houses with a solar hot water system on their roof.*

Note 1: ABS - Attitudes of residential builders to energy issues and usage – 1301.0 Year Book of Australia 2003

Note 2: Standing Heat Losses From Household Hot Water Cylinders, Waterworks Valley Community, http://www.waterworksvalley.com

Note3: ABS - Environmental Issues : Energy Use And Conservation - 4602.0.55.001 - Mar 2008

How we went about it

Strategy

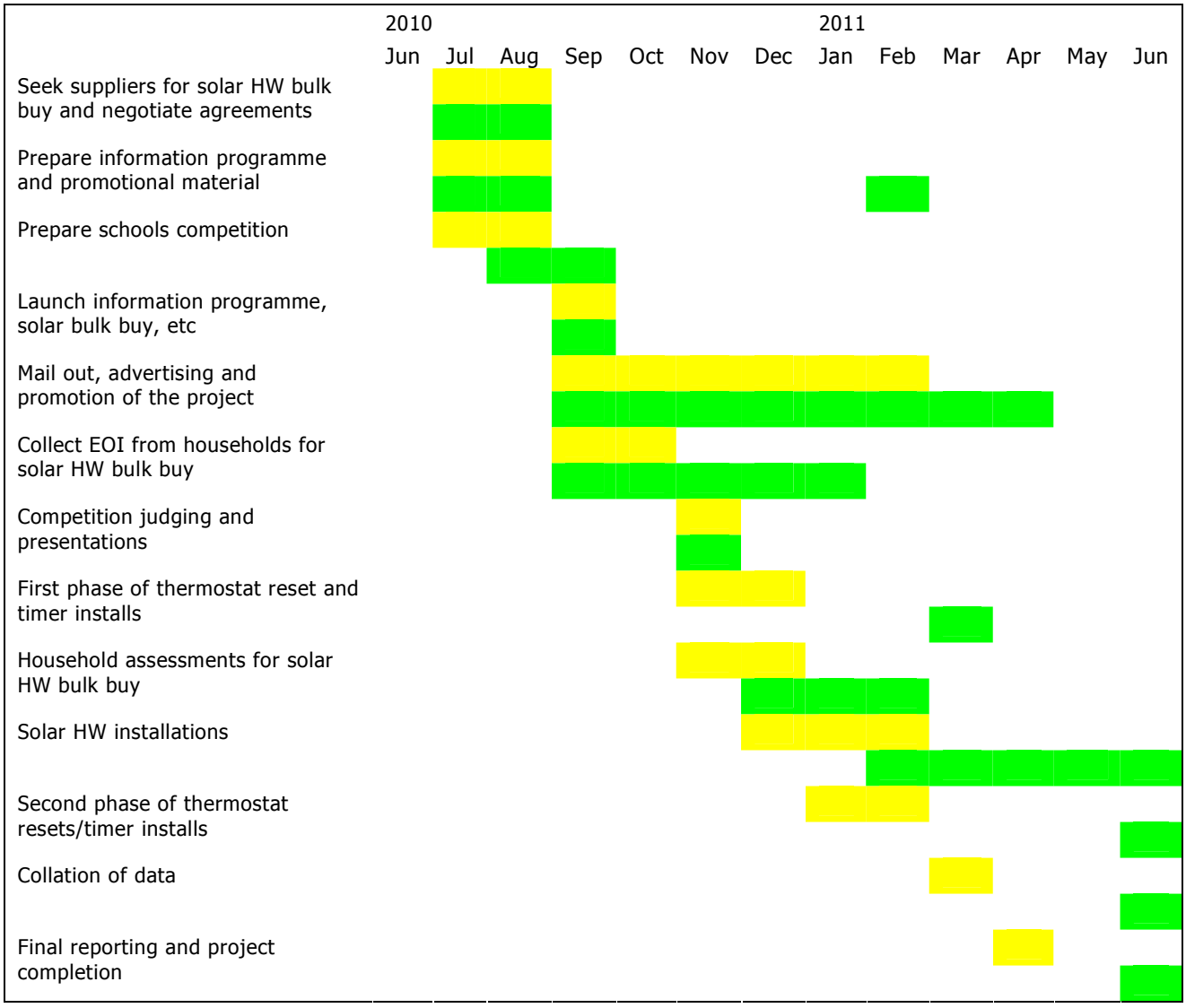
The project aimed to use a combination of strategies focusing solely on hot water systems in order to simplify the message and concentrate on one theme. These strategies included:

- an information programme targeting all households in Kentish, demonstrating ways to improve the energy efficiency of their hot water system as well as how they can reduce their hot water usage;
- facilitating a bulk buy of solar hot water systems – target 50 installations or more;
- assistance to households to reduce thermostat settings on their existing hot water system;
- installation of timers on electric hot water systems with an associated survey of electricity usage data – target was for 20 timer installations;

- Solar Challenge competition run in conjunction with local schools to increase the knowledge base of young people in the science of renewable energy; and
- promotion at public events – launching the project, presentation day for the Solar Challenge competition and an information stand at SteamFest.

