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SUSTAINABLE LIVING TASMANIA

UNIVERSITY of TASMANIA

GET BILL $MART.

FINAL REPORT

JUNE 2016

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Compiled by Sustainable Living Tasmania
and the University of Tasmania

1.1 Acknowledgements

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The GBS Final Report was prepared as a team. Contributors are listed alphabetically: Jodi Alexander, Michelle Gabrielle, Todd Houstein, Millie Rooney, Phillipa Watson, Steve Watson, Anton Vikstrom.

The Get Bill Smart final report includes separately available sub-reports. The sub-reports and authorship are as follows:

Get Bill Smart Bulk Study
Authors: Michelle Gabrielle, Anton Vikstrom, Todd Houstein, Millie Rooney, Phillipa Watson.

Get Bill Smart Detailed Study
Authors: Millie Roonie, Phillipa Watson, Steve Watson.

Get Bill Smart Cost Benefit Analysis
Authors: Anton Vikstrom, Todd Houstein, Phillipa Watson.

Get Bill Smart project processes and organisational analysis
Authors: Millie Roonie, Michelle Gabrielle.

1.2 Acronyms and definitions

Acronyms

AAA showerhead	A water efficient showerhead with a good level of efficiency
CFL	Compact Fluorescent Lighting
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVR	Clarendon Vale / Rokeby suburban area
EC	Community Energy Champions (sometimes called "Power Rangers" in the field)
EO	Community Engagement Officer
Before Survey	Pre-activity survey
After Survey	Post activity survey
GH	Greater Hobart area
GBS	Get Bill Smart (the name of this project)
HEH	Home Energy Helper
LIEEP	Low Income Energy Efficiency Project
MA	Mission Australia
SLT	Sustainable Living Tasmania
UTAS	University of Tasmania

Definitions

Consortium – The three organisations implementing the Get Bill Smart Project. These organisations are: Mission Australia, Sustainable Living Tasmania and University of Tasmania. Individuals working on the GBS project are referred to as 'consortium members'.

GBS Approaches – Any of the Get Bill Smart research approaches including the Representative group.

Energy Efficiency Activities – Any of the active energy efficiency approaches undertaken in the Get Bill Smart Project. This includes: In-home education and upgrades and community capacity building (EDUG + CCB), In-home education and upgrades only (EDUG) and community capacity building only (CCB).

Heat pumps – Reverse Cycle Air Conditioners used in heating mode. These are efficient heaters using 1/3 of the energy to heat a space compared to resistive heating.

Approach/research Group	Abbreviation
In-home education and upgrades and community capacity building	EDUG + CCB
In-home education and upgrades	EDUG
Community capacity building	CCB
Representative group	REP

GBS Approach group acronyms

CCB – Community capacity-building – Activities conducted through community engagement approaches that have the intention of influencing behaviour, in this case energy use behaviour and related activities in households.

EDUG – In-home education and upgrades – Visits to houses conducted to encourage energy efficiency. In- home visits helped householders to make changes to their homes and their practices in order to encourage reductions of energy used in the home. Auditors, called Home Energy Helpers, conducted these visits and installed most upgrades.

EDUG+CCB – This is a combined approach that included both in-home education and upgrades and exposure to community capacity building activities.

REP – Representative Group – These participants provided before and after data in the form of a survey and energy bills. Some participants in the detailed study also had data loggers installed and were interviewed. This group received grocery vouchers to recognise their participation.

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EXECUTIVE SUMMARY

2. Executive Summary

This activity received funding from the Australian Government. The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein.

2.1 Purpose

This report provides a detailed account of the Get Bill Smart project which ran over the period 1 July 2013 to 15 March 2016 in Tasmania, Australia. Get Bill Smart (GBS) was an action research project that operated in the Greater Hobart area of Tasmania. It trialled an innovative community capacity building approach to low income energy efficiency and compared it to a more conventional, well-practiced in-home energy efficiency upgrade approach. GBS trialled approaches to energy efficiency as part of the Low Income Energy Efficiency Program (LIEEP). The LIEEP program primarily aimed to:

- Trial and evaluate a number of different approaches in various locations that assist low incomes households to be more energy efficient;
- To capture and analyses data and information to inform future energy policy and program approaches.

The LIEEP trial also aimed to:

- Assist low income households to implement sustainable energy efficiency practices to help manage the impacts of the carbon price and improve the household's health, social welfare and livelihood;
- Build the knowledge and capacity of consortia members to encourage long-term energy efficiency among their customers or clients, and;
- Build the capacity of Australian energy efficiency technology and equipment companies by maximising the opportunities for Australian Industries to participate in the projects.

The Department of Industry, Innovation and Science provided funding under the Low Income Energy Efficiency Program (LIEEP). The LIEEP program included 20 projects around Australia all of which investigated and evaluated approaches to assist low-income households to be more energy efficient. The detailed findings from these 20 projects will inform future energy efficiency programs and policies.

This Final Report is the 9th milestone report for the GBS project. Submitted to LIEEP for review in March 2016, it was submitted as a final version in May 2016. Submission of this report denotes the end of the main delivery, monitoring and evaluation stages of the GBS project. In order to evaluate the trial approaches, Get Bill Smart collected qualitative and quantitative data using multi-method data collection and analysis techniques. This Final Report was developed from analysis of five sub-reports that describe the evaluation undertaken (Bulk Study, Detailed Study, Cost Benefit Analysis, Project Processes and Organisational Analysis, and Finance Report). This Final Report provides overview and background information to contextualise the four sub-reports and provides a summary of sub-reports, which are contained in the body of this document.

2.2 Focus

The GBS project operated in the Greater Hobart area of Tasmania, as indicated by the map in Figure 2-1. The community capacity building occurred in the suburbs of Clarendon Vale and Rokeby (CVR) (as circled on the map).

Figure 2–1 Greater Hobart area, population centres in brown (Clarendon vale and Rokeby in red)

2.3 Methods

The overall aim of the GBS project was to examine two approaches that were designed to improve energy efficiency in low income households;

- In-home education and upgrades (EDUG); and
- Community capacity-building (CCB).

Each approach was trialled alone and in combination with the other approach, which meant that three different energy efficiency approaches were trialled:

- In-home education and upgrades alone;
- Community capacity-building alone; and
- In-home education and upgrades plus community capacity-building together (EDUG + CCB).

All three approaches were compared against a representative group (REP).

Project Objectives

Overall objectives for GBS were to:

- Understand how a community capacity-building approach can assist low income households to reduce their energy consumption and how this approach compares with and interacts with more common in-home education and upgrade approaches.
- Understand the processes and key determinants for success, barriers, and drivers for each energy efficiency approach.
- Understand how benefits from thermal and energy efficiency improvements are utilised by low-income households in a cool temperate climate; whether households choose reduction of energy use or increased thermal comfort; and, the impacts of these improvements on health and wellbeing.
- Assist low-income households in Rokeby, Clarendon Vale and Southern Tasmania to be more energy efficient.
- Provide employment, training and commercial opportunities for local residents and businesses.

In-home education and upgrade (EDUG)

The in-home education and upgrade approach involved two qualified home energy assessors (Home Energy Helpers or HEH) visiting a household, educating the householder(s), and performing a series of energy efficiency upgrades. The education sessions included discussions about how the home performs, working through tailored booklet, and development of a plan to reduce energy usage. Energy efficiency upgrades were performed by a second HEH (or a subcontractor, and included some, or all, of the following (see Table 2-1, below).

Table 2-1 Energy efficiency upgrades delivered in the Get Bill Smart Project

Upgrade Description
Shower head replacement with equivalent 9L/min model
Hot water storage cylinder insulation with reflective sheeting with bubble-core interior
Hot water pressure relief valve and pipe insulation with ValveCosy (valvecosy.com.au) and foam pipe lagging respectively. Lagging applied to first 2 metres of outlet and pressure relief pipes only
Light globe replacement with high-quality, equivalent light output, warm white compact fluorescent lamps
Accessible power switch installation (EcoSwitch) on home entertainment and IT systems to reduce standby power consumption
Window, door, fan & vent draught-proofing in heated zones
Ceiling insulation to R4
Curtains (thermally lined with full block out) on a track system that acts as a pelmet (trapping air between curtain and window) in heated zones.
Underfloor insulation

Community Capacity Building (CCB)

The Get Bill Smart project implemented an innovative Community Capacity Building (CCB) to encourage community engagement, facilitate community-wide discussion about energy efficiency, and build the capacity of a community to improve their own energy efficiency.

Get Bill Smart took a strengths-based, participatory approach the Community Capacity Building approach. The strengths-based approach allowed a focus on positive capacity rather than problems. Working with community members (Community Energy Champions) a community engagement strategy was developed that played to the strengths and needs of the community. For example, rather than a negative focus on poor thermal performance due to house design and construction and limited finances, the project focussed on the community's pride in being resourceful and addressed the challenges specific to this community such as low income and cash flow. This focus utilised existing community resources including the neighbourhood centres, child and family centre, health centre, churches, schools, sports clubs and interest groups.

The capacity-building approach was participatory in terms of hiring community members to perform as much of the work as possible and involving them in developing the details and implementation of the community engagement activities. A key to this was recruiting as early as possible into the project 12 households to act as Community Energy Champions (EC). These people received the in-home education and upgrades explained above so they could experience the benefits of energy efficiency and some of the activities other participants would be receiving. The 12 ECs were trained in energy efficiency and communication and drove the focus of the energy efficiency activities and campaign.

The participatory nature of the GBS approach required the capacity building activities to be developed with the involvement of the community. Activities the ECs were involved with included:

- developing a focus for the GBS program in CVR
- recruiting people into the GBS study
- distributing the Stay Warm booklet to householders
- developing a calendar of community events
- hosting BBQs and information sessions at neighbourhood centres and the community shed
- staffing stalls at community events, the community centres and other public locations within the CVR area

- organising and running sewing workshops
- organising hardware shopping tours
- organising and staffing a quiz night
- door-knocking homes in the local area to raise awareness of the GBS project, support the research component of the project, and to engage with householders
- organising and running home energy efficiency parties (modelled on the Tupperware approach).

Allocation into approaches and research groups

Get Bill Smart was trialled in the Greater Hobart area, with the community of Clarendon Vale and Rokeby (CVR) providing the location of the CCB approach. The Greater Hobart (GH) approach occurred over the whole of the greater Hobart area. CCB was conducted by the 12 ECs and a Community Engagement Officer (EO) employed by the GBS project. The CCB approach occurred only in the communities of CVR for the participants.

The GBS project recruited 504 low income households (the aim was 480). In the first instance, depending on whether they lived within the CVR area, participants were randomly allocated to one of the four approach groups. As discussed in the Project Processes and Organisational Analysis (section 8.9.3) there were some significant challenges to recruitment. While all attempts were made to randomly allocate participants to approach groups at times this was a practical impossibility. Factors that affected random allocations included: landlord permissions in the EDUG groups (either the landlord refused upgrades or participants were unwilling to seek consent); participant requests for specific allocations (we conceded to these requests given the recruitment challenges faced).

One of the practical challenges to participant completion of the GBS project was the transient nature of many of the householders. As a result, different households participated in GBS to different degrees, meaning that completion numbers for different parts of the project vary.

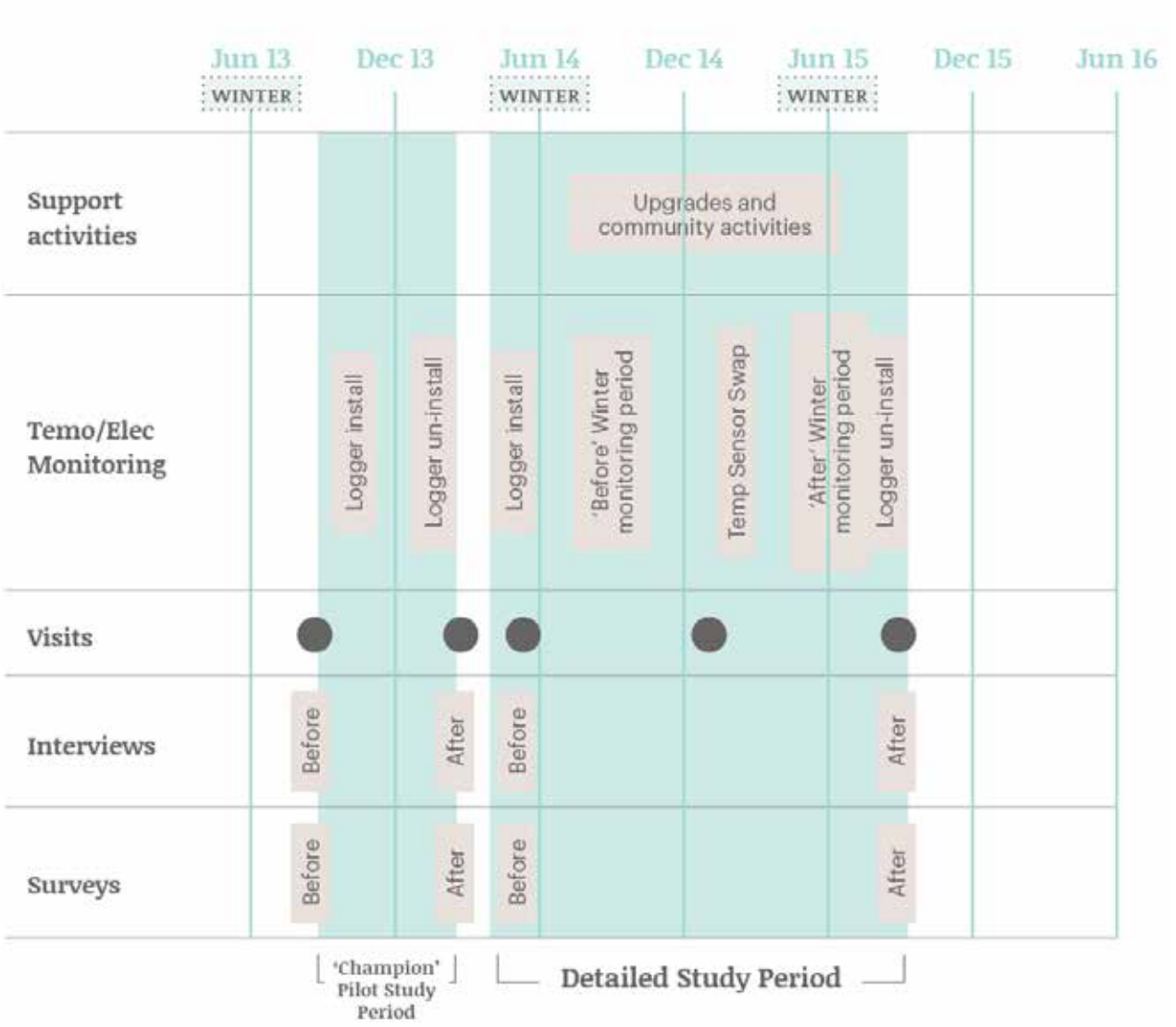
Overall GBS had 510 participants: 88 in EDUG + CCB, 169 in EDUG, 88 in CCB and 165 in REP.

GBS data collection and analysis

The project organised participants into a bulk and a detailed group so that trends and detailed information could be collected together. The bulk study (449 households) entailed 2 surveys and collection of energy billing data from energy suppliers (TasNetworks and Aurora Energy). The Detailed Study involved 51 households spread over the four approach groups and entailed being involved in further (more intensive) data collection in the form of in home energy and temperature monitoring and interviews. Participant's homes were monitored for a 12-15 month period between late 2013 and 2015. Twelve ECs also participated in the detailed style of research, but earlier than the other detailed participants.

Figure 2-2 provides an overview of the timing of the various research activities. The detailed data and analysis for each of these components of the GBS research can be found in the following reports: Bulk Study, Detailed Study, Cost Benefit Analyses, and Project Processes and Organisational Analysis.

Figure 2–2 Timing of research activities for the Get Bill Smart Project



The GBS data collection and analysis aimed to identify:

1 Before and after effects of approaches in terms of household energy use, comfort management, health, wellbeing, financial management and household conditions;

2 The processes, key determinants for success, barriers to, and drivers for each different approach;

3 Comparative effects of approaches against each other and a representative sample of households;

4 Cost benefit ratios of different approaches;

5 Thermal comfort and energy consumption related housing conditions participants live with;

6 Energy reduction outcomes from the different approaches (particular and trends);

7 More detailed understanding of the context of low income, disadvantaged householders in relation to energy efficiency and thermal comfort in the home;

8 More detailed understanding of working towards energy efficiency in Tasmanian contexts;

9 How energy efficiency gains from approaches are utilised by low income households in a cool temperate climate, especially in relation to thermal and physiological comfort; and

10 Successes, failures, drivers, barriers and capacity issues encountered by program stakeholders and organisations when implementing approaches.

2.4 Outcomes

The outcomes section of the executive summary has been structured according to the initial Get Bill Smart project objectives:

1 Understanding how different energy efficiency approaches can assist low income households to reduce their energy consumption,[1]

2 Understand the processes, key determinants for success, barriers, and drivers for each energy efficiency approach,

3 Understand how benefits from thermal and energy efficiency improvements are utilised by low-income households in a cool temperate climate; whether households choose reduction of energy use or increased thermal comfort; and, the impacts of these improvements on health and wellbeing,

4 Assist low-income households in Rokeby, Clarendon Vale and Greater Hobart to be more energy efficient,

5 Provide employment, training and commercial opportunities for local residents and businesses.

Understanding how different energy efficiency approaches can assist low income households to reduce their energy consumption

Energy consumption changes were calculated as changes in electricity usage over the project period. Figure 2-3 on page 23 shows the average and median changes of each GBS approaches. While the CCB approach was effective in delivering energy saving messages to vulnerable and socially isolated households, the EDUG approach was more effective in delivering actual energy and thermal comfort savings. Notably, when these two approaches were combined, EDUG + CCB, the energy and thermal comfort savings were increased.

Figure 2-3 Average and median change in electricity consumption

1 This objective has been reworded for clarity and to assist in structuring a response.

The cumulative energy and water savings from the project have been calculated (see Cost Benefit Analysis). Overall the EDUG+ CCB approach delivers $1596 of savings and the EDUG approach delivers $1400. However the cost-benefit analysis shows the EDUG approach delivering $1 of savings for an investment of $0.86 cents whereas the CCB+EDUG requires $1.32 (see Table 2-2, below).

Table 2-2 Cumulative energy and water savings and cost benefit

	Community Capacity building with in-home education and upgrades	In-home education and upgrades	Community Capacity Building
Total cumulative savings	$1596	$1400	$11
Cost to deliver $1 of savings (cost-benefit)[2]	$1.32	$0.86	$126.93

CCB

The CCB approach provided people with multiple exposures to energy saving conversations with ECs, energy efficiency experts and neighbours.

- The CCB approach emphasised strategies and measures for staying warm, reducing energy and saving money.
- The CCB approach did not deliver quantifiable energy and comfort savings.
- CCB group did not have statistically significant energy savings
- The CCB group helped to contextualise formal energy efficiency education within the familiar social context promoting the idea that other people 'like me' are also interested in energy efficiency and thermal comfort.
- $1 of energy and water savings required a $127 investment

Key factors that may have enhanced energy and thermal comfort savings include:

- multiple opportunities to receive energy efficient and thermal comfort messages and consolidate this knowledge;
- more exposure to role models in the local community who have been able to reduce their energy use.

EDUG

The EDUG approach entailed visits from experts who provided education and installed relevant upgrades.

- The EDUG approach emphasised strategies and measures for staying warm, reducing energy and saving money.
- The EDUG approach delivered effective energy and comfort savings. Energy productivity has improved in this group through reduced energy consumption and increased thermal performance/comfort.
- The EDUG group had average electricity saving of 1.4 kWh per day.
- $1 of energy and water savings required a $1.32 investment.

Key factors that may have enhanced energy and thermal comfort savings include:

- Hard wired physical upgrades that have lasting energy and thermal savings (eg draught proofing and insulation).

2 Level 3 cost benefit analysis, using cumulative electricity and water savings.

EDUG + CCB

The EDUG + CCB approach entailed visits from experts who provided education and installed relevant upgrades. It also provided people with multiple exposures to energy saving conversations with ECs, HEHs, energy efficiency experts and neighbours.

- The EDUG + CCB approach emphasised strategies and measures for staying warm, reducing energy and saving money.
- The EDUG + CCB approach delivered effective energy and comfort savings. Energy productivity has improved in this group through reduced energy consumption and increased thermal performance/comfort.
- The EDUG + CCB group had average electricity saving of 2.8 kWh per day.
- $1 of energy and water savings required a $0.86 investment.
- The EDUG + CCB group helped to contextualise formal energy efficiency education within the familiar social context promoting the idea that other people 'like me' are also interested in energy efficiency and thermal comfort.

Key factors that may have enhanced energy and thermal comfort savings include:

- multiple opportunities to receive energy efficient and thermal comfort messages and consolidate this knowledge;
- hard wired physical upgrades that have lasting energy and thermal savings (eg draught proofing and insulation);
- increased capacity to follow-up on measures received through home upgrade; and
- more exposure to role models in the local community who have been able to reduce their energy use.

Processes, key determinants for success, barriers, and drivers for each energy efficiency approach

For a Community Capacity Building approach to be successful, it needs to be:

- A long term approach (3-5 years) that provides opportunities for project staff to trial different approaches and reset project goals (see Project Processes and Organisational Analysis Report section 8.9).
- Community led (see Project Processes and Organisational Analysis Report section 8.9.2 *Energy Champions Community Networks and Integration*).
- Sufficiently resourced to enable training and up-skilling (see Project Processes and Organisational Analysis Report section 8.8.10).
- Embedded in an organisation that can provide HR and information support (see Project Processes and Organisational Analysis Report section 8.7.11).
- Accommodating of individual preferences for communication channels (e.g. one on one communication, community notice boards and social media) (see Project Processes and Organisational Analysis Report section 8.8.1.
- Accommodating of individual preferences for group forums and one on one interactions when delivering education and support (see Project Processes and Organisational Analysis Report section 8.8.1.
- Have strong linkages with organisations with both community development and sustainability skillsets (see Project Processes and Organisational Analysis Report section 8.8.1).

For an in-home education and upgrades approach to be successful, it needs to be:

- Sufficiently resourced to enable upgrades and training and up-skilling of staff (see Project Processes and Organisational Analysis Report section 8.6).
- Delivered by an organisation with administrative and field skills and a strong working knowledge of local context and energy efficiency and thermal comfort (see Project Processes and Organisational Analysis Report section 8.6).
- Utilise skilled home energy helpers who can assess and tailor to householder contexts (see Project Processes and Organisational Analysis Report section 8.6.4).
- Have strong linkages with organisations with both community development and sustainability skillsets (see Project Processes and Organisational Analysis Report section 8.7).

- Engaging the right staff. Ensure quality advice is provided that is tailored according to need. Householder engagement requires a very particular skillset – we recommend experts with compassion and interpersonal skills. Employ experts who are able to be empathetic (not patronising) in low income/vulnerable household settings. HEHs from GBS have the skills to achieve much of the tailoring needed with the support of systems that support their decision making related to tailoring (e.g. identifying high needs households, and households who need more or less education) (see Project Processes and Organisational Analysis Report section 8.8.3).
- Streamline administration to participants ensuring eligibility criteria are minimised. Ensure programs are open to all home ownership tenures. Reduce blockages to participation (see Project Processes and Organisational Analysis Report section 8.8.3.

How benefits from thermal and energy efficiency improvements are utilised by low-income households in a cool temperate climate; whether households choose reduction of energy use or increased thermal comfort; and, the impacts of these improvements on health and wellbeing

Overall benefits of GBS energy efficiency activities were gained in a variety of areas related to energy, heating, comfort, confidence with information, thermal and moisture performance of the house, community and personal connections, improved thermal conditions in the home, health and stress, and increased choices/options for energy use and comfort.

In this GBS study most householders were low energy users and these householders took opportunities to use extra energy, rather than save it, in response to energy efficiency measures. They used energy most often in order to attain thermal comfort and support related health needs. Alongside thermal comfort and health householders used extra energy for other reasons, most importantly, to support poor housing and appliance performance, because other occupants were not invested in energy efficiency or there were new occupants, for animal care, or because of a lack of investment by landlords.

Householders were often trying to stay warm enough so they could stay healthy and generally function in their lives. This priority indicates that when given a chance householders want to be well and productive.

Measured changes were observed in: overall electricity use, heater use, heating efficiency, hot water, change to comfort zone, moisture levels. Overall EDUG +CCB consistently came out with the best performance (in both household and on a per occupant basis).

Findings noted below are drawn from the detailed study unless otherwise noted (for a more comprehensive examination see Detailed Study report).

Overall electricity use

The detailed study report looked predominantly at winter (cold) periods before and after the GBS approach was delivered. Peak cold weather electricity use increased for all four groups after the GBS approach was implemented. It is recognised that this is primarily as a result of an unusually cold winter in 2015. CCB and EDUG + CCB (the community based groups) increased less than the REP group. EDUG (in greater Hobart) increased more. When factoring in household occupant rates, the EDUG + CCB households recorded a 22.7% reduction in energy consumption compared to the REP group in the after period (see Detail Report section 4.2 for closer examination). EDUG used slightly more than the REP group and CCB a little more again than EDUG.

Heater Use

Overall heating energy increased in all groups compared to the representative group in household comparison. These increases relate to the colder winter in the 2015 after period– householders warned us that the cold winter led to more heater use. EDUG+CCB were the only group with heating increases over that of the REP group on a household basis. However EDUG +CCB's increases correlated with increased time spent in the comfort zone (compared to other groups). The EDUG group had the greatest reduction in heater use, but also had a correlating reduction in time in the comfort zone. When assessed on a per occupant basis outcomes changed with all groups actually reducing heating energy compared with the REP group. The EDUG+CCB group had the biggest reduction on a per occupant basis.

Of note is that HEHs successfully encouraged many householders to shift heating strategies. HEHs suggested that householders transfer heating to more efficient heaters that were available in the house (see Detailed Report section 4.3.1)

Heating efficiency

Excluding houses that used wood fire and gas as their main heating, the EDUG + CCB group had the most significant increase in heating efficiency (25%) (see Detailed Report section 4.3.5 for an explanation of heating efficiency calculations and data). The EDUG group's average efficiency increased by 7.6%, CCB's by 0.5% and the REP group's efficiency decreased. Before and after heating efficiency changes showed a clear pattern of diminishing returns from extra heating energy input into house. As increased energy was pumped in, less came back as improvements to indoor temperatures. This pattern was related to the poor standards of thermal resistance of the building shells of the houses.

Hot water

On a household comparison of all households in the detail group, hot water increased most notably in the CCB group compared to REP group. The EDUG group's use also increased. The EDUG + CCB group's use was minimally different to the REP group. On a per occupant basis compared to the REP group, the EDUG + CCB group was the only one that reduced its use. Both the CCB and the EDUG increase their use when compared to the REP group on an occupant basis.

In home visits HEHS had retrofitted water efficient shower heads, hot water insulation and pipe insulation. These upgrades did support improvements in a range of houses (when viewing houses case by case). The bulk data also suggests that Hot Water (Tariff 41) usage decreased in the EDUG + CCB and EDUG groups. However neither the detailed or bulk data attributed statistical significance to this pattern.

Comfort

When looking at all households including those with non-electric heating and comparing them with the REP group only EDUG+CCB improved their comfort levels as a group. Both the CCB and the EDUG groups had slightly reduced comfort on average. When all houses with wood and gas heating as their main heating are taken out the same outcomes are still observed. The EDUG +CCB group had the most increased comfort and other groups had slight reductions of comfort levels. However, EDUG +CCB's time in the comfort zone did come with a correlating increase in heater use.

Whilst the linkages between thermal comfort and health outcomes was not directly measured in this project, research indicates that:

- Warmer homes reduce unnecessary deaths from cold
- Reducing condensation can reduce mould and resulting respiratory disease
- Improvements to thermal comfort can save more to the health system than money it will save on energy bills.

As discussed in the Cost Benefit Analysis report (Section 5.9.2) these thermal improvements may be the most significant outcome of the project.

Moisture levels

Surface condensation, moisture and mould issues were reported by a range of householders from all groups in both before and after surveys and interviews (see Bulk Report section 5.4.4 and Detailed Report section 5.1.6). The bulk study survey reported a reduction in window condensation for the EDUG group over the project period.

Humidity and moisture were acceptable in most houses but were actually borderline problems that require further investigation. Most people in the detailed group living in older and under-insulated houses presented with temperatures that only just stayed away from meeting dewpoint (and therefore stayed just away from serious condensation problems). Management by householders helped to limit moisture issues. Newer houses temperatures stayed well away from dew point in general when graphed. The EDUG approach did not seem to affect moisture levels adversely in general – but more investigation of the GBS data is needed on moisture levels and mould. One house with moisture and mould issues did report increased mould and moisture after an in-home education and upgrade visit, but there were other construction issue impacting this outcome.

Trade-offs between energy saving and improving comfort

Trade-offs between energy savings and comfort were made by many houses when the opportunity arose. When energy efficiency improved or energy costs went down householders used the extra 'slack' available. Householders tended to use any positive changes to energy efficiency or affordability to improve thermal comfort, particularly for wellbeing and health. We observed that in their complicated lives householders want, in general, to be healthy and functional (see Detailed Report section 5.2.10). If their situations allowed them a chance to make a positive change for health or wellbeing, they used it. Householders traded energy and comfort against each other (see heating comparisons in Detail Report section 5.3), but they also traded energy saving with other things too (including other household bills, groceries and treats for children and household performance related to moisture and mould).

Assist low-income households in Rokeby, Clarendon Vale and Greater Hobart to be more energy efficient.

This project worked with 498 low income householders, many of whom were unemployed and living below the poverty line.

The project assisted low income households in Rokeby, Clarendon Vale and Greater Hobart in the following ways:

- 272 houses received an in-home education and upgrades by participating in the EDUG and EDUG + CCB approaches.
- In total 61 houses received improved insulation.
- In total 26 houses received new curtains.
- A further 15 houses who participated in the REP group received an in-home education and upgrade as a prize after the study period.
- 498 households who completed surveys received grocery vouchers (these were distributed after various participation requirements were met).
- Approximately 340 people received a Stay Warm booklet during the project.
- A range of minor energy efficient measures were provided to people at community forums.

The project also provided intensive assistance to twelve low income people in Rokeby and Clarendon Vale who were recruited to be local energy champions. The champions were employed casually throughout the duration of the community capacity building implementation. They received:

- Training in energy efficiency and communication.
- In-home education and upgrade.
- 4 received improved insulation.
- 4 received new curtains.

Provide employment, training and commercial opportunities for local residents and businesses.

The Get Bill Smart Project provided 34 jobs for residents in the Greater Hobart region. 12 of these were specifically targeted at the project area in Clarendon Vale and Rokeby. The project also engaged and spent $277,000 on local Tasmanian businesses. In detail the project:

- casually employed 12 local energy champions over 15 months ($56,457)
- casually employed 10 local energy auditors over 12 months ($89,488)
- contracted energy data analysis that employed 7 people over a period of 3 years ($100,458)
- employed 2 research staff at the University of Tasmania for monitoring and evaluation (average 1 FTE)
- employed 9 project staff at SLT(various levels of commitment) over the project (average 2.5 FTE)
- purchased technical data logging equipment and commissioned product development from 4 companies ($126,761)
- purchased $64,013 worth of energy efficiency materials from Australian businesses
- subcontracted an additional $90,955 of energy efficiency materials (mainly insulation and curtains) from Tasmanian business
- spent in total $277,487 on Tasmanian businesses (NB excludes UTAS and SLT staff).

2.5 Conclusions

Get Bill Smart successfully trialled a community capacity (CCB) approach with an in-home visit approach (EDUG)in Greater Hobart. Through monitoring this trial we now better understand (with evidence) the processes, key determinants and possible outcomes that affect energy efficiency interventions program like Get Bill Smart in the Tasmanian context.

Despite householders often living in very poor housing stock and despite working with householders with limited capacity to make energy and comfort changes, GBS activities were still able to create various positive outcomes for householders. GBS evidence showed that in-home education and upgrade visits by Home Energy Helpers improve energy productivity by reducing energy use and increasing thermal comfort. The EDUG approach delivered 1.4 kWh/day of energy savings and had a simple payback of 10.3 years and cumulative cost benefit ratio of 0.8 Community Capacity Building (CCB) combined with in-home education and upgrade visits (EDUG) delivered 2.8 kWh/day of energy savings and had a simple payback of 9.7 years and cumulative cost benefit ratio of 1.3. This is an impressive result given that the CCB component, is new, novel, and has not been subject to years of review, reflection and project delivery efficiency gains.

Given the greater possible energy savings from the combined approach, and the potential for delivery improvements in the community capacity building component it is argued that a successful future program should include all aspects of the in-home energy efficiency visits and modified components of the community capacity building.

GBS evidence has outlined key structural barriers challenging moves made for energy efficiency in the Tasmanian context. Critically poor thermal performance of the stock and persistent socio-economic challenges still undermine energy efficiency and comfort efforts by householders and NGOs. Participants live at relatively low indoor temperatures, often under World Health Organisation recommendations and on very low incomes. It cannot be emphasised enough the significant limitations that such poor housing stock places on the capacity of householders to engage in energy efficient behaviours and to be comfortable in their homes. Just achieving one of these aims is difficult in such poor housing, with such limited financial capacity, while achieving both together seems near impossible.

GBS showed that for low income householder's affordability and health needs are closely affected by home energy use and comfort and therefore also need to be engaged with in energy efficiency in housing is to be achieved.

To overcome structural barriers the GBS team suggest the following policy initiatives:

- **Improve thermal performance of houses**
- **Develop a long term energy efficiency program based on current practice**
- **Refine and develop community engagement within a long term energy efficiency program, and**
- **Integrate health priorities with energy efficiency aims through all policy initiatives.**

Through a long term energy efficiency program with community engagement, improvement of the housing stock, and recognition of health priorities embedded in home energy use and home comfort there is an opportunity to transition householders towards better health and better productivity.

2.6 Recommendations

Recommendations are listed below.

Improve the thermal performance of houses in Tasmania (and southern Australia) through:

- Phase out energy-intensive hardwired resistive heaters in cold climates as they are inefficient, expensive and ineffective (see Detailed Report sections 4.3.1 and 4.3.2).
- Subsidise heat pump purchase (see Detailed Report section 4.3.2).
- Ensure minimum rental standards include roof insulation, reasonable draught proofing, hung curtains in the living area and hot water efficiency (the Detailed Report section 5.2.2 shows the significant benefits of these retrofits).

Develop a long-term energy efficiency program:

Programs need to be tailored to climatic conditions and to key capacity issues (rent/own, income, chronic or recurring health issue, disability, elderly, overshadowed house, thermally poor dwelling, old heaters, limited community networks/isolation). Contextual understanding is important to identify what tailoring is needed. For example, as shown in the Project Processes and Organisational Analysis Report (section 8.8.1 - Doorknocking), Community Energy Champions were key to program success ensuring access to those harder to reach or isolated individuals.

Develop community engagement and capacity building further by:

- Ensuring all community capacity building projects have sufficient time for recruitment and training, and to integrate key ideas, concepts and behaviours into the community (see Project Processes and Organisational Analysis Report sections 8.8.4 and 8.8.1).
- Providing strong local leaders in low income areas who are physically situated within the community and with significant resourcing and support, to manage, mentor and train low capacity community members to become (and continue to be) community champions (see Project Processes and Organisational Analysis Report sections 8.8.5 and 8.8.9).
- Acknowledging key priorities and drivers of behaviour within different communities and demographics (see Project Processes and Organisational Analysis Report sections 8.3.4 and 8.8.8, and Milestone 4).
- Genuinely valuing the importance of respect and care for the successful engagement of people with energy efficiency and thermal comfort behaviours by ensuring appropriate time and capacity for initiating and maintaining relationships (see Project Processes and Organisational Analysis Report section 8.7.4).
- Ensuring that metrics designed to measure program success go beyond simple attendance numbers and easily measurable engagements (see Project Processes and Organisational Analysis Report section 8.9.2).
- Placing a value on difficult to measure such as the slow movement of knowledge through social networks, the small changes that happen over time as a result of exposure to ideas and norms, the motivation people give each other through good experience and the shift to different 'normal' ways of doing things (see Detailed Report case studies).
- Identifying ways that governments can work with community networks, being sensitive to the fact interactions with government in low-income areas are generally avoided by community members (see Project Processes and Organisational Analysis Report section 8.9.2).
- Ensuring that existing knowledge about local culture, practices, limitations, expertise and challenges are integrated into program design and implementation (see Project Processes and Organisational Analysis Report section 8.9.2 – Energy Champion community networks and integration in community).
- Supporting capacity exchange within the community to allow existing knowledge to be shared and developed (see Project Processes and Organisational Analysis Report section 8.9.2.

Integrate health priorities with energy efficiency aims:

Trade-offs in GBS and overseas evidence shows that benefits of energy efficiency upgrades in cold climates are predominantly taken as thermal gain (see Detailed Report section 5.3). Energy savings are taken in this way because health and function are important to householders. This take-back can improve health outcomes on a broad scale reducing the drain on health systems.

The health gains from improved thermal comfort are significant. Studies from New Zealand have linked energy efficiency programs (such as installing insulation) with savings to the health system. A study of 1350 households that installed ceiling insulation, concluded that:

"Insulating existing houses led to a significantly warmer, drier indoor environment and resulted in improved self rated health, self reported wheezing, days off school and work, and visits to general practitioners as well as a trend for fewer hospital admissions for respiratory conditions." (Howden-Chapman et al. 2007).

In the GBS study we observed participants using energy saving techniques and technologies to enable them to heat their home to higher degrees or for longer for the same price.

For many participants, the need for greater heating was directly linked to health requirements such as the need to manage chronic illness, seasonal colds and flu or significant health emergencies. Examples of these behaviours can be seen in the case studies presented in the Detailed Report (see case studies 2,6,8, 6,14,17,20,24, 41, 44, 49, 113).

This linkage is strong and the health benefits tend to overwhelm the energy benefits by several magnitudes. In a review of the NZ "Heat Smart" Program the health benefits are attributed to be 99% of the project benefits. These health benefits include reduced mortality, less hospitalisations and reduced pharmaceutical use. Based on these findings for every $8 of energy saving their was $608 in health benefits[3] Grimes, A., Howden-Chapman, P et al (2011)

We argue that thermal comfort changes are a significant component of the GBS program and the impacts of these should not be discounted relative to changes in energy use. In fact health outcomes are likely larger than energy outcomes. In order for this to be recognised at a program **level improving thermal comfort needs to be treated as a "health intervention"**.

Opportunities for linking thermal comfort and energy efficiency with health programs are currently limited, especially as preventative health or so called "Social determinants of health" receive much less funding than emergency or general practice care. A potential policy initiative could be the creation of Social Impact Bonds[4] issued at a population level to change health incomes by improving the thermal performance of households. We have not critically examined this possibility however further research into this may help to consolidate linkages and improve further policy directions.

3 Low scenario, Table 30, pp 26 http://www.healthyhousing.org.nz/wp-content/uploads/2012/05/NZIF_CBA_report-Final-Revised-0612.pdf

4 http://www.socialventures.com.au/investment/social-impact-bonds/

Section 3

INTRODUCTION

3. Introduction

3.1 The LIEEP Program

Get Bill Smart (GBS) is one of 20 projects funded by the Australian Government's Department of Industry Innovation and Science, Low Income Energy Efficiency Program (LIEEP). This competitive funding was distributed by the Federal Government in 2013 to identify strategies to overcome barriers to the uptake of energy efficiency measures in low-income households. All 20 of the LIEEP programs undertook extensive data collection and analysis and are to be completed by June 2016. The findings of the LIEEP projects will inform the development of future energy efficiency programmes and policies that assist low-income households in Australia.

The objectives of the LIEEP are to:

- Trial and evaluate a number of different approaches in various locations to assist low-income households to be more energy efficient; and
- Capture and analyse data and information for future energy efficiency policy and program approaches.

The intended benefits that result from the LIEEP program are to:

- Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households;
- Build the knowledge and capacity of consortium members to encourage long-term energy efficiency among their customers and clients; and
- Build capacity of Australia's energy efficiency technology and equipment companies by maximising the opportunities for Australian industries to participate in the projects.

GBS is the only LIEEP program in Tasmania and, through two main intervention approaches, seeks to improve energy efficiency and thermal comfort in low income households in Greater Hobart, Tasmania. These interventions have been monitored and evaluated through a comprehensive research component to the project.

3.2 Get Bill Smart

Get Bill Smart was an Action Research project that trialled an innovative, community capacity-building approach to educating, informing and motivating energy efficiency and thermal comfort behaviours in low income households in the Greater Hobart area of Tasmania. This was compared to a more conventional approach of in-home education and upgrades, a tried and tested approach from Sustainable Living Tasmania's energy efficiency projects. The aim of GBS was to:

- Improve householder engagement and education levels regarding energy efficiency; and
- Empower low income households to be more energy efficient.

The GBS project examined two approaches to improve energy efficiency in low income households;

1 In-home education and upgrades (EDUG); and

2 Community capacity-building (CCB).

Each approach was trialled alone and in combination with the other approach which meant that three different energy efficiency approaches were trialled:

1 In-home education and upgrades alone;

2 Community capacity-building alone; and

3 In-home education and upgrades plus community capacity-building together (EDUG + CCB).

All three approaches were compared against a representative group (REP).

The Community Capacity Building approach (CCB) occurred in the south east Hobart suburbs of Clarendon Vale and Rokeby, areas recognised to be challenged by socio-economic disadvantage with a high proportion of government and social housing. The remaining study area was in Greater Hobart and included low income households in the Kingborough, Clarence, Hobart and Glenorchy Council areas (see Figure 3-1). The project participants were allocated into bulk and detailed study groups, which determined the level of data that was collected about their household energy consumption and behaviours.

The outcomes and benefits to participating households and communities of Get Bill Smart were aligned with those of the LIEEP and also include:

- Greater capacity to be more energy efficient (knowledge, skills and motivation);
- Reduced energy bills;
- Increased thermal comfort;
- Improved health, social welfare and livelihood;
- Greater sense of one's own situation; and
- Access to grocery vouchers.

3.2.1 Consortium members

The management of GBS involved three key organisations. Mission Australia oversaw the project, ensuring good governance, financial controls, and risk management practices. Sustainable Living Tasmania managed the project and delivered the energy efficiency services and community capacity building activities. The University of Tasmania managed the research component of the project.

3.2.2 Project objectives

The GBS project trialled and evaluated three GBS approaches (community capacity building (CCB) and In-home education and upgrades (EDUG) and a combination of the two (CCB+EDUG) with the objective to:

1 Understand how a community capacity-building approach can assist low income households to reduce their energy consumption and how this approach compares with and interacts with more common in-home education and upgrade approaches.

2 Understand the processes, key determinants for success, barriers, and drivers for each energy efficiency approach.

3 Understand how benefits from thermal and energy efficiency improvements are utilised by low-income households in a cool temperate climate; whether households choose reduction of energy use or increased thermal comfort; and, the impacts of these improvements on health and wellbeing.

4 Assist low-income households in Rokeby, Clarendon Vale and Greater Hobart to be more energy efficient.

5 Provide employment, training and commercial opportunities for local residents and businesses.

Figure 3-1 Greater Hobart (Population areas in brown)

3.2.3 Project outputs

Over the course of the 3 year project, Get Bill Smart produced the following outputs listed in Table 3-1.

Table 3-1 Get Bill Smart project outputs

Educational materials on energy efficiency specifically targeting people with low literacy
In-home education and energy efficiency upgrades for 272 households.
Additional energy efficiency upgrades for households considered to be of high needs.
Detailed case studies of upgrades documented with at least 12 champion households.
Training in energy efficiency and communication skills for 12 champion households.
Half hourly time step temperature and energy use data over 15 months for 51 households, and 3 months for an the 12 champion households.
Analysis of temperature and electricity consumption monitoring equipment for quality and functionality.

Qualitative data from 2 in-depth interviews each with 60 households before and after the Get Bill Smart approach, with transcriptions of these interviews.
A quantitative and qualitative analysis of aforementioned data and interviews that investigates the trade-offs made between energy reduction, affordability, thermal comfort and other housing needs.
Comprehensive community engagement activities in Clarendon Vale and Rokeby.
Collation of energy billing data over >2 years for all participating households.
Qualitative survey data of housing stock, occupant particulars, attitudes, activities and behaviours for all participating households.
A comparative assessment of approaches trialled, describing overall success and failure rates of the entire group of houses studied.
Tabling of costs of approaches trialled against the reported energy efficiency and related thermal comfort outcomes.
Descriptive analysis of processes, key determinants for success, challenges, drivers and the repeatability of the approaches.
Casual employment for at least 12 people within Rokeby and Clarendon Vale.
Employment for 53 project staff, totalling 15 FTE years at Sustainable Living Tasmania.
Casual employment for 4 project staff totalling 3.7 FTE years at UTAS.

3.3 Project Rationale

This section provides background as to why: interventions are pursued for energy efficiency and comfort; a community partnership and champion approach is being examined; and, examines critiques of community capacity building approaches in relation to the Get Bill Smart approach.

3.3.1 Activities to encourage energy efficiency and comfort in Tasmania

Due to economic, social and environmental imperatives, governments and stakeholders in Australia have sought to achieve energy reductions in the residential sector through energy efficiency programs with a current focus on understanding how to engage with low income households through the LIEEP program.

Energy productivity is increasingly the lens through which energy efficiency is being analysed. Energy productivity is defined by COAG (Council of Australian Governments (COAG) 2009: 9) as economic output divided by energy used. This formula is not so useful at the household level where there is a long history of undervaluing or not valuing the household economy. A more effective understanding of energy productivity is the concept of achieving better outcomes with the same or reduced energy inputs. In this context improved energy productivity would encompass improvements in thermal performance of homes with households maintaining or reducing daily energy consumption.

Tasmania has a high proportion of low income householders who tend to live in the poorest quality housing stock in Tasmania (in relation to thermal comfort and energy efficiency) and with inefficient appliances (Watson 2013). The negative social, physical and economic impact that energy inefficient and uncomfortable housing stock and energy inefficient appliances have on householders and the broader community is well recognised as is the significant difficulty low income households have trying to change this (KPMG, Brotherhood of St Laurence et al. 2008; Elliott and Stratford 2009; Office of the United Nations High Commissioner for Human Rights 2009; Howden-Chapman, Crane et al. 2011). Overall we are aware that:

"... housing deprivation seems to pose health risks of similar proportions to smoking and, on

average, greater than that posed by excessive alcohol consumption. Children seem to be particularly vulnerable to prolonged exposure to poor housing." (Howden-Chapman 2004:163).

Energy bills are often a significant proportion of living expenses for low income households. Overall a low income household may not use a lot of energy when compared with more affluent households. Despite their comparative frugality, Tasmanian low income householders' energy bills take up far too much of their income (ABS 2013).

In an already socio-economically disadvantaged state such as Tasmania the benefits of improving indoor comfort (especially in winter) and energy efficiency through both home improvements and behaviour changes can provide critical improvements in health and living affordability.

Energy efficiency programs are usually enacted by Governments and social support organisations and are designed and implemented where there are recognised barriers that stop people from making changes. Activities are designed to support households who have difficulty making change for energy efficiency and comfort themselves. In Get Bill Smart it is recognised that, among other challenges, households living on low incomes will face financial barriers and are also likely to face information/ knowledge and time barriers. Householders, for example may not be able to afford new curtains, may not understand the benefits of prioritising certain home management behaviours or may have limited time to think through energy and comfort improvements.

Social support organisations, government, housing industries, and other housing stakeholders have encouraged dwelling adaptation for energy efficiency, comfort and equity in Tasmania, Australia and internationally (Ambrose 2000; Sustainable Development Commission 2006; Brotherhood of St Laurence 2008; Elliott and Stratford 2009; Maller and Horne 2010). A house with improved thermal efficiency, for example, will support householders to use less energy and be more comfortable. These benefits can lead householders to reduce heating, improve comfort and reduce energy bills. In turn this might lead to reduced stress for the householder, less doctor visits and less environmental burden from energy use. These outcomes are of benefit to all sectors of society and make a significant difference to those who are disadvantaged due to low incomes. Overall these changes create a more productive household with residents able to successfully engage in more elements of society and the economy.

In Australia, large-scale energy efficiency programs have predominantly focused on the provision of energy efficient product information and subsidies for the installation of energy efficient measures, with limited focus on the needs of low income households.

Focus groups conducted by Watson (2013) for a previous Tasmanian investigation highlighted that a more refined understanding is required if Tasmanians are to progress and engage in large scale energy efficiency activities. LIEEP trials have been developed to learn what support activities are most successful at a large scale. GBS has worked to learn and build on previous lessons learnt through practical experience at SLT, previous research project and through literature.

3.3.2 Comfort, health and wellbeing in housing

Supporting change in homes through interventions has mainly focused on energy, rather than comfort, improvements, yet often these issues are closely related. The most common approaches have been focussed on building standards around new build and retrofit of housing, sporadic programs aimed at minor upgrades in buildings (often by councils and the Australian Government), information about energy efficiency and application of an appliance standard through star ratings (Watson 2013). Comfort has been an extra outcome from some of these approaches, often not an emphasised or aimed for one.

Paradoxically, the Australian Bureau of Statistics found repeatedly (in 2002, 2005 and 2008) that Australian's main reason to install energy changes in the home were to improve comfort (Australian Bureau of Statistics 2002; Australian Bureau of Statistics 2005; Australian Bureau of Statistics 2008).

Physiological comfort is important for health. An international systematic assessment of deaths attributable to 'non-optimum temperatures' found that approximately 3-8% of deaths could be attributed to excess cold and heat (higher percentage proportions were found to correlate with excess cold) (Gasparrini, Guo et al. 2015). Notably:

"Seasonal differences in temperatures have a greater impact on avoidable mortality in winter in temperate countries than in colder countries, where houses are more thermally efficient and outdoor clothing is worn more systematically." (Howden-Chapman 2004: 163)

Moisture management in homes is also recognised as a health issue if the levels get too high and mould grows:

"Damp housing is clearly related to respiratory conditions in both adults and children... Mould and fungi have been shown to have a small, but significant respiratory effect on children. There is a dose-dependent risk increase of visible mould for respiratory infections, lower respiratory symptoms, and asthma." (Howden-Chapman 2004:163)

3.3.3 The community approach

Despite the benefits that come from improving thermal comfort and energy efficiency in homes, householders can be hard to engage in such change. Intervention programs have typically tried to support individual households and individualised decision making. Interest in community-based energy efficiency programs has grown in recent years because the approaches potentially offer a way to better engage in such change. In the UK, for example, community action has been a prominent theme in carbon and energy policy programs over the past decade (Department of Energy and Climate Change 2014).

Drawing on SLT's years of experience working in energy efficiency interventions and engaging with the community and on literature on community capacity building and community energy action, we anticipated that a community-partnership approach could deliver opportunities lost with other approaches. In particular, in comparison to one-on-one engagement a community approach could:

- facilitate local ownership of the program;
- establish the legitimacy of energy efficiency and thermal comfort as relevant to the community;
- reach a wide pool of people through established community networks;
- ensure the project was well-targeted towards community priorities;
- ensure energy saving messages were translated into language relevant to the community;
- facilitate new leadership and community networks around energy use;
- help to sustain energy efficiency messages in the community into the future.

Working through community also offered a way to respond to previous observations and literature that showed that decisions made about homes and home practices were influenced by connections with communities. Communities were observed to be intricately involved with individual decision making of householders in their households. Neighbours, friends, local wisdom bringers, local shops, newspapers, local government and many other connections influenced the decisions and understandings householders had of their homes, energy efficiency and comfort (Watson 2013). How we learn and change is critically affected by our communities and our context and therefore communities are important to learning and change.

GBS engaged with an initial focus on place-based, localised suburban community. Our examination of community is therefore geographically based. Like any other community, the Clarendon Vale/Rokeby local suburban community is a dynamic and shifting community that contains real people and their real and complicated lives.

GBS focuses on a community action/community partnership approach in order to support the capacity of the community and individual households to make change in their homes. GBS aimed to generate community capacity that could be sustained after GBS activities were finished. Skinner (2006) describes community capacity building as "activities, resources and support that strengthen the skills, abilities and confidence of people and community groups to take effective action and leading roles in the development of communities". Chaskin (2001, p295) defines community capacity as "the interaction of human capital, organizational resources, and social capital existing within a given community that can be leveraged to solve collective problems and improve or maintain the well-being of a given community". He notes that this process can occur either through "informal social processes and/or organized effort". In describing community capacity, Chaskin draws out common issues raised within this research, including: the existence of resources; networks of relationships; leadership; and support for mechanisms for participation by community members in collective action and problem solving.

Risks exist in community capacity building approaches because inherently a strengths-based approach implies that the community is "deficient – in skills, knowledge and experience" (Craig 2007, Tedmanson 2003). Building participation into program design, as well as providing more clarification of capacity building objectives may go some way to addressing these criticisms. For example, program managers might reject the notion of a general deficiency with the community, in favour of addressing specific capacity gaps through information sharing and delivery of training whilst at the same time acknowledging just what

the community has to offer. There is also a need to move away from engagement based on delivering 'expertise' to lay people to a knowledge exchange between people with different areas of expertise.

Being aware of the risks of starting from the position of assume deficiency the GBS team attempted to engage with this conflict through its community approach that includes locals in the project. This included:

- Local employment and engagement of community champions
- Champions designing and developing plans and strategies and establishing language and priorities.

3.3.4 Champions in community partnership approach

Connecting with communities through local people as 'champions' for a project offers a variety of potential benefits. Champions are likely to have a more subtle understanding of their context, can personalise contact with individuals (with individual needs) and are likely to be seen as more trustworthy than an outsider. Local champions can bridge the gap between external 'expert' or outsider and internal community members making an energy efficiency approach more effective (so its benefits are sustained into the future). Champion involvement assists to overcome critical barriers to engagement. They can help to establish validity of a project in a community and provides access to tacit everyday understanding (expertise) of a local community (Chaskin, 2001). Their understanding can provide insight into critical social normative behaviour, key community practices and knowledge (Glanz and Bishop 2010) which allows engagement approaches to: be contextualised and appropriately tailored; use appropriate language; and be respectful (Hirshfield et al 2012, Watson 2013). Further, as champions, there are opportunities to contribute to building capacity in themselves and in their own community (Fraser 2003), which can be attractive to people who care about their local community.

There has been substantial growth in community-based energy programs in the UK and the USA (Burchell et al, 2014; DECC, 2014; Silicon Valley Energy Watch, 2013). Some programs have explored local 'Energy Champions' as a delivery mechanism for behavioural change and transition/adaptation programs. For example The Community Energy Champions Grant program (CECG) launched in the USA in California 2010. This project views community organisations as community champions and so has somewhat different working definition of champions to the GBS project. Like GBS, the CECG project works from the basis that champions are a valid community engagement pathway and 'can accomplish deep and lasting energy use behavior changes' (Hirshfield and Iyer 2012: 6-105). This program suggests that community members are likely to be more receptive to energy efficiency messages when they are promoted with an awareness of local priorities and outlines the advantages of leveraging community-based organisations (CBO) for the delivery of energy programs suggesting they: establish trust within communities; are vital liaisons between government and local people; and are adept at addressing participation barriers.

Other organisations that have focussed on champions as part of community engagement:

- US Department of Energy and Climate Change's Community Energy Strategy: People Powering Change. details the role of local partnerships and the importance of community access to information and expertise.
- Action At Home, an energy efficiency program, operates in the UK and engages through local champions to run weekly talks to support change
- EnergyMark, developed by CSIRO from the previous WaterMark project, gathered interested community members to be discussion leaders/coordinators and to run discussion groups. Groups met in homes for regular meetings to share information around climate change, energy use and water use.

No existing programs trialled Community Energy Champions in the same way as GBS. As with other terms described 'local champions' is a term that could describe various roles a person might take in an engagement project. In GBS local Champions are people from the case study community of Clarendon Vale Rokeby who have trained by GBS to share energy efficiency ideas through a variety of community activities. The local champions where originally described as "energy champions" however during the project they self-identified as "Power Rangers".

Exploring the part champions play in developing community partnerships and community capacity is a novel aspect of the GBS project. Involving champions in GBS allows us to progress understanding of the potential of champions in community engagement. We recognise that engaging champions had to be done cautiously because organisations can overlook important issues and ignore champion needs or positions. GBS is attempting to explore positive and negative outcomes of champion involvements (for further details see Watson et al. 2015).

3.4 Milestone 9 Reporting Requirements

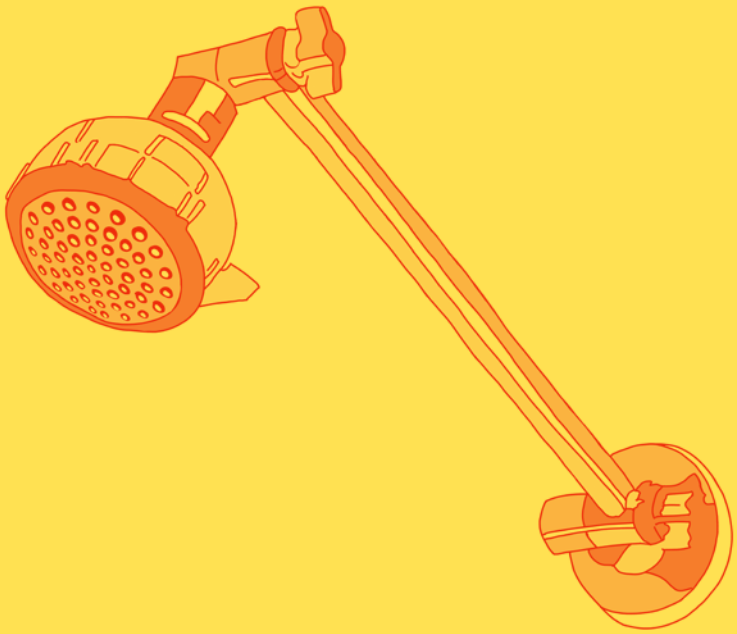
In accordance with the Milestone 9 requirements and reporting period up to 1 March 2016 (extended to 15 March), the Get Bill Smart team have:

- Submitted analysis of the data collected for the entire Activity period (this report);
- Submit the Final Report (this report) that includes:
  - Bulk comparative assessment of Activity approaches – Chapter 5 Bulk Study
  - Detailed study of energy efficient home improvements – Chapter 6 Detailed study
  - Cost versus outcomes of Activity approaches – Chapter 7 Cost Benefit Analysis, and
  - Assessment of Activity processes from an organisational perspective – Chapter 8

These four individual reports are contained within the final report and address the requirements of the LIEEP final report stipulations and the reporting commitments within the original GBS Project Plan for meeting Milestone 9.

Section 4

TRIAL METHODOLOGY - OVERVIEW



4. Trial Methodology – Overview

The overall aim of the GBS project was to examine two intervention approaches to improve energy efficiency in low income households;

1 In-home education and upgrades (EDUG); and

2 Community capacity-building (CCB).

Each approach was trialled alone and in combination with the other approach which meant that three different interventions were trialled:

1 Home education and upgrades alone (EDUG);

2 Community capacity-building alone (EDUG); and

3 Home education and upgrades plus community capacity-building together (EDUG + CCB).

All three approaches were compared against the representative group (REP) which were exposed only to research participation.

Get Bill Smart was trialled in the Greater Hobart area, with the community of Clarendon Vale and Rokeby (CVR) providing the location of the community capacity building intervention approach (see Figure 3-1 on page 26).

The community capacity building approach was conducted by 12 local residents (employed as Community Energy Champions) and a Community Engagement Officer (EO) employed by the GBS project. The community capacity approach occurred only in the communities of CVR.

4.1 Data Collection and Analysis

Data collection and analysis plans were reported and approved in the Milestone Three report. The GBS project recruited 510 low income households (the aim was 480 participants) into one of four research approaches: community capacity building (CCB); in-home education and up-grade (EDUG); community capacity building and in-home education and up-grade (EDUG + CCB); and the representative group (REP).

Both quantitative and qualitative data were collected and analysed with the aim to identify:

1 Before and after effects of different approaches in terms of household energy use, comfort management, health, wellbeing, financial management and household conditions;

2 The processes, key determinants for success, barriers to, and drivers for each approach;

3 Comparative effects of the different approaches against each other and a representative sample of households;

4 Cost benefit ratios of different approaches;

5 Thermal comfort and energy consumption related housing conditions participants live with.

6 Energy reduction outcomes from the different approaches (particular and trends);

7 More detailed understanding of the context of low income, disadvantaged householders in relation to energy efficiency and thermal comfort in the home;

8 More detailed understanding of working towards energy efficiency in Tasmanian contexts;

9 How energy efficiency gains from different approaches are utilised by low income households in a cool temperate climate, especially in relation to thermal and physiological comfort; and

10 Successes, failures, drivers, barriers and capacity issues encountered by program stakeholders and organisations when implementing different approaches.

4.1.1 Qualitative and quantitative data

People, communities and housing issues are known to be complex and messy to monitor and analyse. The complex, or wicked, nature of the subject matter (Rittel 1973) GBS was investigating led to the use of multiple methods to collect data in both quantitative and qualitative forms and from a ranges of sources (Foulds *et al.* 2013). Using multiple methods allowed exploration of participant experiences, housing situations, GBS stakeholder and the community context all at once. We were able to capture multiple sources of information and capture a complex suite of experiences and changes (Franklin 2006, Crosbie and Baker 2010).

Qualitative data was collected to establish participant and stakeholder experiences of GBS, of their energy use and comfort in their homes and of their perceptions of their community.

Quantitative data collected for GBS focused on energy use and thermal performance of participant's homes and establishing trends in the surveys. The bulk and detailed sub-reports in section 5 and 6 respectively, analyse the results of these data sets.

GBS methods follow a now well established approach to energy cultures – both quantitative and qualitative are required. This approach focuses on the interactions between norms (beliefs and understandings about energy), material culture (appliances and energy technology) and energy practices (behaviours and habits) as a basis for understanding energy consumers and their resistance to or acceptance of change. The framework identified by Stephenson (2010) provides useful insight into the way cultures and practices relating to energy are developed and entrenched and how they relate to consumption, and thus give indications of potential methods for influencing behaviour change.

4.1.2 Bulk study and detailed study groups

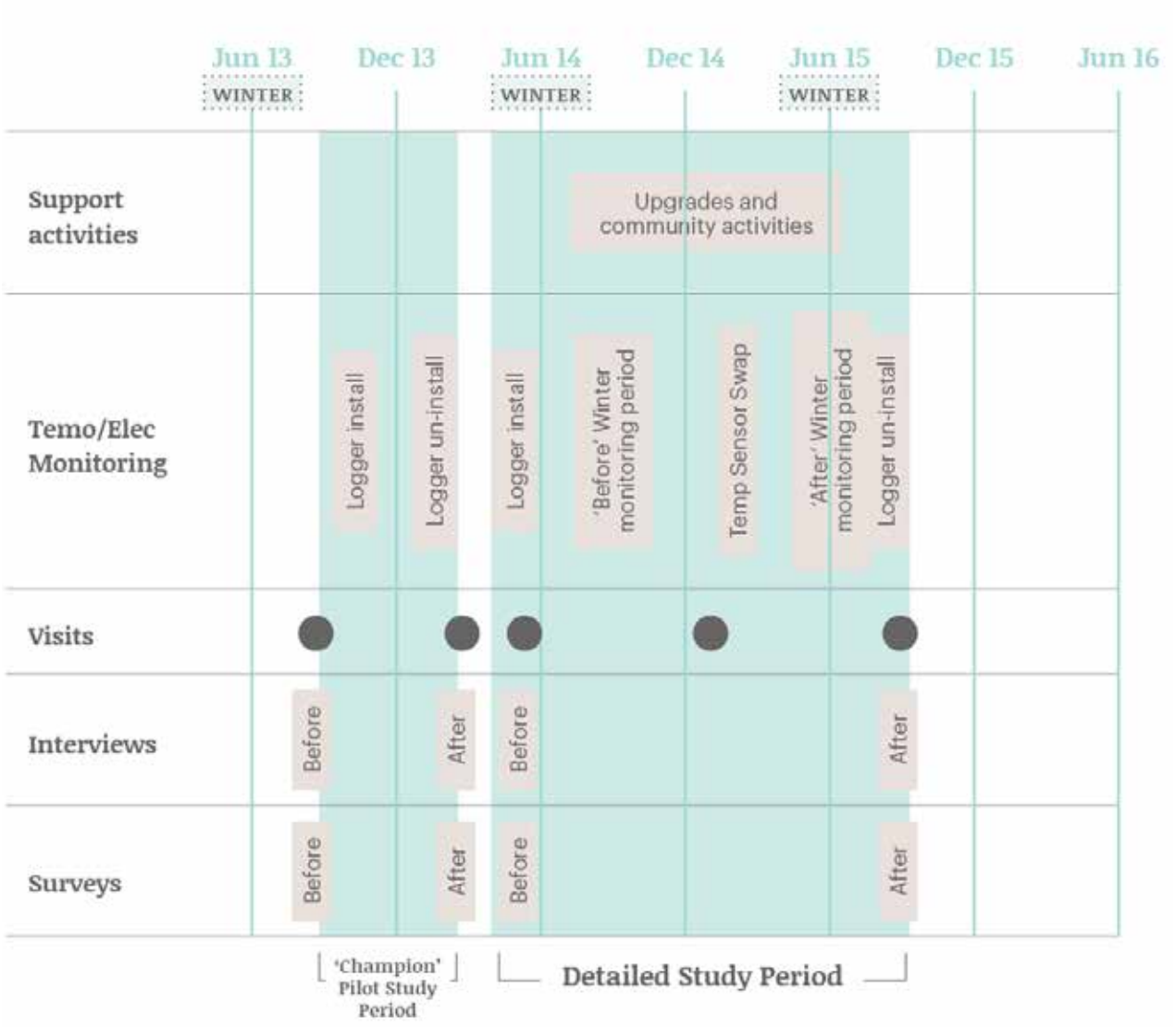
The project organised participants into a bulk and a detailed group so that trends and detailed information could be collected together. The bulk study (449 households) entailed 2 surveys and collection of energy billing data from energy suppliers (TasNetworks and Aurora Energy).

All participants in the project completed a before and after survey as well as provided their electricity consumption data to GBS via the energy retailer Aurora Energy. Twelve households in each of the four approach types (48 households in total) were also involved in the detailed study which entailed more intensive data monitoring. The detailed investigation involved: 2 surveys, collection of energy billing date from energy suppliers (Aurora Energy), 2 qualitative interviews with the householder; observations of the house (with the householder present); and the installation and removal of energy use, temperature and humidity loggers around the home. Participant's homes were monitored for a 12-15 month period between 2013 and 2015.

A pre and post (before/after) assessment system has been used to establish understanding of comparative effects of the different GBS approaches. 'Before' interviews, 'before' surveys and house observations were made June to September 2014 and 'after' interviews and 'after' surveys were conducted in August and September 2015. This data was collated to establish a baseline for the 'follow up' comparison of change data.

The twelve community energy champions also participated in the detailed style of research, but earlier than the other detailed participants. Figure 4-1 provides a summary of the research activity timing across the GBS project.

Figure 4-1 Timing of research activities



4.1.3 The iterative approach

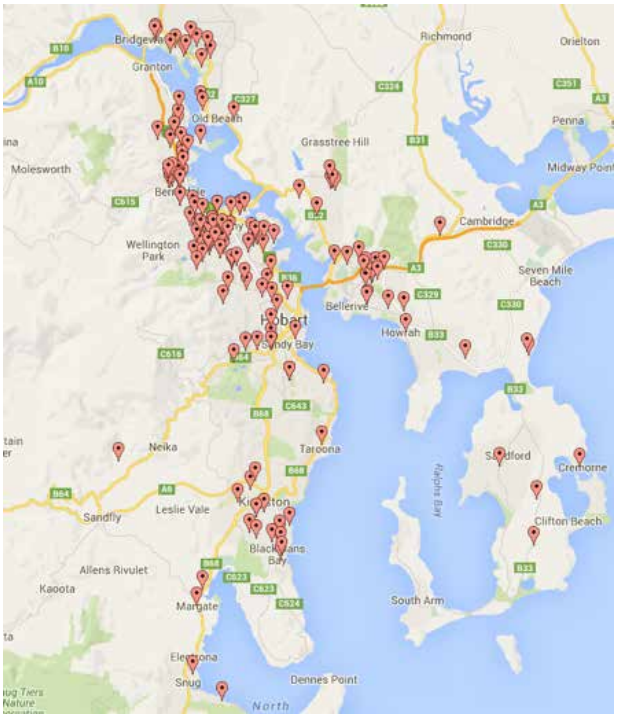
An iterative approach was taken to data collection so that we could test research approaches and data collection tools before embarking on the main study. To achieve this, data collection techniques were trialled on the champion group early on in the project and prior to the main study beginning. Any issues identified when collecting data from the champions was used to adjust data collection tools before the main data collection processes began (with the bulk and detailed household participants). Trialling not from a theoretical position but from a practical standpoint generated from experience helped to ensure a smoother data collection process for the main study.

This approach allowed for understanding to be developed of the current community and housing conditions experienced by participants; to establish a baseline; and to compare this baseline against effects measured after the energy efficiency activity.

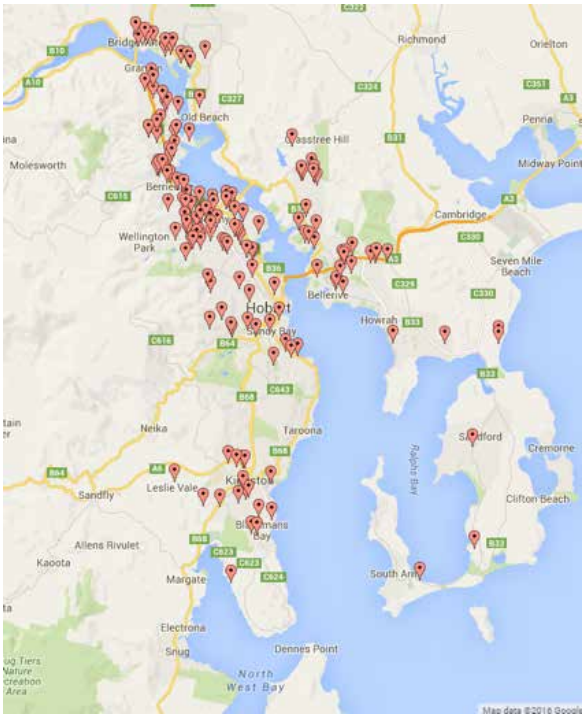
4.2 The Research Area

The research was conducted in the Greater Hobart Area. Greater Hobart was defined as the local government Areas of Hobart, Glenorchy, Clarence and Kingston. The Community Capacity Building Approach was conducted in the suburbs of Clarendon vale and Rokeby. Figure 4-2 shows the location of each participant by research approach.

Figure 4-2 Street Location of participants by research group



In-home education and upgrades



Representative Group

4.2.1 Recruitment to Get Bill Smart

The recruitment to GBS involved two distinct groups with two distinct roles, the Community Energy Champions and the participants in the main research project who were divided into the bulk and detailed study groups. All participants to the project needed to live within the Greater Hobart area (which encompasses Clarendon Vale and Rokeby) and meet the household criteria shown in the recruitment materials in Figure 4-3 Examples of Promotional Materials.

4.2.1.1 Recruitment of Community Energy Champions

The neighbourhoods of Clarendon Vale and Rokeby were the site of the community capacity building intervention and the home of the Community Energy Champions (CEC). The recruitment of the 12 Community Energy Champions was the first critical stage of the project and was completed on 1 November 2013. The CECs were employed by the project to:

- Contribute to developing the community engagement activities;
- Raise awareness of GBS and recruit their local community to the project;
- Deliver community events and activities about energy efficiency and thermal comfort; and
- Clearly communicate simple ways to live in an energy efficient way.

The project's Community Engagement Officer (EO) had an office within the Clarendon Vale Neighbourhood Centre for the duration of the community strategy and managed the CECs and the engagement strategy roll out. Detailed information and analysis about the recruitment of the CECs is provided in Chapter 8 (Project Processes and Organisational Analysis).

4.2.1.2 Recruitment of bulk and detailed study participants

Get Bill Smart recruited 498 (excluding champions) households to the project, with 49 people in the detailed study and 449 people in the bulk study. The detailed study participants were recruited first, and randomly allocated to either the upgrades or no-upgrades group via a randomised database sorting mechanism. Once the 49 detailed study participants were recruited, participants were allocated to the bulk study group and randomly placed into either the upgrades or no-upgrades group via the database. The database was developed specifically for managing the GBS project and allowed for the management of over 700 applicants to the project.

Table 4-1 shows the allocations to each of the groups. The dark grey areas represent those in the detailed study group with the remaining people that are not highlighted in the bulk study group. The trial methodology for each of the detailed and bulk study groups are explained in detail in section 5 and 6.

The allocation to each project group was allocated based firstly on geographic area (Clarendon vale and Rokeby Vs greater Hobart). Within each geographic area allocation to the group that received upgrades was randomly allocated.

While all attempts were made to randomly allocate participants to approach groups at times this was a practical impossibility. Factors that affected random allocations included: landlord permissions in the EDUG groups (either the landlord refused upgrades or participants were unwilling to seek consent); participant requests for specific allocations (we conceded to these requests given the recruitment challenges faced).

Table 4-1 Allocations to Get Bill Smart research group

		Community capacity building approach	
		Off (Greater Hobart)	On (Clarendon Vale / Rokeby)
In-home education and upgrades approach	Off	(Representative) 153	76
		12	12
	On	12	13
		157	63

The recruitment of low income householders to the project began in February 2014 and was completed in December 2014. The recruitment of householders in Clarendon Vale and Rokeby was managed by the Community Engagement Officer (EO) with the help of the Community Energy Champions (ECs). Details about the recruitment processed in Clarendon Vale and Rokeby are described in Chapter 8 (Project Processes and Organisational Analysis). The recruitment to the Greater Hobart study area was managed by the Get Bill Smart project manager from Sustainable Living Tasmania. The project employed the services of a local design company to create legible, eye catching, engaging promotional material in the form of posters, flyers, stickers, banners, newspaper advertisements, newsletters and events calendars as shown in Figure 4-3. The promotional material contained simple language and imagery suited to those with low literacy levels.

Recruitment activities in Greater Hobart generally followed the Recruitment Strategy that was outlined in project Milestone 3. The following activities (Table 4-2) were carried out to promote GBS to Greater Hobart households.

Figure 4-3 Examples of promotional materials used for recruitment and community events

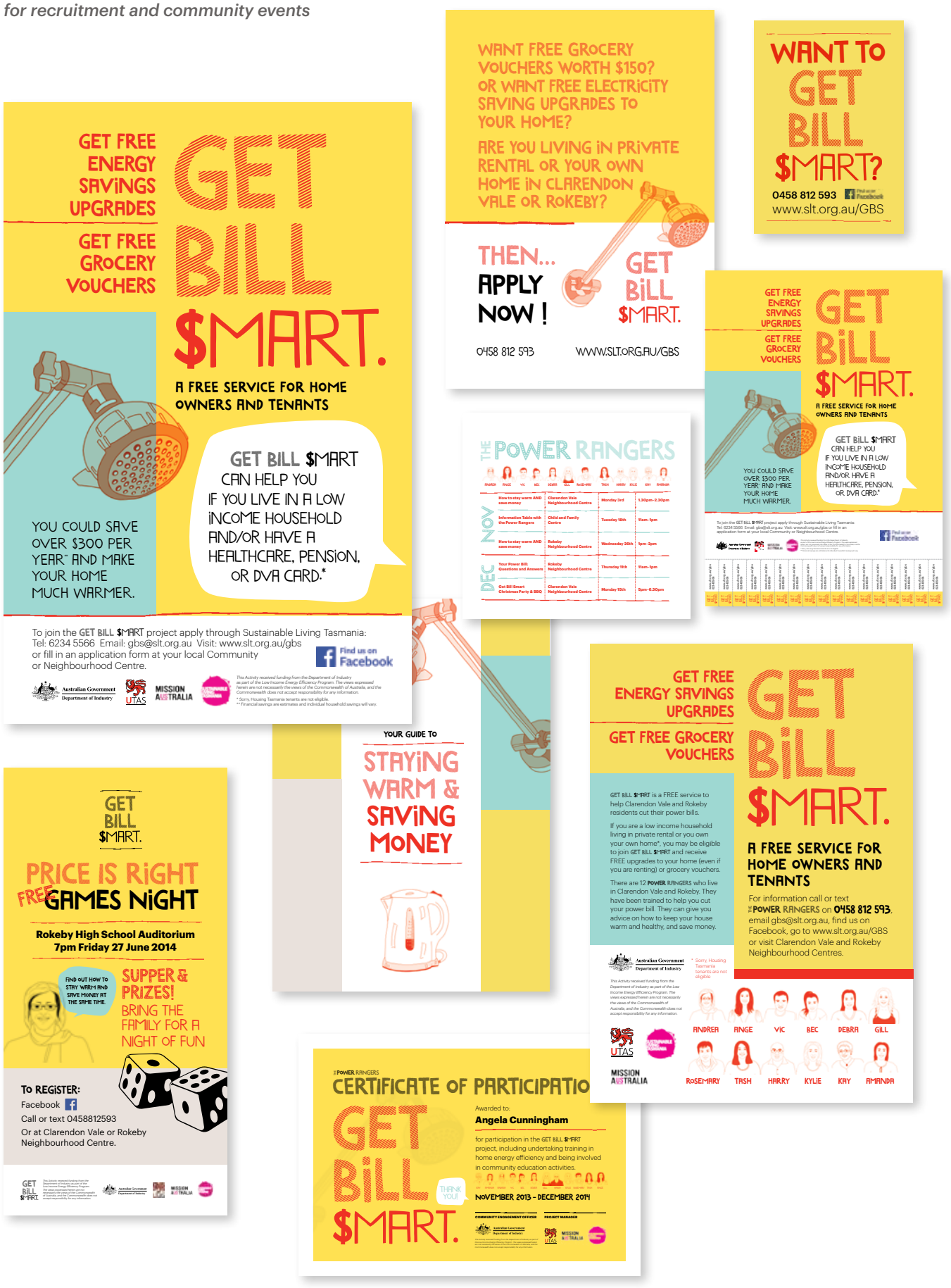


Table 4-2 Summary of GBS participant recruitment activities for Greater Hobart

Activity	Dates and results
Media Releases	June 24th, August 5th, September 25th 2014 ABC radio coverage, Southern Cross TV News coverage, State and local newspaper coverage.
Community and shopping centre stalls	9 stalls in Greater Hobart: direct applications on the spot and contact with many low income earners.
Presentations	13 presentations in Greater Hobart at community centre events, Council meetings and service provider meetings: Direct applications on the spot to eligible residents, contact with service providers and community centre managers who refer people to the GBS project.
Visits to community and neighbourhood centres	17 face to face visits with community centre managers and staff to introduce GBS and maintain relationships, including provision of promotional material and forms.
Low income service providers	Specific flyers and posters made for Colony 47 Hobart housing support centre. Regular communications with Aurora Hardship phone staff. Promotion of GBS at Anglicare Tasmania State wide forum. Promotion of GBS through COTA (Council on the Ageing)
Social Media and Internet	Get Bill Smart webpage, SLT webpage and GBS Facebook .
Promotion through other SLT energy projects	Utilizing the Home Energy Helper staff to promote GBS to friends and family of Housing Tasmania tenants. Contacting helpful landlords who have worked with SLT projects previously to alert them of GBS and to pass onto their tenants.

During each recruitment activity, project staff recorded to the best of their abilities how many people were informed about the GBS project. The number of people reached via the mass media in ABC radio coverage, Southern Cross News coverage and local newspaper articles is difficult to account for. The only way that this stream was able to be recorded was through the increased online registrations and phone calls during the media releases. Table 4-3 shows an estimate of the project recruitment efforts over the course of the recruitment period for both Greater Hobart and Clarendon Vale and Rokeby communities. Participation rates are described as people who provided an expression of interest to the project. Some of these people did not complete the full stage of recruitment to the project due to them either being ineligible for the project or lack of continued communication.

Table 4-3 Estimated recruitment outcomes for Get Bill Smart (Feb – Dec 2014)

Recruitment outcomes	
Number of low income households approached about Get Bill Smart	3512
Percentage of approached households that participated in Get Bill Smart	20%

**Note: includes both Greater Hobart and Clarendon Vale interactions with GBS potential participants.*

4.2.1.3 Vouchers and incentives for participation

It was recognised that some of the GBS approaches would not deliver any benefits to the household in terms of thermal comfort or energy savings. Where an impost in time was incurred without an improvement in energy efficiency then grocery vouchers were offered. Table 4-4 (below) shows the voucher values that were offered to each participant on completion of each project element.

Table 4-4 Grocery vouchers for project participants

	1st survey	1st interview	Install datalogger	2nd survey	2nd interview	Remove datalogger
REP – bulk	$75			$75		
REP – detailed	$75	$25	$25	$75	$25	$25
EDUG – bulk				$25		
EDUG – detailed		$25	$25		$25	$25
CCB – bulk	$75			$75		
CCB – detailed	$75	$25	$25	$75	$25	$25
EDUG + CCB – bulk				$25		
EDUG + CCB – detailed		$25	$25		$25	$25

In addition to the vouchers specified in Table 4-4 an incentive prize was offered for completion of the final survey. An additional 40 x $100 grocery vouchers were offered and 15 complete in-home education and upgrades. Perhaps unsurprisingly the grocery voucher prizes where more sought after than the EDUG approach. These incentives led to a 68% of surveys being returned on time, and overall 82% of participants returned their second survey.

4.2.2 Types of data collected

Overall Data was collected through:

- Observations of housing
- Billing data of householders (Aurora Energy)
- Observations of community activities
- Surveys of participants
- Surveys of champions
- Interviews of participants
- Interviews of champions
- Interviews with GBS staff
- Review of project documentation
- Review of demographics
- Other responses from participants.

Data for the bulk component of the study was collected via:

- Surveys pre and post intervention
- Energy bill data collected (with permission) from the energy suppliers (Aurora Energy).

Data for the detailed component of the study was collected via:

- Surveys pre and post intervention
- Energy bill data collected (with permission) from the energy suppliers (Aurora Energy)
- Semi structured interviews pre and post intervention
- Logging of energy use and thermal performance of houses
- Home observations.

Data for the organisational component of the study was collected via:

- Interviews with champions and stakeholders
- Review of project documentation
- Written surveys/questionnaire.

4.2.3 Approvals for research and Privacy

All recruitment processes and data collection techniques have been approved by the University of Tasmania's Social Science Human Research Ethics Network (Tasmania) through application H13682. In addition the project has progressed through approval stages with the Australian Government. All data collected and intended analysis processes are listed in a data plan approved as part of the GBS contract process. The project ensured the following research principles were met:

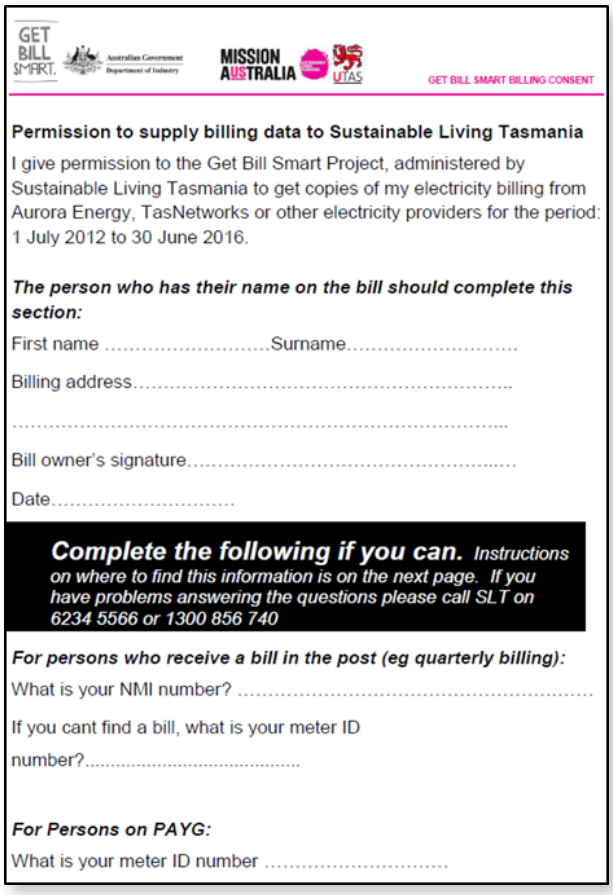
- invitations were sent out through a third party organisation (SLT);
- UTAS only contacted people who expressed an interest to be involved;
- People were well informed about the project and what the data collected will be used for before deciding to participate (through extensive information packages provided to interested people)
- Participants had all necessary contact details of UTAS and SLT;
- Participants gave consent before participating and completing surveys;
- Respect was always maintained in all relationships related to the project;
- Participants remained anonymous in any public presentation of data through unique identification ID's;
- Data was kept secure;
- Participants could seek further information and clarification about the study; and
- Participants could pull out of the research when they needed to (and indeed some did due to illness or change of address).