Our aim was to engage with as many people as possible of all ages and backgrounds over a 10 month period. Whether they were interested because they could save money, save the planet or just because it was fun, we wanted to open a dialogue on the topic with a very broad demographic and not just those who were already environmentally focused.

Project Plan (Planned = Actual =)



Acknowledgements

The Project Team

Project Coordinator:	Julie Hargreaves
Home Sustainability Advisor:	Shayn Harkness
Treasurer:	Lesley Begg
Electrical Advisor:	Stan Jessup

K.E.E.N.E.R. steering committee and members provided a significant amount of help with the project - assisting with envelope stuffing, promotional activities, catering, event set up/take down, competition judging, and many other general support activities.

Judith Bolouri	Eileen Tremble	Doug Begg
Keith Spencer	Ronald Van Der Winckel	Phil Dickinson
Jan Spencer	Kurt Treutlein	Kali Carsburg
Andrew Hill	Len Dixon	

Estimated volunteer time contributed to the project = 180 hrs

Organisations that participated in the project:

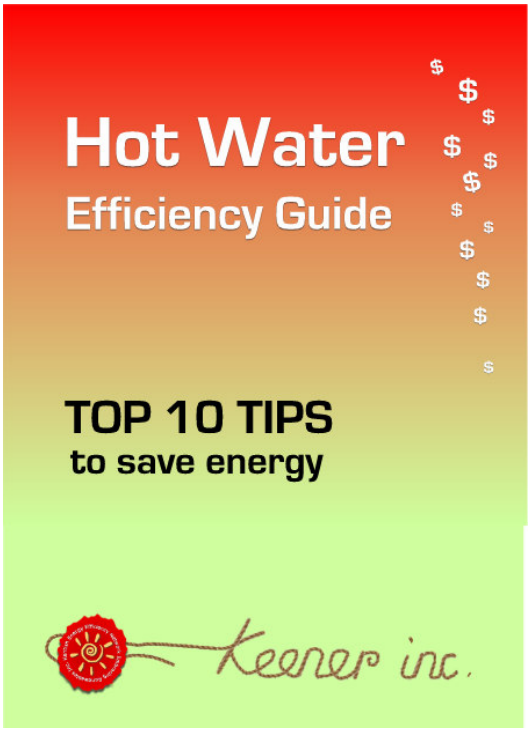
- Tasmanian Government – funding through the ClimateConnect programme
- Kentish Council - Competition prizes; venue hire; Council staff time
- Tasmazia & Cradle Mountain Candy Store, Sheffield - Competition prizes
- Sheffield District High School - "Solar Hot Water Challenge" competition
- Sheffield Primary School - "Solar Hot Water Challenge" competition
- Wilmot Primary School - "Solar Hot Water Challenge" competition
- Redwater Creek Steam & Heritage Society - stall at SteamFest for K.E.E.N.E.R to promote the project
- Mt Roland Rivercare Catchment Inc - Information from their research for an earlier solar hot water project proposal
- Mitchell's Bodyworks, Sheffield - Use of forecourt for competition/presentation day
- Solar Lord, Victoria - Solar hot water bulk buy
- Siddons Solarstream, Victoria - Solar hot water bulk buy
- Air Technology Tasmania, Devonport - Solar hot water bulk buy
- Commercial & Rural Refrigeration, Wivenoe - Solar hot water bulk buy

Information Programme

The information programme hinged around an information pack which was mailed to all households in Kentish as well as monthly advertising in the local Kentish Chronicle.

The information pack included a glossy 8 page A5 booklet "Hot Water Efficiency Guide – Top 10 Tips to save energy" that was specifically developed for the project with a range of suggestions to reduce hot water use or make a hot water system more efficient. The pack also included promotional brochures and order forms for the solar hot water bulk buy opportunity that was being facilitated through the project.

Further to this we created a number of posters illustrating how a hot water system could be improved. These are on display in prominent locations in the municipality – e.g. shop windows, Council offices and the library.



Wherever possible, we have reinforced the hot water efficiency messages of this project – through media coverage of project activities (e.g. Schools Solar Challenge) as well as at promotional events (e.g. K.E.E.N.E.R information stand at SteamFest).