All participants are protected by both Human Research Ethics guidelines and Australian Government privacy laws.

All low-income householders were required to provide permission for GBS to access their billing data and electricity consumption data from their energy provider in order to participate in the project. A simple form (Figure 44) was provided to project recruits that clearly explained the process and asked for their details and permission. If participants did not want their data to be collected, or they did not have a separate electricity meter that tracked their electricity consumption, then they were unfortunately unable to join the project. This only happened in very few cases.

SLT provided a copy of all of the participants' signed forms to TasNetworks and Aurora Energy who exchanged electricity consumption data (Kwh) for each customer, across a variety of tariffs and billing periods from 1 July 2012 to 30 June 2016. Major trends in the consumption of electricity across the project are explained in the Bulk Study Report.

Figure 4-4 Sample billing consent form



GET BILL SMART

Australian Government Department of Industry

MISSION AUSTRALIA

UTAS

GET BILL SMART BILLING CONSENT

Permission to supply billing data to Sustainable Living Tasmania

I give permission to the Get Bill Smart Project, administered by Sustainable Living Tasmania to get copies of my electricity billing from Aurora Energy, TasNetworks or other electricity providers for the period: 1 July 2012 to 30 June 2016.

The person who has their name on the bill should complete this section:

First name .....Surname.....

Billing address.....

.....

Bill owner's signature.....

Date.....

Complete the following if you can. *Instructions on where to find this information is on the next page. If you have problems answering the questions please call SLT on 6234 5566 or 1300 856 740*

For persons who receive a bill in the post (eg quarterly billing):

What is your NMI number? .....

If you cant find a bill, what is your meter ID number?.....

For Persons on PAYG:

What is your meter ID number .....

4.3 Project Delivery

4.3.1 In-Home education and upgrades

Booking and scheduling

Once a participant was allocated to a research group and the project was in its "delivery phase" (after April 2014) householders where contacted to schedule a home visit. The original contact was made by Sustainable Living Tasmania and over 3 telephone contacts where attempted before any attempts to contact via post. The appointments where scheduled for between 2 days and 3 weeks in advance (depending on householder preference). Some participants were not contactable and as such did not receive in-home education and upgrades. In this situation they were re-allocated to the most appropriate research group for them (REP or CCB). A text message was sent 24 hours prior to the appointment as a reminder and a courtesy call made by the HEH in the hours before the appointment. In the case of a participant not attending an appointment, attempts were made to reschedule.

The Home visit

This approach involved two qualified home energy assessors (Home Energy Helpers or HEH) visiting a household, educating the householder(s), and performing a series of energy efficiency upgrades. From past experience, we found that low-income clients respond more positively to the title of Home Energy Helper, since "assessor" or "auditor" can conjure images of having one's possessions or lifestyle judged, rather than being assisted to reduce their energy bills and improve the thermal comfort of their home.

Education

One Home Energy Helper (HEH) sat down with the householder(s) and discussed an educational booklet. Advice specific to the household was discussed and noted inside the booklet. A copy of the booklet is available at Appendix 1. The education session focused time and attention according to the amount of energy used by that area of the house. Roughly speaking 50% of time was spent on heating and approaches to staying warm, 25% on hot water usage and 25% on all other energy using appliances.

The HEH also provided the householder(s) with a thermometer and showed them how to use it. Thermometers are an important tool for ongoing energy efficiency education and behaviour change. They allow householders to directly monitor the temperature of their home, refrigerator and hot water system, and are particularly useful where a heater without a thermostat is being used. Shower timers were also supplied alongside the educational activities.

The HEH assisted the household to develop a personalised power savings plan, consisting of a simple checklist of actions that mirror the individual points of advice included in the educational document. The HEH recorded the information on the personalised power plan for later input into the database for monitoring and evaluation purposes.

Upgrades

While the first HEH educated, the second performed a range of simple energy efficiency upgrades to the household. SLT used a team of qualified and experienced home sustainability assessors trained in each of the upgrade procedures and with a wealth of experience in performing them for thousands of Tasmanian households. The exceptions were ceiling insulation, curtains and extractor fans; for which we used suitably qualified subcontractors. A maintenance contractor and lighting electrician were also used on two occasions.

Our Home Energy Helper assessed whether or not an upgrade was suited to each household. If so, they explained it, including pros and cons, and allowed the householder to make their own informed decision as to whether or not to proceed with the upgrade. The upgrade list (Table 4-5) shows the range of energy efficiency upgrades that where delivered.

Table 4-5 Energy efficiency upgrades delivered in the Get Bill Smart Project

Upgrade Description	Performed When	Monitoring and Evaluation
Shower head replacement with equivalent 9L/min model.	Flow rate of existing shower head is ≥10L/min.	Flow rate before and after replacement recorded. Householder's estimate of average shower used per day.
Hot water storage cylinder insulation with reflective sheeting with bubble-core interior.	Hot water cylinder is accessible. This work will be completed by HEH if it is a user serviceable "bung" type thermostat.	Size of cylinder. Location of cylinder.
Hot water pressure relief valve and pipe insulation with ValveCosy (valvecosy.com.au) and foam pipe lagging respectively. Lagging applied to first 2 metres of outlet and pressure relief pipes only.	Pipes are accessible and not already insulated.	Location of pipes. Length of pipes insulated.
Light globe replacement with high-quality, equivalent light output, warm white compact fluorescent lamps.[5]	Existing light globes are less efficient (e.g. incandescent or halogen). In regularly occupied rooms only.	Type and power rating of light globe(s) replaced. Householder's estimate of average time lights used per day.
Accessible power switch installation (EcoSwitch) on home entertainment and IT systems to reduce standby power consumption.	Standby power is >3W and there is not already an easily accessible switch.	Standby power. Householder's estimate of average time system used per day.
Window, door, fan & vent draught-proofing in heated zones.[6]	Draughts are present. Residual risk of mould due to condensation from trapped humidity is minimal.[7]	Number and type of door/window draught-proofing applied to.
Ceiling insulation to R4.	Existing ceiling insulation is less than R2.0. Roof cavity is accessible and installation is safe. One or more occupants are classified as 'high needs'[8]	Type, thickness, coverage & condition of existing insulation. R value of Insulation added.
Curtains (thermally lined with full blockout) on a track system that acts as a pelmet (trapping air between curtain and window) in heated zones.	Existing window coverings are non-existent, venetian blinds, horizontal blinds, or light curtains. One or more occupants are classified as 'high needs' Only in heated zones.	Type and condition of window coverings before upgrade. Size of window. Location of window.
Underfloor insulation.	No floor coverings present, large cracks in floorboards, accessible to underfloor.	Estimate of R value of existing floor materials. R value of Insulation added.

5 While incandescent light globes are no longer being sold in Australia, halogen globes branded as "efficient" are being sold even though they use 3 times more energy to produce the same amount of light as a compact fluorescent lamp (CFL). Further, many householders are turning away from CFLs due to approximately experiencing poor quality light from cool white and/or cheap products. Giving people a good experience of CFLs can influence their future purchasing decisions.

6 Our draught-proofing techniques use a variety of screw-fixed brush strip, adhesive backed v-strip, adhesive backed foam tape, and door snakes depending on the application.

7 Householders were educated on managing humidity and condensation and asked to monitor it. All draught-proofing measures are easily reversible if ever necessary.

8 The Home Energy Helper will rate the household's likely thermal improvement from having curtains installed (recording a score between 1 and 5), and the susceptibility of occupants to ill-health due to cold (recording a score between 1 and 5). Households will be classified as high-needs when the product of these two ratings is 16 or greater.

Reporting and data collection

Following the delivery of the In-home education and upgrades the HEH entered their visit data into the project management database. This kept track of stock use as well as recording information on upgrades performed, building structure and confirmation of electricity billing data.

Table 4-6 Upgrades delivered through the Get Bill Smart Project

Upgrade Description	# of households that received this upgrade
Shower head replacement with equivalent 9L/min model	142
Hot water storage cylinder insulation with reflective sheeting with bubble-core interior	58
Hot water pressure relief valve and pipe insulation with ValveCosy	171
Foam pipe lagging applied to first 2 metres of outlet and pressure relief pipes only	210
Light globe replacement with high-quality, equivalent light output, warm white compact fluorescent lamps (i)	237
Accessible power switch installation (EcoSwitch) on home entertainment and IT systems to reduce standby power consumption	75
Doors draught proofed	223
Windows draught proofed	44
Exhaust fans draught proofed	12
Ceiling insulation to R3.5	61
Curtains (thermally lined with full blockout) on a track system that acts as a pelmet (trapping air between curtain and window) in heated zones.	26
Underfloor insulation	0

Note, one home was recommended for underfloor insulation however the tenant would not remove obstacles stored under the house and suitable arrangements for the subcontractor to install could not be made.

4.3.2 Community Capacity Building

Phase one of CCB: Building capacity of Energy Champions

The first phase of CBB entailed employing a Community Engagement Officer (EO) and 12 community representatives as Energy Champions (ECs). The role of the EO was to recruit the ECs and to support them to develop a community engagement program and raise awareness about GBS and energy efficiency.

On joining the GBS project, the ECs received training in energy efficiency and communication from experts in these fields. As part of this training, the ECs were involved in some practical exercises in order to develop their knowledge and skills. The EO also facilitated a number of workshops that familiarised the ECs with what community capacity building entails and how to develop and implement a community engagement strategy.

In order to extend their understanding of home energy saving, all ECs received in-home education and upgrades in their own homes. This increased the ECs' understanding of the GBS project and objectives, practical measures to reduce energy use and improve thermal comfort, and the effectiveness of energy efficiency measures. Full details of the recruitment and training of energy champions can be found in Chapter 8.

Phase two of CCB: Building capacity in the local community

The EO and the ECs met regularly during late 2015 to develop a Community Engagement Strategy. During this stage the ECs were supported to make a video about the GBS project and their role in the project. The ECs also worked with the EO to develop a calendar of home energy community events and activities.

The EO then supported the ECs to run community events and to raise awareness about GBS in the Clarendon Vale/Rokeby community over an eleven month period (Feb– Dec 2014).

Activities the ECs were involved with included:

- recruiting people into the GBS study
- distributing the Stay Warm booklet to householders
- developing a calendar of community events
- hosting BBQs and information sessions at neighbourhood centres and the community shed
- staffing stalls at community events, the community centres and other public locations within the CVR area
- organising and running sewing workshops
- organising hardware shopping tours
- organising and staffing a quiz night
- door-knocking homes in the local area to raise awareness of the GBS project, support the research component of the project, and to engage with householders
- organising and running home energy efficiency parties (modelled on the Tupperware approach).

Reporting and data collection

Details of the activities of the EC's and the participation at events where recorded by the EO and communicated with UTAS researchers or recorded in the GBS database.

4.4 Aims of project sub-reports

There are four sub-reports prepared under the GBS final report. Each one of these reports allows the reader to understand an aspect of the project from a particular perspective. Details of each sub-report and its aims is provided below.

Chapter 5 – Bulk Study

The Bulk Study, reviews broad scale outcomes of the Get Bill Smart (GBS) project through before and after surveys and householder energy billing information. The report presents the methods, findings and discussion of findings from

1 Before and after surveys conducted with GBS participants; and

2 GBS participants' energy billing data.

The surveys and energy billing data collected for GBS allow pictures of the effects of GBS activities to be developed and to understand outcomes, including energy affordability as trends.

Read this report if you would like an insight into broad patterns of energy use over time in relation to different program approaches.

Chapter 6 – Detailed Study

The Detailed Study, provides in-depth examination of 51 participant households and the change that occurred for them after involvement with Get Bill Smart (GBS). These detailed households are a subset of the participants from the broader GBS study. This report assists in the evaluation of GBS by providing further insight into householder experiences and the conditions householders were living with, addresses gaps in understanding of the effects of GBS energy efficiency support activities, identifies key drivers affecting energy and comfort outcomes and the trade-offs made by householders at the individual household level.

The detailed report has been formatted as a stand alone report. If it is not attached to this report please download it from www.slt.org.au/get_bill_smart.

Read this report if you would like an insight into the different ways that individuals and households manage energy efficiency and thermal comfort and respond to different program approaches.

Chapter 7 – Cost Benefit Analysis

The Cost Benefit report identifies cost effectiveness, cost benefit and co-benefits of GBS energy efficiency activities. Cost effectiveness is a technique that relates costs of a program to its outcomes, including its benefits. Cost effectiveness uses units that are non-monetary to measure impacts. Cost benefit is a technique that relates the costs of a program to its financial outcomes/ benefits. This technique is used to identify the most cost effective option for achieving a particular outcome or benefit. Both techniques are used to identify the most cost effective options for achieving a particular outcome or benefit. Together cost benefits, cost effectiveness and co-benefits are being described to support future development of energy efficiency programs.

Read this report if you would like insight into the financial, social and health costs and benefits associated with different program approaches.

Chapter 8 – Project processes and organisational analysis

The Organisational analysis measured the success of the GBS project against four key questions

1 What were the capacity and constraint issues experienced by participating organisations?

2 What were the key successes and challenges associated with implementing the GBS project?

3 What impact did participating in a national trial evaluation have on project implementation?

4 What were the key lessons for future low income energy efficiency projects?

Read this report if you would like insight into the detailed implementation of each different approach and an understanding of how such programs are facilitated in practice.

Details of the data collection and analysis methodologies are contained within each sub-report.

Section 5

BULK STUDY

5. Bulk study

5.1 Introduction

This report, The Bulk Study, reviews broad scale outcomes of the Get Bill Smart (GBS) project through before and after surveys and householder energy billing information.

The report presents the methods, findings and discussion of findings from

1. Before and after surveys conducted with GBS participants; and
2. GBS participants' energy billing data.

The surveys and energy billing data collected for GBS allow pictures of the effects of GBS activities to be developed and to understand outcomes, including energy affordability as trends. This report is one of four reporting on Get Bill Smart activities and outcomes. The other three are:

1. The Get Bill Smart detailed study report
2. Cost benefit analysis
3. Assessment of support approaches used from an organisational perspective

Along with these other three reports, this makes up part of the final report being submitted for the Get Bill Smart project. This Bulk Study report assists to meet the GBS objectives of: comparing outcomes of the approaches and support activities trialled; understanding how community capacity-building can assist to improve energy efficiency; understanding better drivers and barriers that effect energy and comfort changes; understanding how energy and comfort outcomes are utilised by low income householders. Overall GBS is working to assist in advancing understanding of energy use and thermal performance to improve the design of support activities for application in Tasmania and Australia.

The Get Bill Smart (GBS) project trialled two energy efficiency approaches that aimed to improve energy efficiency in households with low incomes:

1. Direct engagement with households through home energy visits that include education, auditing and physical upgrades to the house, fittings and appliances; and
2. Community capacity building that involves employing 12 local energy champions and conducting a community engagement strategy.

GBS also trialled how these approaches worked in combination.

This report assists in the evaluation of GBS by providing further insight of householder experience and providing key outcomes in relation to energy use and thermal comfort and a comparison of outcomes between GBs approaches.

5.2 Bulk study data collection and analysis methods

This section outlines the methods used to collect, process and analyse data for the bulk study component of the Get Bill Smart project. Data collection and analysis of before and after surveys are described as are the analysis processes for the electricity billing data.

5.2.1 Recruitment of bulk study participants

Low income households in Greater Hobart and Clarendon Vale/Rokeby were contacted and recruited through a combination of methods including: self-identification (in response to targeted advertising), referrals from community service providers (including but not limited to Mission Australia), extensive community engagement initiatives, local newsletters, letterbox drop of target communities, Community Champions (local advocates), online social networks, and advertising

in popular media. There were incentives for people to participate in the project, including a free home energy audit, education and upgrades; or grocery vouchers. The project recruited a total of 498 project participants (plus twelve community energy champions) (see Table 4-1 Allocations to Get Bill Smart research groups).

5.2.2 Energy efficiency approaches and groups

Two energy efficiency approaches were evaluated in isolation and in combination. In order to undertake these comparative evaluations, project participants were randomly allocated into four distinct groups when they were recruited into the project in early 2014. The groups they were allocated to were:

1. In-home education and upgrades (EDUG)
2. Community capacity building (CCB)
3. In-home education and upgrades plus community capacity building (EDUG+CCB);
4. Representative group (REP) (no GBS energy efficiency activities were undertaken with this group)

The project recruited low income households from two comparable geographic areas: Greater Hobart and Clarendon Vale/ Rokeby. Clarendon Vale/ Rokeby was the trial site for community capacity building. Households from Clarendon Vale /Rokeby were randomly allocated into GBS groups 2 and 3. Households from Greater Hobart were randomly allocated into GBS groups 1 and 4.

Originally the project was designed to have equal numbers (n=120) in each research group. However given the limited recruitment pool in the Clarendon vale and Rokeby (community) areas the final research numbers were smaller in Clarendon Vale and higher in Greater Hobart (see Table 5-1 below).

Table 5-1 GBS approaches and numbers of households involved

		Community capacity-building	
		Off	**On**
In-home education and upgrades	Off	REP 165 households	CCB 88 households
	On	EDUG 169 households	EDUG+CCB 76 households

5.2.3 Survey methods

5.2.3.1 Administering before and after activity surveys

The first stage of the GBS evaluation entailed collecting comprehensive baseline data from the 498low income households participating in the project. Undertaking the survey was a condition of project participation and hence we were able to achieve a 100% response rate for the 'before' survey. The survey was available online at a survey collection website and posted as a paper version to participants prior to the commencement of the GBS activities (in-home education and upgrade visits; and community capacity building activities).

Before and after surveys asked participants about dwelling characteristics; motivation for participation in project; financial hardship; heating and cooling appliances; insulation; presence of moisture and mould; knowledge of thermal comfort and energy efficiency; capacity for and barriers to improving thermal comfort and energy efficiency; views on their local community; and socio-demographic information.

The second stage of the GBS evaluation entailed collecting comprehensive post-activity data. Paper surveys were sent to all participants. A small number of surveys were returned to sender because participants had moved (and not notified GBS). These participants were contacted wherever possible and were asked to fill out the survey on the time they had lived in the home they had moved from (noting dates the householders moved). Participants who did not respond to the paper version of the survey were contacted via phone. Overall we received/conducted 408 after surveys; which was a response rate of 82%.

The majority of participants chose, for both before and after surveys, to complete paper based versions of the survey. The online survey site acted as a cloud data repository for surveys so answers received on paper versions of surveys were entered into the online survey by researchers. Survey databases were then downloaded from the survey collection site to conduct analysis. Before analysis was conducted some pre-processing of data occurred in spread sheets.

Table 5-2 Participants who completed before and after surveys (by GBS approach)

		Community capacity-building	
		Off	On
In-home education and upgrades	Off	144 households	65 households
	On	143 households	56 households

5.2.3.2 Before and after survey data analysis

Survey data was analysed using IBM SPSS software. Descriptive statistical procedures were undertaken including frequencies and cross-tabulation. Bivariate analysis and some regression modelling was undertaken to test hypotheses of association between variables. Tests of statistical significance, Chi square (X2) tests, were undertaken to determine the level of confidence that any observed associations between variables were valid rather than an outcome of chance.

5.2.3.3 Ethics and privacy guidelines

The research team obtained ethics approval for the project from the University of Tasmania's Social Science Human Research Ethics Network (Tasmania) in application H0013682. Participants were sought through government and Ethics committee approved recruiting activities. Participants submitted expression of interest so the GBS project manager could check suitability criteria.

On enrolment in the project, participants were informed about the purpose and nature of the project; each stage of data collection; their right to withdraw from the project at any time; how the data they provide will be used; and how the data they provide will be stored. They were reassured that any information they provided would be treated confidentially. They were required to sign a consent form and the Federal Government's Privacy Notice prior to participating in any project or research activity.

Upon enrolment householders also provided permission for the Tasmanian electricity retailer to provide SLT with their household energy billing data.

5.2.4 Energy billing data methods

Electricity billing data was used to evaluate changes in energy usage for project participants before and after the energy efficiency activities. All data was supplied by electricity suppliers with permission from each participant. Energy billing analysis was undertaken by SLT project staff. SLT had previous experience obtaining and processing energy billing data from the supplier and was therefore well placed to conduct this analysis.

GBS was able to access electricity billing data for 437 of the 498 GBS project participants (88%). Due to availability of data varying for each participant and different tariffs having to be treated differently when analysing, each analysis conducted has some variation in the sample size.

5.2.4.1 Tasmanian electricity tariffs

The majority of participants received quarterly bills from their electricity retailer, with the remainder on a Pay As You Go (PAYG) system.

Of the participants billed quarterly, the majority used a general light and power tariff (31) and a second cheaper tariff either for hot water (41) or for hot water and hard-wired heating (42). Other quarterly-billed tariffs are described in Table 5-3.

The PAYG system has special meters installed in homes that require a prepaid electricity card to run. The process for PAYG is similar to pre-paid mobile phones. PAYG uses a time-of-use tariff structure, so its data outputs are structured according to time of use.

Table 5-3 Electricity tariffs used by project participants

Tariff name	Description	Number of participants with sufficient billing data for analysis				
		EDUG	CCB	EDUG+CCB	REP	Total
T31 – Light and power	Quarterly residential light and power circuits (often combined with Tariff 41 or 42).	128	39	38	88	293
T41 – Hot Water	Quarterly tariff with discount for hard- wired hot water systems. Households on this tariff tend to have wood or gas as their main source of heating.	40	16	11	31	98
T42 – Heating discount (hot water and space heating)	Quarterly tariff with discount for hard- wired hot water systems and heaters. Households on this tariff tend to have electricity as their main source of heating.	86	21	26	57	190
T22 – Business LV general	Quarterly business general tariff. First 500kW per month at higher rate.	0	0	0	1	1
T61 – Off-peak with afternoon boost	Quarterly off-peak heater and hot water.	8	3	3	7	21
T62 – Off-peak night period only	Quarterly off-peak heater and hot water.	1	0	0	0	1
TASX1I – Solar export – Transitional	Quarterly one-to-one feed in tariff.	16	7	2	10	35
PAYG	Pay As You Go pre-paid electricity with time-of-use rates.	19	26	19	35	99
All tariffs combined		**143**	**64**	**54**	**122**	**383**

5.2.4.2 Billing analysis tool

For previous projects, Sustainable Living Tasmania had worked with the Australian Bureau of Statistics to develop a Microsoft Excel tool with generalised formulae and macros to efficiently and accurately clean, process and analyse billing data. This tool was further developed by SLT staff for the GBS project.

5.2.4.3 Meter reading estimates

The supplied raw meter data included meter reads that had been estimated – where the meter reader wasn't able to actually read the meter for some reason, and so had generated an estimate for the period. These estimates were generally derived from the previous year's or the previous period's usage, so were unsuitable to be used in the analysis. A macro was written in the billing analysis tool that removed all estimates from the data series and only used real data points.

5.2.4.4 Determining before and after periods

If complete billing data were available for a household, the tool compared energy usage for the whole year after the assessment with the whole year before the assessment. If less data was available, the tool used the longest equivalent periods of data before and after the assessment (i.e. same date range exactly one year apart). This ensured the season was the same for the before and after data for each house, however the seasons may have been different between houses.

5.2.4.5 Minimum comparison periods

The analysis tool allowed the minimum comparison period (in days) to be specified. Any houses that had insufficient data to meet the minimum comparison period were omitted from the analysis.

Longer minimum comparison periods increased the reliability of the comparisons as anomalies tend to be averaged out over longer periods, but also reduced the number of houses analysed due to limited data availability for some houses (e.g. due to them moving out during the study).

5.2.4.6 Dividing a billing period into 'before' and 'after' periods

If there was more than one year of billing data before and after the energy efficiency activity, then the billing period that the activity occurred in was omitted from the analysis. Otherwise, the energy for that billing period needed to be divided into before and after periods.

In previous projects, SLT had used a basic method in which the power consumption within the billing period was assumed to be constant. The drawback with this approach arises from the fact that Tasmanians typically using several times more power in winter than summer, and so power consumption can change markedly over the course of a billing period (particularly autumn and spring as the climate cools and warms). This is illustrated in Chart 5-1.

To overcome this, for the GBS project, a new methodology was developed using linear interpolation. This is illustrated in Chart 5-2.

Chart 5-1 Demonstration of basic method used in past projects

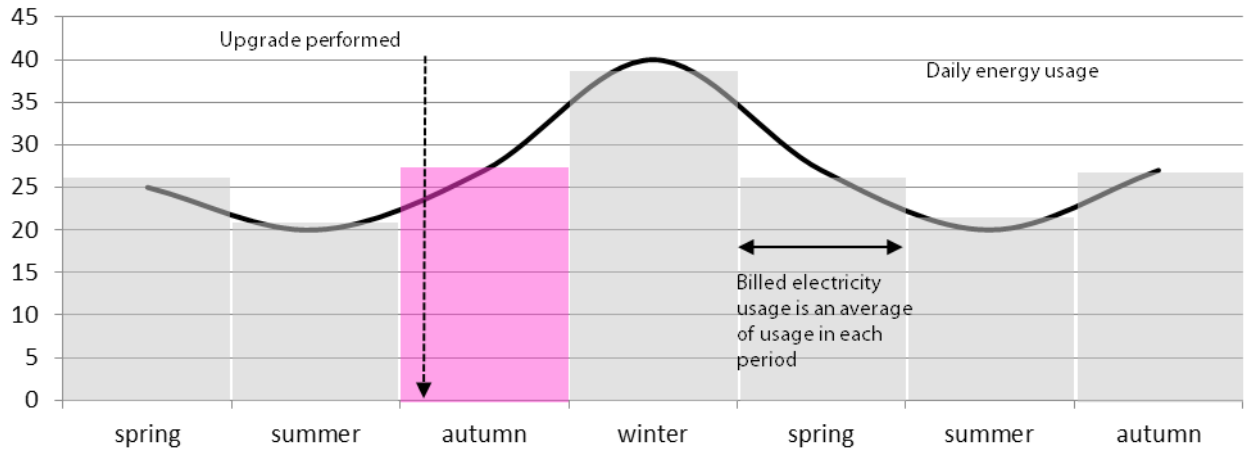
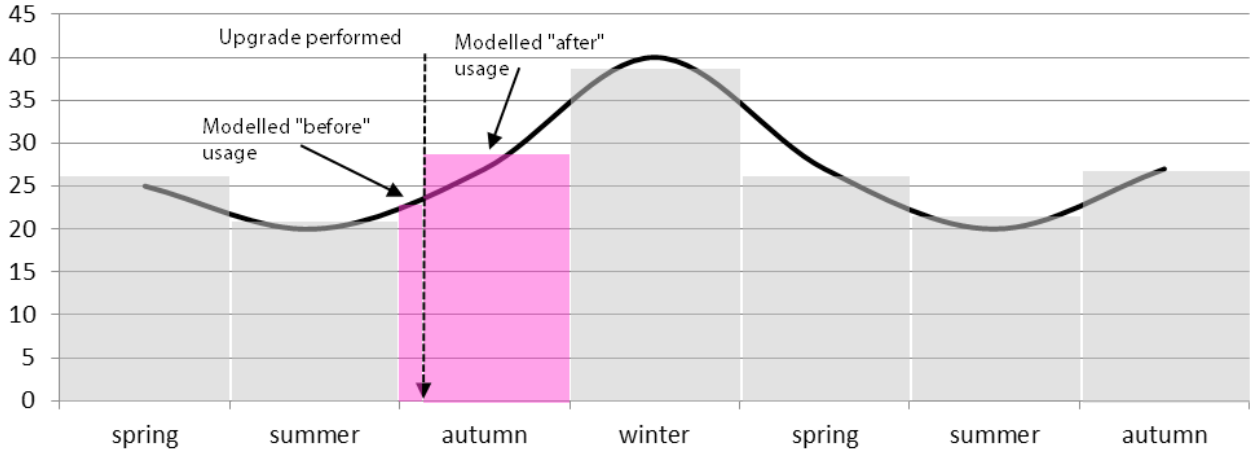


Chart 5-2 Demonstration of linear interpolation method used in this project



Linear interpolation between billing periods was performed using standard mathematical formula as explained on the next page.

Figure 5-1 Interpolation model schematic

Linear interpolation between billing periods was performed using standard mathematical formula as explained below.

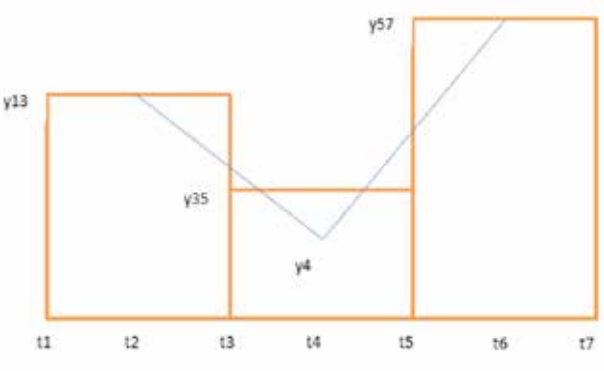


Figure 5.3-1 (above) represents three billing periods, with average usage of y13, y35 and y57 respectively. The first billing period starts at t1 and finishes at t3, with a midpoint at t2.

The blue line is the interpolation line which is fixed at the midpoints of the adjacent billing periods: points (t2, y13) and (t6, y57).

The average of the interpolation line between t3 and t5 needs to equal y35. This is why y4 does not necessarily equal y35.

To calculate y4, the area under the interpolation line between t3 and t4 must be equal to the total usage across that period.

$$y_{35}(t_5 - t_3) = A_{left} + A_{right}$$

where 'Aleft' and 'Aright' are the areas under the interpolation line but within the read period.

$$A_{left} = \frac{1}{2}(t_4 - t_3)\left\{y_4(1 + \frac{t_3 - t_2}{t_4 - t_2}) + y_{13}(1 + \frac{t_3 - t_2}{t_4 - t_2})\right\}$$

$$A_{right} = \frac{1}{2}(t_5 - t_4)\left\{y_4(1 + \frac{t_6 - t_5}{t_6 - t_4}) + y_{57}(1 + \frac{t_6 - t_5}{t_6 - t_4})\right\}$$

These can be rearranged to solve for y4.

$$y_4 = \frac{y_{35}(t_5 - t_3) - \frac{1}{2}y_{13}(t_4 - t_3)\left(\frac{t_3 - t_2}{t_4 - t_2}\right) - \frac{1}{2}y_{57}(t_5 - t_4)\left(\frac{t_6 - t_5}{t_6 - t_4}\right)}{\frac{1}{2}(t_4 - t_3)\left(1 + \frac{t_3 - t_2}{t_4 - t_2}\right) + \frac{1}{2}(t_5 - 4)\left(1 + \frac{t_6 - t_5}{t_6 - t_4}\right)}$$

Each of these five parts were calculated in their own column in the spreadsheet tool, then used to calculate y4. The left (y3) and right (y5) values were also calculated using simple linear interpolation between y4 and y13, and between y4 and y57.

From there, there were six possible options for the comparison periods. Comparison periods could:

1. end in the left half of the current read period
2. end in the right half of the current read period
3. start in the left half of the current read period
4. start in the right half of the current read period
5. cover the whole of the left half of the current read period, or
6. cover the whole of the right half of the current read period.

For each of the first four cases, a linear interpolation was used to calculate the daily usage to apply. The result was then multiplied by the number of days overlap to get total usage. For cases 5 & 6, the average of y3 and y4 or y4 and y5 was used, as appropriate.

If an interpolation couldn't be calculated (e.g. if the current read did not have a preceding or following read), then the basic method assuming constant power use over the billing period was used.

5.2.4.7 Houses with photovoltaic solar

Solar Photovoltaic (PV) energy generation in participant homes further complicated billing analysis. Billing data included the energy exported to the grid and the energy imported from the grid (e.g. via Tariffs 31 and 41), but not the energy generated or the energy consumed. Any energy generated by PV that was used onsite to meet a house's consumption was not metered.

There are two ways of calculating net energy consumption (variables shown in green are available from the billing data):

Net energy consumed	=	**Energy imported – Energy exported**; and
Net energy consumed	=	**Energy consumed – Energy generated**

Therefore:

Energy consumed	=	**Energy imported – Energy exported** + Energy generated

So, if the energy generated were known, the energy consumed could be calculated. Estimating energy generated from PV systems using their rated power output was considered, however the approach was not adopted given the number of influencing variables such as tilt, orientation and shading.

As such, it was deemed impossible to accurately determine the energy consumed of houses with PV systems, and so they were omitted from analyses that involved energy consumption figures (e.g. Chart 5-4, Chart 5-5, and Chart 5-6).

However, the change in energy consumed between the before and after periods could still be calculated, by assuming the energy generated by PV systems was equal in the before and after periods.

Change in energy consumed	=	**(Energy imported after – Energy exported after** + Energy generated after) **– (Energy imported before – Energy exported before** + Energy generated before)
	=	**(Energy imported after – Energy exported after) – (Energy imported before – Energy exported before)**

This was a reasonable assumption given both periods covered the same seasons, however it is important to note that differences in 'before' and 'after' solar generation may have arisen from changes in climate (e.g. cloudier one year than the other), shading (e.g. a tree cut down), or system performance (e.g. degradation or failure of the PV system). As such, some analyses were conducted both with and without houses with PV.

5.2.5 Data sources

Sustainable Living Tasmania obtained electricity billing data from Tas Networks and Aurora Energy. Tas Networks is the state-owned electricity distributor. Aurora Energy is the state-owned electricity retailer. The two were originally one organisation that split in July 2014 to comply with National Electricity Market requirements. Currently Aurora is the only electricity retailer in Tasmania for residential customers.

5.2.5.1 Tas Networks

Tas Networks provided guidance for billing analysis and supplied the energy data free of charge to the project. Tas Networks provided 4 data sets as follows:

- March 2014 – Sample data set
- December 2014 – Major data matching set
- May 2015 – Initial analysis data, and
- November 2015 – Final Billing and CDN Data.

5.2.5.2 Aurora Energy

Aurora Energy supplied data for PAYG customers. Because of the split between Aurora and Tas Networks, Aurora energy had a much better data set for PAYG customers. Aurora Energy provided guidance for billing analysis and supplied the energy data free of charge to the project. Aurora provided one PAYG data set in October 2015.

5.2.6 Data matching and cleaning

Matching the supplied billing data to the correct project participant required a significant amount of work. In some cases the project had access to correct billing names, address, meter ID# and National Meter Identifier (NMI). However, in many cases participants supplied incorrect billing names or poor quality meter or NMI details. Some participants also moved house during the project period as well as changing account names whilst remaining in the same residence

The National Meter Identifier (NMI) was matched to the participant household. A major complication is that the data provided for each NMI was not always tied to a particular customer. If someone moved in or out of a house during the period covered by the data set, the data set included data from the previous or next occupant, who were not project participants.

To overcome these occupant mismatches, the billing data was reconciled with the move-in and move-out dates for each house. Three sources of data were used for this: connection-disconnection (CDN) data from Tas Networks, UTAS's survey data and SLT's project management database (SLT database).

5.2.7 Setting dates

5.2.7.1 Energy efficiency activity date

"Energy efficiency activity dates" needed to be determined in order to separate the before and after periods.

EDUG and EDUG+CCB: For participants receiving in-home education and upgrades (with or without community capacity building), the energy efficiency activity date was taken from the SLT database (i.e. the date that the in-home education and upgrades were conducted).

CCB: For participants receiving community capacity building only, the energy efficiency activity date was taken as the transfer date from the SLT database (i.e. when the participant was recruited). If the period between the move-in date and transfer date was less than thirty days then the energy efficiency activity date was taken to be the move-in date plus thirty days. If the allocated date was less than thirty days from the move-out date then the energy efficiency activity date was taken as the move-out date minus thirty days.

REP: For the representative group, the energy efficiency activity date was taken to be the average of all energy efficiency activity dates from the other groups – 29/09/2014. If the period between the move-in date and the allocated date was less than thirty days then the energy efficiency activity date was taken as the move-in date plus thirty days. If the allocated date was less than thirty days from the move-out date then the energy efficiency activity date was taken to be the move-out date minus thirty days.

5.2.7.2 End dates

The end date for analyses on each household was assumed as the survey return date unless:

- the survey data indicated the participant moved out prior to project end; or
- the database notes indicated the participant moved out before project end; or
- the participant did not return a survey.

In these cases connection/disconnection data from Tas Networks was referenced to find appropriate a move-out date for the participant.

If the participant did not return the "after" survey and there was no corresponding connection/ disconnection data then the move-out date was assumed to be 01/01/2016.

5.3 Before and after survey results

5.3.1 Socio-demographic description of participants

In this section, we examine the socio-demographic characteristics of households participating in the Get Bill Smart project. In particular we examine: household type, size and age; household income; education; employment; place of birth; cultural identity and language; whether or not there is someone with chronic illness and disability in the household; tenure; and length of residence.

5.3.1.1 Household type

There were a range of household types participating in the Get Bill Smart project as shown in Table 5-4. Most households were stable, with 81.3% of households (n=321) reporting the same household type across the two surveys.

Table 5-4 What household type best describes this household?

	n	%
Single person	125	31.5
Single parent and dependent/s	91	22.9
Couple	79	19.9
Couple and dependent/s	73	18.4
Group / share household	19	4.8
Other	10	2.5
Total	**397**	**100.0**

Missing cases=11

The household size varied among participating households, as shown in Table 5-5. In relation to household size most households were stable, with 84.5% of households (n=338) reporting the same number of people living in the home across the two surveys. Only 6.25% of households (n=25) reported an increase in household size and 9.25% (n=37) reported a decrease in household size across the two surveys.

Table 5-5 Household size

	n	%
1	124	30.8
2	120	29.9
3	60	14.9
4	59	14.7
More than 4	39	9.7
Total	**402**	**100.0**

Missing cases = 6

There were a range of households in various age brackets participating in the GBS project as shown in Table 5-6.

Table 5-6 Household age

	n	%
Under 25 years	13	3.3
25 – 44 years	124	31.1
45 – 64 years	140	35.1
Over 65 years	122	30.6
	399	**100.1**

Missing cases = 9

5.3.1.2 Household income

Only low income households were eligible to participate in the Get Bill Smart project. Participants were asked to estimate either their weekly or their annual income. Thirty five per cent of participants (n=141) provided an estimate of their weekly income and 60% (n=245) provided an estimate of their annual income.

The Australian Council of Social Service's report *Poverty in Australia 2014*[9] provides a recent estimate of poverty in Australia. In 2012, the poverty line (50% of median income) for a:

- lone person was $400.30 per week,
- lone parent with 2 children was $640.40,
- couple was $600.40, and
- couple with 2 children was $840.60 (ACOSS 2014: 9).

9 ACOSS (Australian Council of Social Service) (2014) *The Poverty Report* 2014 Strawberry Hills, NSW: ACOSS.

Even without regard for household type, the tables below highlight that many participating households were experiencing financial hardship. Among the participants who nominated to provide an estimate of their weekly income, Table 5-7 indicates that at least 26.2% of these households (n=37) were living below the poverty line.

Table 5-7 Weekly household income

	n	%
Less than $400	37	26.2
$400 – 599	62	44.0
$600 – 799	27	19.1
$800 and more	15	10.6
Total	**141**	**100.0**

Among the participants who nominated to provide an estimate of their annual income, Table 5-8 indicates that over a third of these households (n=86, 35.1%) were living below the poverty line.

Table 5-8 Annual household income

	n	%
Less than $20,800	86	35.1
$20,800 – 31,199	64	26.1
$31,200 – 41, 599	32	13.1
$41,600 – 51,999	35	14.3
More than $52,000	28	11.4
Total	**245**	**100.0**

By combining weekly and annual income data to generate an estimate of the weekly income for all valid cases (n=347) we were then able to compare this data by household type. The results indicate that substantial proportions of each household type were below the poverty line. There were:

- 50.0% of single persons living on less than $400 a week (n=57);
- 63.3% of single parents living on less than $600 a week (n=57);
- 56.9% of couples living on less than $600 a week (n=41); and
- 54.9% of couples with children living on less than $800 a week (n=39).

Table 5-9 Weekly income by household type

	Single person	Single parent and dependent/s	Couple	Couple and dependent/s	Total
Less than $400	57	26	19	9	111
	50.0%	28.9%	26.4%	12.7%	
$400–599	50	31	22	14	117
	43.9%	34.4%	30.6%	19.7%	
$600–799	7	17	14	16	54
	6.1%	18.9%	19.4%	22.5%	
$800 and more	0	16	17	32	65
	0.0%	17.8%	23.6%	45.1%	
Total	114	90	72	71	347
	100.0%	**100.0%**	**100.0%**	**100.0%**	

5.3.1.3 Education

In 2011, of Australia's resident population of 14.8 million people aged 15-64 years, 8.4 million (57%) held at least one formal (non-school) qualification.

In comparison, just over a third of the households (n= 143, 35.0%) participating in the GBS study reported that either Person 1 and/or 2 held at least one formal (non-school) qualification.

Table 5-10 Highest level of education, Person 1 and 2

	Person 1	%	Person 2	%
Finished high school at year 8	34	9.6	19	10.3
Finished high school at year 10	117	32.9	61	33.0
Finished high school at year 12	75	21.1	53	28.6
TAFE or Polytech	61	17.1	26	14.1
Tertiary degree or diploma	69	19.4	26	14.1
Total	**356**	**100.0**	**185**	**100.0**

5.3.1.4 Employment

Table 5-11 (on the next page) indicates that around half of the households participating in GBS were not attached to the labour force (54.9%, n=182). There were only a small proportion of households with one or two full-time employees (10.6%, n=35) and around a third of households (32.3%, n=107) with one or two part-time employees.

There was some change in the employment situation of households over the two year study period, with 19.8% of households (n=76) experiencing a change in their employment situation.

Table 5-11 Household attachment to the labour force

	n	%
Household attached to the labour force		
Two full-time workers	1	0.3
One full-time worker	23	6.9
– and one part-time, casual or small business operator	11	3.3
Two part time workers	17	5.1
One part-time worker	83	25.1
– and one casual or small business operator	7	2.1
Two-casual/small business operators	7	2.1
Household not attached to the labour force	182	55.0
Total	**331**	**100.0**

Missing cases=77

5.3.1.5 Cultural identity and language

Households participating in the GBS project were predominantly Australian-born (n=353, 86.5%) and English was the main language at home (n=367, 98.7%). Table 5-12 highlights that there were a small number of households participating in the study who were from: the United Kingdom; New Zealand and/or the South Pacific; Asia; Africa and the United States.

Table 5-12 Place of birth

	n	%
Australia	353	86.5
NZ/South Pacific	6	1.5
UK	26	6.4
Europe	7	1.7
Asia	4	1.0
Africa	3	0.7
US	1	0.2
Total	**400**	**100.0**

Missing cases=8

Table 5-13 Language spoken at home

	n	%
English	367	98.7
Language other than English	5	1.3
Total	**372**	**100**

Missing cases=36

While most households (n=278, 89.4%) participating in the GBS project identified as non-Indigenous, 9% identified as Aboriginal (n=28), 0.3% identified as Torres Strait Islander (n=1); and 1.3% identified as Aboriginal and Torres Strait Islander (n=4).

Table 5-14 Identify as Aboriginal and/or Torres Strait Islander

	n	%
Non-indigenous	278	89.4
Aboriginal	28	9.0
Torres Strait Islander	1	0.3
Aboriginal and Torres Strait Islander	4	1.3
Total	**311**	**100.0**

Missing cases=97

5.3.1.6 Chronic illness and disability

Just under a half of households participating in GBS had a member of the family who had a chronic illness or disability (n=190, 47.7%), with 42.6% of these households (n=81) requiring a carer to support their family member. Most of these households (n=171, 90.0%) had a family member who was experiencing a chronic illness or disability in both 2014 and 2015. There was no significant difference between the health profiles of households across the GBS approach groups.

Table 5-15 Does anyone in your household have a chronic illness or disability

	n	%
No	190	47.7
Yes	208	52.3
Total	**484**	**100.0**

Missing cases=24

5.3.1.7 Tenure

Around two-thirds of the households participating in GBS (n=253) were home owners, with 31.1% of these households (n=125) owning their home outright and a further 31.8% (n=128) paying off their mortgage. Around a third of households were private rental tenants (n=136). Only a small proportion of households (n=21, 5.3%) changed tenure between the two surveys.

Table 5-16 Tenure

	n	%
Owned outright	125	31.1
Owned with a mortgage	128	31.8
Private rental	136	33.8
Other	13	3.2
Total	**402**	**100.0**

Missing cases=6

5.3.1.8 Length of residence

Over half of the households participating in GBS (54.8%, n=222) had lived in their current residence for over five years, 28.1% (n=114) had lived in their current residence for between 1 and 5 years, and a further 17.0% (n=69) had lived in their current residence for less than a year.

Table 5-17 How long have you lived at your current address?

	n	%
0 – 6 months	32	7.9
6 months – 1 year	37	9.1
1 – 2 years	45	11.1
2 – 5 years	69	17.0
5 – 10 years	58	14.3
10 + years	164	40.5
Total	**405**	**100.0**

Missing cases=3

As Table 5-18 highlights home owners were more likely than renters to have lived in their current residence for over 5 years.

Table 5-18 Tenure by length of residence

	Owned outright	Owned with a mortgage	Private rental
Less than a year	6.6%	7.0%	37.5%
1-5 years	9.8%	22.7%	47.8%
Over 5 years	83.6%	70.3%	14.7%
Total	100.0%	100.0%	100.0%

Missing cases=19

5.3.2 Description of dwelling condition

In this section, we examine the characteristics of the dwellings of households participating in the Get Bill Smart project, including dwelling age; house structure; insulation; and the household's hot water system.

5.3.2.1 Dwelling age

Over half of the dwellings participating in the GBS project were over 30 years old (54.2%, n=220), with only 10.6% (n=43) less than 15 years old.

Table 5-19 Dwelling age

	n	%
Less than 15 years	43	10.6
15-29 years	143	35.2
30-49 years	128	31.5
50 years and over	92	22.7
Don't know	43	10.6
Total	**406**	**100.0**

Missing cases=2

5.3.2.2 House structure

The majority of dwellings participating in GBS were free-stranding houses (88.7%, n=346), with only a small proportion of flats, units, townhouses and apartments (11.2%, n=44). The majority of dwellings were single storey dwellings (86.2%, n=350), with only a small proportion of multi-storey dwellings (13.8%, n=56).

Table 5-20 Dwelling structure

	n	%
Free standing house	346	88.7
Co-joined house	24	6.2
Flat in two or more storeys	20	5.1
Total	**390**	**100.0**

Missing cases=18

Table 5-21 How many storeys is your house?

	n	%
One storey	350	86.2
Two storey	52	12.8
Three or more	4	1.0
Total	**496**	**100.0**

Missing cases=2

Just under two-thirds of dwellings participating in GBS were three bedroom dwellings (61.2%, n=249), with 13.5% of dwellings with four or more bedrooms (n=55) and 25.3% of dwellings with one or two bedrooms (n=103).

Table 5-22 How many bedrooms are in your house?

	n	%
1	23	5.7
2	80	19.7
3	249	61.2
4 or more	**55**	**13.5**

Missing cases=1

5.3.2.3 Insulation

In general, homes were inadequately insulated given that Hobart experiences low temperatures throughout winter. Around two-thirds of participants were aware that they had some form of insulation in their home (65.3%, n=264), with 9.9% of participants (n=40) reporting that their home did not have any insulation.

Table 5-23 Does your house have any insulation (2014)?

	n	%
Yes	264	65.3
No	40	9.9
I don't know	100	24.8
Total	**404**	**100.0**

Missing cases=4

The most common location for insulation was in the ceiling. Almost half of participants noted that their home had insulation in the whole ceiling (49.3%, n=201), with a further 12.5% (n=51) noting that their home had some insulation in the ceiling (11.4%, n=34). Thirty eight per cent of respondents (n=156) did not respond to this question. While some may have been unsure, others may not have had insulation.

Table 5-24 Do you have insulation in your ceiling (2014)?

	n	%
Whole ceiling	201	49.3
Some ceiling	51	12.5
No/unsure	156	38.2
Total	**408**	**100.0**

5.3.2.4 Hot water systems

The majority of homes (90.6%, n=365) in the GBS project had electric hot water systems, with only a small number of homes having gas (4.0%, n=16) or solar (4.2%, n=17) hot water systems. Of those homes with electric hot water systems, the majority were reliant on storage tanks (76.7%, n=280). Thirty participants (7.4%) had a new hot water system installed during the GBS project.

Notably, few participants reported that they had insulation around their hot water heater and/or hot water pipes in 2014 prior to the assessment (6.3%, n=26).

Table 5-25 Type of hot water system, 2014

	n	%
Electric	365	90.6
Gas	16	4.0
Solar	17	4.2
Other	5	1.2
Total	**403**	**100.0**

Missing cases=5

5.3.2.5 Heating and cooling systems

In 2014, most households (n=317, 88.1%) relied on electric heating to heat their home in winter. In addition, 27.1% of households relied on a wood heater (n=109), with only 3.2% of households (n=13) using gas to heat their home. Of those using electric heating (n=317), 17.0% (n=54) reported using a plug-in heater to heat their main living space.

The type of heating used by GBS participants was similar in 2014 and 2015. In 2015, most households (n=351, 86.0%) relied on electric heating to heat their home in winter. In addition, 23.3% of households relied on a wood heater (n=95), with only 3.4% of households (n=15) using gas to heat their home. Of those using electric heating (n=317), 16.2% (n=57) reported using a plug-in heater to heat their main living space.

Table 5-26 What type of heating do you use to heat your home? 2014 and 2015

	2014			2015		
	n	%	Total	n	%	Total
Electric	317	88.1	360	351	86.0	408
Wood heater	109	27.1	404	95	23.3	408
Gas	**13**	**3.2**	**402**	**14**	**3.4**	**408**

In 2015, we also asked participants whether or not they used a heat pump. We found that over half the GBS participants were using a heat pump (57.-%, n=232).

Table 5-27 Do you use a heat pump? 2015

	n	%
Yes	232	57.0%
No	175	43.0%
Total	**407**	**100.0**

Missing cases=1

In addition, we asked participants in both surveys if they used an appliance to cool their home. Participants reported similar levels of appliance use across the two periods, with 73.3% of participants (n=291) reporting that they use an appliance to cool their home in 2014 and 72.9% of participants (n=293) in 2015.

Table 5-28 Do you use any appliances to cool your home? 2014 and 2015

	2014		2015	
	n	%	n	%
Yes	291	73.3	293	72.9
No	106	26.7	109	27.1
Total	397	100.0	402	100.0

2014 Missing cases=11
2015 Missing cases=6

5.3.3 Draughts

Most participants observed that their home was draughty (72.8%, n=294) prior to any energy efficiency activity, with 27.2% (n=110) reporting that their home was not draughty. Similar levels of draughtiness were reported across Greater Hobart and Clarendon Vale/Rokeby.

Following the implementation of energy efficiency activities, EDUG and CCB, there was an increase in the proportion of participants who felt that their house was not draughty (44.8%, n=181).

Table 5-29 Is your house draughty?

	2014		2015	
	n	%	n	%
Yes	294	72.8	223	55.2
No	110	27.2	181	44.8
Total	404	100.0	404	100.0

2014 Missing cases=4
2015 Missing cases=4

Looking at changes in the presence of draughts in the home after the GBS energy efficiency activities, Table 5-30 indicates that around two-thirds of the households (n=268) experienced no change in the draughtiness of their home. In contrast, around a quarter of households (n=102) reported less draught around their home, with 7.5% (n=30) reporting an increase in draught around the home.

Table 5-30 Change in self-reported presence of draught, 2014 and 2015

	n	%
Same	268	67.0
Less draught[10]	102	25.5
More draught[11]	30	7.5
Total	400	100.0

Missing cases=8

We then examined the impact of the GBS energy efficiency activities (CCB, EDUG, and EDUG +CCB) on people's reporting of draughtiness. Table 5-31 shows changes in reporting of draughtiness by GBS approach.

Table 5-31 Change in self-reported present of draught by GBS approach

	CCB	EDUG	EDUG +CCB	REP
Same	64.1%	59.3%	67.9%	75.7%
Less draught	21.9%	37.9%	28.6%	13.6%
More draught	14.1%	2.9%	3.6%	10.7
Total	100.0% (n=64)	100.0% (n=140)	100.0% (n=56)	100.0% (n=140)

Missing cases=8

We tested each GBS approach separately to see if the changes reported were significant. We found no significant differences between the reporting of draughtiness for those who experienced community capacity building and the representative group (X2=3.1, p>0.05).

However, those participants who received in-home education and upgrades (EDUG and EDUG+CCB) were significantly more likely to report less draught than the Representative (REP) group:

- EDUG (X2=7.7, p<0.05),
- EDUG+CCB (X2=25.2, p<0.05).

10 "Less draught" here means that, to the question "is your house draughty?", the respondent answered "yes" before the energy efficiency activities and "no" after them.

11 "More draught" here means that, to the question "is your house draughty?", the respondent answered "no" before the energy efficiency activities and "yes" after them.

In addition, the groups that received in-home education and upgrades (EDUG and EDUG+CCB) had a significant reduction in reported draughtiness compared with the groups that did not (CCB and REP) ($X2=25.9$, $p<0.05$). A higher proportion of participants who received in-home education and upgrades reported less draught (35.2%, n=69) following the activity compared with those who did not (16.2%, n=33). In contrast, a smaller proportion of participants who received in-home education and upgrades reported more draught (3.1%, n=6) following the activity compared with those who did not (11.8%, n=24).

It is important to note that this is self-reported data and as such measures changes in perceived levels of draughtiness rather than actual levels of draughtiness in the home.

Table 5-32 Change in self-reported presence of draught by whether or not in-home education and upgrades were received

Received in-home education & upgrades:	No		Yes	
	n	%	n	%
Same	147	72.1	121	61.7
Less draught	33	16.2	69	35.2
More draught	24	11.8	6	3.1
Total	**204**	**100.0**	**196**	**100.0**

Missing cases=8

5.3.4 Moisture

Most participants had observed moisture on their windows during cold weather in the past year (82.0%, n=328) prior to any assessment, with 18.0% (n=72) reporting no moisture on their windows. Of those who observed moisture on their windows during cold weather (n=328), around two thirds of these participants (63.7%, n=209) described the moisture levels in their home as medium or high, with 36.0% (n=118) describing moisture levels as low. There were no significant differences in relation to moisture levels reported in Clarendon Vale/Rokeby and Greater Hobart.

Table 5-33 Observed moisture on windows during cold weather, 2014 and 2015

	2014		2015	
	n	%	n	%
Yes	328	82.0	263	67.3
No	72	18.0	128	32.7
Total	**400**	**100.0**	**391**	**100.0**

2014 Missing cases=8
2015 Missing cases=17

Looking at changes in moisture observations after the GBS approach, Table 5-34 indicates that the majority of households (77.1%, n=296) experienced no change in their observation of moisture on their windows in cold weather. In contrast, 18.8% (n=72) who observed moisture in 2014 did not observe moisture in 2015. Only a small minority (4.2%, n=16) who did not observe moisture in 2014 did observe moisture in 2015.

Air leakage test

While participants subjectively reporting whether or not their houses were draughty before and after the energy efficiency activities provides some useful insight, we wanted to test the effectiveness of the draught-proofing upgrades objectively in a controlled manner. As such, we performed an air leakage test on one GBS participant's house before and after draught-proofing upgrades were undertaken.

The test effectively measured the change in rate of air exchange in the house in compliance with the CAN/CGSB 149.10-2002 standard. It involved attaching a calibrated fan to the house to depressurise it.

Before the draught proofing was installed the household experienced 20.41 air exchanges per hour at 50 Pa. After the installation of basic draught proofing on doors and windows the air exchange rate was reduced to 15.71 exchanges per hour. This is a 23% decrease.

GBS draught-proofing upgrades focussed on doors and windows and, to a lesser extent, exhaust fans. Sources of draughts not tackled included skirting boards, light fixtures, and power points.

Table 5-34 Change in observed moisture on windows between 2014 and 2015

	n	%
Same	296	77.1
Moisture observed in 2014 but not in 2015	72	18.8
Moisture observed in 2015 but not in 2014	16	4.2
Total	**384**	**100.0**

Missing cases=8

In terms of reported moisture levels, Table 5-35 indicates that around a quarter of the households (26.6%, n=65) who reported on moisture levels in both 2014 and 2015 experienced a decline in moisture levels either from high to medium/low or medium to low following the energy efficiency activities. In contrast, 18.4% of participants reported an increase in moisture levels between 2014 and 2015.

Table 5-35 Change in level of moisture on windows, 2014 and 2015

	n	%
Same	130	53.3
Less moisture	65	26.6
More moisture	45	18.4
Total	**240**	**98.4**

Missing cases=23

We then examined the impact of the GBS energy efficiency activities (CCB, EDUG, and EDUG+CCB) on people's reporting of moisture. Table 5-36 shows changes in observed moisture on windows between 2014 and 2015 by GBS approach.

We tested each GBS approach separately to see if the changes in moisture observation were significant when compared with the representative group. While a weak relationship did exist between moisture observation and all three GBS approaches, we found no significant differences for:

- Community capacity building (X2=5.8, p>0.05),
- Community capacity building and in-home education and upgrades (X2=4.8, p>0.05).

However, the in-home education and upgrade approach did have a statistically significant impact on people's observation of moisture compared with the representative group (X2=11.1, p<0.05). People who received in-home education and upgrades were less likely to report moisture in 2015 compared with the representative group.

Table 5-36 Change in observed moisture on windows during cold weather by GBS approach

	CCB	EDUG	EDUG +CCB	REP
Same	71.0%	75.7%	76.5%	81.5%
Moisture observed in 2014 but not in 2015	24.2%	22.8%	21.6%	11.1%
Moisture observed in 2015 but not in 2014	4.8%	1.5%	2.0%	7.4%
Total	**100.0% (n=62)**	**100.0% (n=136)**	**100.0% (n=51)**	**100.0% (n=135)**

Missing cases=24

Further analysis comparing the participants who received in-home education and upgrades (EDUG and EDUG+CCB) and those who did not (CCB and REP) also highlighted that in-home education and upgrades did have an impact on reducing moisture observations in people's homes (X2=8.5, p<0.05).

Table 5-37 Change in observed level of moisture on windows by whether or not in-home education and upgrades were received

Received in-home education & upgrades:	No		Yes	
	n	%	n	%
Same	71	57.3	59	50.9
Less moisture	28	22.6	37	31.9
More moisture	25	20.2	20	17.2
Total	**124**	**100.0**	**116**	**100.0**

Missing cases=23

5.3.5 Heating practices and thermal comfort in winter

Heating practices across the study period, 2014 and 2015, were relatively stable. The most popular time to heat the main living space over winter was in the evening, with over half of GBS participants heating their main living space in the evenings in 2014 (54.7%, n=223) and in 2015 (56.1%, n=229). In contrast, only a minority of participants heated their main living space in the middle of the day in 2014 (9.3%, n=38) and in 2015 (12.0%, n=49). Similar heating practices were reported across Greater Hobart and Clarendon Vale/Rokeby.

Table 5-38 During what times of the day do you heat your home in winter? 2014 and 2015

	2014		2015	
	n	%	n	%
Early morning	150	36.8	169	41.4
Late morning	46	11.3	52	12.7
Midday	38	9.3	49	12.0
Afternoon	102	25.0	110	27.0
Evening	223	54.7	229	56.1
Overnight	49	12.0	45	11.0
Most of day and night	162	39.7	169	41.4
Total	**408**	**100.0**	**408**	**100.0**

Most participants observed that without heating their home was rarely or never comfortable (71.9%, n=280) in winter prior to any assessment. Similar levels of thermal comfort in winter were reported across Greater Hobart and Clarendon Vale/Rokeby.

There was a decrease in the proportion of EDUG+CCB group participants who described their home as rarely or never comfortable (65.6%, n=161).

Table 5-39 In winter without heating my house is? 2014 and 2015

	2014		2015	
	n	%	n	%
Always comfortable	7	1.8	10	2.5
Mostly comfortable	27	6.9	38	9.5
Sometimes	75	19.3	90	22.6
Rarely	99	25.4	100	25.1
Never	181	46.5	161	40.4
Total	**389**	**100.0**	**399**	**100.0**

2014 Missing cases=19
2015 Missing cases=9

Looking at changes in participants' assessment of the thermal comfort of their home in winter, Table 5-40 indicates that just under half the participants (47.8%, n=182) reported the same level of thermal comfort in 2014 and 2015, with 30.2% of participants (n=115) reporting improvements in thermal comfort and 22.0% of participants (n=84) reporting decreased thermal comfort.

Table 5-40 Change in assessment of thermal comfort of home in winter, 2014 and 2015

	n	%
Same	182	47.8
Increased comfort	115	30.2
Decreased comfort	84	22.0
Total	**381**	**100.0**

Missing cases=27

We then examined the impact of the GBS approaches (CCB, EDUG, and EDUG+CCB) on people's assessment of the thermal comfort of their home in winter. Table 5-41 shows changes in reporting of thermal comfort by GBS approach.

Table 5-41 Change in assessment of thermal comfort of home in winter by GBS approach

	CCB	EDUG	EDUG +CCB	REP
Same	48.3%	41.0%	49.1%	53.7%
Increased comfort	36.7%	36.6%	26.4%	22.4%
Decreased comfort	15.0%	22.4%	24.5%	23.9%
Total	**100.0% (n=60)**	**100.0% (n=134)**	**100.0% (n=53)**	**100.0% (n=134)**

Missing cases=27

We tested each GBS approach separately to see if the changes reported were significant. We found no significant differences between participants' assessment of thermal comfort of home in winter for:

- Community capacity building (X2=4.9, p>0.05),
- Community capacity building and in-home education and upgrades (X2=0.4, p>0.05),

However, we did find that the EDUG approach did have a statistically significant increase in people's reporting of the thermal comfort of their home in winter compared with the REP group (X2=6.9, p<0.05).

The survey also collected data on participants' assessment of thermal comfort in summer. The final results did not provide a clear picture of the impact of the GBS approaches on participant reporting of thermal comfort in summer.

5.3.6 Changes in thermal comfort knowledge

Prior to GBS activities, GBS participants were asked if they agreed with the following statements about thermal comfort:

- I know a lot about keeping my home thermally comfortable in winter,
- I know a lot about keeping my home thermally comfortable in summer,
- I feel that I am doing everything I can to keep my household warm in winter.

In relation to the first statement ("I know a lot about keeping my home thermally comfortable in winter"), in 2014 over half of GBS participants (53.8%, n=208) mostly/strongly agreed that they did know a lot about keeping their home thermally comfortable in winter. In contrast, only 19.7% (n=76) mostly/strongly disagreed and 26.6% (N=103) neither agreed nor disagreed.

Following GBS activities, there was an increase in GBS participants mostly/strongly agreeing that they "know a lot about keeping my home thermally comfortable in winter", with 81% of participants mostly/strongly agreeing (n=319). There was also a decline in the proportion of GBS participants who mostly/strongly disagreed, with 5.1% of participants mostly/strongly disagreeing (n=20).

Table 5-42 I know a lot about keeping my home thermally comfortable in winter, 2014 and 2015

	2014		2015	
	n	%	n	%
Strongly agree	46	11.9	111	28.2
Mostly agree	162	41.9	208	52.8
Neither agree nor disagree	103	26.6	55	14.0
Mostly disagree	56	14.5	17	4.3
Strongly disagree	20	5.2	3	.8
Total	**387**	**100.0**	**394**	**100.0**

2014 Missing cases=21 2015 Missing case=14

We then examined the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on people's knowledge of keeping their home thermally comfortable in winter. We tested each GBS approach separately and found that the CCB ($x^2=2.1$, $p>0.05$) and EDUG+CCB approach ($x^2=4.9$, $p>0.05$) did not have a significant impact on people's knowledge of keeping their home thermally comfortable in winter. In contrast, a comparison of the EDUG approach with the representative group indicated that there was a significant impact on people's knowledge of keeping their home thermally comfortable in winter ($x^2=10.7$, $p<0.05$).

Table 5-43 Changes in participant's knowledge of keeping home thermally comfortable in winter by GBS approach

	CCB		EDUG		EDUG +CCB		REP	
	n	%	n	%	n	%	n	%
Same	32	53.3	48	35.3	17	32.1	56	42.4
Improve	9	15.0	9	6.6	5	9.4	22	16.7
Decline	19	31.7	79	58.1	31	58.5	54	40.9
Total	**60**	**100.0**	**136**	**100.0**	**53**	**100.0**	**132**	**100.0**

Further analysis indicated that in-home education and upgrades did have a significant impact on people's knowledge of where to get information to improve the thermal comfort of their home. Upon comparison of all participants who received in-home education and upgrades (EDUG and EDUG+CCB) with those who didn't (CCB and REP) a stronger correlation between the two variables was observed ($X^2=10.7$, $p<0.01$).

In relation to the second statement ("I know a lot about keeping my home thermally comfortable in summer"), in 2014 over half of GBS participants (56.0%, n=215) mostly/strongly agreed that they did know a lot about keeping their home thermally comfortable in summer. In contrast, only 18.2% (n=70) mostly/strongly disagreed and 25.8% (n=99) neither agreed nor disagreed.

Following the GBS approach, there was an increase in GBS participants mostly/strongly agreeing that they "know a lot about keeping my home thermally comfortable in summer", with 83.7% of participants mostly/strongly agreeing (n=328). There was also a decline in the proportion of GBS participants who mostly/strongly disagreed, with 4.6% of participants mostly/strongly disagreeing (n=18).

Table 5-44 I know a lot about keeping my home thermally comfortable in summer, 2014 and 2015

	2014		2015	
	n	%	n	%
Strongly agree	48	12.5	110	28.1
Mostly agree	167	43.5	218	55.6
Neither agree nor disagree	99	25.8	46	11.7
Mostly disagree	52	13.5	15	3.8
Strongly disagree	18	4.7	3	0.8
Total	**384**	**100.0**	**392**	**100.0**

2014 Missing cases=24
2015 Missing case=16

We then examined the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on people's knowledge of keeping their home thermally comfortable in summer. We tested each GBS approach separately and found that the CCB ($x^2=0.6$, $p>0.05$) and EDUG+CCB approach ($x^2=3.1$, $p>0.05$) did not have a significant impact on people's knowledge of keeping their home thermally comfortable in summer. In contrast, a comparison of the EDUG approach with the representative group indicated that there was a significant impact on people's knowledge of keeping their home thermally comfortable in summer ($x^2=8.9$, $p<0.05$).

Table 5-45 Changes in participant's knowledge of keeping home thermally comfortable in summer by GBS approach

	CCB		EDUG		EDUG+CCB		REP	
	n	%	n	%	n	%	n	%
Same	23	39.7	51	38.3	17	32.1	55	41.0
Improve	23	39.7	74	55.6	30	56.6	57	42.5
Decline	12	20.7	8	6.0	6	11.3	22	16.4
Total	**58**	**100.0**	**133**	**100.0**	**53**	**100.0**	**134**	**100.0**

Further analysis indicated that the in-home education and upgrade experience did have a significant impact on people's knowledge of where to get information to improve the thermal comfort of their home in summer. Upon comparison of all participants who received in-home education and upgrades (EDUG and EDUG+CCB) with those who didn't (CCB and REP) a stronger correlation between the two variables was observed ($X2=12.1$, $p<0.01$).

In relation to the third statement ("I feel that I am doing everything I can to keep my household warm in winter"), in 2014 over half of GBS participants (65.2%, n=257) mostly/strongly agreed that are doing everything they can to keep my household warm in winter. In contrast, only 14.2% (n=56) mostly/strongly disagreed and 20.6% (=81) neither agreed nor disagreed.

Following the GBS approach, there was an increase in GBS participants mostly/strongly agreeing that they "are doing everything they can to keep my household warm in winter", with 84.3% of participants mostly/strongly agreeing (n=334). There was also a decline in the proportion of GBS participants who mostly/strongly disagreed, with 7.8% of participants mostly/strongly disagreeing (n=31).

Table 5-46 I feel that I am doing everything I can to keep my household warm in winter, 2014 and 2015

	2014		2015	
	n	%	n	%
Strongly agree	91	23.1	141	35.6
Mostly agree	166	42.1	193	48.7
Neither agree nor disagree	81	20.6	31	7.8
Mostly disagree	38	9.6	25	6.3
Strongly disagree	18	4.6	6	1.5
Total	**394**	**100.0**	**396**	**100.0**

2014 Missing cases=14
2015 Missing case=12

We then examined the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on people's perception that they are doing everything they can to keep their household warm in winter. We tested each GBS approach separately and found that the CCB (x2=3.1, p>0.05) did not have a significant impact on people's perception that they are doing everything they can to keep their household warm in winter. In contrast, a comparison of the EDUG+CCB and the EDUG approach with the REP group indicated that there both had a significant impact on people's perception that they are doing everything they can to keep their household warm in winter:

- Community capacity building and in-home education and upgrades (x2=6.6, p<0.05),
- In-home education and upgrades (x2=9.3, p<0.01).

Table 5-47 Changes in participant's perception that they are doing everything they can to keep their household warm in winter by GBS approach

	CCB		EDUG		EDUG+CCB		REP	
	n	%	n	%	n	%	n	%
Same	33	54.1	53	38.7	17	33.3	60	43.8
Improve	20	32.8	67	48.9	27	52.9	45	32.8
Decline	8	13.1	17	12.4	7	13.7	32	23.4
Total	**61**	**100.0**	**137**	**100.0**	**51**	**100.0**	**137**	**100.0**

Further analysis indicated that in-home education and upgrades did have a significant impact on people's knowledge of where to get information to improve the energy efficiency of their home. Upon comparison of all participants who received in-home education and upgrades (EDUG and EDUG+CCB) with those who didn't (CCB and REP) a stronger correlation between the two variables was observed (X2=12.3, p<0.01).

5.3.7 Perception of energy use

Prior to any GBS approach, around half of the GBS participants rated themselves as medium energy users (49.8%, n=199), 28.3% of participants (n=113) rated themselves as high energy users, 13.0% (n=52) rated themselves as low energy users, and 9.0% (n=36) were unsure about their energy use.

In Greater Hobart a greater proportion of participants rated themselves as low energy users (16%, n=45), compared with Clarendon Vale/Rokeby (5.9%, n=7) in 2014.

Following the implementation of the GBS approaches there was a small increase in the proportion of participants who rated themselves as low energy users (19.5%, n=77).

Table 5-48 Perception of energy use in the home, 2014 and 2015

	2014		2015	
	n	%	n	%
High	113	28.3	87	22.1
Medium	199	49.8	196	49.7
Low	52	13.0	77	19.5
Don't know	36	9.0	34	8.6
Total	**400**	**100.0**	**394**	**100.0**

2014 Missing cases=8
2015 Missing cases=14

We then examined the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on people's perception of their energy use. We tested each approach separately and found that each of the approaches did have an impact on people's rating of their energy use.

Each of the approaches had a significant impact on the people's perception of energy use (i.e. people were more likely to rate themselves as using lower energy in 2015 compared with 2014) compared with the representative group:

- Community capacity building (X2=6.4, p<0.05),
- In-home education and upgrades (X2=11.8, p<0.05),
- Community capacity building and In-home education and upgrades (X2=6.9, p<0.05).

Table 5-49 Change in perception of energy use in the home following GBS approach, 2015

	CCB	EDUG	EDUG+CCB	REP
Same	62.7%	57.6%	63.8%	57.5%
Improve*	27.5%	31.4%	27.7%	16.8%
Decline**	9.8%	11.0%	8.5%	25.7%
Total	**100.0% (n=51)**	**100.0% (n=118)**	**100.0% (n=47)**	**100.0% (n=113)**

* People who rated their energy use lower in 2015 than in 2014.
**People who rated their energy use higher in 2015 than in 204.
Missing cases=79

5.3.8 Changes in energy efficiency knowledge

Prior to any GBS approach, 36.9% of GBS participants (n=145) agreed or strongly agreed with the statement that they knew where to get information to improve their energy efficiency, with just over a third disagreeing or strongly disagreeing with this statement (34.4%, n=135).

Following the implementation of the GBS approaches, there was an increase in the proportion of GBS participants (65.0%, n=145) who agreed or strongly agreed with the statement that they knew where to get information to improve their energy efficiency.

Table 5-50 I know where to get information to improve the energy efficiency of my home, 2014 and 2015

	2014		2015	
	n	%	n	%
Strongly agree	37	9.4	80	20.9
Mostly agree	108	27.5	165	43.1
Neither agree nor disagree	113	28.8	83	21.7
Mostly disagree	80	20.4	41	10.7
Strongly disagree	55	14.0	14	3.7
Total	**393**	**100.0**	**383**	**100.0**

We then examined the impact of the GBS approaches (CCB, EDUG, and EDUG+CCB) on people's knowledge of where to get information to improve the energy efficiency of their home. We tested each approach separately and found that the CCB (x2=1.2, p>0.05) and EDUG+CCB approaches (x2=3.4, p>0.05) did not have a significant impact on people's knowledge of where to get information to improve energy efficiency. In contrast, a comparison of the EDUG approach with the REP group indicated that there was a significant impact on people's knowledge of where to get information to improve the energy efficiency of their home (x2=7.9, p<0.05).

Table 5-51 Changes in participant's knowledge of where to get information to improve the energy efficiency of my home by GBS approach

	CCB		EDUG		EDUG+CCB		REP	
	n	%	n	%	n	%	n	%
Same	13	25.0	38	30.2	19	31.1	50	37.9
Improve	31	59.6	78	61.9	29	47.5	60	45.5
Decline	8	15.4	10	7.9	13	21.3	22	16.7
Total	**52**	**100.0**	**126**	**100.0**	**61**	**100.0**	**132**	**100.0**

Further analysis indicated that the in-home education and upgrades did have a significant impact on people's knowledge of where to get information to improve the energy efficiency of their home. Upon comparison of all participants who received in-home education and upgrades (EDUG and EDUG+CCB) with those who didn't (CCB and REP) a stronger correlation between the two variables was observed (X2=9.9, p<0.01).

5.3.9 Affordability and home energy use

In this section, we examine affordability and home energy use: difficulties households experience paying their energy bill; interest in reducing energy bills; and their capacity to reduce energy bills.

5.3.9.1 Difficulties paying energy bill

Over half of participants (54.2%, n=214) had found it difficult to pay their energy bills over the last year in 2014. Following the implementation of the GBS project, 40% of participants had found it difficult to pay their energy bills.

Table 5-52 Have you found it difficult to pay your energy bill over the last year? 2014 and 2015

	2014		2015	
	n	%	n	%
Yes	214	54.2	160	40.0
No	181	45.8	240	60.0
Total	**395**	**100.0**	**400**	**100.0**

2014 Missing cases=13
2015 Missing cases=8

We then examined the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on participants' capacity to pay their energy bill. We tested each GBS approach separately and found that none of the approaches had a significant impact on the participant's capacity to pay their energy bill:

- Community capacity building (X2=0.5, p>0.05)
- In-home education and upgrades (X2=2.8, p>0.05),
- Community capacity building and In-home education and upgrades (X2=1.4, p>0.05).

We also tested whether or not the in-home education and upgrades experience had an impact on people's capacity to pay their energy bill and again the relationship was not significant (X2=2.9, p>0.05).

This result is not surprising given that the participating households were low income households, with a substantial proportion living below the poverty line. It is also in-line with our finding from the Detailed Study that low-income households will use energy efficiency improvements to increase utility rather than decrease use.

The consistent improvement in ability to pay energy bills may be linked to decreased electricity prices across the research period, with electricity dropping around 11% from 2012-2015[12].

12 Eg: Tariff 31 has dropped from 26.806 cents kWh to 25.2 cents kWh.

Table 5-53 Change in capacity to pay energy bill following GBS approach, 2015

	CCB	EDUG	EDUG+CCB	REP
Same	72.1%	72.7%	63.0%	69.3%
Improve	18.0%	22.0%	29.6%	22.5%
Decline	9.8%	5.3%	7.4%	8.3%
Total	**100.0% (n=61)**	**100.0% (n=132)**	**100.0% (n=54)**	**100.0% (n=140)**

Missing cases=21

5.3.9.2 Capacity to reduce to energy expenses

At the beginning of the project, around a quarter of participants (24.8%, n=100) reported that they currently felt able to reduce their energy expenses. In contrast, 35.6% of households (n=144) did not feel able to reduce their energy expenses and a further 39.6% (n=160) were unsure or did not know.

Following the implementation of the GBS project, there was an increase in the proportion of participants who reported that they felt they were able to reduce their energy expenses (35.4%, n=142). There was also a slight increase in the proportion of participants who did not feel able to reduce their energy expenses (39.2%, n=157). In contrast, there was a decline in the proportion of people who were unsure about their capacity to reduce their energy expenses (25.4%, n=102).

Table 5-54 Do you feel you are able to reduce your energy expenses? 2014 and 2015

	2014		2015	
	n	%	n	%
Yes	100	24.8	142	35.4
No	144	35.6	157	39.2
I don't know	160	39.6	102	25.4
Total	**404**	**100,0**	**401**	**100.0**

2014 Missing cases=4
2015 Missing cases=7

There were a high number of people who reported that they were unsure about their capacity to reduce their energy expenses in both 2014 and 2015. Consequently, there are insufficient cases (missing cases=191) to enable us to undertake analysis on the impact of the GBS approaches on people's capacity to reduce their energy bill.

5.3.9.3 Action to reduce energy expenses

Most participants had tried to reduce their energy expenses both prior to the implementation of the GBS project and following the implementation of the GBS project. In 2014, 84.7% of participants had tried to reduce their energy expenses and in 2015 81.2% had tried to reduce their energy expenses.

Following the implementation of the GBS project, there was only a small decline in the proportion of people trying to reduce their energy expenses.

Table 5-55 In the last year have you tried to reduce your energy expenses? 2014 and 2015

	2014		2015	
	n	%	n	%
Yes	333	84.7	324	81.2
No	60	15.3	75	18.8
Total	**393**	**100.0**	**399**	**100.0**

2014 Missing cases=15
2015 Missing cases=9

In terms of change in trying to reduce energy expenses, 11.0% of participants who had not previously been trying to reduce their energy expenses were now trying in 2015 to do so. In addition, 15.4% of participants who had previously been trying to reduce their energy expenses had stopped trying in 2015.

We were interested in whether this change was evident in relation to each GBS approach. We found less evidence of change in trying to reduce energy expenses among the GBS groups compared with the REP. However, it is difficult to disentangle whether or not reduced effort in reducing energy expenses in 2015 was experienced positively by the participant – that is, following the GBS approach they no longer need to reduce energy expenses – or more negatively they had become disinterested in energy efficiency practices.

Table 5-56 Change in trying to reduce energy expenses following GBS approach, 2015

	CCB	EDUG	EDUG+CCB	REP
Same	76.6%	80.0%	80.4%	59.0%
Improve*	4.7%	10.0%	15.7%	15.1%
Decline**	18.8%	10.0%	3.9%	25.9%
Total	**100.0% (n=64)**	**100.0% (n=130)**	**100.0% (n=51)**	**100.0% (n=139)**

Missing cases=24

*Participant who did not try to reduce energy expenses in 2014, but who had tried in 2015

**Participant who had tried to reduce energy expenses in 2014, but was no longer trying in 2015.

5.3.10 Perceptions of community

One of the anticipated benefits of the community capacity building approach was that not only would it have an impact on thermal comfort and energy efficiency of people's homes, it would also contribute to wellbeing through strengthening community relations and building local resources and capacity around home energy use.

In the bulk survey we examined the impact the approaches may or may not have had on the community through three key questions which asked people to agree or disagree with the following statements:

- I live in a strongly connected community.
- There are people in my community who I can ask about how to keep my house warm/cool.
- There are people in my community who I can ask about energy efficiency.

We anticipated that there may have been differences in the responses of participants in the two geographic regions across the study, Clarendon Vale/Rokeby and Greater Hobart, to these questions. However, analysis indicated that there were no significant differences.

5.3.10.1 Community connectedness

Table 5-57 shows that in 2014 over a third of participants (35.3%, n=139) in the GBS study mostly/strongly agreed that they lived in a strongly connected community, with 28.2% of participants (n=131) mostly/strongly disagreeing that they lived in a strongly connected community.

Table 5-57 I live in a strongly connected community, 2014

	n	%
Strongly agree	42	10.7
Mostly agree	97	24.6
Neither agree nor disagree	144	36.5
Mostly disagree	70	17.8
Strongly disagree	41	10.4
Total	**394**	**100.0**

Missing cases=14

We then examined the impact of the GBS approaches (CCB, EDUG, and EDUG+CCB) on community connectedness. We tested each approach separately and found that none of the approaches had a significant impact on the participant's assessment of community connectedness:

- Community capacity building ($X^2=1.1$, $p>0.05$)
- In-home education and upgrades ($X^2=0.8$, $p>0.05$),
- Community capacity building and In-home education and upgrades ($X^2=5.1$, $p>0.05$).

We also tested whether or not in-home education and upgrades (EDUG and EDUG+CCB) had an impact on community connection, and again the relationship was not significant ($X^2=3.1$, $p>0.05$).

5.3.10.2 Knowing someone in the community I can ask about thermal comfort

Table 5-58 shows that over half of the participants (51.2%, n=163) mostly/strongly disagreed that there are people in their community who they can ask about keeping their house warm/cool. In contrast, only 27.8% participants (n=110) in the GBS study mostly/strongly agreed that there are people in their community who they can ask about keeping their house warm/cool.

Table 5-58 There are people in my community who I can ask about keeping my house warm/cool, 2014

	n	%
Strongly agree	43	10.9
Mostly agree	67	16.9
Neither agree nor disagree	123	31.1
Mostly disagree	93	23.5
Strongly disagree	70	17.7
Total	**396**	**100.0**

Missing cases=12

We then examined the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on peoples' awareness of people in their community who they can ask about keeping their house warm/cool. We tested each approach separately and found that none of the approaches had a significant impact on participants' awareness of people in their community who know about thermal comfort:

- Community capacity building (X2=1.3, p>0.05)
- In-home education and upgrades (X2=4.5, p>0.05),
- Community capacity building and In-home education and upgrades (X2=3.7, p>0.05).

We also tested whether or not in-home education and upgrades had an impact on participants' awareness of people in their community who know about thermal comfort. We found that those participants who experienced in-home education and upgrades (EDUG and EDUG+CCB) had an increased their awareness of people in their community who they can ask about thermal comfort compared with those who did not (CCB and REP) (X2=6.3, p<0.05).

Table 5-59 There are people in my community who I can about keeping my house warm/cool by whether or not in-home education and upgrades were received

Received in-home education and upgrades:	No		Yes		Total
	n	%	n	%	
Same	64	35.2	83	42.1	147
Improve	77	42.3	59	29.9	136
Decline	41	22.5	55	27.9	96
Total	**182**	**100.0**	**83**	**100.0**	**379**

Missing cases=9

5.3.10.3 Knowing someone in the community I can ask about energy efficiency

Table 5-60 shows that 39.1% of participants (28.3%, n=155) mostly/strongly disagreed that there are people in their community who they can ask about energy efficiency. In contrast, only 28.3% participants (n=110) in the GBS study mostly/strongly agreed that there are people in their community who they can ask about keeping their house warm/cool.

Table 5-60 There are people in my community who I can ask about energy efficiency, 2014

	n	%
Strongly agree	46	11.6
Mostly agree	66	16.7
Neither agree nor disagree	129	32.6
Mostly disagree	92	23.2
Strongly disagree	63	15.9
Total	**396**	**100.0**

Missing cases=12

We then examined the impact of the GBS approaches (CCB, EDUG, and EDUG+CCB) on peoples' awareness of people in their community who they can ask about energy efficiency. We tested each approach separately and found that none of the approaches had a significant impact on participants' awareness of people in their community who know about thermal comfort:

- Community capacity building (X2=3.1, p>0.05)
- In-home education and upgrades (X2=1.5, p>0.05),
- Community capacity building and In-home education and upgrades (X2=0.98, p>0.05).

We also tested whether or not in-home education and upgrades had an impact on participants' awareness of people in their community who know about energy efficiency. We found that experiencing in-home education and upgrades (EDUG and EDUG+CCB) did not impact on people's awareness of people in their community who they can ask about energy efficiency.