Every opportunity was used to raise awareness of the benefits of improving efficiencies in hot water systems as well as to explain how that could be done.

The Kentish Chronicle is distributed monthly to the majority of households in Kentish, which gave us regular access to our target market and was a very effective use of the advertising budget for the project.

While the glossy booklet was well received and people who had an interest in energy efficiency kept it, the information pack was a costly exercise to do - both financially and in volunteer resources to manually assemble them for mailout to around 2500 addresses. However, the multi-targeted nature of our information programme has certainly achieved its aim of raising awareness throughout the whole municipality, with possible exception of those with low or no literacy. For this demographic, we have relied on word of mouth or personal interaction at events such as SteamFest, where committee members were available to talk to people and explain about the project.

Solar Hot Water Bulk Buy

Process

Our aim for the solar hot water bulk buy was to act as a facilitator to obtain cost savings from a supplier who would be installing a number of systems within one geographic area. The anticipation was that efficiencies could be achieved in the installation process with volumes of 50 systems or more. K.E.E.N.E.R had already collected a list of 50 people who had expressed interest (in principle) prior to the start of the project.

A call for expressions of interest from suppliers was publicised in July with a briefing document sent out to 40 suppliers/installers/retailers of solar hot water systems. The brief included two options – evacuated tubes and heat pumps – these system types being chosen as the most effective in Tasmania and which accommodated those households with good sun aspect and those that didn't.

12 EOI's were received and after a rigorous assessment from a panel of three K.E.E.N.E.R members, the following two suppliers were chosen:

- Siddons Solarstream heat pump system, installed by Commercial & Rural Refrigeration, Wivenoe; and
- Solar Lord evacuated tube system, installed by Air Technology Tasmania, Devonport.

Details were agreed with each supplier and information was included in the information pack and other advertising to promote the options to Kentish households.

People registered their interest – either through the K.E.E.N.E.R web site or direct to the supplier, after which they received an assessment and quote from the supplier. If they chose to go ahead, then they completed the paperwork provided by the supplier. All further interactions then being between the householder and the supplier to arrange installation and payment.

Launch Event

The promotion of the project and the solar hot water bulk buy was launched on 16th September at the Sheffield Town Hall. On one of the worst nights of weather with gale force winds bringing down trees, all of the suppliers and installation companies braved the elements to bring demonstration systems to the event. Chris Siddons from Siddons Solarstream and Phillip Beet from Solar Lord also flew over from Victoria for the occasion and to deliver a presentation on their products.


Solar Hot Water

Bulk Buy Opportunity for Kentish

Federal Government rebates still available*

As part of a hot water efficiency project in Kentish, KEENER has negotiated a once off deal with two solar hot water suppliers (Siddons and Solar Lord) for Kentish households to get a discounted price for solar hot water systems. This is based on us getting enough orders for a container load of each type of hot water system to be shipped in to Kentish. The two options are shown below.

Prices start from $1,988 installed. (This is for a standard install and depends upon the size and type of system chosen and is after deduction of RECs and rebates*.)

Closing date for registering your interest in this offer is 15th October.

Solar Lord Evacuated Tube System (Installed by Air Technology)

Siddons Solarstream Heat Pump (Installed by Commercial & Rural Refrigeration)

The first stage is to register your interest (by 15th October), then you will receive a free assessment and a firm quote for your specific installation. No money is required until you sign a contract with the supplier of your chosen system.

* Government Rebates - $600 for a heat pump / $1000 for evacuated tubes - to be eligible you need to be replacing an electric hot water system with solar, have not already had an insulation rebate and the house is older than 1 year. In the current political climate, there is no guarantee how long this rebate will still be available - which is why KEENER has instigated this project now.

* RECs (Renewable Energy Certificates) – every solar hot water system (including heat pumps) is allocated a number of RECs, based upon efficiency of the system and its size. As RECs are a tradeable item, the price per REC may vary (approx. $35/REC currently) & is offered as a discount at point of sale – would be between $600 and $1200 discount depending upon the system chosen.

Keener inc.

Kentish Energy Efficiency Network Embracing Renewables Inc

Contact Shayn (Secretary) 0419 905462 shayn@keener.com.au www.keener.com.au

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Expecting no-one to show up in such atrocious weather, we were pleasantly surprised by how man people attended, rugged up for the elements and looking somewhat windswept but enough to fill the hall and hear presentations about both systems.

K.E.E.N.E.R committee members provided home-cooked catering for an informal supper afterwards.