Table 5-61 There are people in my community who I can about energy efficiency by whether or not in-home education and upgrades were received, 2015

In-home education and upgrades received:	Yes		No		Total
	n	%	n	%	
Same	69	37.9	82	40.2	151
Improve	72	39.6	62	30.4	134
Decline	41	22.5	60	29.4	101
Total	**182**	**100.0**	**204**	**100.0**	**386**

Missing cases=22

5.3.11 Value of project

In general, participants found the GBS project to be a useful experience. Over two-thirds (65.5%, n=165) felt that the GBS project was very useful to them and a further third of participants (32.5%, n=82) felt the project was somewhat useful. Only 2% did not find the GBS project useful. Looking at the responses of participants involved in the three energy efficiency activities, the people who experienced in-home education and upgrades were more likely to rate the GBS project as very useful. In contrast, participants who experienced CCB only were more likely to rate the GBS project as not useful.

Table 5-62 How useful did you find the GBS project?

	CCB		EDUG		EDUG+CCB		Total	
	n	%	n	%	n	%	n	%
Very useful	25	39.7	104	77.6	36	65.5	165	65.5
Somewhat useful	36	57.1	27	20.1	19	34.5	82	32.5
Not useful	2	3.2	3	2.2	0	0.0	5	2.0
Total	**63**	**100.0**	**134**	**100.0**	**55**	**100.0**	**252**	**100.0**

Missing cases=12,
Representative group not included.

Everyone who experienced in-home education and upgrades received a Stay Warm booklet. Table 5-63 shows that the majority of participants recalled receiving the booklet. Notably, there were many who did not recall receiving the booklet. This may have been due to the length of time between the booklet being distributed and the survey.

In relation to the community capacity building approach, most people recalled receiving a Stay Warm booklet. The survey data indicates that 34 of the CCB participants (77.3%) received the Stay Warm booklet from a Power Ranger who knocked on their door.

Table 5-63 Did you receive a copy of the Stay Warm booklet by GBS approach?

	CCB		EDUG		EDUG+CCB		Total	
	n	%	n	%	n	%	n	%
Yes	44	69.8	96	70.6	35	63.6	175	68.9
No	12	19.0	12	8.8	5	9.1	29	11.4
I don't remember	7	11.1	28	20.6	15	27.3	50	19.7
Total	**63**	**100.0**	**136**	**100.0**	**55**	**100.0**	**254**	**100.0**

Missing cases=10,
Representative group not included.

Of those who recalled receiving the Stay Warm booklet, the majority (98.2%, n=164) found this a useful resource, with only 1.8% (n=3) finding it not useful.

Table 5-64 How useful did you find the Stay Warm booklet?

	n	%
Yes	164	98.2
No	3	1.8
Total	**167**	**100.0**

5.3.12 Participant reflections on in-home education and upgrades

In general, participants found the upgrades useful. Table 5-65 shows that at least 80% of participants rated each upgrade as useful. The only exception to this was the shower timer, with 61.7% (n=50) finding this upgrade useful.

Table 5-65 Recollection and evaluation of energy efficiency upgrades

Upgrade	Participant recalled receiving upgrade		Participant found upgrade useful	
	n	%	n	%
Draught proofing on doors	167	83.9	144	96.6
Draught proofing on windows	40	20.1	33	82.5
Door snakes	99	49.7	71	80.7
Eco-switch	44	22.1	37	82.2
Thermometer	114	57.3	75	80.6
Energy efficient lighting	123	61.8	96	86.5
Hot water thermostat adjusted to 60 degrees	31	15.6	21	84.0
Water efficient showerhead	98	49.2	75	89.3
Shower timer	92	46.2	50	61.7
Insulation on the hot water tank pipes	73	36.7	55	94.8
Ceiling insulation	90	45.2	58	86.6
Curtains	49	24.6	41	95.3
Total Upgrade Households	**199**	**100.0**		

When asked 'What did you like the most about the GBS project?', participants who experienced in-home education and upgrades commented on: the effectiveness of the upgrades; the fact that the in-home education and upgrades were provided for free; and the information and tips provided on saving energy.

"The upgrades I received because I could not have paid for them myself. Marvellous!" (GBS347)

"That people came and improved the house for free. Given my disability it was great that both the cost and the work were covered. Also love that it is an intelligent, ecological way of looking at energy consumption." (GBS385)

"Upgrades were very helpful especially being free for us as we couldn't have afforded them otherwise." (GBS 509)

In addition, participants noted that the staff members were friendly, caring, helpful and efficient when performing upgrades. They also appreciated that the program was well-organised and communication about the project was good.

"The friendly approach and the efficient action." (GBS474)

"The very friendly and helpful team that came to my home. The efficient way they worked through my house. A very positive experience." (GBS483)

When asked 'What they didn't you like about the GBS project?', many participants who experienced the in-home education and upgrades did not respond or commented that there was nothing they disliked. However there were concerns raised about specific upgrades, including faulty light globes, and problems with people missing out on particular upgrades, as well as staff failing to follow-up on particular requests from participants.

"Light bulbs were faulty and kept blowing." (GBS553)

"I like least the fact that some things that were after offered were not followed through. I'd rather a person said for example 'we can't look at the light bulb because we can't do that' or we'll come and do that in 2018 - hate that promise not fulfilled." (GBS298)

A few participants expressed concern about the practice of removing and replacing light globes and throwing working incandescent light globes in the bin.

"The guy who installed all the light bulbs put the old ones straight in the wheelie bin! Total waste. We took them out and put them back in the cupboard. Our globes blow every six months or so, and we used them." (GBS583)

The other major concern raised was that many of the suggestions to improve the thermal performance and energy efficiency of their home were beyond their financial means.

"It's all helpful but without the money so many things are out of reach." (GBS279)

5.3.13 Participant reflections on community activities

There were 121 Clarendon Vale/Rokeby residents who participated in the Community Capacity Building approach, with 56 of these residents also receiving in-home education and upgrades.

During the implementation of the CCB approach, attendance at community events and activities was generally low. This is reflected in the survey data, with Table 5-66 showing that only 14.7% of participants (n=17) attending a GBS event.

Table 5-66 Did you attend events run by GBS and power rangers?

	n	%
Yes	17	14.7
No	99	85.3
Total	**116**	**100.0**

Missing cases=5

Despite low turnouts at events, the Power Rangers did talk to many residents about energy efficiency through door-knocking. Again, this is reflected in the survey data, with Table 5-67 showing that over two-thirds of participants (69.0%, n=69) recalled a Power Ranger knocking on their door.

Table 5-67 Did a power ranger or GBS representative knock on your door?

	n	%
Yes	69	69.0
No	31	31.0
	100.0	**100.0**

Missing cases = 21

Despite low attendance at many GBS community events and activities, residents were mostly positive about the CCB approach and they would like to see more energy efficiency and thermal comfort activities in their community. Table 5-68 shows that most people (87.4%, n=90) would like more GBS-type activities in their community, with only 12.6% (n=13) not interested in seeing more GBS-type activities in their community.

Table 5-68 Would you like to see more energy efficiency and thermal comfort activities in your community?

	n	%
Yes	90	87.4
No	13	12.6
Total	**103**	**100.0**

Missing cases = 18

When asked 'What did you like the most about the GBS project?', participants who experienced community capacity building and no in-home education and upgrades commented on the helpful information provided through the project. They felt the information was useful, in particular the Stay Warm booklet, and it had made them more aware of their own energy consumption.

"It was informative." (GBS 101)

"Meet and share tips!" (GBS 561)

In addition, participants commented that the project was well-organised, well-targeted and that they valued the support provided. Participants also commented that project staff members, including the Power Rangers, were friendly and that they didn't feel judged.

"Useful, everyone really nice, didn't look dumb when we didn't know things." (GBS 290)

"The fact it may be assisting people less well-off and educated than myself to make changes that save them money. That's a great community service." (GBS 506)

"I think it beneficial as everybody is struggling with energy bills." (GBS 541)

Others were happy with grocery vouchers provided as part of the project.

When asked 'what didn't you like about the GBS project?', many participants who experienced community capacity building and no in-home education and upgrades did not respond or commented that there was nothing they disliked. Of those who did respond, one participant noted that the events were always on during days she/he worked (GBS 110) and another complained that there were no experts during home visits from Power Rangers.

"No experts used during home visits regarding providing quotes etc." (GBS 549)

5.4 Energy billing results

5.4.1 Sample size and minimum comparison period

The analysis was first conducted with the minimum comparison period set to 360 days, however there was a low number of houses for 360 days (n=90), particularly in the representative group (n=3). As such changes, statistically significant changes could not be found.

The minimum comparison period was then altered to 180 days, yielding greater sample sizes from which statistically significant correlations could be found. Excluding houses with solar PV, a 180 day minimum comparison period provided a sample size (n=348) and greater representative group size (n=112). Including houses solar PV a 180 day minimum comparison period provided a sample size (n=383) and greater representative group size (n=122).

5.4.2 Average and median changes to energy use

Chart 5-3 shows the average and median changes in electricity consumption by each research group. Table 5-69 presents the difference in electricity usage compared to the representative group.

Full statistical information for households with and without solar PV customers is included in the subsequent tables on page 81 – Table 5-70 Statistical tests of In-home education and upgrades with community capacity building, Table 5-71 Statistical tests of in-home education and upgrades only and Table 5-72 Statistical tests of community capacity building only.

Chart 5-3 Average and median change in electricity consumption (excluding solar PV households)

Table 5-69 Billing data analysis results (excluding solar PV households)

	Change in electricity usage (kWh/day)				Change in electricity usage relative to representative group (kWh/day)			
	EDUG+CCB	EDUG	CCB	REP	EDUG+CCB	EDUG	CCB	REP
Average	-1.66	-0.28	1.09	1.16	-2.82	-1.44	-0.07	0.00
Median	-0.82	-0.12	0.77	0.86	-1.68	-0.98	-0.10	0.00

5.4.2.1 In-home education and upgrades plus community capacity building delivered the best energy savings

As demonstrated above, in-home education and upgrades combined with community capacity building delivered the best energy efficiency outcomes. The average improvement over the representative group was 2.82 kWh per day. The median improvement was 1.62 kWh per day (see Table 5-69).

The changes were demonstrated to be statistically significant. A t-Test (two-sample assuming unequal variances) was used to determine the statistical significance of the approachs. As shown in Table 5-70 the in-home education and upgrades + capacity building demonstrated a highly significant change compared to the representative groups ($p<0.01$).

Table 5-70 Statistical tests of In-home education and upgrades with community capacity building

	Analysis excluding solar PV		Analysis including solar PV	
	EDUG+CCB	REP	EDUG+CCB	REP
Mean	-1.66	1.16	-1.56	1.15
Variance	42.60	30.31	41.41	30.17
Observations	52	112	54	122
p(T<=t) two-tail	0.01		0.01	

5.4.2.2 In-home education and upgrades without community capacity building delivered substantial energy savings

In-home education and upgrades without capacity building delivered substantial energy savings. The average improvement over the representative group was 1.44 kWh per day. The median improvement was and 0.98 kWh per day (see Table 5-69).

As shown in Table 5-71 (below), this improvement was statistically significant when compared to the representative groups (p<0.02).

Table 5-71 Statistical tests of in-home education and upgrades only

	Analysis excluding solar PV		Analysis including solar PV	
	EDUG	REP	EDUG	REP
Mean	-0.28	1.16	-0.17	1.15
Variance	15.46	30.31	15.75	30.17
Observations	127	112	143	122
p(T<=t) two-tail	0.02		0.03	

5.4.2.3 Community capacity building delivered similar energy change to the representative group

The community capacity building without upgrades did not deliver significant energy savings, with the improvement over the representative group being only 0.07 kWh per day. The median improvement was 0.10 kWh per day (see Table 5-69 on page 80). As shown in Table 5-72 this improvement was not statistically significant when compared to the representative group.

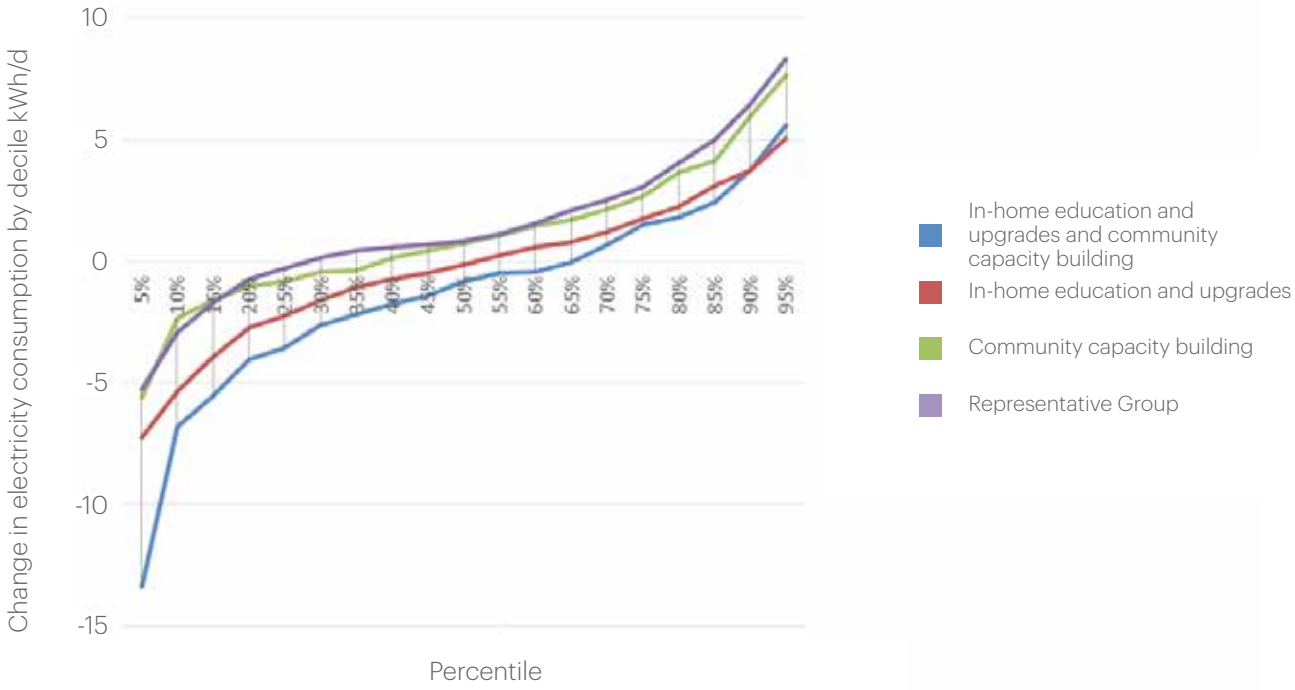
Table 5-72 Statistical tests of community capacity building only

	Analysis excluding solar PV		Analysis including solar PV	
	CCB	REP	CCB	REP
Mean	1.09	1.16	0.91	1.15
Variance	30.20	30.31	27.68	30.17
Observations	57	112	64	122
p(T<=t) two-tail	0.94		0.77	

5.4.3 Changes to energy usage by percentile

Chart 5-4 shows the changes in electricity consumption by percentile. This chart demonstrates that some clients increased energy usage whilst others showed a decrease. Notably only 27% of the representative group showed a decrease in electricity usage, compared to 65% of the EDUG+CCB. All groups had a similar trend with the outliers showing large increases and decreases in energy usage, and the middle percentiles showing a more linear change in energy usage.

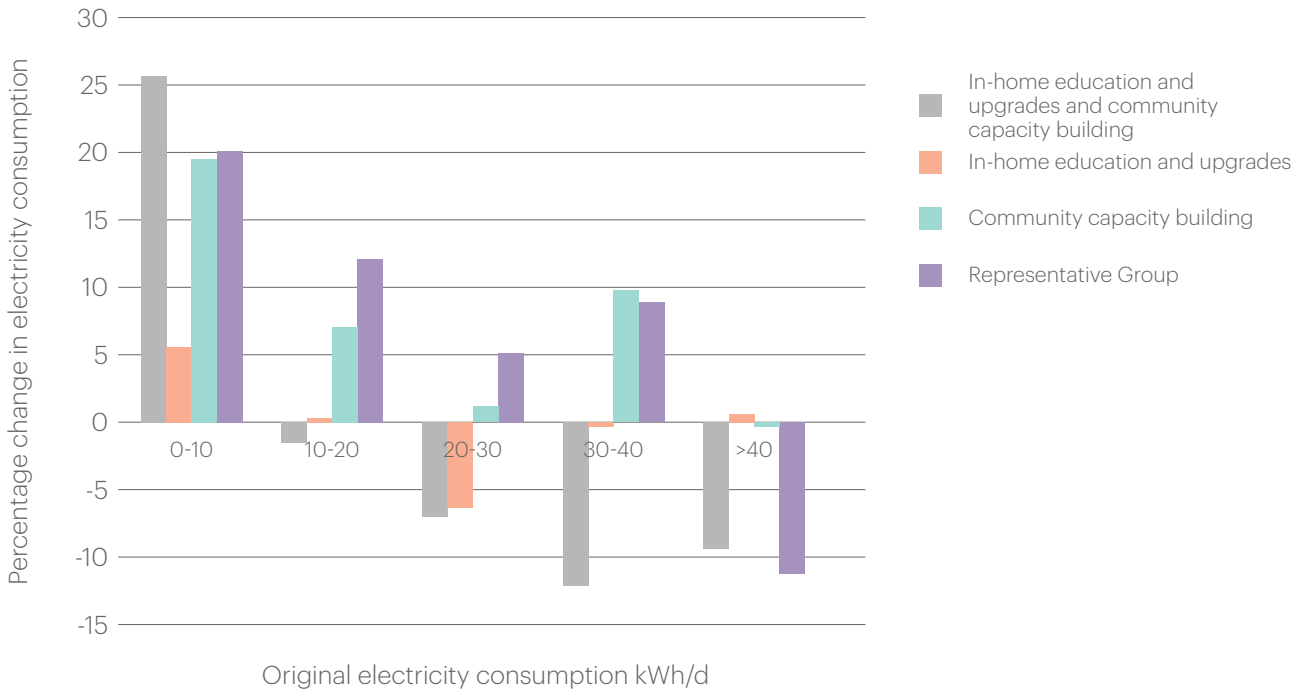
Chart 5-4 Changes in electricity consumption by percentile (excluding solar PV households)



5.4.4 Changes in electricity consumption by original usage

Chart 5-5 (below) displays results categorised by participants' original energy use (i.e. in the 'before' period). This data shows that households with low original energy use generally increased energy use over the project period. For participants with higher original energy usage, those receiving in-home education and upgrades (EDUG and EDUG+CCB) decreased their energy usage. Please note there was only a small sample size of households with original energy use of 40+ kWh/day (n=26) and so these results are less reliable than the households with lower original energy usage.

Chart 5-5: Change in Electricity consumption by original usage (excluding solar PV households)



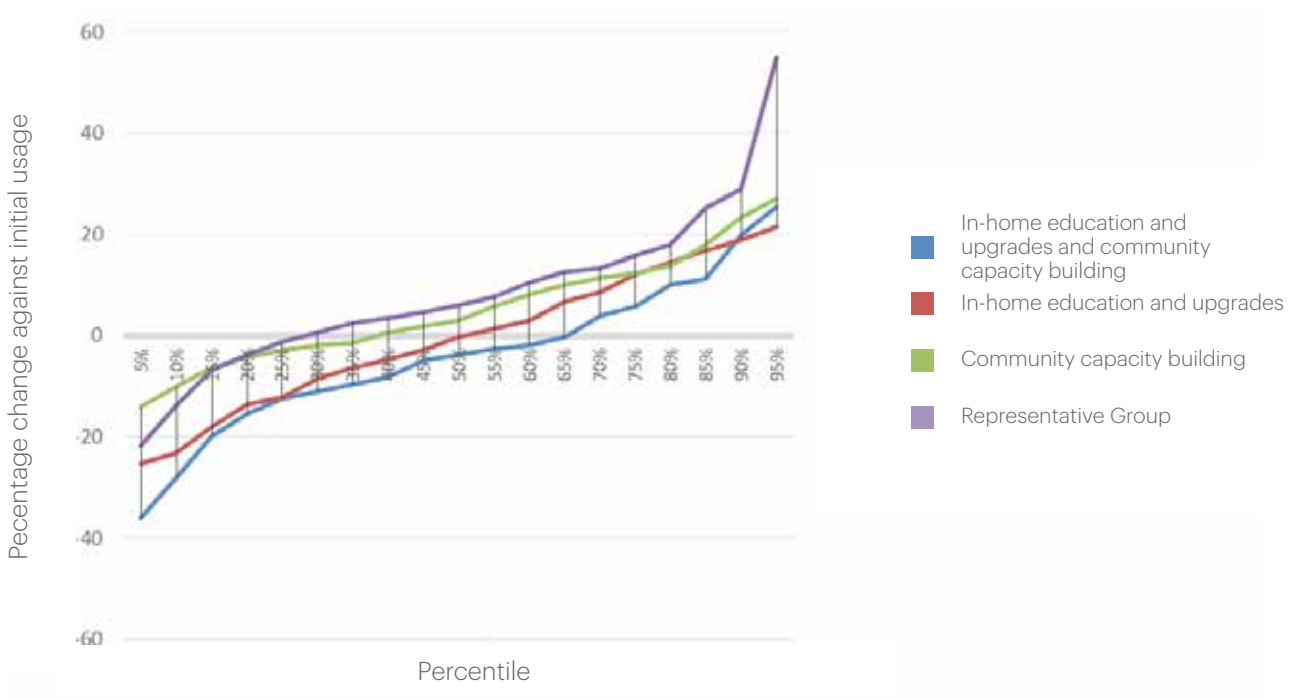
5.4.5 Percentage change in energy usage

The percentage change in energy use for each participant was calculated and is shown in Chart 5-6 below. It shows largely the same trends as described in Chart 5-5 on page 82.

Of note, for the 50th percentile:

- The REP group showed a 5.8% increase in energy usage
- The CCB group had had a 2.9% increase in energy usage
- The EDUG group had a 0.4% decrease in energy usage
- The EDUG+CCB had a 3.7% decrease. This amounts to a reduction relative to the REP group of 9.6%.

Chart 5-6 Percentage change in electricity consumption (excluding solar PV households)



5.4.6 Changes in energy usage by tariff and group

Examining differences between tariffs may allow a deeper understanding of the approaches taken and their impacts on participant behaviour. Some discussion of observed differences between tariffs for each group and hypotheses to explain them is given below. However, the number of participants in some approach/tariff combinations was very limited (e.g. there were only 11 participants on T41 within the EDUG+CCB group; see Table 5-3), and so none of the differences were found to be statistically significant. As such, the differences could well be due to chance and so the hypotheses given below should be considered as topics for potential future research rather than evidence-based conclusions from this project.

Table 5-73 Average changes in energy use by tariff and group

Tariff	Absolute change in energy use (kWh/day)				Relative to REP change in energy use (kWh/day)			
	EDUG	CCB	EDUG+CCB	REP	EDUG	CCB	EDUG+CCB	REP
T31	-0.32	1.43	-0.91	0.26	-0.59	1.17	-1.17	0.00
T41	-0.53	-0.13	-0.49	0.16	-0.70	-0.30	-0.66	0.00
T42	0.18	-0.72	0.59	1.20	-1.02	-1.92	-0.61	0.00
T42-T41	0.71	-0.59	1.09	1.03	-0.32	-1.63	0.05	0.71

First, examining the REP group:

- T41 (hot water) use on average increased slightly (+0.16 kWh/day); likely due to the harsh 2015 winter meaning lower inlet temperatures and greater standing losses for hot water cylinders.
- T42 (hot water and heating) use on average increased more substantially (+1.20 kWh/day). Assuming changes in hot water use were the same as for T41 users, most of this change would be attributable to increased heating; again due to the harsh 2015 winter.
- T31 (lights and power points, which may include plug-in heaters) use on average increased slightly. (+0.26 kWh/day), which may be due to increased use of plug-in heaters in the harsh 2015 winter, or increased uptake of appliances such as large screen televisions.

Now examining the changes for other groups relative to the representative group:

- In-home education and upgrades appear to have been particularly effective at reducing hot water energy use (the average relative change for T41 hot water tariff was -0.70 kWh/day for EDUG and -0.66 kWh/day for EDUG+CCB). This may be attributable to hot water upgrades including shower head replacement and hot water system insulation, and/or education about ways of reducing hot water consumption. By contrast community capacity building appears to have resulted in a smaller relative reduction (-0.30 kWh/day).
- Assuming T42 users experienced the same change in hot water use as T41 users, the differences between the two tariffs would be due to changes in heating. Under these assumptions, heating was not substantially reduced for the EDUG or EDUG+CCB groups, but was substantially reduced for the CCB group (-1.63 kWh/day). This seems an unlikely correlation given the EDUG+CCB group achieved no such reduction in heating, and is most likely due to chance.
- T31 (lights and power points, which may include plug-in heaters) appears to have been reduced for the groups receiving in-home education and upgrades relative to the representative group. This may be due to households learning from the in-home education that heaters on T42 are significantly more cost effective than plug-in heaters on T31. By contrast, T31 use for the CCB group increased substantially. This could be due to a failure of messaging within the community leading to people shifting heater use from T42 to the more expensive T31, but is more likely due to chance arising from the small sample size involved in the analysis.

5.5 Analysis and Discussion

5.5.1 Bulk survey results

5.5.1.1 Household capacity

The GBS project targeted low income households. The bulk survey results show that we recruited a range of household types (e.g. single person, single parent, couples and dependents), households of variable size, as well as younger, middle-age and older households. When compared with the Australian population, the GBS participants had lower education levels and lower employment participation rates. Around half the households that participated had a family member with a chronic illness or disability. In addition, the project recruited predominantly Australian-born participants, with only a minority of migrant households participating in the project. Only a small proportion of Indigenous people participated in the GBS project.

The GBS project sought to recruit both home owners and private rental tenants. The bulk survey results show that we recruited a good mix of outright owners, owners with a mortgage and private rental tenants. We also recruited a good mix of residents that had lived in their home for over 5 years and those who had more recently moved.

5.5.1.2 Dwelling quality

Participant's dwellings were predominantly older (built before 1990), free-standing, single-storey, three bedroom homes. In general, insulation was limited to ceilings. Most people relied on electric heating, with around half of the homes having a heat pump installed. Most people had electric hot water systems with a storage tank. Most participants reported that they had observed moisture on their windows in cold weather and that their homes were draughty.

5.5.1.3 Impact of project on dwelling condition

Participants were asked to report on whether or not their home was draughty and whether or not they had observed moisture on their windows in cold weather. Following project implementation, the results indicate that the EDUG and EDUG+CCB approaches did have a significant impact on draughtiness compared with the representative group, with these participants more likely to report a reduction in draughtiness. In contrast, the CCB

approach did not have an impact on reporting of draughtiness.

Following project implementation, the results indicate the EDUG approach did have a significant impact on observed moisture compared with the representative group, with these participants more likely to report a reduction in moisture on windows. In contrast, the EDUG+CCB and CCB did not have an impact on reporting of moisture levels.

5.5.1.4 Impact of project on perception of energy use

Participants were asked to assess themselves as high, medium or low energy users. Following project implementation, the results indicate that all the approaches (CCB, EDUG, EDUG+CCB) did have a significant impact on people's perception of their energy use, with CCB, EDUG and EDUG+CCB participants more likely to rate themselves as lower energy users in 2015 than in 2014 compared with the representative group.

5.5.1.5 Impact of project on thermal comfort and energy efficiency knowledge

Participants were asked if they agreed with the following statements about thermal comfort:

- I know a lot about keeping my home thermally comfortable in winter,
- I know a lot about keeping my home thermally comfortable in summer,

Following project implementation, the results indicate that the EDUG approach did have a significant impact on people's knowledge of keeping their home thermally comfortable in winter and summer compared with those in the representative group. These participants were more likely to strongly/mostly agree with the statements 'I know a lot about keeping my home thermally comfortable in winter' and 'I know a lot about keeping my home thermally comfortable in summer'.

In contrast, the CCB and the EDUG+CCB approaches did not have an impact on people's knowledge of keeping their home thermally comfortable in winter and summer.

5.5.1.6 Impact of project on thermal comfort and energy efficiency capacity

Prior to any GBS approach, GBS participants were asked if they agreed with the following statement about thermal comfort:

- I feel that I am doing everything I can to keep my household warm in winter.

Following project implementation, the results indicate that the EDUG approach did have a significant impact on people's perception that they were doing everything they can to keep their household warm in winter when compared with the representative group. EDUG participants were more likely to strongly/mostly agree with the statement 'I feel that I am doing everything I can to keep my household warm in winter' following project' compared with the representative group. In contrast, the CCB and EDUG+CCB did not have an impact on people's response to the statement 'I feel that I am doing everything I can to keep my household warm in winter' following project'.

Participants were also asked if they felt able to reduce their energy bill. Unfortunately, there were a high number of people who reported that they were unsure about their capacity to reduce their energy expenses in both 2014 and 2015. Consequently, there are insufficient cases (missing cases=191) to enable us to undertake analysis on the impact of the GBS approaches on people's capacity to reduce their energy bill.

5.5.1.7 Impact of project on affordability of energy bills

Participants were asked whether or not they found it difficult to pay their energy bill. In 2014, over half of participants (54.2%, n=214) had found it difficult to pay their energy bills over the last year and following the implementation of the GBS project, 40% of participants had found it difficult to pay their energy bills.

Despite this overall reduction in the proportion of people finding it difficult to pay their energy bills, our examination of the impact of the GBS approach (CCB, EDUG, and EDUG+CCB) on participants' capacity to pay their energy bill found that none of the approaches had a significant impact on the participant's capacity to pay their energy bill. This result is not surprising given that the participating households were low income households, with a substantial proportion living below the poverty line. It is also in-line with our finding from the Detailed Study that low-income households will use energy efficiency improvements to increase utility rather than decrease use.

5.5.1.8 Impact of project on community

In the bulk survey we examined the impact the GBS approaches may or may not have had on the community through three key questions which asked people to agree or disagree with the following statements:

- I live in a strongly connected community.
- There are people in my community who I can ask about how to keep my house warm/cool.
- There are people in my community who I can ask about energy efficiency.

Following project implementation, we tested to see if each of the three approaches (CCB, EDUG, EDUG+CCB) had a significant impact on participants' responses to the three statements in comparison with the representative group. We did not find any significant relationships. However, further data analysis showed that those who experienced in-home education and upgrades were more likely to strongly/mostly agree with the statement that 'There are people in my community who I can ask about how to keep my house warm/cool'.

5.5.1.9 Participant satisfaction with GBS project

The GBS project was valued by the majority of project participants and participants expressed interest in further opportunities to engage in projects like GBS.

Participants who experienced in-home education and upgrades valued the project highly. They were grateful for the energy efficiency upgrades provided through the project and consistently rated these upgrades as useful.

They raised concerns about specific upgrades, including faulty light globes. They also reported problems with people missing out on particular upgrades and staff failing to follow-up on particular requests from participants.

Participants who experienced the Community Capacity Building approach valued the project. They appreciated the information provided to them through the project. Many participants commented that the project staff members were friendly and helpful. The main concerns raised by participants were the timing of community activities and the lack of energy experts.

5.5.1.10 Summary

In general, the GBS project was valued by the majority of project participants. That said, the approach that had the most impact on people's thermal comfort and energy efficiency perceptions, knowledge and capacity was in-home education and upgrades. In contrast, the CCB had the least impact on people's perceptions, knowledge and capacity and the EDUG+CCB had a more variable effect. When the team conducted further testing that compared those who experienced in-home education and upgrades (EDUG and EDUG+CCB) with those who did not (CCB and REP) we found further evidence to support the view that in-home education and upgrades impacted on people's perceptions, knowledge and capacity in relation to energy efficiency and thermal comfort. The results emerging from the bulk survey provide a sound evidence-base to support the view that in-home education and upgrades are effective regardless of whether this is experienced individually by participants or whether this is embedded within a community action and engagement strategy.

5.5.2 Energy billing data results

5.5.2.1 Low income household energy usage increased in 2015

The representative group was used as our reference for the general low income community. As can be seen by Chart 5-3, energy usage over the project period increased in this group. There were two likely factors at play:

1. Energy prices have decreased over the project period.
2. The 2015 winter was particularly harsh, driving an increase in heating demand.

5.5.2.2 In-home education & upgrades consistently helped houses to reduce energy use

The data (see Chart 5-4) shows that in-home education and upgrades consistently and significantly reduced household energy usage compared to the representative group.

The impact of in-home education and upgrades is a product of two elements:

1. The physical works that improve the efficiency or productivity of the home or appliance
2. The change in behaviour that results in lower energy usage through approaches like zoning heating

The tariff analysis shows a general increase in heating (T42) across the EDUG. This is likely due to a cold 2015 winter. However this is counteracted by a corresponding drop in T31 (light and power) effectively resulting in an increase in financial savings (because T42 has lower charges), whilst improving thermal comfort.

5.5.2.3 Combination of in-home education & upgrades and community capacity building had the greatest impact on energy use

The EDUG+CCB group had the greatest energy savings. Given that this group had a significant improvement over the EDUG only group indicates that changes in community norms/behaviour have resulted in energy savings of a similar scale as the in-home education and upgrades.

PAYG consumption in the EDUG +CCB group (n=15) shows a large drop. Notably, the PAYG system offers a de facto in-home display, thus a household actively managing power could effectively manage to reduce consumption.

5.5.2.4 Community capacity building is ineffective without in-home education and upgrades

At the overall level, Chart 5-3 (page 80) shows no significant difference in energy use between the representative group and the community capacity building approach.

5.5.2.5 Households with higher original energy usage are able to make greater savings

As demonstrated in Chart 5-5 average energy use increased by more for lower original energy users than higher original energy users. This is likely due to houses with low original energy use being comfort constrained, whereby any improvement in energy productivity is used to improve comfort rather than to save energy and money.

For high original energy users, average energy use decreased significantly. This is likely due to those houses being relatively inefficient / wasteful before, and so the GBS energy efficiency activities were able to help them more. A key recommendation from this could be to target future energy efficiency programs on those with relatively high original energy use (e.g. original energy usage >30kWh/day).

Conclusion

The Get Bill Smart Project delivered statistically significant energy savings to the in-home education and upgrades group and community capacity building group (EDUG+CCB) (-2.88 kWh/day) as well as the in-home education and upgrades only group (EDUG) (-1.44 kWh/day). There was not a statistically significant difference between the community capacity building only group (CCB) and the representative group (REP).

Energy savings were greatest in households with high original energy usage (>30kWh/day). Within the EDUG+CCB group this was an energy saving of around 12%.

The energy billing data provides a useful policy pointer for future programs including:

- In-home education and upgrades offer effective and measurable reductions in energy usage.
- If energy savings is the key aim, limiting eligibility to high energy users may improve cost effectiveness.
- Targeting messaging for households on particular tariff structures.

The survey data confirms that the GBS project was valued by the majority of project participants. Participants who experienced in-home education and upgrades were grateful for the assistance provided through the project and consistently rated these activities as useful. Participants who experienced the community capacity building approach appreciated the information provided to them through the project. Many participants commented that the project staff members were friendly and helpful. Participants expressed interest in further opportunities to engage in projects like GBS.

In general, the approach that had the most impact on people's thermal comfort and energy efficiency perceptions, knowledge and capacity was the EDUG approach when compared with the representative group. In contrast, the CCB approach had the least impact on people's perceptions, knowledge and capacity. The EDUG+CCB had a more variable effect.

The one area where the CCB approach did have an impact compared with the representative group was 'people's perception of their own energy use'. However, surprisingly, the CCB approach did not significantly increase people's perception of living in a strongly connected community, nor did it significantly increase people's awareness of someone in their community who they could ask about thermal comfort and energy efficiency.

In contrast, the EDUG approach when compared with the representative group did have an impact on people's reporting of draughtiness in their home and moisture, with those in the EDUG approach more likely to report a reduction in draughtiness and a reduction in observed moisture on cold days. In addition, the EDUG approach when compared with the representative group did have an impact on: people's perception of their own energy use; people's knowledge of thermal comfort in winter and summer; people's knowledge of energy efficiency; and people's sense that they were doing everything they could to keep their household warm in winter. The EDUG+CCB approach also had an impact on: participants' reporting of draughtiness; participants' perception of their own energy use; and participants' sense that they were doing everything they could to keep their household warm in winter.

However, neither the EDUG approach nor the EDUG +CCB approach had an impact on people's perception of living in a strongly connected community and people's awareness of someone in their community who they could ask about thermal comfort and energy efficiency.

None of the approaches had a significant impact on people's efforts to reduce their energy bill or on the affordability of their energy bill. Most of the participants were trying to reduce their energy bill prior to the project and around half the participants were experiencing difficulties paying their energy bill prior to the project. Following project implementation, people were persisting in their efforts to reduce their energy bill and they continued to experience problems affording their energy bill. This result is not surprising given the difficult financial circumstances of many households in the study and the substantial proportion of participants who were not attached to the labour force and who were living below the poverty line.

Based on our knowledge of project implementation, we suspected that in-home education and upgrades had an impact regardless of whether the participant was exposed to the CCB approach. We were aware that there were substantial differences in people's direct experience of these two approaches. While in-home education and upgrades were mandatory for everyone in the EDUG and EDUG+CCB groups, the community capacity building activities were optional for the CCB and EDUG+CCB groups, and so some participants had much more engagement in the community capacity building activities than others.

Given this situation, we decided to conduct additional testing that compared those in the project who received in-home education and upgrades (EDUG and EDUG+CCB) with those who did not (CCB and REP group). We found that direct experience of in-home education and upgrades had a significant impact on people's perception, knowledge and capacity of energy efficiency and thermal comfort. The in-home education and upgrades did have an impact on: people's perception of their own energy use; people's knowledge of thermal comfort in winter and summer; people's knowledge of energy efficiency; people's sense that they were doing everything they could to keep their household warm in winter; and people's awareness of someone in their local community who they can ask about thermal comfort. People who experienced in-home education and upgrades were also more likely to report a reduction in the draughtiness of their home and a reduction in observed moisture on cold days.

In short, the Bulk Study report provides a substantial evidence base for the effectiveness of in-home education and upgrades in reducing people's energy usage. It also provides a good body of information on perceptions, knowledge and capacity in relation to energy efficiency and thermal comfort. In-home education and upgrades are effective regardless of whether this is experienced individually by participants or whether this is embedded within a community action and engagement strategy.

Improved Energy Productivity

The survey and billing data shows a statistically significant improvement in energy productivity.

The EDUG+CCB group improved thermal comfort (e.g. reduced draughts (Table 5-31 page 63), less moisture on windows (Table 5-37, page 65), whilst statistically decreasing energy usage by 2.8 kWh per day (Chart 5-3, page 80) approximately 10% at the 50th percentile (EDUG + CCB see Chart 5-4 on page 82).

The EDUG group improved thermal comfort (e.g. reduced draughts (Table 5-31 page 63), less moisture on windows (Table 5-37, page 65), whilst statistically decreasing r energy usage by 1.4kWh per day (Chart 5-3, page 80).

Both groups reduced energy costs whilst achieving improved thermal comfort, and did so by favouring more cost effective heating tariffs (Table 5-73 on page 83).

Section 6

DETAILED STUDY

6. Detailed Study

Details of the Get Bill Smart DETAILED Study are contained in a standalone report titled "DETAILED STUDY". The following is an excerpt of the introduction of the detailed report.

Read this report if you would like an insight into the different ways that individuals and households manage energy efficiency and thermal comfort and respond to different program approaches.

6.1 Detailed report introduction

This report, The Detailed Study, provides in-depth examination of participant households and the change that occurred for these households after Get Bill Smart (GBS) program involvement. The report presents the methods and findings from qualitative and quantitative detailed research conducted with 51 of the households involved in the broader GBS project. The aim of The Detailed Study is to gain further insight into energy efficiency and thermal comfort behaviours through more nuanced understanding of the conditions that householders experience, the changes (outcomes) that occur over the GBS study period, key influences affecting those changes, and trade-offs made between energy use and comfort.

The Detailed Study enhances understanding of:

- home energy consumption and energy efficiency change outcomes
- home thermal comfort management and performance changes
- housing conditions participants live with that influence their thermal comfort and energy consumption
- affordability related to energy use and thermal comfort
- health and wellbeing and its relationship to energy use and thermal comfort
- trade-offs participants make when there is an opportunity for comfort improvement or energysaving
- comparative effects of GBS support approaches, and
- the context of low income householders and how it affects energy use, energy efficiency and
- thermal comfort in the home.

GBS is working to advance understanding of energy use and thermal performance to improve the design of support activities for application in Tasmania and Australia.

Participants in GBS are divided into four approaches:

1. In-home education and upgrades (EDUG)
2. Community capacity building (CCB)
3. In-home education and upgrades and community capacity building (EDUG+CCB)
4. Representative group (the no activity, baseline comparative group) (REP)

Essentially in these four groups GBS tested two key approaches to energy efficiency support: Community capacity building with local energy champions, and in-home education and upgrades supported by expert sustainability assessors. The 51 households who participated in this detail part of the study were drawn from all four GBS approach groups in roughly equal numbers so that differences in the approaches could be compared.

Research methods used for the Detailed Study were both qualitative and quantitative. As Foulds et al. (2013: 627) have previously observed, the use of both types of data "provides the depth required to reflect suitably on data collection, theoretical application and analysis-related issues". Change outcomes are examined by comparing key indicators before GBS energy efficiency activities and again after the activities, and through comparisons between the GBS approach groups. The quantitative data collection involved monitoring of household's electrical consumption and temperatures inside and outside the house, over a 15-month period.

The electricity and temperature monitoring period was across two winters in order to establish 'before' and 'after' periods of cold weather. The qualitative methods involved before and after interviews with householders in addition to the surveys conducted across all GBS households. Electricity billing

data, gathered for all participants in GBS, is also referred to in this report. Detailed study findings are presented in two ways: as individual case studies and as comparative (summative) analysis. Each participant household is described in an individual case study. Each case study describes key characteristics of the participant household, the physical house conditions relevant to the energy/comfort focus, outcomes of the energy efficiency support activities; key influences that affected those outcomes; critical contextual and community considerations; and key domestic considerations within the household. The richness of information presented in this way, while not statistically significant, allows examination of varied cases and reveals critical dynamics (differences) in experiences house to house.

A case-based approach, such as we have used, has recently been applied by Gram-Hassen (2010) to understand variation in residential heat comfort practices and energy use across households. By pulling together quantitative aspects of the home with personalised dwelling experiences we are able, as Ellsworth-Krebs et al. (2015, 100) suggest, to "adopt the home (and all the baggage the term comes with) as the focus for investigation, highlighting an appreciation for the socio-technical nature of domestic energy demand".