Installations

70 systems have been (or are in the process of being) installed throughout Kentish and neighbouring regions. With such a good deal on offer, word got around and people out of the area wanted to be part of the bulk buy. Whether they were included or not was at the

discretion of the suppliers, who were doing all of the hard work in visiting houses and assessing them for a quote.

Not everything went according to plan and the time for the whole process took a lot longer than originally anticipated, but credit goes to the companies involved in that they stuck with it and made it happen. On a commercial level, the deal has probably ended up in the category of "I'm cutting my own throat to do this" and would probably not happen again in this format. However, feedback to K.E.E.N.E.R is that the project has been worthwhile as it has given a lot of visibility to solar hot water systems in this locality, which can only benefit the industry in the long term.

From conversations with people interested in the solar bulk buy, it is apparent that other than a few specialised businesses, there is a lack of skills and in-depth knowledge in the general plumbing/electrical trades about solar technology. In fact some people have reported being deterred from having a solar hot water system by their plumber, and we know of one instance where a solar hot water system was installed with the panels pointing the wrong way!

The problem faced by householders is that a solar hot water system (even with the Federal Government rebate) is considerably more expensive than the standard electric hot water storage system. People are also inclined to wait until their current system needs replacing before considering a renewable energy option. When their hot water system eventually fails, the householder wants a replacement installed very quickly. However, solar hot water systems often need to be ordered, because the demand is not high enough for it to be commercially viable for general suppliers of hot water systems to hold stock. Therefore, the householder often ends up with a standard electric hot water system, because that is all that was available at the time at short notice.

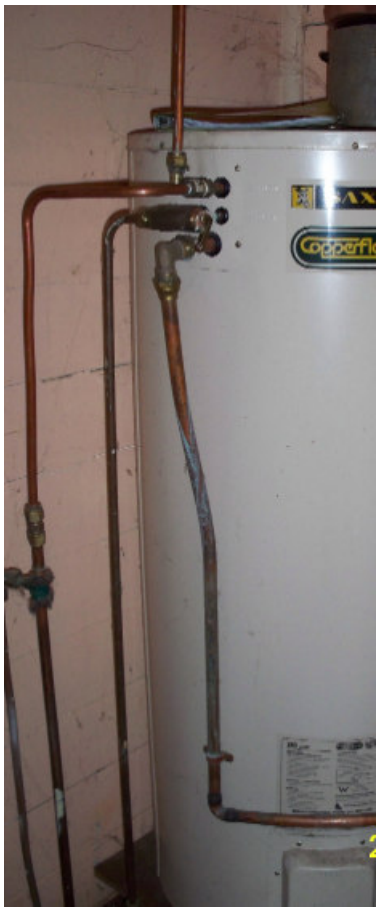
This is one of the reasons why K.E.E.N.E.R included the bulk buy facilitation in the project to give some stimulus to the renewable energy technology market with the hope that the project would encourage more growth of renewable energy technology business.

One other way for this stimulus to occur would be the mandatory phase out of electric resistance storage hot water heaters. This National legislation is applicable in all other states, with Tasmania being exempted at the request of the Tasmanian Government in 2009.

Thermostat Resets

The purpose of this part of the project was to provide some direct assistance to householders to turn down the thermostat on their water heaters. This is a relatively straightforward task but often requires an electrician to do depending upon the specific hot water system. However, the long term benefits can be significant and ongoing – in reduced costs for heating water as well as the consequent reduction in greenhouse gas emissions.

We recognised that the cost for this task being done as a one-off job by an electrician for one household was probably a deterrent to many people, but by organising this as a collective task which was subsidised by the grant, we considered that it would be cheap enough to encourage everyone to want their thermostat turning down. We thought!



Our first promotion of this was very lack lustre in its response – less than a handful signed up.

We therefore revised our strategy and made it completely free, and promoted again. And, again.

Over several months, we placed full page advertisements in the Kentish Chronicle; we created a poster and displayed it in prominent locations and we promoted in person at an information stand at SteamFest as well as other events.

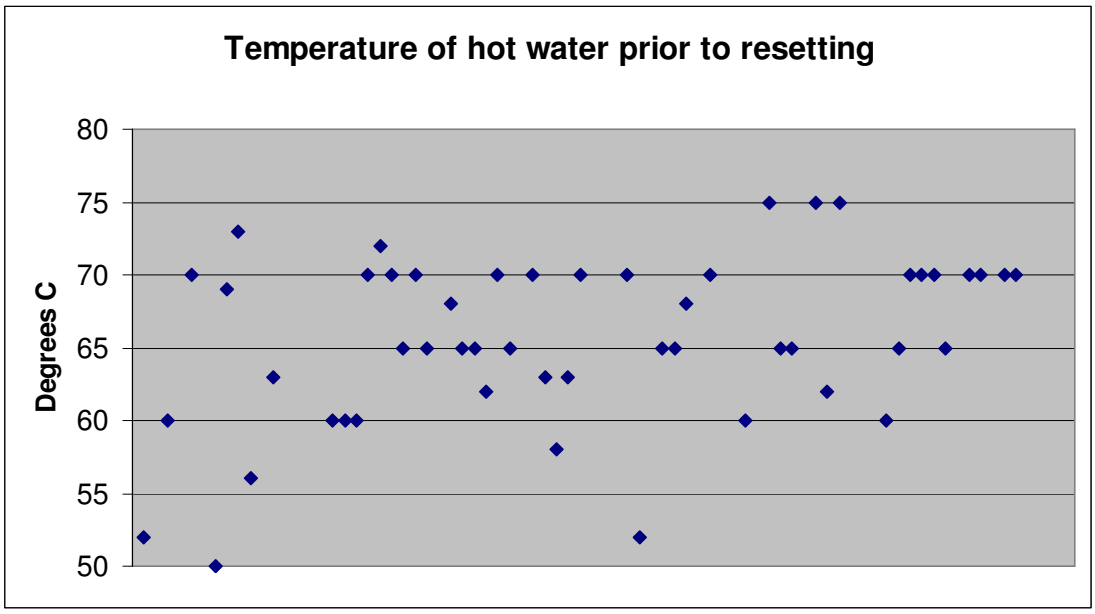
The requests trickled in until we had enough to engage an electrician and organise the work, which was coordinated to happen along with the timer installation programme (see section following).

Because of the general lack of interest by householders, we re-apportioned some of the budgeted amount for this task towards the additional promotion and information displays (advertising and printing costs) as well as some value adding to the task.

It was apparent from the first batch of work done that existing hot water systems were generally deficient in the insulation of pipework (see left for a typical example). We therefore purchased some inexpensive foam pipe insulation and installed this along the first metre of pipe from the tank (where insulation is most effective).

The temperature before and after resetting the thermostat was recorded for each house that was visited. Overall, about three quarters of the houses visited had thermostats set at more than 60° C and the highest temperature noted was 75° C. The following is a scatter chart of the range of temperature spreads of hot water systems prior to being reset.

[Note: If the hot water system did not have a regulated dial on the thermostat, then the temperature was estimated by measuring the temperature of water from the nearest hot tap to the cylinder, which accounts for the few low readings.]



[Note: each point represents the hot water temperature of one household in the study]

An example of the cost savings to an average family as a result of this project by not having to heat the water more than is required - the family would save from $72 to $217 per year (tank size of 250 litre, used up once a day, range of temperature reduction made varying from 5° C to 15° C). This does not include the standing losses from the hot water system, which would also be reduced as a result of the temperature of the thermostat being lowered.

In total 58 hot water systems were checked of which 50 were reset to a lower temperature.

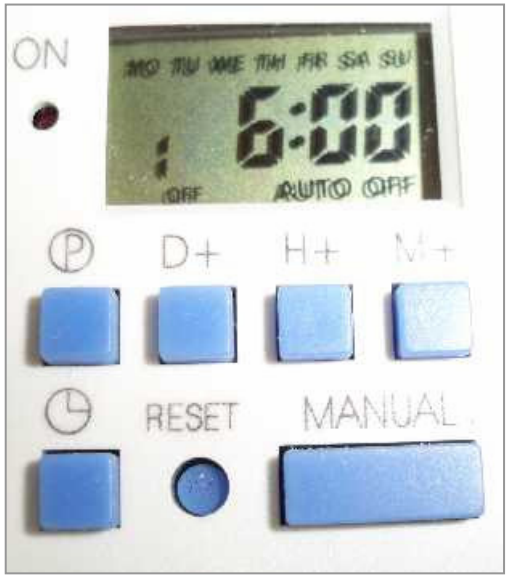
It is unclear why there was a disappointingly low response to this programme – whether people were making the thermostat adjustment themselves; they considered that their hot water was set at the right temperature or whether the price of electricity is still not high enough to prompt action.

When we changed the strategy to no cost to the householder we got a better response but certainly not at the level that we originally anticipated. The actual response rate represents approximately 2.5% of Kentish households. However, through this process we have gained a valuable insight into the state of hot water systems and electrical infrastructure in houses generally, along with some very useful data on household electricity usage.

Installation of Timers

The purpose of this part of the project was to determine the level of savings on electricity use that could be made by installing a timer on a hot water system to regulate when water is heated.