Comparative summary analyses identify outcomes for different approach groups and outcomes according to key indicators. Comparisons are presented in tables with interpretation. These comparisons:

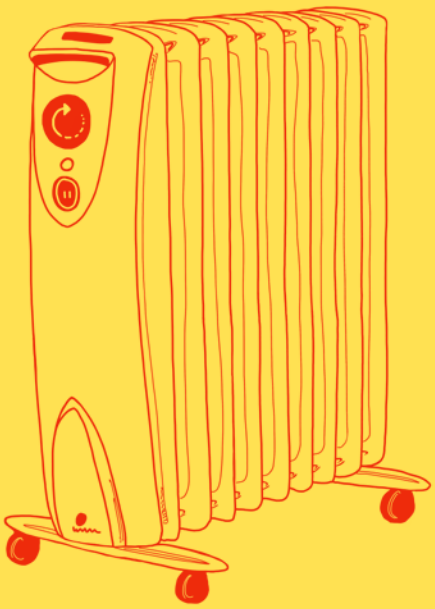
- illuminate influential relationships between housing/heater performance and electricity use/comfort outcomes
- present outcomes of the four different GBS approaches, and
- assist, in conjunction with case study analysis, to develop overall detail study findings.

In order to compare cases, the Detailed Study includes only the detailed participants that took part in the main study proper and were part of one of the four approaches described above. 'Energy Champion' (EC) households are not reported here. The 12 EC households took part in similar research processes to detailed participants but, due to program delays at the outset of the project, the monitoring period for the ECs was a non-winter period. Hence, quality data regarding heating could not be collected from the EC household group. The 12 EC households became a very valuable testing ground for detailed research processes. Understanding from researching champion households was fed back into the research processes for the detailed study.

In this report we present all stages of the detailed study by first outlining methods used for quantitative and qualitative data collection and combined analysis; then presenting detailed case studies and comparative analyses; and, finally, presenting a discussion of findings and conclusions.

Section 7

COST-BENEFIT ANALYSIS



7. Cost-Benefit Analysis

7.1 Introduction

This report, the Cost-Benefit report, includes cost-benefit, cost effectiveness, and additional benefit analyses of Get Bill Smart (GBS) energy efficiency activities. These analyses are presented here to offer data that supports the development of future energy efficiency programs.

The Get Bill Smart Final Report consists of an overview report and sub-reports (including this one). The sub-reports include:

1. The Bulk Study
2. The Detailed Study
3. Cost Benefit Analysis
4. Project processes and organisational analysis, and
5. Financial report.

Cost-benefit analysis is a technique that relates the financial outcomes/benefits of an activity with its financial costs. Cost effectiveness analysis differs in that it relates outcomes/benefits in non-financial terms to the financial costs of the activity. Data for the cost benefits and cost effectiveness analysis mainly comes from the Financial and Bulk Reports.

Some further benefits are that were identified during GBS data collection and analysis, but were not able to be included in cost-benefit and cost effectiveness analyses due to insufficient sample sizes and/or difficultly in quantifying results. Additional benefits discussion in this report draws on findings from the Detailed Study and the Project processes and organisational analysis reports.

This Cost benefit report compares the four approaches used in GBS:

1. In-home education and upgrades (EDUG)
2. Community capacity building (CCB)
3. In-home education and upgrades and community capacity building (EDUG+CCB)
4. Representative group (the no activity, baseline comparative group) (REP)

In addition to the approaches described above, the project yielded a number of benefits to the wider energy efficiency industry and related sectors. These "Trial co-benefits" are also examined in this report. Methods for Trial co-benefits are presented in section 7.3.5.

7.2 Methodology

This section describes processes used to conduct cost-benefit, cost effectiveness and benefit analyses.

The methods for the GBS cost-benefit analysis and cost effectiveness ratios were developed by the Department of Industry Innovation and Science (the Department) and are described in sections 7.3.1 and 7.3.2. All data from other GBS reports used to calculate cost benefits and effectiveness are presented in this methods section. Limitations to cost benefit and effectiveness analysis is described in section 7.3.4.

In addition to the approaches described above, the project yielded a number of benefits to the wider energy efficiency industry and related sectors. These "Trial co-benefits" are also examined in this report. Methods for Trial co-benefits are presented in section 7.3.5.

7.2.1 Cost effectiveness analysis

7.2.1.1 Description of method

Cost effectiveness analysis generates ratios that relate program costs to outcomes to identify the most cost effective approaches. This technique uses non- monetary units to measure impacts/effect. The cost-effectiveness analysis used here involves:

- Identification of trial approaches
- Calculation of the costs of each trial approach (see Table 7-11 on page 98)
- Identification of trial benefits (see section 7.2.2.2 on page 95)
- Assessment of the trial approach cost against its benefit
- Comparison of the cost effectiveness analysis outcome for each of the trial approaches to determine the most cost-effective approach within the trial

The cost effectiveness ratio is determined by the following formula:

$$\text{Cost effectiveness ratio} = \frac{\text{Cost}}{\text{Unit of Effectiveness}}$$

Cost effectiveness ratios were calculated for each approach relative to the representative (REP) group, which acted as a control for the study.

7.2.1.2 Effectiveness

Identified benefits that could be used in cost effectiveness ratios were: change in energy consumption; change in heating efficiency; change in time spent in comfort zone; and change in water usage. However, only changes in energy consumption and water consumption could be quantified confidently. The other benefits were only measured for Detailed Study participants, which were too few in number to confidently statistically determine trends and estimate benefits. Instead, these benefits are discussed under heading 7.3.4 Additional project level benefits.

Change in electricity consumption (kWh/day)

The change in electricity consumption for each research group was calculated as per the methodology described in Chapter 5 (The Bulk Study). The average change in electricity consumption of the representative (REP) group was subtracted from the average changes of the other groups to give their impact relative to doing nothing (see Table 7-1 below).

Table 7-1 Changes in electricity consumption per house by group relative to representative group (kWh/day)

	EDUG	CCB	EDUG +CCB	REP
Change in electricity consumption (kWh/day)	-1.44	-0.07	-2.82	0.00

Change in water consumption (L/day)

The change in water usage (water savings) for each research group was calculated by measuring the initial water usage of a shower head and subtracting the water usage following the upgrade of the shower. This was multiplied by the amount of time the shower was used each day to give a value in Litres per day.

Table 7-2 Change in water usage per house by group relative to representative group (L/day)

	EDUG	CCB	EDUG +CCB	REP
Change in water consumption (L/day)	-83	0.00	-83	0.00

7.2.2 Cost benefit analysis

7.2.2.1 Description of method

Cost benefit is a technique to relate the costs of a program to its financial outcomes/benefits. It is used to identify the most cost effective option for achieving a particular outcome or benefit. The cost-benefit analysis involves the following steps:

- Identify trial approaches
- Calculate the costs of each trial approach (Table 7-11 on page 98)

- Identify direct trial financial benefits (see Table 7-3).
- Assess the trial approach cost against its benefit
- Compare the cost benefit analysis outcome for each of the trial approaches to determine the most cost-effective approach within the trial

The cost benefit ratio is determined by the following formula:

$$\text{Cost benefit ratio} = \frac{\text{Cost}}{\text{Benefit in dollars}}$$

7.2.2.2 Benefits

There are two easily measurable financial benefits to recipients of the project, namely reduction in electricity costs and reduction in metered water charges. While there were a number of other GBS benefits that could sit in a cost benefit analysis, it was beyond the scope of the GBS project to collect information needed to estimate the benefits in financial terms.

Reduction in electricity costs

The benefit was calculated by multiplying the average changes in electricity use (as specified in Table 7-1 on page 94) by the average electricity price. Tariff rates averaged over the project period were used to remove the impact of electricity price rises and falls.

For all the approaches a weighted average of tariff 31 and 41/42 rates was used based on actual billing data from households in the Detailed Study. The weighting was 49% tariff 31 and 51% tariff 41/42, resulting in an average electricity price of 21.259c/kWh.

The cost savings per annum are presented in Table 7-3.

Table 7-3 Change in electricity costs per house by research group relative to the representative group ($/year)

	EDUG +CCB	EDUG	CCB	REP
Reduction in electricity costs ($/year)	219	112	5	–

The EDUG and EDUG+CCB groups also experienced a shift in electricity usage from tariff 31 to the cheaper tariff 2. On average, this amounted to 1.2 kWh/day shift for EDUG+CCB and 0.5 kWh/day for the EDUG group. The value of this shift is between $17/year and $44/year in addition to the figures in Table 7-3. This value was not included because not all customers were on the same tariff structure. Indeed the payback would vary widely depending on the tariff structure. For example, PAYG clients in EDUG+CCB exhibited almost 50% greater electricity savings than those on other tariffs. However, these results were not statistically significant and are not included here because they may skew the statistically significant results.

Electricity savings over time

Electricity savings are expected to accrue over time. For example, the CFL globes used in the project have a rated service life of 6000 hours (approx. 4 years usage). A model was created to accrue the energy savings over time based on the parameters of:

- Contribution to total energy savings and
- Likely service life of the upgrade item or approach.

Assumptions used to generate the service life periods for GBS approaches can be seen in Table 7-4.

Table 7-4 Assumptions for service life of Get Bill Smart Approaches

	CCB + EDUG Approach		EDUG Approach		CCB Approach	
Approach	Contribution to energy savings (%)	Expected Service Life (years)	Contribution to energy savings (%)	Expected Service Life (years)	Contribution to energy savings (%)	Expected Service Life (years)
CCB	50%	2	0%		100%	2
Education (with upgrades)	10%	2	20%	2		
Lighting	5%	4.1	10%	4.1		
Shower head	8%	10	15%	10		
Draught proofing	10%	5	20%	5		
HWS lag	3%	10	5%	10		
Ceiling Insulation	10%	25	20%	25		
Curtains	5%	10	10%	10		

Based on the assumptions in Table 7-4 and the data in Table 7-3 calculation can be made that determines the total value of energy savings over the project. Note that this is a simple number that does not account for inflation or changes in future electricity prices.

Please note a very conservative estimate (2 years) has been made to the duration that "educational" activities can deliver energy savings. This could have the possibility of skewing results in favour of the EDUG approach.

Table 7-5 Cumulative reduction in electricity costs

	EDUG +CCB	EDUG	CCB	REP
Reduction in electricity costs ($)	$1292	$1096	$11	–

Reduction in water usage

The change in water usage for each research group was calculated by measuring the initial water usage of a shower head and subtracting the water usage following the upgrade of the shower. This was multiplied by the amount of time the shower was used each day to calculate daily usage and multiplied by 365 to calculate annual usage (Table 7-6, below).

The average cost of metered water over a 3 year period of $0.99 per kL is used. The water usage reduction was multiplied by the water cost to determine annual savings to metered water bills from changing the showerhead.

Table 7-6 Change in water usage per house by group relative to representative group ($/year)

	EDUG	CCB	EDUG +CCB	REP
Savings from showerhead replacement ($/year)	$30.40	–	$30.40	–

Reduction in water usage over time

It has been estimated that the showerhead will have a useful service life of 10 years. Based on this a cumulative savings from replacing a showerhead can be developed.

Table 7-7 Cumulative savings from replacing showerhead ($)

	EDUG	CCB	EDUG +CCB	REP
Savings from showerhead replacement ($/year)	$304	–	$304	–

Cumulative Water and Electricity Savings

The combination of electricity and water savings deliver the total financial savings from the project. These are detailed in Table 7-8.

Table 7-8 Cumulative electricity and water savings by Get Bill Smart Research Group

	EDUG	CCB	EDUG +CCB	REP
Cumulative water and electricity savings ($/year)	$1400	$11	$1596	0.00

7.2.2.3 Costs

Given that this was a trial project that had additional research expenses above and beyond the "delivery cost" of a standard project, the cost of the project was calculated at four levels. These levels where defined by the Department for the purposes of the project (see Table 7-9).

Table 7-9 Allocating project costs at four levels

Cost level	Cost data Included
Direct trial approach (Level 1)	The cost of delivering the trial approach to a particular participant
Trial Component (Level 2)	The cost of delivering the trial approach to a particular participant, and Costs associated with: (i) Recruiting a participant, and (ii) Maintaining a participant
Total Business (Level 3)	The cost of delivering the trial approach to a particular participant, and Costs associated with: (i) Recruiting a participant, and (ii) Maintaining a participant, and Costs of running an organisation to do the above
Total Trial (Level 4)	The cost of delivering the trial approach to a particular participant, and Costs associated with: (i) Recruiting a participant, and (ii) Maintaining a participant, and Costs of running an organisation to do the above, and Cost of participating in a government funded trial

The GBS project budget was used to allocate project costs for the cost benefit analysis. Final project budget estimates were used from February 2015. The budget line items were allocated across the four levels (as described in Table 7-9 above) and across the four research approach groups.

Expenses were allocated based on loadings derived from the number of participants in each GBS approach (Table 7-10).

Table 7-10 Percentage allocation by research group

Research Group	Number	Percentage	Community development split	Upgrades split
EDUG + CCB	78	16%	47%	32%
EDUG	168	34%		68%
CCB	89	18%	53%	
REP	165	33%		
Total	**500**	**100%**	**100%**	**100%**

The costs for each of the research groups and levels is detailed in Table 7-11 (below). Further details of the assumptions can be found at APPENDIX 3 .

Table 7-11 Costs of intervention per house by research group and cost level

Research Group	Level 1 – direct trial	Level 2 – Trial component	Level 3 – Total Business	Level 4 – Total trial
EDUG + CCB	1,459	1,846	2,121	5,431
EDUG	873	1,006	1,150	3,840
CCB	721	1,104	1,379	4,642
REP	**74**	**75**	**75**	**2,939**

7.2.3 Limitations of cost effectiveness and cost benefit analyses

The limit of the cost benefit and cost effectiveness approaches is their reliance on universally and easily applied numerical constants. Improvements to households that may increase thermal comfort, health or well-being are not as easily defined or recorded in a project. Even if defined, reducing these variables to a universal constant that can be applied across project approaches is not often possible, and measuring them can be expensive (e.g. data collection and analysis for the Detailed Study was a large expense for the GBS project). An attempt was made in the Detailed study to quantify a range of thermal variables and their relationship to the energy efficiency approaches. However, the impact of independent variables such as home construction, employment, household size and behaviour created too much 'noise' in a relatively limited data set to confidently quantify benefits. Instead other benefits of the project have attempted to be qualified as per section 7.3.4.

7.2.4 Additional project level benefits

Additional benefits have been experienced by the participants in the Get Bill Smart Project. These are described in Table 7-12. A variety of sources have been used to demonstrate these benefits including in-home data logging, survey questions and expenditure analysis. Each benefit listed in the right hand column of Table 7-12 will have evidence supplied to verify the improvements made.

Table 7-12 Additional project level benefits

LIEEP Benefits	GBS Benefits
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	– Greater capacity for low income householders to be more energy efficient (knowledge, skills and motivation) – Reduced energy bills – Increased thermal comfort – Improved health, social welfare and livelihood – Improved sense of community connection – Improved sense of who can go to in community to help with energy efficiency – Access to local energy champion – Access to grocery vouchers.

7.2.5 Trial co-benefits

Co-benefits are benefits of the activities that experienced by people or organisations other than the low income households that participated in the project. Benefits have accrued to the Tasmanian energy efficiency sector and industry more widely. These are described in Table 7-13 (below). A variety of sources have been used to demonstrate these benefits including internal interview, training logs and expenditure analysis. GBS benefits listed in the right hand column of Table 7-13 will have evidence supplied to verify the improvements made.

Table 7-13 Trial co-benefits

LIEEP Benefits	GBS Benefits
Build the knowledge and capacity of consortium members to encourage long-term energy efficiency among their customers and clients.	Collated data on motivations, barriers and best approaches to energy efficiency projects in low income households in southern Tasmania.
Build capacity of Australia's energy efficiency technology and equipment companies by maximising the opportunities for Australian industries to participate in the projects.	Provided employment, training and commercial opportunities for local residents and businesses.

7.3 Results

7.3.1 Cost effectiveness analysis

Change in energy consumption

For comparison between the research approaches, the Level 3 analysis appears to give the best reference point – the expected cost for a program delivered by an organisation. At this level both the education and upgrades combined with community capacity building (EDUG+CCB) and the education and upgrades by themselves (EDUG) give equivalent ratios. These ratios are $752 per kWh/day for EDUG+CCB and $798 per kWh/day for EDUG. The community capacity building approach delivers a very poor ratio $19,698 per kWh/day. This is due to a lack of energy savings in this group.

Table 7-14 Electricity cost effectiveness analysis (1 year)

Research Group / Approach	Cost effectiveness ratio ($ per kWh/day)			
	Level 1	Level 2	Level 3	Level 4
EDUG +CCB	517	655	752	1,926
EDUG	606	698	798	2,666
CCB	10,302	15,776	19,698	66,321

Change in water usage

The cost effectiveness of reduction in metered water charges[13] can be seen in Table 7-15 (below). At level 3 reductions of 1 kL/PA in water use will costs $38 to support in the EDUG or $69 in the EDUG+CCB approach.

13 Note this does not include any component of electricity usage, simply the cost to supply water.

Table 7-15 Water saving cost effectiveness analysis (1 year)

Research Group/Approach	Cost effectiveness ratio ($ per kL/PA)			
	Level 1	Level 2	Level 3	Level 4
EDUG +CCB	48	60	69	178
EDUG	29	33	38	126
CCB	–	–	–	–

7.3.2 Cost benefit analysis

1 year electricity cost benefit analysis

The cost benefit ratios of electricity use reflect the same findings as the cost effectiveness. At level 3 both the education and upgrades combined with community capacity building and the education and upgrades by themselves give equivalent ratios (10).

This gives the project a simple payback period of 10 years (based on energy savings alone). The community capacity building approach delivers a very poor ratio at 254. This is due to the very poor observed energy savings in this group.

Table 7-16 Electricity cost-benefit analysis by group and cost level

Research Group/Approach	Ratio ($ upfront cost per $/year saving)			
	Level 1	Level 2	Level 3	Level 4
EDUG + CCB	6.7	8.4	9.7	24.8
EDUG	7.8	9.0	10.3	34.4
CCB	132.8	203.3	253.9	854.7

Cumulative electricity cost benefit analysis

The cumulative energy savings demonstrate that the EDUG approach delivers $1 of energy savings for $1 of investment at level 3. EDUG+CCB delivers $1 of energy savings for $1.60 of investment and CCB requires $127 to obtain $1 energy saving.

Table 7-17 Cumulative electricity cost-benefit analysis by group and cost level

Research Group/Approach	Ratio ($ upfront cost per $ saving)			
	Level 1	Level 2	Level 3	Level 4
EDUG + CCB	1.1	1.4	1.6	4.2
EDUG	.80	.92	1.0	3.5
CCB	66.4	101.7	126.9	427.3

Cumulative and combined electricity and water cost benefit analysis

Combining the electricity and water savings over the project life delivers the cumulative, combined cost benefit analysis. Under the level 3 scenario CCB costs $127 to deliver a $1 saving. CCB + EDUG requires a $1.30 to deliver $1 of savings. EDUG approach by itself requires just $0.82 investment to save the householder $1 in water and energy costs. It should be noted that this is a simple cost benefit analysis and the forward estimates of costs do not include inflation, indexing or the time value of money.

Table 7-18 Cumulative combined electricity and water cost-benefit analysis by group and cost level

Research Group	Ratio ($ upfront cost per $ saving)			
	Level 1	Level 2	Level 3	Level 4
EDUG + CCB	.9	1.2	1.3	3.4
EDUG	.6	.7	.8	2.7
CCB	66.4	101.7	126.9	427.3

7.3.3 Additional benefits (project level)

This section lists additional benefits identified from the GBS project activities. Each benefit is discussed under its own heading.

Reduction in draughts in all households receiving in-home education and upgrades (for EDUG and EDUG+CCB households)

Home energy upgrades included draught proofing on doors and windows. This is a vital component of providing thermal comfort in a home and in reducing the amount of money and electricity used to heat the house.

Table 7-19 Evidence of reduction in draughts

LIEEP Benefits	GBS Benefits	Evidence
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	Improved health, social welfare and livelihood. Increased thermal comfort.	After the intervention, there was an increase in the number of people that stated their homes were not draughty (44.8% of participants said their homes were not draughty in 2015 in comparison to 2014) (see the Bulk Study). An air blower test indicated a 23% reduction in air exchange after the implementation of basic draft proofing measures (participant GBS716 test conducted April 2015).

Improvement in warmth in winter

Householder perceptions of thermal comfort in winter were included in the survey of Bulk Study participants and time spent in the comfort zone was identified in the Detailed Study. Table 7-20 shows bulk and detail answers demonstrated an improvement in warmth in winter.

Table 7-20 Evidence of improvement in warmth in winter

LIEEP Benefits	GBS Benefits	Evidence
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	Improved health, social welfare and livelihood. Increased thermal comfort.	The home energy upgrade intervention group were more likely to report increased thermal comfort in winter when compared to the representative group (see The Bulk Study findings). Comparative analysis in The Detailed Study showed an overall improvement in time spent in the comfort zone for the EDUG + CCB group (see Detailed Study synthesis and discussion). The EDUG+CCB group noted an improvement in heating efficiency of 0.24 °C hrs /kWh /day. This resulted in this group spending 4% more time in the thermal comfort zone (Detailed Study analysis). Due to CCB activities in the CCB approach and the EDUG+CCB approach, the GBS project was able to connect with households who were harder to reach in the communities through locals and because of an overall local presence (Organisational report section 8.9.2).

Reduction in moisture on windows

Risk of mould spores in households increases with higher moisture levels inside homes and with surface condensation, especially as a consequence of moisture forming on cold window surfaces. Mould spores can reduce the health of household occupants, compromising immune health and increasing respiratory problems such as asthma[14].

Flow on impacts from reduced health and wellbeing caused by moist homes can include loss of income and educational opportunities. Table 7-21 evidence statistically demonstrates a reduction of moisture on windows.

14 The WHO cites water on the surface of materials (eg windows) as the most important trigger for microorganism growth (http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf)

Table 7-21 Evidence of a reduction in moisture on windows

LIEEP Benefits	GBS Benefits	Evidence
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	Improved health, social welfare and livelihood.	Households that received a home energy upgrade were less likely to report moisture on windows in 2015, compared to the representative group. (see The Bulk Study 5.4.4).

Increasing the capacity to be more energy efficient

Low-income householders were given the opportunity to increase their understanding of energy efficiency.

Table 7-22 Evidence of increasing capacity for energy efficiency

LIEEP Benefits	GBS Benefits	Evidence
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	Greater capacity for low income householders to be more energy efficient (knowledge, skills and motivation).	After the intervention, 65% of GBS participants in the Bulk Study agreed or strongly agreed with the statement that they knew where to get information to improve their energy efficiency. Bulk study participants were more likely to rate themselves as using less energy in 2015 compared to 2014, when compared to the representative group. (see The Bulk Study findings

Improving Community Connectivity

Community capacity building activities employing local champions helped build community connectivity.

Table 7-23 Evidence of improving community connectivity

LIEEP Benefits	GBS Benefits	Evidence
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	Greater capacity for low income householders to be more energy efficient (knowledge, skills and motivation).	After GBS activities, 65% of GBS participants in the Bulk Study agreed or strongly agreed with the statement that they knew where to get information to improve their energy efficiency (compared with 36.9% before) (Bulk Study section 5.4.8). Bulk study participants were more likely to rate themselves as using less energy in 2015 compared to 2014, when compared to the representative group (Bulk Study section 5.4.7). Participants reported improved information flows by using community connections in CVR to share information about energy use and management and comfort management (Detailed Study section 5.2.3). Participants demonstrated raised awareness and brought topics into conversation, thought and turned them into priorities in households – particularly energy use and efficiency, heater management, shower behaviour and tariff management/ understanding (Detailed Study various sections).

Providing incentives that support a healthy livelihood

GBS provided Woolworths Groceries Only gift cards to participants at various stages of the project in exchange for household energy data and/or as incentives to return data promptly. Providing these cards to low income householders so that they could spend money on groceries benefited hundreds of households in the Greater Hobart area. This had an added benefit of supporting local shopping centres.

Table 7-24 Evidence of supporting healthy livelihood

LIEEP Benefits	GBS Benefits	Evidence
Assist low-income households to implement sustainable energy efficiency practices to help manage the impacts of increasing energy prices and improve the health, social welfare and livelihood of low-income households.	Access to grocery vouchers.	GBS provided $47,375 worth of grocery vouchers to low income households in the Greater Hobart area.

Building the energy efficiency industry

The GBS project provided an opportunity to employ local energy efficiency specialists. High-tech energy monitoring equipment was also installed. Both of these activities brought benefits to the energy efficiency industry in alignment with the intended LIEEP benefits.

Table 7-25 Evidence of supporting energy efficiency industry

LIEEP Benefits	GBS Benefits	Evidence
Build capacity of Australia's energy efficiency technology and equipment companies by maximising the opportunities for Australian industries to participate in the projects.	Provide employment, training and commercial opportunities for local residents and businesses.	GBS directly purchased $64,013 worth of energy efficiency materials for home energy upgrades (Finance Report). Subcontracted the installation of an additional $90,955 of energy efficiency upgrades (Ibid.). GBS employed10 energy auditors to conduct home upgrades and spent $89,488 on wages (Ibid.). GBS spent $100,458 employing energy data analysts (7 people at various levels of employment) (Ibid.). GBS purchased technical data logging equipment to the value of $126,761 from 4 companies (Ibid). Commissioned product development to allow "Power tracker" (an energy efficiency services company) to develop large scale multi-site data collection . Helping to build their business and ability to service new market segments(Ibid.).

7.3.4 Benefits outside of the LIEEP scope

LIEEP and GBS provided benefits to the energy efficiency industry as stated in Table 7-25, however there were also economic benefits for supporting local Tasmanian and other Australian businesses through the rollout of the project. Table 7-26 provides a list of additional benefits that the GBS project provided.

Table 7-26 Evidence of additional GBS benefits

Additional GBS benefits	Evidence
Supporting local businesses	GBS spent over $277,487 at Tasmanian businesses (this does not include wages for SLT or UTAS employees) GBS spent $132,793 on Australian businesses not supplying specific energy efficiency services (eg, computer support and postage).
Educating the broader public about energy efficiency projects available to help low income earners.	The State and potentially national reach of media coverage (exact numbers unknown) about GBS through ABC radio, local newspapers and State television stations. Public outreach of findings will also occur on completion of the final report. Presentations will occur in Clarendon Vale, Hobart, Adelaide and New Zealand. Papers are also being produced for international journals on completion of the Final Report.
Building relationships between community centres and NGO's.	Presentations at Greater Hobart community and neighbourhood centres introduced citizens to the work of local NGO's such as Sustainable Living Tasmania and Mission Australia.
Contributing to energy efficiency, comfort explorations with low income household groups. Developing specialist understanding of encouraging energy efficiency in Australia.	Consortium members were actively exploring this area over the duration of the GBS project (and will continue to do so after the completion of the project). Specialist research was conducted by UTAS and RED consultants throughout GBS. Understandings from this, including sophisticated methodological approaches, will inform future energy efficiency and energy use work.
Contributing to future energy efficiency research and policy development through connections made between governments, NGOs and universities around Australia, including through GEEAR.	The GBS team have attended LIEEP forums and will be attending further conferences to discuss LIEEP and GBS. A GBS UTAS representative has been directly involved in the development of the Group of Energy Efficiency Academic Researchers (GEEAR) group that has emerged from LIEEP. GEEAR has a conference in February 2017 and a UTAS representative is speaking about LIEEP at the Energy Cultures Conference in NZ. There have been numerous spontaneous communications between LIEEP projects and discussions will continue through GEEAR.

7.4 Discussion

Each of the approaches taken in the Get Bill Smart project resulted in lower energy use than the representative (control) group. The cost effectiveness and cost-benefit ratios varied considerably between these approaches.

7.4.1 Energy Efficiency

Community capacity building (CCB) was a novel approach to energy efficiency and thermal comfort and was trialled and developed over the course of the GBS project. As a result, it is not unexpected that in its current form, CCB was highly inefficient in terms of the financial costs required to achieve energy savings. Based on electricity savings for 1 year the project delivered a simple payback of 254 years (Level 3 analysis). The cumulative energy and water savings over the service life of the works will yield $1 of household savings for every $127 invested

While financially the CCB approach appears inefficient, there were many other benefits to the CCB approach. Such benefits included improved physical and mental health for participant householders and, thanks to the localised knowledge of the ECs, the CCB approach was able to access some of the most difficult to reach and isolated individuals within the community. A great deal was learned from the CCB approach that can be applied to the development of future programs. Evidence from the Detailed Study and the Project Processes and Organisational analysis demonstrates there are benefits for community building and information sharing from the community capacity building approach.

The in-home education and upgrades (EDUG) approach, which SLT has been developing over several years, was the most cost effective approach. Based on electricity savings for 1 year the project delivered a simple payback of 10.3 years (Level 3 analysis). When electricity and water savings where combined over the useful life of the upgrade items, it was calculated that an $0.82 investment delivered $1 of savings. Like the CCB approach there were also intangible benefits from program participation linked to improved mental and physical health. Key to the success of the EDUG approach were the excellent people skills of those involved in program implementation. The intangible benefits of this significantly enhanced the ability of the EDUG approach to make financial savings.

Delivering the community capacity building in conjunction with in-home education and upgrades (EDUG + CCB) achieved a similar result (in terms of cost benefits) to the in-home education and upgrades (EDUG) approach, although slightly improved. With a 1 year simple payback the EDUG+CCB approach had a payback of 9.7 years (Level 3 analysis). However, the cumulative energy and water savings were not as favourable with $1.30 required to deliver $1 of savings. The poorer performance of this approach is largely due to a predicted decay in the effectiveness of the "education" and "capacity building" relative to fixed physical works. Further research could help determine if this assumption is correct.

Sealasash

a successful energy efficiency business

Sealasash is a Tasmanian small business that is now expanding interstate. They specialise in high quality draft proofing for wooden sash windows. Sealasash also has a wide knowledge of the manufacturing industry and alternative products that are available. They could see an opportunity for introducing a better alternative for low-income households.

Three years ago they met with SLT to introduce their high quality draft proofing products. The "brush strip" they supply is used to draft proof wooden framed doors and windows. It is a durable product that is quick to install. SLT has ordered and installed their "brush strip" door seals on thousands of houses through the Get Bill Smart Project and State Government funded programs. Government energy efficiency programs provide the security for small companies to invest in innovative products, grow their business and create employment opportunities.

Both the cost effectiveness and cost benefit analyses are dependent upon the electricity savings and the cost of delivering programs/approaches. As can be seen in the Bulk Study, the change in energy use is dependent on the original energy use. In fact, households that used less than 10 kWh/day on average increased their average energy usage regardless of which energy efficiency activities were undertaken with them. Across the project, 66% of households used less than 30kWh/day (approximately the Tasmanian household average). One policy response to this finding could be to target energy efficiency projects at higher energy users. Applying this approach to the EDUG+CCB group shows a 4.2 kWh/day saving. This improves the 1 year, cost-benefit ratio from 9.7 to 6.5 (at cost level 3). However, this is a cost based suggestion and would ignore the significant challenges that lower energy users have with both energy use and comfort.

Another potential approach (when focussing on cost-based data) is to focus on hot water energy use only (HWEU). We estimated the payback for such an approach would be 6.1 years. If focussing on hot water energy only *and* high energy users only, the payback period could be reduced even further - our analysis indicated as low as 2.7 years. However, the sample size for this analysis is too small to use this number confidently.

7.4.2 Comfort and health

Achieving thermal comfort improves health outcomes

The Get Bill Smart project significantly improved thermal comfort. This included reductions in window condensation, draughts and improvement of time spent in the thermal comfort zone. Households also increased their knowledge and ability to manage their homes effectively (Table 7-22).

In physiologically uncomfortable situations (such as we commonly saw in GBS participant houses), improvements to thermal comfort can support improvements to health. Indeed, health impacts of thermal comfort improvements may outweigh the energy and water savings discussed above by orders of magnitude.

The health gains from improved thermal comfort can be significant. Studies from New Zealand have linked energy efficiency programs (such as installing insulation) with savings to the health system. A NZ study that observed the effects of installing ceiling insulation in 1350 households, concluded:

"Insulating existing houses led to a significantly warmer, drier indoor environment and resulted in improved self rated health, self reported wheezing, days off school and work, and visits to general practitioners as well as a trend for fewer hospital admissions for respiratory conditions."
Howden-Chapman, P., A. Matheson, et al. (2007)

This connection is strong and the health benefits tend to overwhelm the energy benefits by several magnitudes. In a review of the NZ "Heat Smart" Program the health benefits are attributed to be 99% of the project benefits. These health benefits include reduced: mortality, hospitalisations and pharmaceutical use. Based on these findings, for every $8 of energy saving their was $608 in health benefits[15] (Grimes, A, , Howden Chapman, Pet al 2011).

It is argued that thermal comfort changes are a significant component of the program and the impacts of these should not be discounted relative to changes in energy use. Australian cost benefit analysis cannot fully represent health cost reductions due to energy efficiency support in households as we have not developed our health cost impact understanding in the way that New Zealand has.

Cold homes result in increased death

Recent research by the Lancet (Gasparrini et a,l 2015) finds that 6.5% of Australian deaths are attributable to the cold. The research indicates that cold conditions raise peoples blood pressure and aggravates pre-existing conditions such as cardiovascular and respiratory disease. Countries with cold climates experience lower rates of mortality, due largely to better performing homes (Sweden 3.69% and Canada 4.46% of deaths). Population wide 6.5% of deaths equates to over 1000 lives lost in Australia every year due partially to poor thermal resistance (insulation) and poor construction.

15 Low scenario, Table 30, pp 26 http://www.healthyhousing.org.nz/wp-content/uploads/2012/05/NZIF_CBA_report-Final-Revised-0612.pdf

Reducing condensation will reduce mould occurrence and subsequent health problems

The World Health Organisations Guidelines for Indoor Air Quality's volume on "Dampness and Mould" (WHO, 2009)concludes that

"sufficient epidemiological evidence exists...to show that occupants of damp and mouldy buildings ... are at increased risk of respiratory symptoms, respiratory infections and exacerbation of asthma" (pp xiii)

They continue with policy advice that:

"Dampness and mould may be particularly prevalent in poorly maintained housing for low-income people. Remediation of the conditions that lead to adverse exposure should be given priority to prevent an additional contribution to poor health in populations who are already living with an increased burden of disease." (pp xv)

GBS demonstrated that energy efficiency support to householders can help to ameliorate mould and damp issues and therefore can assist to provide another opportunity for health improvements.

7.5 Conclusion

This trial approach explored novel community capacity building approaches. On its own the CCB approach was not cost effective, but when combined with in-home education and upgrades (EDUG+CCB) had the best simple payback period. Community capacity building activities are still in their infancy and, if further developed with the learnings from this project, could prove to be more cost effective.

The in-home education and upgrades approach (EDUG) had a similar simple payback as EDUG + CCB at around 10 years. However when all energy and water savings are combined over the useful life of the installed equipment the in-home education and upgrades approach (EDUG) delivers the best savings with $0.82 investment returning $1 in savings, compared to community capacity building and in-home education and upgrades (EDUG+CCB) requiring $1.32. Research also indicates that targeting high energy users and Hot Water and shower upgrades could also deliver highly favourable cost benefit returns .

Other evidence from the project shows that it has improved the warmth and comfort of participants. Quantification of the relationship between these improvements and health and wellbeing outcomes in Tasmania is required before the benefits can be financially quantified. Studies conducted in New Zealand indicate improvements to thermal comfort result in ongoing health and wellbeing benefits that are likely to be several times more financially valuable than the energy savings achieved.

Other co-benefits to Tasmanian and Australian business have included strong support for the innovative energy efficiency industry.

Section 8

PROJECT PROCESSES AND ORGANISATIONAL ANALYSIS

8. Project processes and organisational analysis

8.1 Executive Summary

The Get Bill Smart (GBS) organisational report looks at Get Bill Smart project activities from an organisational perspective. The report examines: capacity and constraint issues experienced by participating organisations; key successes and challenges associated with implementation; impacts on project implementation from participating in a national trial evaluation; and key lessons for future low income energy efficiency projects.

This report describes the project, consortium members, GBS project staff roles and responsibilities, methods used to evaluate organisational processes, and the evaluations of various approaches used in GBS. Evaluation is made of in home education and upgrade (EDUG) visits and the community capacity building (CCB) processes. CCB processes required firstly recruiting and preparing local Energy Champions (EC) and then working with the ECs in their community to roll out community capacity building activities. The two stages of activities are reported here as phase one: building capacity of the ECs and phase two: building capacity of local community.

Evaluation in this report was based on data collected through: consultation with project staff, including ECs, via written correspondence, interviews, and evaluation feedback, observation of GBS community activities; review of GBS community plans and promotional materials. The report also drew on insights gained during other GBS data collection

Through this review learnings were identified that would help in the roll out of future home energy efficiency programs. The review found that in home education and upgrade visits were well received by community members thanks to positive and non-judgemental interactions with Home Energy Helpers. The smooth implementation of this approach was assisted by SLT's previous experience in similar program delivery. Limiting the efficiency of delivery and the capacity of staff was the large administrative load of the project as a result of participation in the broader LIEEP program.

Community capacity building programs (CCB) were also well received by the community. A strong Community Engagement Officer was key to the success of this program in managing a diverse group of Energy Champions with a range of capacities. Short time frames created serious challenges in terms of staff recruitment and time to imbed the program within the community. Community members appeared to prefer one-on-one style encounters (some group community activities worked and others did not), group community activities did however provide a symbolic identity for the program which provided legitimacy and visibility within the CVR area.

To achieve greater efficiency in future programs such as these, the following factors need to be considered:

- Considerable time needs to be given to recruiting and preparing Energy Champions and this needs to be coupled with a strong and capable Community Engagement Officer.
- Training of local staff (Energy Champions) needs to be ongoing and iterative. As staff begin work in the community, a return to key messages in the form of refresher courses would help to consolidate learning and ensure confidence.
- Energy Champions who are imbedded socially and culturally within the community are vital for legitimacy of the project and help to translate energy efficiency and thermal comfort messages.
- In a low income setting, local Energy Champions are not necessarily work ready – many are on disability pensions, look after families, have health problems and/or other limitations on capacity. However these are the people who understand the community best. It is important to understand the value of working with people with this limited capacity and to provide the required support, training and management.

8.2 Introduction

8.2.1 Purpose of report

This report describes and assesses the Get Bill Smart (GBS) project from an organisational perspective. We ask four key questions:

1. What were the capacity and constraint issues experienced by participating organisations?
2. What were the key successes and challenges associated with implementing the GBS project?
3. What impact did participating in a national trial evaluation have on project implementation?
4. What were the key lessons for future low income energy efficiency projects?

8.2.2 Project Benefits

The GBS project trialled three approaches that aimed to improve energy efficiency in households with low incomes: direct engagement with households through In-home education and an upgrade (EDUG); community capacity building (CCB); and a combination of both (EDUG + CCB).

The cost-benefit and cost-effectiveness of each of these approaches were tested against a representative group (see Cost Benefit Study). The GBS trial evaluation was based on:

- bulk survey data collected before and after GBS approach,
- interviews with participants before and after GBS approach,
- monitoring of energy bills before and after GBS approach, and
- monitoring of indoor temperature, humidity and energy use before and (through to) after GBS intervention activities.

Table 8-1 Number of participants completing the pre and post GBS activity survey

		Community Capacity Building Approach	
		Off (Greater Hobart)	On (Clarendon Vale / Rokeby)
In-home education and upgrades approach	Off	144	65
	On	143	56

Table 8-2 Number of participants who participated in pre and post GBS activity interviews and monitoring of indoor temperature, humidity and energy use

		Community Engagement Approach	
		Off (Greater Hobart)	On (Clarendon Vale / Rokeby)
Home Upgrade/ Education Approach	Off	12	14
	On	12	13

8.2.3 Approach one: In-home Education and Upgrade (EDUG)

Approach one, In-Home Education and Upgrade (EDUG), involved direct engagement with households through a home visit. Each EDUG was conducted by two trained Home Energy Helpers (HEH). At the visit, the HEHs provided the participant with information about home energy efficiency and thermal comfort. Householders had basic energy efficiency and thermal comfort principles and tips explained to them and they received a copy of Sustainable Living Tasmania's (SLT) Your Guide to Staying Warm and Saving Money booklet (See Appendix 1). The HEHs then conducted an audit of the home with the intention of identifying what measures would improve the thermal comfort of the house and in turn reduce energy costs. The HEHs then installed relevant measures that could potentially reduce energy costs and improve comfort. Participants also received a Power Savings Plan specific to their energy use.

Standard Home Upgrade

All participants in approach one received a Standard Home Upgrade (SHU). The types of measures undertaken as part of an SHU varied according to the individual household's needs. Participants involved in the GBS project who received an SHU were [originally] eligible to receive:

- draught proofing on the front and back door
- door snakes
- draught proofing on windows
- fridge/freezer seal check/replacement
- eco-switch
- thermometer
- energy efficient light bulbs
- flow restrictors
- water efficient showerhead
- shower timer
- insulation on the hot water tank (cylinder)
- insulation on the hot water tank pipes
- insulation in the ceiling
- curtains.

Not all upgrades were conducted in each house. HEHs would assess what was needed house by house.

The types of advice that householders were given regarding behaviours to improve energy efficiency and thermal comfort included the following suggestions:

- shorter shower times
- running appliances (such as washing machines) during cheap energy periods
- ensuring that the fridge/freezer is mostly full for maximum efficiency
- opening and closing curtains depending on sunlight and outdoor temperatures
- turning heaters off when no one is home
- hanging blankets or curtains in doorways where there are no existing doors
- using door sausages

High Needs Upgrade

At the EDUG visit, the HEH determined whether the household was eligible to receive additional energy efficiency measures. A household was eligible for a High Needs Upgrade (HNU) based on a rating system (see Table 8-3).

Table 8-3 Questions to assess high needs

High needs questions	A
Questions of Household: How would you describe your level of health over the past 12 months? From 1 to 5 with 1 being good and 5 very poor health	
Questions of Household: Do you feel that being cold in your house has effected your health? From 1 to 5 (1 = not at all, 5 very significantly)	
ASSESSOR High Needs Health ranking (1=OK health to 5 =high health needs)	
WOULD "High Needs" upgrades improve health conditions 1= marginal improvement to 5 = significant improvement	
MULTIPLY the two numbers above, if >15 high needs	
RECOMMENDED AS HIGH NEEDS (Y/N)	
Why Assessor recommends as high needs (free text)	

Initially, the HEH was required to rate the household in terms of:

- the susceptibility of occupants to ill-health due to cold, and
- the likelihood that the household would experience a substantial thermal improvement from additional measures.