Most households have regular patterns of hot water usage e.g. first thing in the morning for showers or early evening after work. Hot water is seldom required during the night when most people are asleep, yet hot water systems will still continue to maintain the set temperature for the full 24 hours. Overnight the standing losses will increase as the temperature difference between the hot water cylinder and the ambient air increases. Therefore installing a timer to switch the heating element on and off to suit the times when hot water is needed should result in reduced electricity use.



By installing timers in a number of households where they were willing to provide data on their past and future electricity use for heating water, we hoped to provide some quantitative data of the level of savings that could be made.

Having originally budgeted for 20 timers, we sourced a lower cost digital timer which allowed us to double the planned number of households that would be involved in the survey. This timer was easily programmable and included a manual override button – giving complete control to the householder, negating any fears that "there may not be enough hot water".

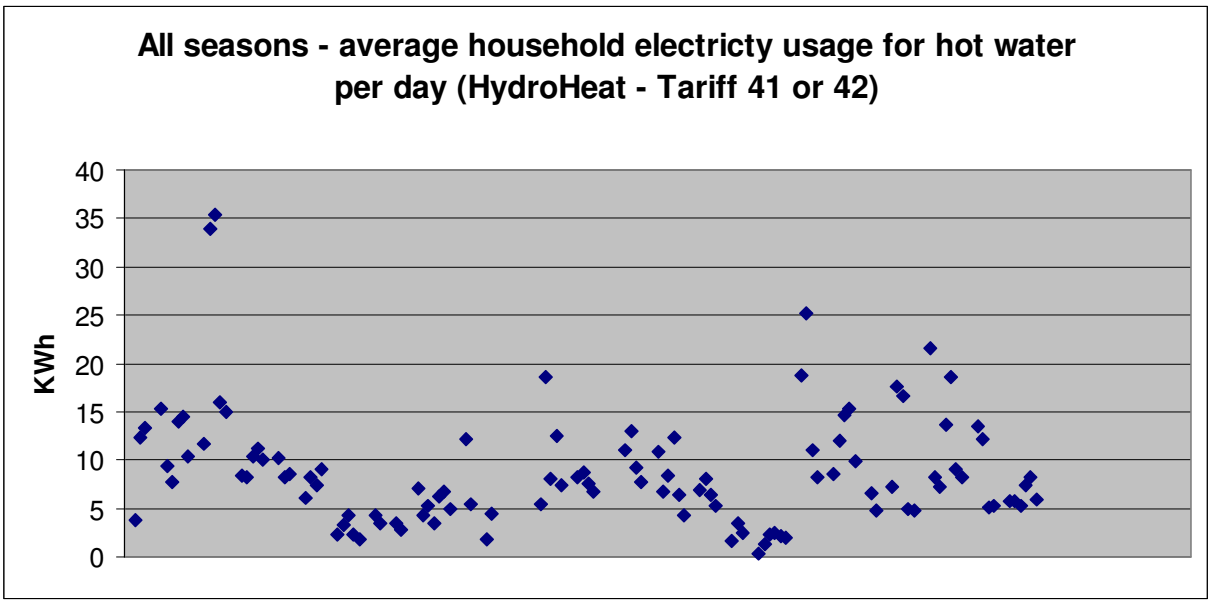
However, as with the thermostat reset we found it difficult, initially, to gain enough interest from householders – even though the timer and installation work was at no cost to the householder (other than if additional work was required to enable the timer to be fitted). We also had an additional problem in that most of the households that were interested generally also had too high a thermostat setting on their water heater.