As the project progressed, these criteria were adjusted to also include recommendations based on:

- other occupant health concerns, and
- vulnerability to financial hardship.

The types of upgrades that were available for people described as high needs included:

- roof and floor insulation
- curtains and pelmets
- additional draught proofing
- rugs and carpets
- sealing exhaust vents where appropriate
- retro fit double glazing
- replacement seals on fridges or freezers.

8.2.4 Approach two: Community Capacity Building (CCB)

The second approach, Community Capacity Building (CCB), involved two distinct phases. Phase one involved building the capacity of local Energy Champions. Phase two involved building the capacity of the neighbouring Clarendon Vale and Rokeby (CVR) communities.

Phase one of CCB: Building capacity of Energy Champions

The first phase of CBB entailed employing a Community Engagement Officer (EO) (0.4 FTE from Oct 2013 to Dec 2014) and 12 community representatives as Energy Champions (ECs) (paid on casual basis from Nov 2013 to Nov 2014). The role of the CEO was to recruit the ECs and to support them to develop a community engagement program and raise awareness about GBS and energy efficiency.

On joining the GBS project, the ECs received training in energy efficiency and communication from experts in these fields. As part of this training, the ECs were involved in some practical exercises in order to develop their knowledge and skills. The EO also facilitated a number of workshops that familiarised the ECs with what community capacity building entails and how to run a community engagement strategy.

In order to extend their understanding of home energy saving, all ECs received a standard home upgrade in their own homes – some also received a High Needs Upgrade. This increased the ECs' understanding of the GBS project and objectives, practical measures to reduce energy use and improve thermal comfort, and the effectiveness of energy efficiency measures.

Phase two of CCB: Building capacity in the local community

The CEO and the ECs met regularly during early 2014 (March – June) to develop a Community Engagement Strategy. During this stage the ECs were supported to make a video about the GBS project and their role in the project. A professional artist also drew cartoon images of the ECs to be used in individual case study promotion. The ECs also worked with the CEO to develop a calendar of home energy community events and activities.

The CEO then supported the ECs to run community events and to raise awareness about GBS in the Clarendon Vale/Rokeby community over a six month period (Jun – Dec 2014).

Activities the ECs were involved with included:

- recruiting people into the GBS study
- distributing the Stay Warm booklet to householders
- developing a calendar of community events
- hosting BBQs and information sessions at neighbourhood centres and the community shed
- staffing stalls at community events, the community centres and other public locations within the CVR area
- organising and running sewing workshops
- organising hardware shopping tours
- organising and staffing a quiz night
- door-knocking homes in the local area to raise awareness of the GBS project, support the research component of the project, and to engage with householders
- organising and running home energy efficiency parties (modelled on the Tupperware approach).

8.2.5 Approach three: Home Education and Upgrade & Community Capacity Building (EDUG + CCB)

This approach is a combination of the first two approaches described above and occurred in the Clarendon Vale and Rokeby suburbs as the community activities were being run there.

8.3 Consortium members and responsibilities

8.3.1 Mission Australia

Mission Australia was responsible for the overall project governance. Key responsibilities were to conduct review and quality assurance of project reports, convene the project steering committee, disperse funds, liaise with the Federal Government and undertake overall contract management.

8.3.2 Sustainable Living Tasmania

Sustainable Living Tasmania (SLT) was responsible for the delivery of the GBS project. Key responsibilities were to develop the project plan, compliance plan and risk management, prepare project financial reports, undertake energy efficiency education and upgrades, coordinate the community capacity building program, including providing training, draft and finalise reports on project progress, draft and finalise final reports and collate and analyse billing data.

8.3.3 University of Tasmania

The University of Tasmania (UTAS) was responsible for the evaluation of the GBS project. Key responsibilities were to develop the research plan, ensure compliance with participant confidentiality and privacy issues, obtain ethics approval, undertake primary data collection, including surveys, interviews and participant observation, collate and analyse billing, household and energy efficiency data, draft and finalise final reports, and archive datasets.

8.4 Roles and responsibilities of GBS project staff

8.4.1 Project management and administration

In order to manage and implement the GBS project, a project manager was employed by SLT throughout the duration of the three year project (1 June 2013 to March 2016). The project manager was responsible for project governance and liaison between consortium members, project management, recruitment and management of GBS staff, including the project officer (see below), EO and HEHs, liaison with government and LIEEP stakeholders, media engagement, electricity billing data collection, risk management, compliance and reporting.

A GBS project officer was also employed by SLT from 1 August 2013 to March 2016. The GBS project officer was responsible for the day to day management of the project promotion and media engagement, training the ECs, recruitment of and communication with GBS project participants, coordination of home visits, liaison with the research staff and evaluation program and reporting.

The complexity and scale of the GBS trial meant that there was a significant amount of administrative work associated with project implementation. A database was used to record participant details and track their progress through the project. SLT employed casual staff to design and manage the database, manage mail outs, field project inquiries, book appointments and communicate with project participants.

SLT with assistance from the consortium, developed a risk management plan. The plan included risks under the categories of: program governance, project management, workplace safety, project set up, approvals, recruitment and community engagement, participant retention, landlord permissions, data management, data logging, data analysis. SLT closely managed risks and reported potential problems to the rest of the consortium. On occasions where the strategy was needed, it was implemented effectively and challenges were safely addressed.

8.4.2 Home Energy Upgrade approach

To implement the in-home education and upgrades, Home Energy Helpers (HEH) were employed by SLT on a casual basis to provide in-home energy efficiency education and upgrades to GBS project participants. A range of contractors were engaged to supply and install insulation, lighting, curtains and extractor vent covers in eligible houses. Some participants also received maintenance services as part of the High Needs Upgrade.

8.4.3 Community Capacity Building approach

A Community Engagement Officer (EO) was employed (from 1 Oct 2013 to 1 Dec 2014) to coordinate and implement the CCB approach in Clarendon Vale and Rokeby. The EO was responsible for project promotion in CVR, recruiting ECs, supporting the ECs to undertake energy efficiency and communication training, and supporting the ECs to develop and implement a community engagement strategy.

Community representatives were employed by SLT on a casual basis as ECs within the CVR community for the GBS project. ECs were required to undertake energy efficiency and communication training, contribute to the development of a community engagement strategy, deliver community activities (centred on energy efficiency and thermal comfort), raise awareness of the GBS project in the community, and assist with recruitment of participants to the GBS project.

HEHs were also employed by SLT on a casual basis to deliver energy efficiency training to the ECs as a part of the CCB approach.

8.4.4 Evaluation

Evaluation of the GBS project was conducted by UTAS researchers. The team included a research Supervisor (employed from 1 June 2013 to March 2016), a Research Fellow (o.5 FTE employed from 1 June 2013 to March 2016) and a secondary Research Fellow (0.4 FTE employed from 1 April 2014 to March 2016). The research team were responsible for evaluation design, managing CSIRO data requirements, conducting BEFORE and AFTER surveys with all project participants and BEFORE and AFTER interviews with detailed study participants and ECs, observing community events, liaising with research stakeholders, data analysis and reporting.

A key part of the GBS evaluation involved monitoring energy use, temperature and humidity in a group of participant homes (in what is titled the detailed group). RED Sustainability Consultants worked in conjunction with UTAS for this component of the research. RED were responsible for installation of temperature and humidity loggers in homes, collection and analysis of logger data. A qualified electrician was employed for the installation and removal of the loggers.

Table 8-4 Summary of GBS project staff

Key staff	Organisation	Employment status	Duration (months)	Area of responsibility
Project manager	SLT	Part-time	34	Project management
Project officer	SLT	Part-time	24	Project management
Administrative Officer	SLT	Casual	34	Administration
HEH	SLT	Casual	14	EDUG
CEO	SLT	Part-time	18	CCB
EC	SLT	Casual	14	CCB
Research Supervisor	UTAS	Part-time (0.1 FTE)	34	Evaluation
Research Fellow	UTAS	Part-time (0.5 FTE)	34	Evaluation
Research Fellow	UTAS	Part-time (0.4 FTE)	23	Evaluation
Sustainability Consultant	RED	Part-time	34	Evaluation

Electrician	Self-employed	Casual		Evaluation
Other contractors	Bradfords Decorama Lights & Lamps Smithy's Maintenance	Casual/contractors		EDUG

8.5 Methods for assessing organisational processes

8.5.1 Consultation with project staff

This report is primarily based on consultation with project staff involved in the implementation of the GBS project. The views of project staff were elicited through interviews, evaluation forms and/or written correspondence. Participants included the program manager, the project officer, the Home Energy Helpers, the Community Engagement Officer, and the Energy Champions. The format and date of feedback is detailed in Table 8-5.

Table 8-5 Consultation with GBS staff

Role	Feedback format	Date
Project manager	Written correspondence	28 Oct 2015
Project officer	Interview	25 Feb 2015
Community engagement officer	Interview	16 Dec 2014
Home energy helpers	Written correspondence	3 Feb 2014
	Written correspondence	4 Feb 2014
	Written correspondence	5 Feb 2014
Energy champions	Workshop and training evaluation (anonymous)	18 Dec 2013
	Interview	8 Dec 2014
	Interview	8 Dec 2014
	Interview	15 Dec 2014
	Interview	15 Dec 2014
	Interview	16 Dec 2014
	Interview	17 Dec 2014
	Interview	22 Dec 2014
	Interview	21 Jan 2015
	Interview	22 Jan 2015
	Interview	27 Jan 2015

The report also draws on insights about the EDUG and CBB approaches from participant observation at home visits and community events. The activity and the dates of participation observation of the GBS project are detailed in the Table 8-6.

Table 8-6 Participation observation of GBS activities

Community event	Date
Door snake making workshop	13 Oct 2014
Information table at child and family centre	18 Oct 2014
HEH community presentation	3 Nov 2014
Home upgrade x 2	15 Oct 2014
Home upgrade	4 Dec 2014

Where relevant, some insights are drawn from AFTER surveys and AFTER interviews conducted with GBS household participants. A description of the AFTER survey method is detailed in The Bulk Study: Bulk comparative assessment of approaches. A description of the AFTER interview method is detailed in The Detailed Study of effects of GBS approaches.

8.5.2 Evaluation framework

This report examines the GBS project from an organisational perspective. We ask four key questions:

1. What were the capacity and constraint issues experienced by participating organisations?
2. What were the key successes and challenges associated with implementing the GBS project?
3. What impact did participating in a national trial evaluation have on project implementation?
4. What were the key lessons for future low income energy efficiency projects?

The discussion of findings is organised around the following themes:

- organisational capacity
- organisational constraints
- implementation successes
- implementation challenges
- impact of research on approaches
- key lessons that have emerged from the experience of project implementation

8.6 Evaluation of Home Education and Upgrade approach

As detailed in section 8.3.3, the EDUG approach entailed home visits which were undertaken by two qualified Home Energy Helpers (HEH). At EDUG visits participants received:

- education about home energy use and thermal comfort,
- a copy of Your Guide to Staying Warm and Saving Money booklet,
- an energy audit of the house,
- a ranged of energy efficiency upgrades (see 1.2.1), and
- a Power Savings Plan specific to their energy use.

A home visit and upgrade took approximately 2 hours. While the upgrade was typically performed in one visit, in some situations additional upgrades were installed at a later date (see section 1.2.1 for a list of standard and high needs upgrades).

In 2014 and 2015, the GBS project delivered 249 Standard Home Upgrades (SHU) to low income households, 164 in Greater Hobart and 85 in Clarendon Vale and Rokeby. Ninety-eight of these households were identified by the GBS team as high needs based on the HEHs assessment of their house quality, financial situation and personal health and the potential impact of the upgrade on thermal comfort. In addition to the SHU, these households received a High Needs Upgrade (HNU), which involved higher cost energy efficiency measures than available through the SHU, such as insulation and window coverings.

8.6.1 Organisational capacity

SLT was well-placed to deliver the EDUG approach. Prior to GBS, SLT had facilitated over 4000 energy efficiency upgrade visits to households in low income areas in Tasmania. SLT staff therefore had extensive experience managing this type of approach and were able to overcome known barriers by designing specific processes into the home upgrade approach.

For GBS, SLT employed experienced HEH staff who they had worked with before. These HEHs had experience at both the home visits/upgrades aspect and also at working with low income households.

SLT was also able to use contractors they had worked with before for some of the outsourced high need upgrades (like insulation and curtains).

Their previous home upgrade work also provided a sound understanding of what protocols were needed, what risk issues may arise, and education approaches that were likely to work during the GBS upgrade visits. For the education component of the home visits SLT updated and tailored a household education booklet they had previously developed, called Your Guide to Staying Warm and Saving Money (see Appendix 1).

Private rental tenants are traditionally challenging to engage in home upgrade activity because of split incentives tenant/landlords and other well documented issues. SLT knew about these engagement challenges because they had (also) previously worked with private rental tenants in programs. SLT therefore knew that any program aiming to engage private rental tenants had to ensure there were processes that allowed direct communication (on behalf of tenants) with landlords, especially when permission needed to be obtained for upgrade work.

8.6.2 Organisational constraints

While the scale of the upgrade delivery program was lower than previously experienced by SLT, the administrative process of delivering the HEU approach was also more complex due to substantial data collection and reporting requirements. For SLT to deliver the HEU approach as part of a major research trial required development of new systems to recruit participants into the GBS trial and track their progress through the project. SLT developed a new database and employed additional casual staff to manage this additional administrative work.

SLT did not have the capacity to undertake all the upgrade work. They were reliant on contractors to install some energy saving upgrades (e.g. ceiling and floor insulation and curtains). In order to monitor quality of contract work, SLT organised a random audit of upgrades. While SLT provided direction to contractors about the work required, the quality of contractor work varied. In addition contractors' understanding of energy efficiency varied which sometimes limited their understanding of the aim of the installations (for example that curtains were for improving thermal performance). Contractors' knowledge of energy efficiency therefore cannot be assumed and clear direction by the program is therefore very important.

8.6.3 Implementation successes

The EDUG approach was successful, with 249 home upgrades performed. In addition home upgrades were conducted with no major incidents occurring.

Householder experiences of HEU were monitored through:

- audits of (12 of) the households who received insulation,
- random audits of a number of households by an experienced (retired) HEH,
- post GBS activity interviews with participants (25 participants), and
- post GBS activity surveys with participants (200 participants).

The independent audit results conducted by Building Evaluate[16] indicated that the insulation had been installed to an "average-good" condition. There were no safety issues noted in the audits.

The bulk survey responses and interview transcripts of households who received the EDUG highlighted a positive overall experience. For example:

> I received ceiling insulation which I feel was a wonderful gift. Thank you very much for this project!! (GBS612 after survey, 2015)

The GBS project team also received unsolicited feedback from participants about the EDUG experience. Sixteen participants contacted SLT to thank them for their work and to comment on how helpful the HEHs who visited had been. For example, one participant called to say:

> It was lovely to have [the HEHs] here, they did such a good job. They did a marvellous job, they got me thinking of all the contractors that I've had here before and the Get Bill Smart team were so much better!

Another wrote a card to say:

> Thanks so much for doing the energy upgrades to my unit. I'm really impressed.

One challenge for HEHs is developing goodwill, and trust, with householders in a short period of time at the beginning of home visits.

16 Building Evaluate are licenced building inspectors and energy efficiency experts.

HEHs need to achieve some repour with householders because they closely assess participants' homes, make actual upgrades, and need to gain their attention when they provide advice on how to improve energy efficiency. Having a person looking through their home and being offered advice can be unsettling for householders, particularly when they feel they are managing well and doing the best they can. It was a credit to the HEHs that the majority of comments were positive:

All good. Everything was carried out without fuss and bother to the running of house. (GBS019 after survey, 2015)

The very friendly and helpful team that came to my home. The efficient way they worked through my house. A very positive experience. (GBS482 after survey, 2015)

They were very friendly and helpful around my home. (GBS513 after survey, 2015)

One participant commented that "I didn't feel judged" (GBS135 after survey, 2015).

Another noted:

Representatives were happy and cheerful – they didn't talk down to you or judge the appearance of the home. (GBS243 after survey 2015)

However, when dealing with large numbers of households (living in a range of situations) it can be difficult to find the balance between getting the job done and ensuring that people are comfortable with all aspects of the upgrade. One participant found the advice "***a bit patronising***" (GBS593 after survey, 2015) and another, who had appreciated the upgrades, was disappointed to note that "***the lady [who] did the upgrades [was] pompous***" (GBS347 after survey, 2015).

Worth noting also are the relationships built with local Tasmanian and Australian businesses. Contractors were employed to install insulation, make and install curtains, and provide HEHs with upgrades materials.

8.6.4 Implementation challenges

Key implementation challenges are described below under four themes: the duration of home visits; the intensity of the home visits, the tension between tailored responses and maintaining consistency and fairness; and, the challenge of reversibility and choice.

Duration of home visit and upgrade

The duration of the home visit and upgrade was an issue raised by both HEHs and household participants. The HEHs observed that a 2 hour visit was not sufficient in some instances to deliver education about home energy saving and thermal comfort, as well as perform home upgrades adequately. However, the HEHs also recognised that some participants felt overloaded by the information provided in the single 2 hour session. HEHs expressed concern that scheduling visits that potentially run for over two hours might reduce program participation. One suggestion from the HEHs was to provide the participant with the Your Guide to Staying Warm & Saving Money booklet prior to the visit to enable them to absorb the information and to prepare any questions.

From the participants' perspective, the main concern was that they had not anticipated that the home visit and upgrade would take such a long time or require them to make some quick decisions. One participant, who was very pleased with her upgrades, wrote: "***A small shortcoming: From the info I read in the paper, I hadn't realised how much they were able to do, so I wasn't prepared for decisions or questions covering it all***" (GBS593 after survey, 2015). While participants were advised that the visit could take up to two hours when appointments were made, they were still surprised by the length of time the HEHs spent in their home and the range of measures being undertaken. In some instances, participants opted to cut short the home visit due to other commitments. SLT made a significant effort to communicate to participants in a variety of forms (over the phone, in all recruitment information etc.) that visits would take up to two hours. Given that many participants were still surprised at the length of the visit it would be worthwhile taking extra steps to explain ***why*** such a lengthy visit might be necessary. Any organisation running a similar activity needs to be prepared for mismatched time expectations between parties.

Intensity of the home visit and upgrade

While the HEU approach was highly valued by participating households, this approach was not suitable for all households. Some private rental tenants were unable to get permission from their landlord to participate. Others renters who were able to get permission felt limited in their capacity to make changes given they were tenants:

[I'm] frustrated that I can't make changes that would make a real difference because I don't own the house and I haven't any money for proper window coverings (GBS475 after survey, 2015).

While SLT took a lead role in contacting landlords to request permission and explain the benefits of the home visits, in some instances permission was still declined (by landlord or the tenant) due to concerns about risk and lack of interest. Other households who were keen to be involved in GBS explicitly requested that they be excluded from the EDUG group for a range of reasons: some felt unable to commit the time to a two hour visit, some had a preference for a less intensive form of involvement, some were wary of landlord reactions (such as eviction or increased rent) and some wanted to urgently access the grocery vouchers that were available to other approach groups due to personal hardship and crisis.

Tailored approach versus consistency and fairness

A strength of the EDUG approach was that HEHs could provide tailored solutions and suggestions to participants that responded to their individual housing situation. At times, however, there was some tension between providing a tailored response and consistency in program delivery. Some participants were confused that they had not received some measures when others did. This situation arose most obviously in the third approach group (EDUG + CCB) in the trial site, Clarendon Vale and Rokeby, where neighbours and friends were talking about their experiences and comparing their involvement.

Some inconsistency also arose in EDUG visits when HEHs were not sufficiently stocked with equipment to undertake all upgrades measures, possibly due to the challenge associated with delivering a large number of upgrades in a short period (GBS099, GBS085 surveys, 2015). For example, in one instance the HEH insulated the hot water tank and pipe, but did not have a valve cosy available. The HEH was able to improvise by making use of insulating tape to cover the valve (GBS357 survey, 2015). In other situations, the household may not have received some equipment such as an eco-switch or shower-timer simply due to lack of stock.

In determining basic upgrades versus high needs upgrades there was a lack of clarity around who qualified for what. HEHs had criteria by which to judge high needs on but this was often still a very subjective process. To ensure this was fair, a more robust measure of high needs needed to be developed.

There was more consistency in the educational component of the home visit. While the consistency was useful, there were sometimes issues because the education booklet assumed a certain basic level knowledge about energy efficiency. GBS EDUG visits were aimed at households who, it was assumed, would have low energy literacy and limited capacity to use to make energy efficiency changes in their homes. In general this was a reasonable assumption. Some participants were far more knowledgeable about energy efficiency and had capabilities that could help them make change. Some participants felt that the HEHs did not take the time to find out what they knew about energy efficiency and delivered information that was already familiar to the participant.

A HEH also observed that the EDUG was delivered to a household without the direct involvement of the householder (HEH, 4 Feb 2014). The HEH felt that where there was capacity and interest from householders to be more involved in the upgrade process and that it would be valuable to involve the householder as this builds 'know-how' about the home.

Reversibility and choice

Householders expressed dissatisfaction with some of the Standard Home Upgrade measures. Some participants expressed dissatisfaction with the compact fluorescent lights (CFLs) due to the quality of the light (GBS015, 31 Jan 2015; GBS099, 06/02/2015) or the lights flickering when turned off (GBS135, 16/02/2015). The flickering CFLs created some anxiety for households who were concerned that this was an electrical fault (for example, GBS133 after survey, 2015). Others were dissatisfied with the installation of draught-proofing (GBS029, 30 Jan 2015) or the pressure of the water efficient showerheads (GBS100, 06/02/2015).While in some instances households contacted SLT to arrange to have measures fixed, other households went ahead and made the changes themselves (GBS015, 31/01/2015).

However, this capacity to reverse any unwelcome changes that occurred during the upgrade was hindered by the protocol of HEHs disposing of incandescent bulbs when installing the new CFLs:

> Upset that the Home energy helpers threw away light globes!! (GBS021 after survey, 2015).

> The guy who installed all the light bulbs put the old ones straight in the wheelie bin! Total waste. We took them out and put them back in the cupboard (GBS583 after survey, 2015).

SLT explained that ***keeping light bulbs on site totally goes against energy efficiency – they need to be removed so that the change actually is permanent*** (SLT pers. comm. March 2016). While this is a solid approach from an energy efficiency perspective, it is worth considering two things: 1) the expense that a low income person will have to go to in order to replace a dysfunctional bulb, especially if they feel unable to complain to an organisation that they either see an authority figure or one to whom they owe a favour and 2) it may be offensive for low income people to watch perfectly functional items being discarded.

From an organisational perspective dysfunctional equipment does create a risk to the success of EDUG processes as it can undermine people's confidence in energy efficiency measures and, in turn, undermine future household engagement and investment in energy efficiency.

8.6.5 Impact of research on GBS activities

The GBS research trial did have some impact on the delivery of the EDUG approach. Paperwork and early exposure to the energy efficiency questions were the main issues. Participants were required to return privacy statements, ethics forms and a comprehensive pre GBS activity survey before upgrades could occur. Some HEH visits were delayed due to the lengthy process involved in acquiring project paperwork from participants. This had a minor impact on the availability of HEH who anticipated that the upgrade work would be undertaken over a two month period rather than spread out over nearly 6 months.

Energy efficiency was, in some cases, brought to the fore of participant's minds when they went through the privacy forms and surveys. This awareness led to some householders saying to HEHs at the beginning of their visits that they had already gone through energy efficiency 'stuff'. This was a curious but not really surprising side effect of the research devices.

8.6.6 Key Lessons

The EDUG approach is a well-practiced approach to energy and comfort behaviour change and an approach that SLT was very comfortable delivering. The following key lessons should be understood in this light.

Previous experience with home upgrades ensured many barriers were identified and dealt with in early project design and that householders overall were happy with their interactions the HEHs at EDUG visits.
There are staffing and administrative challenges associated with delivering a large-scale energy saving program for small-scale organisations.
The intensity and duration of home visits did not suit all households, including some private rental tenants and people experiencing personal hardship and crisis.
Clearer communication of the duration of the home visit to participants is required.
There needs to be clarification of guidelines, in order to address tension between tailoring the home visit and upgrade and ensuring consistency in program delivery.
The criteria by which high needs upgrades will be assessed needs to be clarified in detail early, prior to program delivery.
Contractors' knowledge of energy efficiency cannot be assumed and clear direction as to the intent of the upgrades should be shared with them.
Audits and quality checks were useful and allowed identification of problems and iterative improvements.
There is a need for householders to make informed choices about upgrades and for householders to be able to reverse upgrade measures if required.
A non-judgemental approach to delivering education and upgrade is valued by participants.
There is great variability in the energy literacy and capacity of participant households. The current approach does not allow participants with capacity and interest to be directly involved in installing energy saving measures. This is a missed opportunity for participants to gain energy saving "know-how".

8.7 Evaluation of CCB approach phase one: Building capacity of Energy Champions

As discussed in Section 8.3.4, the CCB approach involved two distinct phases: building the capacity of local Energy Champions, and building the capacity of the neighbouring Clarendon Vale and Rokeby communities. In this section, we evaluate phase one and phase two of the CCB approach from an organisational perspective.

8.7.1 Overview

Phase one of the CCB approach involved:

- recruiting an Community Engagement Officer (EO) and local Energy Champions (ECs),
- training and skill development of ECs, and
- providing ECs with home upgrades (standard and high needs).
- These activities were undertaken between August 2013 and March 2014 (see Section 8.3.4).

8.7.2 Recruitment of CEO and ECs

The first phase of CBB entailed employing a Community Engagement Officer (0.4 FTE from Oct 2013 to Dec 2014). The role of the EO was to recruit 12 community representatives to be the Energy Champions and to support them to develop a community engagement program and raise awareness about GBS and energy efficiency. The ECs were paid on a casual basis from Nov 2013 to Nov 2014.

Formal recruitment began with the advertisement of community information meetings through:

- an advertisement in Clarence Plains Talking, a local community newsletter, distributed to every household in CVR (2,100 copies)
- advertisements in other community newsletters (e.g. produced by schools, neighbourhood centres)
- posters put up in shop windows
- posters put up in service provider windows
- a newly-created GBS Facebook page.

The CEO met with a large number of community service providers (including neighbourhood houses, youth centres, local schools, local churches and real estate agents) about the project and possible recruitment activities.

8.7.3 Organisational capacity

While SLT had experience working with low income households and presenting individual workshops, they had not undertaken community capacity building work at this scale before. From previous experience SLT knew that community capacity had the potential to work at this scale, but had as yet not had a chance to trial their ideas. They employed the EO and ECs specifically for the GBS project.

8.7.4 Organisational constraint

The original intention of the GBS project was to recruit both the EO and the ECs from within the CVR population. Following delays in securing funding, the project timeframe was pushed back and as a consequence there was an unexpectedly short time frame for recruitment. This had implications for the range of candidates considered for the positions.

A key drawback for the project was that the GBS project manager was unable to recruit an EO from within the trial site. This was due to lack of interest in the relatively short period of time for which the position was advertised. The EO was, instead, selected (from outside CVR) for her experience in undertaking community engagement. Unfortunately, the EO then had limited time to embed herself in the CVR communities. As one of the ECs explained:

> [The EO] was good. She's friendly but you could see she was working to an agenda and that was fine. But within that Neighbourhood House, this is a concept the Neighbourhood House should have come up with so that it actually became owned by the community long before [the EO] turned up (GBS007, 03/04/2014).

The EO was responsible for recruiting 14 ECs to the project. While the positions were advertised in local media and the EO tapped into existing service providers to identify potential recruits, only 25 applications were received. Of these, 20 progressed to selection interview stage. Eight out of the 20 interviewed where either not suitable, not eligible, or decided against participation. The remaining 12 were recruited. While it was anticipated that ECs would be selected based on their eagerness to be involved, level of involvement in the community, communication skills, capacity to understand energy efficiency, and the diversity they brought to the project, in practice, due to low levels of

interest, the ECs were selected for their availability and interest, rather than their skill-set or community action experience. The first selection interview was held on 12 September 2013, and the last selection interview was held on 1 November 2013.

8.7.5 Implementation success

In relation to recruitment, the key success factor was that the EO was highly committed to the project and she remained in the position for the entire period that community capacity building was being conducted. She provided leadership and support to the ECs, with many stating how much they appreciated her work:

> [The EO] was great! She was amazing! And she taught us everything, you know if it wasn't for her then we wouldn't have been out there (GBS002, 21/01/2015).

Among the ECs, there were varying degrees of commitment and participation. One EC moved out of area and was no longer able to participate and one EC had serious health issues which significantly limited participation.

8.7.6 Implementation challenges

Surveys of those people who became ECs suggest that the advertisements in local newspapers and community newsletters were not effective recruitment methods. Most ECs heard about the project through brochures and leaflets or via word of mouth from others involved in the project

There were several applications from people who lived in Mission Australia housing[17]. Although advertisements included eligibility criteria (which Mission Australia residents did not meet), people were confused by the inclusion of the Mission Australia logo on the advertisements. Details of these people were not recorded. Similarly, two very keen and suitable people were living in Red Shield rental housing[18]. The EC recruitment process was started with these people until it was established that as Red Shield manages houses for Housing Tasmania, and due to government funding limitations their tenants were not eligible to participate in GBS. This artificial constraint was detrimental and sent out a problematic message to the CVR community.

Table 8-7 outlines the key strengths and weakness of the various recruitment strategies and a more detailed discussion follows.

17 LIEEP funding for GBS excluded government owned housing. Mission Australia manage, and are gradually transferring ownership of government housing in the CVR area. The LIEEP requirement meant that a large number of householders who lived in government-owned (and Mission Australia managed) housing in the area could not take part in GBS. The same issues occurred with Red Shield housing in the area – the housing was still government owned. This was a significant issue for GBS and limited the community members that GBS could engage with.

18 Housing Tasmania is a state government run welfare housing organisation in Tasmania.

Table 8-7 Review of recruitment strategies

Recruitment strategy	Strengths	Weaknesses
Word of mouth/service providers informing people of the GBS opportunity	The most successful recruitment strategy. This worked particularly well through the Clarendon Vale Neighbourhood Centre Coordinator. This was particularly successful with the presence of the Community Engagement Officer	Recruitment low on the list of priorities for service providers without EO present. Time intensive for EO having to spend a lot of time with service providers.
Pamphlets/fliers	A useful recruitment strategy. The community meeting was advertised with a flier in the community newsletter, and resulted in the recruitment of several ECs.	The risk of getting people offside through advertising overload and 'junk mail'. The fliers were 'wordy' and may not have caught interest.
Community meetings	Community meetings on 10 Sept 2013 and resulted in the recruitment of four ECs who applied successfully.	These meetings were poorly attended (a total of nine people) as a result of insufficient EO time in the community in lead up to meetings. The EO found it hard to convince people about why they might like to become ECs.
EC snowballing	Not all ECs were interviewed or offered the position at the same time, the first four to be given positions were asked to help recruit applicants and this yielded three more ECs.	Recruitment of closely related people (friends/family), rather than diverse household involvement.
Community events/ festivals	Stalls at a local festival generated a lot of interest and conversation about the project and recruited three ECs.	The display was static – more opportunities for interactions might have helped increase applicant numbers.
Real estate agents	One property manager herself lived in Rokeby was interested in being an EC (this fell through but was instrumental in the recruitment of another)	All bar one real estate agency were uncooperative.
Advertisements in community newsletters/ newspapers	Potential for wide coverage of local households. Some expressions of interest received however these were from people who were ineligible.	The inclusion of the Mission Australia logo created confusion as to eligibility.
Facebook	(May have been a useful approach for recruitment once the project was up and running).	Did not successfully recruit Champions as too early in the project for this.

Problematically the EC recruitment process had to be conducted in a very short time frame which was the result of contractual delays and paperwork-constraints in LIEEP paperwork. Consequently there was very little time for investment in recruitment strategies or for word about the project to spread, giving little time for potential ECs to consider the project let alone respond. This short window for recruitment was not only stressful for the GBS team (a problem in itself), but meant that people were hurriedly chosen for ECs' roles that were actually fairly long-term commitments (15 months).

It is evident from Table 8.7 that recruitment was most effective when those promoting the project engaged directly with potential ECs. For example recruitment through community service organisations was far more successful when the EO was present. The time that the CEO spent with the service providers when other community members were present was vital for success.

The enthusiasm, proactive approach and professional skill of the EO was pivotal in the recruitment of ECs. It was particularly helpful that the EO had a base (an office in the Clarendon Vale Neighbourhood Centre) within the community. While the CEO's professionalism was invaluable, employing someone from within the community for this role may further strengthen this position given that the recruitment process was significantly strengthened when strong personal relationships were utilised.

8.7.7 Energy Champion profiles

This section provides some illustration of EC capacity and household attributes. The information is drawn from surveys and interviews completed by the ECs. Their ages, tenure, education levels and household occupancy varied, which meant the group was reasonably diverse.

Of the 12 ECs, eight lived in Clarendon Vale and four in Rokeby. Ten were women and two were men. Their ages ranged from 29 to 74, with the majority over 45. Tenures varied. Nine of the 12 were home owners. Three of these were owner occupiers with no mortgage, five were owner occupiers with mortgages (one of these was paid off by the end of EC preparation), and one was buying their house through a rent-purchase scheme. The other three ECs were renting their homes. The EC who paid off their mortgage during the project reported having a notably changed outlook and practices after the mortgage was paid.

The 12 ECs had a range of educational experiences with the majority (10) having finished high school to year 12 (the final year of high school in Australia). Of these ten, two had TAFE or polytechnic course qualifications and three had a tertiary diploma or degree. Two ECs finished school at year ten.

The composition of EC households changed over the first few months. To begin with, there were five single parent households with dependent children, four couples with dependent children, and three single occupant households. One of the single parent households lived in a group share house. Seven of the households had at least one person with a chronic illness or disability and one of the ECs lived with someone who was chronically ill and required full-time care. During 2014 one EC moved from her house and out of the area due to domestic problems. Table 8-8 provides a snapshot of the EC and participating household attributes.

Table 8-8 Champion and participating household attributes

Champion and participating household attributes	No. of participants
HOUSEHOLD COMPOSITION	
Single parent with dependent children	5
Couples with dependents	4
Single occupant household	3
LEVEL OF EDUCATION OF CHAMPION	
Tertiary degree or diploma	3
TAFE/ polytechnic	2
High school to year twelve	5
High school to year ten	2
EMPLOYMENT STATUS	
Households with at least one person working full time	3
Households with at least one person working part time	3
AGE OF CHAMPION	
Age <30	1
Aged >60	2
TENURE	
Home owned outright	3
Home owned with mortgage	5 (4 by March 2014)
Home rented	3
Home being purchased under a rent/buy scheme	1
ILLNESS OR DISABILITY	
Households with at least one person with chronic illness/ disability	7
Households with at least one person with chronic illness/ disability requiring full time care	1

Consistent with the diversity of the group, there was a mix in employment status amongst the households. All the households had at least one adult involved in some kind of paid work; however for some, the EC role generated the only work-related income.

It is worth noting that of the 12 ECs, ten were significantly affected by health issues. These included having chronically sick partners or children, having significant personal problems with health (mental and physical) and recovering from life threatening illness.

Some of the ECs had existing skills in energy efficiency and community engagement. One person was a community support worker, one had good technical knowledge on energy efficiency, and one had previously lived in a self-sufficient house and thus fully understood energy and water efficiency from lived experience. At a less formal level, the ECs reported high levels of control and agency when it came to the management of their own energy bills and thermal comfort. Many explained how carefully they monitored their finances and energy use while others detailed practices of household management. For example many used rolled up towels or pieces of wood as draught stoppers, or had carefully thought out plans for their modifying their homes.

8.7.8 Training and skill development of Energy Champions

On joining the project, ECs began preparations for their community engagement role. They received training in home energy efficiency and communications as well as home energy upgrades.

The description of the EC preparation program, the ECs' experience of these preparations and assessments of the success of the preparations are described below. The information in this section is based on the data described in section 2.1 of this report.

Workshops

ECs participated in seven training workshops in November and December 2013. As part of this training, the ECs were involved in some practical exercises in order to develop their knowledge and skills. The workshops were designed to educate and inform champions about effective thermal comfort energy efficiency measures, to support the development of skills that would help them to develop an effective community capacity building strategy and to prepare them for work in the community.

The EO, employed by SLT but situated in the Clarendon Vale Community House, was responsible for running training sessions and workshops. Training workshops covered:

- key concepts in community capacity building,
- project objectives including strategy development,
- community and individual strength identification,
- asset mapping,
- brainstorming community capacity building activities using mind maps,
- barriers in community projects,
- home energy efficiency (what changes to make at home and why),
- recruitment and engagement activities,
- communication styles,
- ways to motivate community members, and
- behaviour change.

Workshops provided the opportunity for champions to reflect on their own skills, the skills and capacities available in their community and the needs and requirements of their community. The outcomes of training workshops informed the development of the community capacity building strategy.

The EO guided the development of the community strategy and wrote up the final document. It was obvious that her skills in community engagement, workshopping and communication were critical to the success of this process.

The community strategy was followed closely throughout the GBS community engagement period. However, there was a periodic review of activities and adjustments were made to planned workshops according to learning when the ECs were out in the community.

8.7.9 Implementation successes

ECs valued the workshop and information sessions for a variety of reasons, primarily the opportunity they provided to learn new things including technical knowledge, opportunities for financial savings and social and communication skills.

Overall, training was reported by both the EO and the ECs to have been a positive experience (December 2013 training evaluations; EO evaluations of training; EO communication with researcher, 28 Jan 2014). The EO reported that most aims were achieved, that the ECs considered the information to be useful and that generally there was a noticeable camaraderie. The training was seen by both the EO and some ECs as important to help bring ECs up to speed and, for some other ECs, as a way to refresh their understanding of energy efficiency.

In evaluation forms filled out by nine ECs on their training workshops in December 2013, the workshops were rated well. On a rating scale of 1 to 5 (with 1 being very poor and 5 being excellent), with only a few exceptions all workshops were rated at either a 4 or a 5.

High levels of EC enthusiasm

At the completion of the workshops and training the ECs were excited and enthusiastic about the year ahead. As reported on the anonymous workshop evaluation forms:

> I have learnt things I have never known before, it has always been men's territory.

> I have enjoyed all the sessions. And I am really enjoying this, and I'm very motivated and inspired to start.

> Looking forward to next year.

> I have really enjoyed this group I have learned so much already and can't wait to get out there and teach others.

> Love the program.

Improved confidence and capacity of Energy Champions

ECs exhibited substantial improvements in confidence after the training workshops. This was noted by the EO and the ECs themselves:

> I think having an income has been a really big benefit for them but also picking up on, learning new information about energy efficiency, about how to communicate, about how to be professional in working in a group. There's a couple of people who have said that it has given them a lot more confidence whereas they never had the confidence maybe to stand in front of a group of people and talk about things. (EO, 16/12/2014).

> Well, confidence. Big confidence. I spoke at the forum that Rokeby High School had a couple of weeks ago. [Some of us] did a session on Get Bill Smart, so I spoke about how I found Get Bill Smart for me and Jane spoke about her experience and [the EO]

just did a brief talk about what Get Bill Smart was all about and how it was run and stuff, so we just spoke to a group. And I said to them before, I wouldn't hardly say a word to people, and to be able to sit in a group and actually talk is a big thing, so confidence has been a big thing. Also, looking into jobs, like careers for me, I mean I'm back at TAFE and it's good to say that I've had some employment and that I've been employed through you and it's good to actually say that I'm a mum of three and I've actually worked for Get Bill Smart and this is what we're about. (GBS005, 08/12/2014)

She'd [a fellow EC] come out with a speech and we all just went, "Where did that come from, she never speaks..." And that's the confidence that's giving people, that's what giving her confidence," (GBS001, 06/03/2014).

So we've just learnt so much, and it just gives you that, you know, like the barbeques, it was that easy to go up and approach someone and say, "Hey, you know, I'm Vanessa, I'm, you know, do you want to save some money, I've got ways". (GBS002, 17/03/2014)

At the completion of the training program one EC reflected: *"I'm pleased to be a Power Ranger*[19]". (GBS009, 06/03/2014)

Strong and trusting relationship between EO and ECs

The EO developed a strong relationship with the ECs. The ECs recognised the value of this role and the skill of the CEO. Over time, strong levels of trust developed:

She treats us all like we're all an individual, which is a good thing as well. It's amazing. She treats us all like we're all a different personality, not just oh you all come from... She realises and recognises all our experience and potential. And she's able to bring it out in us. (GBS001, 06/03/2014)

19 'Power Rangers' was the name that the ECs chose to identify themselves as.

The EO successfully managed the diversity of personalities both within the training and later in the field, recognising that certain people were not capable of working with each other. To the credit of the EO a strong sense of team developed with feedback including, "***We just seem to work so well together***" (GBS002, 17 Mar 2014), and the rallying cry of, "***Go Power Rangers, go!***" (GBS002, 17/03/2014).

Development of the Community Engagement Strategy

The EO and the ECs successfully developed a community engagement strategy. This strategy and the calendar of events provided a solid framework for the roll out of Get Bill Smart into the wider CVR community. The intimate knowledge of the people and culture enabled a community engagement strategy that aligned well to the wants and needs of the community (see Milestone 4). Fundamentally the ECs knew the priorities of the community and this helped in the successful development of a community engagement strategy.

Direct experience of EDUG

In order to extend their understanding of home energy saving, all ECs experienced a Standard Home Upgrade and/or a High Needs Upgrade (as described in section 1.2.2). Eight ECs received insulation, and four received new curtains; a total of eight out of the 12 received HNUs. This increased the ECs' understanding of the GBS project and objectives, practical measures to reduce energy use and improve thermal comfort and the effectiveness of energy efficiency measures.

The EC training and the Home Energy Helper visits were designed to complement each other, enabling ECs to learn the theory of energy efficiency and experience the benefits of energy efficiency in tandem. This training and experience approach aimed to provide champions with real and detailed understanding of the advantages of suggested physical and habitual changes presented in the GBS program. With this experience it was imagined they could more honestly 'champion' ways to achieve energy efficiency and thermal comfort in the community.

The combination of the education and in home upgrades was powerful for ECs.