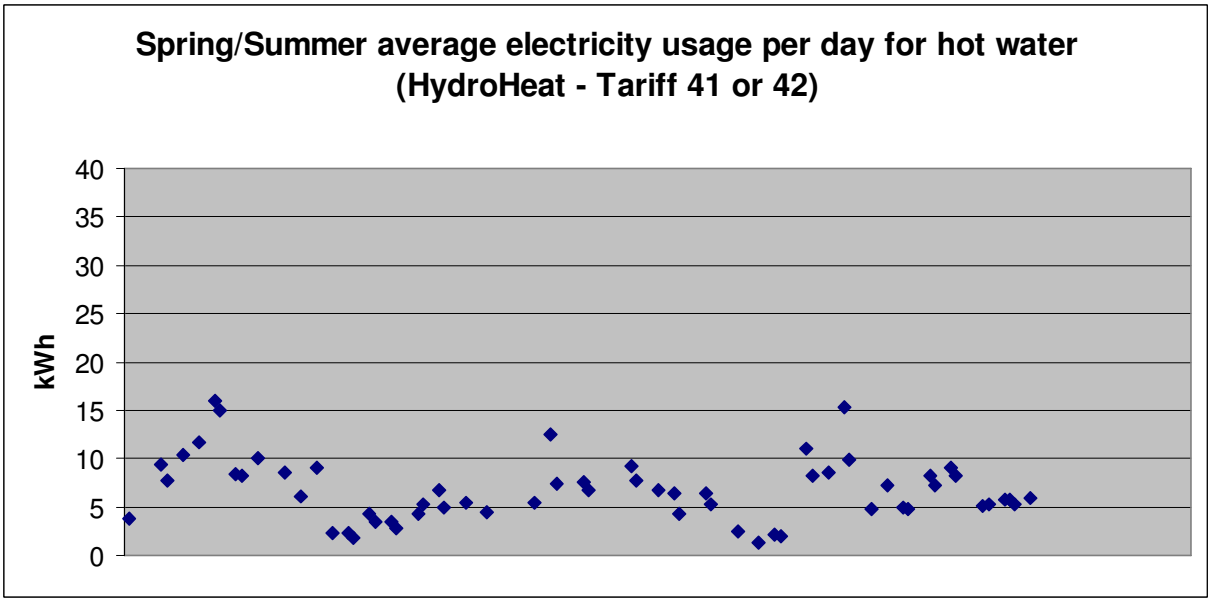
As we had increased the number of households that would be surveyed, we opted to include all those who were able to supply past electricity use data – therefore providing us with a broader sample from which to collate data.

While we may not, in all cases, be able to attribute savings to one specific change, the household electricity data collected would provide a good evidence base to demonstrate the benefits for a package of small improvement measures together (i.e. timer, thermostat reduction, pipe insulation). With the broader sample, we could look individually at specific measures as well as aggregate a greater amount of data for the overall picture.

The following scatter charts show the range of daily electricity usage on the hot water tariff for each household involved in the survey. Each point represents the daily average for a given quarter for one household.

The first chart shows all data collected, and the second focuses only on the spring and summer seasons. As the hot water tariff also, in some cases, includes a heat pump on the same meter, the Spring/Summer electricity data gives a more accurate picture of the hot water component.





Averaged over all households, the past electricity usage varied by season as follows:

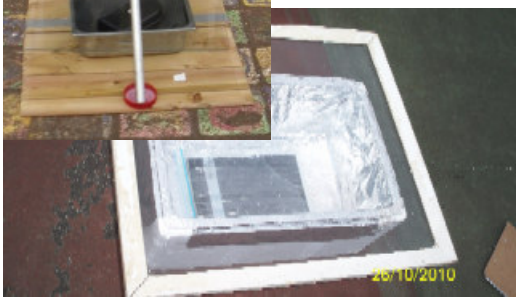
	kWh per day
Summer	6.27
Autumn	11.02
Winter	11.38
Spring	7.48
All Year Average	8.84

Further data will be collected from all households for the 12 months following the installation and collated for comparison with their previous electricity usage.

Schools Solar Challenge

The schools solar challenge was a competition targeting children and youth to engage them in a greater understanding of the science behind renewable energy by challenging them to design their own solar water heater.

Their task was to heat one litre of water within one hour using only solar energy. Their apparatus could be no bigger than 1m x 1m x 1m, but other than that the only limitations were their imaginations.



Three schools were involved – Sheffield District High School, Sheffield Primary School and Wilmot Primary School. Two judging days were held – one in Wilmot and one in Sheffield and prizes were awarded for each school – for the highest temperature achieved as well as the most innovative design.

There were 39 entries in total and over 80 school children participated.

Even though the weather on the judging days was not ideal, there was enough sun to heat water to 49° C.

Nor did it deter all the participants who happily spent their lunch hour watching water heat up and when the wind got up, formed their own human shields to protect their experiments from any wind chill factor!

As one of the prizes was a "mad minute in the lolly shop", a prizing giving event and demonstration day was held in Sheffield Main Street. This provided a promotional opportunity for the project as well as to show some of the entries to the competition. A good crowd gathered outside the Cradle Mountain Candy Store to watch the winners in their dash to grab as many lollies as they could in the allotted time.

Conclusion

This project has made a significant contribution to raising awareness on the topic of energy efficiency in relation to domestic hot water systems. The project has engaged with a broad cross section of people from the very young to the very old, from the technologically savvy to those who just want hot water when they turn on the tap.

While it is easier to convince environmentally minded people to make personal changes for the benefit of the climate, this project has looked at ways to encourage everyone to reduce energy use for heating water, irrespective of their views about climate change.

Whether people don't care, don't understand or don't have the wherewithal to make changes, we wanted to have an energy reduction programme that everyone could benefit from as a way to achieving a long term reduction of greenhouse gas emissions. As Kentish is a low socio-economic municipality, where households may have lower levels of disposable income, we intentionally focused a lot of promotional information on $ savings to the householder.

Lessons that we learned throughout the duration of this project were that:

- the most enthusiastic, open to new ideas and inventive were schoolchildren;
- the most cost conscious were seniors (who tended to be the lowest energy users);
- the least likely to participate were families or younger couples (who tended to be the highest energy users);
- many hot water systems are inadequately insulated, pipework especially being ignored;
- most hot water systems are set to too high a temperature; and
- inertia is a very big hurdle to overcome when trying to encourage change.

This last point is particularly relevant to other initiatives attempting to change behaviour in the wider community. What K.E.E.N.E.R has found throughout this project is that despite rising electricity prices and the publicly aired angst in the media about the cost on households, not many people took up the opportunity for free assistance through this project that would reduce the cost of their hot water.

Overall, however, the project has been a success on many levels. Some people have taken the suggestions for improvements and run with them. For example, enclosing external hot water cylinders with boxing and extra insulation is one idea which has produced immediately obvious results to one householder who noted the hot water turning off much sooner because it had got up to temperature quicker.

It is anticipated that word of mouth and personal recommendations will continue the momentum of energy efficiency changes throughout Kentish. As people hear about the experiences of their friends, family or neighbours – good ideas will be passed on.

What we have achieved through this project:

- hot water energy efficiency Information distributed to all households in Kentish (approximately 2500 households);
- prominent displays of hot water efficiency information posters at various public locations in the municipality;
- hot water energy efficiency Information published every month for 10 months in the Kentish Chronicle;
- 70 solar hot water installations replacing electric storage hot water systems;
- 35 households with timers on their hot water system participating in a further 12 month monitoring programme to verify the reduction in energy use;
- temperature reduced on 50 hot water systems by amounts varying up to 15° C;
- pipe insulation installed to approximately 40 hot water systems further reducing standing losses from those systems;
- 80 schoolchildren with a greater understanding and practical knowledge of the science of solar water heating; and
- stimulus to the local renewable energy technology sector.

K.E.E.N.E.R thanks the Tasmanian Government and sponsors for supporting this project.

Recommendations

K.E.E.N.E.R has taken this initiative as far as it currently can at a community level, but much more can still be done to improve the energy efficiency of hot water systems in Kentish and Tasmania generally.

K.E.E.N.E.R's 5 point plan for further action would be:

1. Mandatory phase out of electric resistance storage hot water systems through the removal of Tasmania's exemption from National legislation which is applicable to households in other states. [A major impetus to change the status quo that would invigorate the renewable energy sector in Tasmania.]
2. More skills training and Information targeting electrical and plumbing trades to improve their knowledge of and ability to install renewable energy technology. [Plumbers are generally the first port of call for a householder whose hot water system has failed. For a householder to have real options for a renewable energy or energy efficient hot water system, the plumber needs the skills and knowledge to be able to assess their needs and offer adequate solutions.]
3. Requirement for the insulation of pipework to hot water cylinders as part of installation work as a standard procedure. [A very simple task to do at the time of installation with a very small extra cost on the installation work.]
4. Requirement for the thermostat on new hot water systems to have their default level set at the minimum temperature setting required for health and safety. [If an installer doesn't bother to check the temperature at least it will not be left set at too high a temperature for energy efficient use.]
5. Additional incentives (e.g. extra rebates) to householders to encourage changing to a renewable energy source for heating water. [Easily slashing 10% off domestic energy use across Tasmania as a result of all households having energy efficient hot water systems. This could provide Tasmania's extra power capacity needed for new transport technology such as electric car charging or it could reduce the amount of imported power from the mainland. Both options contributing to a reduction in greenhouse gases. It also puts more money back

into household budgets which will need to accommodate carbon pricing in the future.]

Contacts

All enquiries regarding this document should be addressed to:

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Web site: www.keener.com.au

Appendices

Appendix 1 - Indirect emission factors for consumption of purchased electricity from the grid:

State, Territory or grid description	Emission factor kg CO_2-e/kWh
New South Wales and Australian Capital Territory	0.90
Victoria	1.23
Queensland	0.89
South Australia	0.72
South West Interconnected System in Western Australia	0.82
Tasmania	0.32
Northern Territory	0.68

"National Greenhouse Accounts (NGA) Factors, July 2010" published by the Australian Government, Department of Climate Change and Energy Efficiency.