It strengthened any belief I had in, whether... It actually resolved any doubt I had of whether I was doing the right thing or not, and in some cases I was and in some cases I wasn't. Therefore I must

have learnt quite a bit from this program. I know I have but I can't specify in words. And when I look into it and I will actually write down one day when I'm thinking about things and I'm relaxed I'll think, what exactly specifically did I learn from this program. But whether that's necessary or not I'm not sure. I think it's resolved a lot of my doubts this program. I mean I just can't say enough about it. I think of all the things I've ever done and I have done a lot in my life, I mean you just wouldn't believe what I've done. The thing is and I'm not boasting is because I like a diversity in life. But this thing I could be stuck with because it's just unending what you could do with it. (GBS001 06/03/2014)

8.7.10 Implementation challenges

Training did have some challenges. The EO reported that there was a lot of information to get through in a set time. Some ECs did not understand how to conduct themselves in a meeting or workshop, and group dynamics and some difficult behaviour (of a few ECs) in meetings meant that the EO had to make efforts to carefully manage them. The EO also reported that while she thought that any more than the seven weeks of meetings in one go would have been stretching the patience of the ECs, she did believe that more training would have been useful later in the program (once they were out and about in the community).

Timing constraints

A key obstacle to successfully building the capacity of ECs was the limited timeframe available. Some ECs thought that more time was needed for the training, while similarly others thought that there was too much information all at once. As the EO clarified, it was not that the training had been pitched too high, but rather more time was needed for the Power Rangers to be able to effectively absorb the information provided.

Diversity of skills and personalities

The ECs' assessments of the training pointed to issues with people having varied levels of knowledge and skills which meant that training sessions did not suit everyone. ECs also mentioned that some problems were encountered due to group dynamics and a couple of clashing personalities. There were variations in tempers and capacities, and one EC noted that she had difficulty learning some of the technical and mathematical aspects of energy efficiency. Another EC noted her aversion to having to undertake role play early on in the training sessions – she thought the role play would have been easier later in the training session sequence.

It appeared that the different skill bases and knowledge bases of ECs meant that information shared at training was new to most ECs but not all. The EC who noted that training was boring and was slow to get going was one of the people well acquainted with energy efficiency information (although she also said that training was good). The other few people who were fairly knowledgeable on energy efficiency in homes felt the training was a good refresher. This mix of knowledge levels was hard for the EO to cater to.

Given the diversity of the ECs the EO suggested that some people may have benefited from more personal coaching, particularly in regards to communication skills. Had there been more time and money allocated not only could training have been more tailored, but refresher training courses could have been offered throughout the course of the project. Once ECs were actively implementing the community engagement strategy and trialling their new skills, further training to consolidate learning would have been beneficial. As it was, the EO was able to provide some personalised feedback to ECs which assisted in their capacity to undertake the project.

In anonymous feedback, comments from ECs varied:

Some workshops were rushed.

Not enough time to cram in all this info.

[The EO] is too slow for us.

Sometimes [workshops and training] seemed a bit long.

One EC provided more detail about her concerns when interviewed:

I think the feedback that you need to know about the training sessions are, they were boring. Mainly because of the structure more than the content at times. And [the EO] would have been given a set criteria to work to so it's not her responsibility for that format, but it's very boring sitting for hours. So the way it was formatted should have been where, initially, there might have been a talking session about the aims

and vision, and then a hands on thing. And then a discussion about the hands on thing, followed up by a further discussion of next step down the line. Because people who go to school and do learning, learning, learning are not working in a hands on environment. It's too paper led and the role was a hands on role. (GBS007, 15/12/2014)

Complex group dynamics

The diversity of EC personalities and capacities was challenging during EC training, the development of the community engagement strategy and during community capacity building in the community. The challenge caused by this diversity in capacity was identified as a significant issue by both SLT staff and some ECs. Managing such differences in skills and capacities was challenging for the EO, who had to carefully think about who she matched with which types of work. Different personalities had to be matched against different tasks and the capacities and temperaments of the other ECs.

ECs' evaluation of training picked up group dynamics as the biggest barrier to the success of the CCB approach. In particular, evaluations mentioned meeting interruptions due to people not turning on off phones or needing to manage children they had brought along, and people talking over each other. GBS005 (08/12/2014). noted that "***people still developing skills for group appropriate behaviour".*** GBS001 (after interview 06/03/2014) said that "***group members should take training more seriously***". Another EC explained: ***I think professionally, [the EO] needs to toughen up, especially when it came to*** meetings***. We all agreed upon the rules from day one, and yet continuously there was issues with the rules not being followed; people complaining about it and it just continuing on and on and on. To the point where it did start to cause tension, even between the workers*** (GBS011, 15/12/2014).

The EO explained that, despite protocols having been established by the group for meeting etiquette, because of the different personalities and the inability of many in the group to conform to appropriate behaviour in the meetings (e.g. talking one at a time, not answering mobile phones etc.) some tension did develop amongst the group. Many ECs also acknowledged this tension and how difficult it was for the EO:

"We all agreed upon the rules from day one, and yet continuously there was issues with the rules not being followed; people complaining about it and it just continuing on and on and on. To the point where it did start to cause tension, even between the workers". (GBS011, 15/12/2014)

Other issues raised included uncertain and different goals and aims, a lack of focus, differences in learning styles, lack of practical training, and different base levels of knowledge and skills. Tensions also emerged between ECs over who was given what work and whether the money was actually earned. As one EC explained: "***I think a lot of money was wasted there actually paying people for doing nothing on the face of it***" (GBS001, 06/03/2014). Also, ECs often failed to inform the EO when they could not attend events.

At times, the EO had to be particularly stern in her approach. For example one EC continually failed to submit their pay claims on time. After providing considerable flexibility for many pay cycles, the EO had no choice but to hold off paying this EC until the next pay cycle. With this action, the EO found that pay claims were then put in on time.

There were times when the EO did not feel it was strategic to be too stern. Given the limited number of ECs (12), the EO was perhaps more cautious in asserting her authority than she would otherwise have been. She explained that she couldn't afford to get any ECs offside and lose them from the program. As it was, two of the ECs moved out of area and several others were limited in their capacity to contribute.

Confusion around project aims

Confusion around the project aims was another implementation challenge. As previously noted, the lack of time for clearly establishing the aims of the project and the different roles of the people involved was problematic. The diversity of skills and capacity of ECs also contributed to this confusion as did the very nature of the project. The aim of the CCB component of GBS was to work with CVR community members (the ECs) to develop a tailored approach to energy efficiency and thermal comfort. As a result Champions themselves were expected to contribute to the aims and process of the program. Unfortunately at times this lead to significant confusion:

Look, in all honesty I think that there has been a very high level of confusion. And it's not just me, I think the whole group feel that we're very unsure at the end of the day of really what we're – what is it that we're

trying – like, we know what we're trying to do but how are we meant to be doing it? (GBS011, 17/03/2015)

Just a lot of confusion happening at the moment, we're all getting our wires crossed.... I think it's just because it's new, the next time it'll be easier to work out because you'll be expecting certain things and it's not just going, oh no, we've got this or we've got to do that. (GBS006, 21/03/2014)

[The worst thing about the training was] understanding where the group is going: while getting a strategy organised and agreed to. [It could have been better with] more focus on the outcome and group building. (Anonymous feedback on training and workshops)

In developing this project it was understood that ECs recruited from disadvantaged communities were likely to be disadvantaged in some way themselves. The other project staff worked from this understanding and acknowledged that while many were on disability support payments, were early school leavers or were entrenched in intergenerational poverty, local champions brought invaluable insight into the cultural context of their community. When those you employ are disadvantaged it is vital to understand the impact that this will have on capacity to work to certain expectations.

8.7.11 Organisational capacity

SLT was well-placed to deliver energy efficiency and thermal comfort projects in low income communities. Prior to GBS, SLT had worked with a number of other low income communities around Tasmania and had experience with this demographic. SLT also employed an experienced EO who had previously worked in a community development capacity with low income communities in Tasmania.

The Clarendon Vale Community Centre provided an office space for the EO. Linking in with the Clarendon Vale Community Centre increased the capacity of the GBS project in four significant ways:

- The centre provided a physical space to house project paraphernalia (timesheets, information stands, energy efficiency gadgets, paperwork, workshop materials etc.).
- The centre provided a sense of local legitimacy for the project. According to survey data many people in the area feel comfortable accessing the services at the centre and participate in existing programs there.
- The centre provided a local workplace for the ECs.
- The centre provided opportunities for incidental interactions between the EO and the community. At the same time it allowed for the EO to immerse themselves within the community and learn about the wants and need of the community.

8.7.12 Impact of research on building capacity of Energy Champions

The research component of GBS did not impact significantly on the process of building the capacity of the ECs. The small impact of the research presence was considered positive as it provided more contact points for ECs and enabled them to feel supported, valued and important. Interviews provided opportunities for ECs to find out more about the project evaluation and project objectives.

8.7.13 Key Lessons

The CCB approach is in its early stages of development. SLT had previously never delivered such an approach to energy and comfort behaviour change. The following key lessons should be understood in this light.

Ensure there is time for the Community Engagement Officer to embed themselves within the community and for word of mouth processes to work prior to commencing Energy Champion recruitment. Flexibility of contracts would allow for this to be adapted to community needs.

Although the training was generally a success, additional refresher, revision or consolidation sessions would be helpful once work in the community had commenced.

Champion input into goals and language of community engagement strategy and implementation was vital to success.

Champions need to feel ownership of the project, but they also require close support and mentoring, clarity around the terms and expectations of employment, and regular check-ins to identify problems and frustrations. Many of the people employed were not entirely workplace ready – a number were also receiving the disability support pension or were unemployed – and the extra time needed to effectively train and manage people in this situation needs to be taken into consideration.

The EO needs to have strong interpersonal capabilities in order to deal with and manage appropriately a variety of skill-sets, capacities and personalities among the ECs.

It is better to recruit people with appropriate skills and capacity to commit than to be bound to a particular number of recruits according to a funding contract.

8.8 Evaluation of CCB approach phase two: Building capacity of local community

Phase two of the community capacity building approach involved the implementation of the community engagement strategy as developed by the Energy Champions and Community Engagement Officer.

CCB activities were to recruit and engage households in Clarendon Vale and Rokeby, to give them the knowledge required to make their own in-home energy efficiency upgrades, and to change behaviours that result in high energy bills.

ECs and the EO worked together to develop a timetable of community events and workshops (see Figure 8-2, Figure 8-3, and Figure 8-4). In this section we briefly describe each activity and note the strengths and challenges of each approach. The varying lengths of the discussions of each are primarily due to the nature of data available. The information comes from interviews with the EO and ECs. We have also drawn on records kept by the EO and the ECs, researchers' observations of events and relevant comments from the bulk surveys and the detailed interviews. It is important to note that written records for the ECs appear to be incomplete and as such the number of events and attendees are only approximate.

Community activities and events were promoted in the following ways:

- local community newsletters
- the GBS Facebook page
- text messages to research participants
- stickers on wheelie bins
- posters around the community (shops, schools, community centres, fence posts)
- GBS newsletter
- branded clothing for Energy Champions.

The positive and recognised brand of GBS was important for project take up. ECs were visible in the community and their 'brand' was important. The EO explained:

> And people are able to actually know who we were by identifying who we were by

looking at them. And I think that that was great, having the uniform. And I felt really, "I'm in a uniform," kind of thing, so I – yeah, no, it was good. (GBS005 08/12/2014)

The ECs also had personalised case studies explaining their experience of the project (see Appendix 3) which helped to provide them with a certain legitimacy of experience within the community. The GBS branding also included artist impressions of each of the ECs and these were posted in the Community Centre and on information fliers.

As an incentive to participate in activities and to build on the branding of the project, the ECs developed a rewards star card. People could collect a star for every event they attended. Once five stars were collected participants could collect a prize from the EO (see Figure 8-1, below).

AFTER survey responses from CVR participants indicate high levels of GBS brand awareness within the community.

Figure 8-1 Get Bill Smart Rewards Card

Figure 8-2 Community activities March and May 2014

BBQ 12pm Wednesday 26 March	**BBQ** 12pm Monday 17 March
Information Session: HEATING – how to keep warm AND save money 10.30–11.30am Monday 31 March	**Sewing Workshop: Learn how to make curtains** 10am Tuesday 25 March
BBQ 12pm Tuesday 15 April	**BBQ** 12pm Tuesday 8 April
Community Shed Workshop: learn how to make your house warmer and how to change a shower head 9am–12pm Wednesday 16 April	**Information Session: HOT WATER – never run out again!** 10.30–11.30am Monday 14 April
BBQ 12pm Thursday 8 May	**BBQ** 12pm Thursday 15 May
Community Shed Workshop: Insulating ceiling and hot water tank/pipes 9am–12pm Wednesday 14 May	**Sewing Workshop: Make your own free door snake** 10am Tuesday 6 May
Hardware Shopping Tour Thursday 22 May (pick up at 10am)	**Hardware Shopping Tour** Thursday 22 May (pick up at 10.15am)
Information Session: No Interest Loans Scheme (NILS) 10.30–11.30am Tuesday 27 May	**Information Session: No Interest Loans Scheme (NILS)** 10.30–11.30am Monday 19 May

Figure 8-3 Community activities June, July, August 2014

	CLARENDON VALE NEIGHBOURHOOD CENTRE (INCLUDING SHED)	ROKEBY NEIGHBOURHOOD CENTRE
JUNE	**Information Session: HEATING – how to keep warm AND save money** 9am–12pm Thursday 5 June	**Morning Tea with the Power Rangers** 10.30–11.30am Monday 16 June
	Morning Tea with the Power Rangers 10.30–11.30am Thursday 26 June	**Sewing Workshop: Make your own free door snake/curtains** 10.30am–12pm Tuesday 2 June
	Community Shed Workshop 9am–12pm Wednesday 11 June	**The Price is Right Games Night** 7pm Friday 27 June (Rokeby High School Auditorium)
JULY	**Morning Tea with the Power Rangers** 10.30–11.30am Tuesday 8 July (Child and Family Centre)	**Morning Tea with the Power Rangers** 10.30–11.30am Friday 25 July
	Sewing Workshop: Make your own free door snake 10.30am–12pm Thursday 3 July	**Sewing Workshop: Make your own free door snake/curtains** 10.30am–12pm Tuesday 1 July
	Community Shed Workshop 9am–12pm Wednesday 16 July	**How to use a Home Energy Audit Toolkit** 11am–12pm Monday 28 July
	Hardware Shopping Tour 10am Thursday 24 July	**Hardware Shopping Tour** 10.15am Thursday 24 July
AUGUST	**Morning Tea with the Power Rangers** 10.30–11.30am Friday 1 August	**Sewing Workshop: Make your own free door snake/curtains** 10.30am–12pm Tuesday 5 August
	Community Shed Workshop 9am–12pm Wednesday 30 August	**Information Session: HEATING – how to keep warm AND save money** 1.30–2.30pm Thursday 21 August
	Information Session: No Interest Loans Scheme (NILS) 10.30–11.30am Tuesday 26 August	**Information Session: No Interest Loans Scheme (NILS)** 10.30–11.30am Friday 15 August

Figure 8-4 Community activities available in the Winter Spring 2014 GBS newsletter

Figure 8-5 GBS community activities Nov Dec 2014

8.8.1 Description of community engagement activities

Information tables

Information tables were run by the ECs at the following events and locations:

- the Rokeby IGA (1)
- the Rokeby Neighbourhood Centre (7)
- Clarendon Vale Neighbourhood Centre (7)
- unknown location (4)
- Rokeby soccer ground (6)
- Rokeby High School (6)

Each stall consisted of a GBS banner, information fliers on how to save energy and stay warm in the home, information on how to join the GBS project and some demonstration equipment (such as shower heads, shower timers etc.).

As the project progressed and recruitment for the research component became pressing, ECs also held recruitment/information stalls at:

- Clarence Plains Online Access Centre (8)
- Knopwood shops (4)
- the local Zumba class
- Rokeby Primary School Fair
- Rokeby IGA
- Clarence Plains Community Festival
- various other events and locations throughout CVR that were not recorded by ECs.

Successes

The ECs spoke with hundreds of people at these stalls and events. The stalls outside the Rokeby IGA were particularly well located and rough records show that approximately 20-50 people were engaged each time.

Challenges

While there were a couple of ECs unwilling to actively grab the attention of people passing by stalls and tables, most felt concerned about doing this. UTAS researchers observed stalls (one at the Clarendon Vale Neighbourhood Centre and one at the Clarence Plains Community Festival) where there were times when ECs sat back and did not engage with the community.

Because GBS was unable to formally include residents of government or community housing in the project many community members were excluded. ECs may have informed these people that they were not eligible to participate in the formal evaluation of the project without making it clear that they were still able to access the community events and information.

During the recruiting phase of GBS ECs focussed their efforts on recruiting people to the GBS project. At this time discussion of ECs was diverted away from energy saving measures and instead was focussed on clarifying project requirements, potential upgrades and grocery vouchers incentives.

Expert information sessions

Free expert energy efficiency and thermal comfort information sessions were held at the Clarendon Vale Neighbourhood Centre and the Rokeby Neighbourhood Centre. The experts present were SLT-trained Home Energy Helpers, the CEO, SLT staff or community service providers. The different sessions were:

- Heating: How to keep warm and save money (5)
- Hot water: Never run out again! (1)

- NILS (No Interest Loans Scheme) information (4)
- How to use a Home Energy Audit Toolkit (1)
- Session with professional Home Energy Helper: How to cut your power use (2)
- Your power bill: Questions and answers (1)

The sessions were usually scheduled for one hour and the space was set up and facilitated by either an EC or the EO.

Successes

According to EC notes, a total of 13 people attended the 14 information sessions.

Challenges

There did not seem to be much community interest for these sessions and many events had to be cancelled due to lack of attendance.

Visits to schools

ECs and the EO made five school visits:

- door snake making workshop with Clarendon Vale Primary School grades three and four
- door snake making, shower timer demonstrations and papier mache globe making with Clarendon Vale Primary School students
- energy efficiency technology demonstration with high school students from Emmanuel Christian School
- participation in textiles class (making door snakes) with Rokeby High School students.

With the exception of the participation in the textiles class, these visits were run by the ECs who provided hands on experience for the children and discussed what sorts of changes could be made in the home.

Successes

The feedback from teachers and children indicates that the school visits were successful. As one EC said, "***The schools with the door snake making, that was huge, the kids loved it. They knew what they were for, like we explained about keeping warm and keep the draught out.***" (GBS006, 17/12/2014)

Anonymous written feedback from high school students in response to the question 'What was the MOST interesting thing you learnt about today's session?' included statements such as:

> Learning the different amounts of power used by different appliances you can find in your home.
>
> Finding out how to use the meter and working out the cost for different appliances. And measuring the heat from the floor to the ceiling.
>
> Seeing how little those [fluffy electric] blankets cost. Seriously. I'm finding mine.

Some students said that they would change their energy use behaviours:

> Yes I will unplug my devices more often so not as much standby power is used.
>
> Yes I will do more things to save power such as, short showers and turning off power points when I'm finished.

Demonstrating energy efficiency technologies, high school students were taught how to measure energy use of various appliances. One activity was to boil a kettle and record energy use and cost. Students then used the hot water to make hot chocolate. Linking the activity to a task that was relevant to the students was very successful. Several students made positive reference to this activity:

> Getting to make milo from the kettle and finding out how to use a power measurer.
>
> Making milo and reading the prices.

Students clearly enjoyed the sessions with other comments including "***it was really fun***" and "***thank you for coming to our school***". There were no negative comments on the feedback.

Challenges

Some schools were not interested or only interested if the ECs developed a program clearly within the curriculum. However, ECs' reports do not provide enough feedback about this to be able to provide more meaningful discussion of this challenge.

Community barbeques

ECs ran six free barbeque events for the local community (three at Clarendon Vale Neighbourhood Centre and three at Rokeby Neighbourhood Centre). These barbeques were an opportunity for the ECs to introduce themselves and the project to the community in an informal setting.

Successes

A total of 36 people attended the barbeques at the Clarendon Vale Neighbourhood Centre and a total of 25 people attended the barbeques at the Rokeby Neighbourhood Centre. Given that some people attended more than one barbeque, these figures do not give an accurate view of the number of individuals reached.

While the BBQs did not provide a useful forum for discussions of energy efficiency and thermal comfort they did promote the project and create brand visibility and goodwill. For those who did attend, the social element of the gathering was valued:

> I went to barbeques and things, and it was wonderful. I mean that's a social event as well as learning something. Yeah they were great. (GBS045, 08/09/2015)

Challenges

Barbeques did not attract a large number of people and there was very little discussion around energy efficiency and thermal comfort at these events. However, ECs' reports do not provide enough feedback about this to be able to provide more meaningful discussion of this challenge.

Morning tea with the Power Rangers[20]

ECs ran six morning events for the local community (three at Clarendon Vale Neighbourhood Centre and three at Rokeby Neighbourhood Centre). These morning teas were an opportunity for the ECs to introduce themselves and the project to the community in an informal setting.

Success

A total of 32 people attended the morning teas, nine at the Rokeby Neighbourhood Centre, 17 at the Clarendon Vale Neighbourhood Centre (for the remaining five, location was not recorded).

Challenges

Similar to the barbeques, the morning teas did not attract a huge number of people. Those they did attract were either repeat attendees or already friends with the ECs.

20 Power Rangers is the name the ECs chose to call themselves for CCB work in their community.

Hardware store bus tour

ECs arranged for a mini-bus to take residents on a tour of the local hardware store. This was promoted as an opportunity to learn about the different products that could be cheaply bought for energy efficiency and thermal comfort gains.

Challenges

The hardware bus tour was not popular. Despite advertising for two events only one person was interested and the tours were cancelled.

Community shed workshop

ECs facilitated four community shed workshops. These workshops were to demonstrate how to install ceiling and hot water tank/pipe insulation. Workshops were run by volunteers from the community shed with help from ECs and the EO.

Successes

Community shed workshops were a way for people other than the ECs to take a leadership role in the CVR community. One man from the community shed felt he had played a significant role in the training of the ECs.

Challenges

Only five people attended the community shed workshops. There was some informal feedback suggesting some personality clashes and some rudeness. One EC also noted that people turned up to the workshop not to learn anything but to receive their stars for project participation.

Door snake workshops

Champions ran seven sewing workshops to teach people how to make draught-stopping door snakes. At some of the workshops advice was also given about how to make curtains.

Successes

Eighteen people attended the seven sewing workshops. Feedback from community members was that these were enjoyable and sociable events.

Challenges

As with many of the events, attendance at these workshops was low. There were some challenges with advertising; on one occasion the text message advertising the event included an incorrect time.

The Rokeby Neighbourhood Centre only had one functional sewing machine and did not have enough material supplies for some of the workshops.

Initially some people were keen to make their own curtains, but could not afford to purchase the fabric themselves. This meant curtain workshops did not run.

Some of the ECs who had agreed to run these sessions pulled out at the last minute and two SLT staff members had to step in at late notice.

Energy Champion attendance at community groups

ECs were invited to attend the Clarendon Vale Child and Family Centre playgroup. ECs gave out information booklets and shower timers and spoke with some of the parents.

ECs also attended a meeting of the Eating with Friends group at the Lindisfarne Motor Yacht Club.

Successes

Generally EC attendance at these community events helped to promote the GBS project and improve brand awareness and program visibility.

Challenges

ECs' reports do not provide enough feedback about these events to be able to provide meaningful discussion of any challenges.

GBS "party"

Some ECs ran GBS parties for residents. Based on the Tupperware party plan idea, ECs would visit houses and demonstrate energy efficient products and provide tips on how to improve thermal comfort and energy efficiency in the home. At least four parties were held; however some parties occurred informally and were not recorded by ECs.

Successes

ECs' reports do not provide enough feedback about these events to be able to provide meaningful discussion of any successes. GBS researchers did hear about GBS party events from other participants – they related the events in a positive light.

Challenges

ECs' reports do not provide enough feedback about these events to be able to provide meaningful discussion of any challenges.

'Price is Right' games night

With the help of the EO and SLT, the ECs ran a community games night. This event was very well advertised around the community with posters at major intersections, in shops and community centres.

Successes

Those who attended the event appeared to have a good time. The advertising for the event increased brand awareness.

Challenges

There was very poor turn out to the event. Twenty people attended and the majority of participants were extended family members of ECs.

Individual house visits

ECs arranged personal visits with members of the CVR community to give energy efficiency and thermal comfort advice. At one visit ECs installed draught proofing around windows and door frames with foam tape. At another house the EC sat with the householder and worked out the financial value of the upgrades she had received as a part of the upgrades component of the GBS project.

While ECs officially recorded only four home visits, it is suspected that they conducted several more. Some home visits would also have been spontaneously conducted as a part of the doorknocking activity – see below – or as a part of unrelated social visits.

Successes

Individual contact with community members was one of the most successful EC activities. Feedback on surveys made positive reference to the home visits by ECs and included comments such as "***I did appreciate the ideas from Power Ranger but still unable to afford major changes. I appreciated the info***" (GBS549, 2015), "***I would like to thank the Power Rangers for their kind help***" (GBS622, 2015) and, "***[the best thing about GBS] was talking to the girls who came to visit about things. In general for upkeep of home and things you can do (money is a problem to do these)*** (GBS461, 2015)".

The CEO also recognised the value of these home visits and the headway they made in engaging people with project aims.

> Sort of take the cue from the householder. So knock on the day, say, "Hi I'm a Power Ranger, you haven't been coming to visit,

we've got this information for you, we'd really love to leave it for you". Most people have been inviting them in so they've been engaging and getting some really good – having some really good conversations with people. (EO, 16/12/2014)

Challenges

Champions did not always have the correct information or access to many of the materials. In one instance the UTAS researcher had explain to one of the ECs that the advice they were giving was incorrect (GBS009, 08/12/2014).

Doorknocking

Door knocking was originally discarded as community engagement approach as the ECs felt uncomfortable with the idea, not wanting to force themselves on neighbours.

Over time however ECs began to adopt doorknocking as a community engagement strategy due to as very low attendance at community events meant that new strategies were needed.

ECs door-knocked over 50 houses in the area and offered on the spot home energy and thermal comfort advice similar to the individual house visits above.

Successes

It is worth briefly noting here that the research requirements forced some particular behaviours in program roll out. While this report is not intended to articulate how to run an energy efficiency and thermal comfort *research* project, at times the two components of the program became inextricably linked. It is important to recognise these links and to understand the function performed by the different elements of the project.

Doorknocking was a successful community engagement strategy. One on one contact with residents was an effective way to engage householders in the GBS project and with information about energy efficiency and thermal comfort. The process enabled people to access information without having to attend public events – particularly valuable for a population with high levels of physical and mental ill health.

As one of the ECs explained, doorknocking enabled them to reach otherwise socially isolated residents:

Another person we found had agoraphobia and she found that she virtually couldn't come out at all. But we had quite a good conversation with her and she actually was interested in a lot of these things. Wanted to know how to do this and how to do that and things like that, but because she had agoraphobia she was a little bit hesitant about coming out and going to meetings where there were a lot of people around, that type of thing. (GBS012, 22/12/2014)

Another EC had a similar perspective, explaining, in conversation with a UTAS researcher:

EC: I cannot stress how important I really do feel this program is to lower economic family households, but I do think that we really need to open up the doors of people that are socially confined. Or are unable to get this information under normal circumstances, like seeing a flyer at a local shop.

UTAS: So that's what you were saying about some seniors and some people with disabilities, that they can't get out of their homes.

EC: Or people with mental health problems. That have social phobias or have deep depression and they don't leave their homes. There's just so many different people and we're all so diverse. (GBS011, 15/12/2014)

Champions were aware that most of the activities they ran for the community attracted very little attention and interest, while the one on one contact was important:

I think we got more when we actually went and knocked on people's doors and actually spoke to people at home... They don't like to get out and about or you know they don't feel comfortable going to things, I don't know. We got through to them well in their homes. (GBS002 21/01/2015)

I think the actual going into people's homes. Once you were invited and they were willing, it was really good. (GBS006, 17/12/2014)

The more one-on-one you can provide, I think the more interest there seems to be. (GBS011, 15/12/2014)

To be honest I didn't want to do door knocking at first, because I was a bit, like going to people's houses, a bit nervous because I felt it was quite confronting, but after I'd done it I quite enjoy it, because you're getting that initial contact and they're more comfortable in their own home. (GBS009, 08/12/2014)

At least when you're down there, you're at the front door and some people just stood at the front door and talked, which was fine. Because they had a little bit of information but other people would invite them in, say can you come and have a look at this for us and things like that...Oh yeah, yeah, so I found that the most effective way of dealing with it and I would be encouraging any future project, to go down that avenue. (GBS012, 22/12/2014)

The CEO also thought the doorknocking was a successful approach to engaging people with energy efficiency and thermal comfort: "got the Power Rangers to do some doorknocking and that has been really positive". (CEO, 16/12/2014)

Doorknocking was also a successful part of the community engagement strategy as it played to the strengths of the ECs. One EC explained that:

I think the easiest, well I found it easiest to go to people's homes and chat to people. And when we had stalls I found that easy. Umm, the men's shed and stuff like that was harder. Because you know you had to demonstrate everything to everyone. But no I really enjoyed going to people's homes, face to face. (GBS002, 21/01/2015)

We've really got some really good results from [doorknocking]. People are really appreciative of the visit. They're actually inviting the Power Rangers to come in so the idea was just the Power Rangers... But that wasn't one of the ones that was in the strategy. So that doorknocking was never part of the strategy. It was... And these are probably things that maybe they would never have even thought about ever if no-one – if a community member hadn't knocked on their door and told them about it. They may never have even realised that they could do something about cutting their power bills. (CEO, 16/12/2014)

Appointments with the community

As part of the recruitment process and as a way to engage with the community, some ECs arranged to meet residents at their homes to help them to complete the survey and to talk to them about changes they could make to their homes. This process is distinct from the doorknocking and home visits, although often appointments were set up as a result of doorknocking.

Successes

As above, one-on-one interaction with community residents was very successful.

Challenges

While this was generally considered to be an effective and positive process, one of the ECs noted how frustrating it was when people cancelled appointments, failed to turn up or were running late.

You've got to come back and then go back out, which also takes time and things like that which is you know, a little bit awkward. So making appointments it was, I guess one of the most difficult and frustrating parts of the project, to get that to work smoothly. (GBS012, 22/12/2014)

8.8.2 Community engagement successes

In general the community engagement activities run by the EO and the ECs can be considered successful. While attendance at events was low, the very existence of such activities meant high levels of brand recognition and trust. Of those surveyed in CVR, 87% said they wanted more programs on energy efficiency and thermal comfort run in their community. Whether or not people attended events or had upgrades, the general feeling in the community was the GBS program was very positive and having the program continue in the area was supported.

It is important that the limited turn out to events is not seen as a complete failure of the program as it laid the groundwork for the doorknocking and one

on one engagement that came later by providing identity for GBS and legitimacy when ECs went doorknocking.

What follows below is summary of the successes and challenges of the CCB approach as whole.

Strong CEO

The developed a strong relationship with ECs, and the ECs s recognised the value of the EO role and the EO's skills. Over time, high levels of trust developed:

> She treats us all like we're all an individual, which is a good thing as well. It's amazing. She treats us all like we're all a different personality, not just oh you all come from... She realises and recognises all our experience and potential. And she's able to bring it out in us. (GBS001, 06/03/2014)

The strength and skill of the EO was vital to the successful roll out of the community engagement strategy. She successfully managed the diversity of personalities both within the training sessions and later in the field, recognising that certain people were not capable of working with each other. To her credit a strong sense of team developed:

> "I think most people within the Power Rangers21 worked very, very effectively. I've worked with quite a few different Power Rangers at various times. I mean it's okay it's been Jane lately, but I've worked with Georgia, I've worked with Ursula, I've worked with Zac, I've worked with others and things like that. We're all committed to getting that same message across. Some would do it one way, some would do it slightly differently and most of the time we would complement one another." (GBS012, 22/12/2014)

Strong and trusting relationships between CEO, ECs and CVR community

One of the risks of using local residents to champion external projects is that if the project is poorly managed this may reflect badly on the local champions and their positions within the community.

However, the GBS CEO had the capacity to successfully support the ECs, and they reported that she quickly and effectively dealt with issues that arose.

For example, one EC explained how a man had called her on the GBS phone, angry and upset about monitoring equipment in his house and frustrated that no one had talked to him about vouchers. The EC immediately rang the EO:

> I rang [the EO] straight up, "I've got a very upset man about his monitor and he wants his vouchers". Yeah, so pretty much he thought that he had it in, got his vouchers and then you took it away within a few – I think he got a little bit jumbled up. I think he thought he only had it in for a few weeks or something, and I don't think he understood – but I know that the EO did ring and he was fine. I think it was just him understanding. (GBS005 08/12/2014)

It was clearly understood by the ECs that without the EO, this part of the project would have failed:

> I'd highly recommend [the EO] if she ever had to do anything like this again or even anyone that had to take on a role like this. I think you need that person there. I mean because she had to type everything on the computer then she'd let us know who the people that we needed to still get hold of that we'd track down paperwork from and then she'd tell us the people that wanted information posted out... (GBS005, 8 Dec 2014)

> Yes – I think so. Because she is the one that sets things up and covered what not being done by [ECs]. (GBS010, 16/12/2014).

> She kept it all flowing and on track. (GBS006 17/12/2014)

21 The ECs decided to brand themselves as Power Rangers in the community.

Strong connection with the Clarendon Vale Neighbourhood Centre

A strong relationship existed between the ECs and the Clarendon Vale Neighbourhood Centre where their office was based and where many workshops and events held. As one EC explained:

> The positive thing that came out of it [the training] was the regular meetings at Clarendon Vale that it became a thing we were accepted as part of the community. The office at the end [of the corridor] probably never would've been occupied apart from [the EO] using it. The office people, the volunteers that work in the office became quite accustomed to our ways, accepted us as part of and I think we're going to leave an empty spot in the Clarendon Vale Community Centre. (GBS001, 06/03/2014)

> The above observation seems particularly important when you consider that several of the team were new to the community. Some ECs used their relationship with the Neighbourhood Centre to give the project local credibility. For example an EC explained that when she was doorknocking houses, "A lot of people would see you and they'd think 'No! Go away you're not selling me anything' and I'd go 'Hey! I'm from your local community centre actually!'" (GBS002, 21/01/2015)

Not only did association with the Centre position ECs as a part of the community, but it also helped in practical ways. As ECs explained:

> The neighbourhood centres were really good. They were really good with giving us somewhere to go and setting up the tables and everything, because that's where a lot of people come to, [long pause] because a lot of people just go to the neighbourhood centres anyway for information or whatever it is that they might need if they need help with anything. So letting them know that we were sometimes there or we were based out of mainly Clarendon Vale one was a good thing too. To let them know that we were there. (GBS009, 08/12/2014)

> There's definitely going to be an empty spot there because it's a shame that when, as I say, there should be something carrying on after that. Even if it was just somebody in the office who was educated, something should be left behind it shouldn't just go and leave. (GBS001, 08/12/2014)

Having an office at the Neighbourhood Centre successfully helped to facilitate connections between local residents and the ECs. In particular it was vital that the ECs were embedded in the community and visible for incidental interactions.

Energy Champion community networks and integration in community

ECs had an intimate knowledge of the culture of the CVR community that significantly contributed to the success of GBS in three key ways: ECs understood the community and the needs and challenges they faced, they were trusted by the community as genuine locals and many of them had extensive social networks within which to disseminate information and generate interest.

Community needs and project goals were well aligned. Having local people develop the engagement strategy was important. As one EC explained, "***I think all of our backgrounds and different personalities and different views, all helped to get the message out...***"(GBS011, 15/12/2014).

The ECs had lived experience of what it was like to live with poverty and the implications this has not only for community capacity but in order to feel safe participating in programs offered by outside organisations.

> That poverty thing is something you can't explain unless you live it. And when people say, this business about people on the dole not spending their money on cigarettes, they've just got no idea how poverty and social isolation impact on people's abilities to even be normal. And that was another thing in the group, where there was quite a number of people like myself that are on their own with physical or financial disabilities, that the program was good in giving them a bit of extra money but also that involvement in an empowerment model. And for those people that come along they are the ones that should be

continually getting supported because when an opportunity comes they will be trained up enough to step into a role of some description. (GBS005, 15/12/2014)

ECs had their own experience of home upgrades written up into case studies (see appendix 3). These case studies were quick guides to the changes and savings made by ECs and helped to make accessible the shift towards more energy efficient behaviour and greater thermal comfort. The EO explained how these case studies worked:

Yeah so Natalie would sort of say since I've been using a timer it means that we don't run out of hot water anymore which has been great so the last person to hop in the shower is now not having a cold shower. So that's been really great. We've had Georgia who says that her winter power bill has been halved and that was from doing A, B and C, doing simple things. I think... (EO, 16/12/2014)

Conversations about power saving, energy efficiency and thermal comfort became much more legitimate thanks to the role modelling done by ECs:

It's opening up a very different conversation. I don't really ever recall ever hearing people talking about their power bills to one another over the fence ever before, whereas I'm feeling that that's now what is starting to be created from this program. People are saying "Well geez, I got a power bill that was $900 this last bill" and that other neighbour being able to say "Hey look, I've just found out all this information" and it hopefully could snowball. (GBS011 15/12/2014)

ECs were also able to reassure residents that the program was genuinely about improving energy efficiency and thermal comfort and that there were no strings attached. According to the EO:

[The ECs could approach people and say] "I'm a community member just like you, I have done things... This is my story. It's easy. There are no strings attached", because I think that's been a really big thing whereas people think there are strings attached. Having that reassurance of a community member actually telling them that I think they felt... (EO , 16/12/2014)

The ECs themselves had a similar perspective:

Because like and the thing that we explained to a lot of people too was, we were just ordinary people that live in Clarendon Vale. I said, "We're no different to you", and I think when they realised too that we live in the area. What we're talking about, we're not someone that's come out of the area. Into the area and saying, do this or learn that. They know that we live in the area, and we know what they put up with or whatever... Because they relate better to us then, when they know that we are from this area. I just say to them: "No I'm not special. Just ordinary people like you". (GBS009, 08/12/2014)

Having local residents in the EC role was also important in order to really connect with not only the needs of the community but the local culture. The significance of this was explained by one of the ECs who was new to the area. This EC had a strong work ethic and at times resented the less professional approaches of the others. As she explains, while she was more professional, the others often had more luck in connecting with the community.

I also felt a bit disappointed that some didn't seem to take it as seriously perhaps as others, and it was not just with disrespecting the rules, but it was also in their approach to themselves and the way that they presented themselves to not only us – the group – but also the community. I mean, I'm not here to judge anybody, but I just felt that if you're rocking up to work where you're going to be paid to go out and help people in the community, you don't rock up to work in a pair of old tracky pants and a tank top, swearing your head off, on your phone all the time, kids running all around running amok; and that's where it's difficult because this is a community program, and who am I to say what's the dress code.... But on saying that, those two in particular that always seemed to have this standard dress code, and this is also what they wore when they were volunteering at the community centre, so it's not like it was out of their character, this is their norm. They were very, very effective. They were really good workers,

because they know so many people. Their kids are at the schools and they just seemed to know the community really well, so it was so beneficial to have them on board and like I said, who am I to judge? (GBS011, 15/12/2014)

Many ECs were well connected into the community as they had grown up in the area and still had large networks of family and friends there. Many of them were good at putting these connections to use and were unafraid of actively recruiting people into the project.

So it was quite funny because I'd find myself at my family's or even at friends' and I'd be like, "That power point over there, I want to switch [it] off," and I did, at people's houses that I know wouldn't mind and that would just have a joke. I did. I did switch stuff off. And I'd say, "That can save you money doing that," and they'd come back with the little smart, "Go Power Ranger Natalie". (GBS005, 08/12/2014)

ECs were able to translate energy efficiency measures into a language that the community could understand. While this was mostly a successful element of the project, there were some instances where the message became too simplified or was lost in translation and thus the ECs simply acted as part of a giant game of Chinese whispers. There were occasions when the ECs presented energy savings measurers that lacked detail and the EO noted that more training was required to ensure that the ECs were *"**singing from the same song sheet**"* (EO, 19/11/2014).

Building capacity within the community

As intended the project built capacity in the CVR community. That ECs are visibly present in the community means that their knowledge and expertise is easily accessible to others in the area. ECs saw themselves as an ongoing community resource. One EC reflected that: *"**Best thing about the program was the development of people as a community resource. The long term skills that will stay in the community have been the biggest benefit**"* (GBS004, 27/01/2015), while another explained: *"**I found it a very, very worthwhile exercise. Both for myself personally and we've learnt a lot, and also obviously for trying to pass the information on to I guess the wider community**"* (GBS012, 22/12/2014).

The CEO also recognised the value of building energy efficiency and thermal comfort knowledge within the community. She said: *"**The projects got a face so they know someone in their community who knows something about energy efficiency, if they've got further questions they've got someone to go back to**."* (EO, 16/12/2014).

Positive experience and skill development for Energy Champions

Feedback from the ECs was overwhelmingly positive in regards to their own skill development. Comments from ECs included reflections on the skills and knowledge they had gained, their potential to seek new work, their improved self-confidence and their pride in making a difference.

The most for me was knowing how to work the heat pump for one, I was always told to leave it on, so that was a $1200 bill we ended up that time..... I think also with the ones that were interested and willing to learn, sharing our knowledge with them. So that was really cool. (GBS006, 17/12/2014)

I enjoyed being a power ranger... I just really enjoyed what I was doing. You know even now people call me up and say "oh you're a Power Ranger..." and they ask me certain questions and it's like... it makes you feel proud that you've achieved something. (GBS002, 21/21/2015)

Oh, we enjoy it. We have met so many nice people. It's just been wonderful just to go back and check on them and see them again. (GBS009, 08/12/2014)

I found the job very, very interesting and very fulfilling. (GBS002, 08/12/2014)

I met a lot of new people. I got out and about in the community, it was enjoyable, I enjoyed it. (GBS002, 21 Jan 2015)

No, apart from missing it. Like I said I will miss it. (GBS010, 16/12/2014)

Flexibility

The EO and ECs were flexible in their implementation of the community engagement strategy – this was vital. For example they had extremely low attendance at the community shed events and so stopped running these events. That the ECs and the EO felt able to do this reflects a strong sense of ownership and control over the process.

We found that for example the community shed workshops weren't well attended so we stopped doing those. There were things that we tried to do different things to see if we could increase participation. And it did seem that probably towards the end of winter, so say around about maybe September, August/September it seemed like the numbers were increasing a little. (CEO, 16/12/2014)

8.8.3 Community engagement challenges

There were some significant challenges faced in the rollout of the community engagement activities in CVR. Primarily these challenges related to limited time frames and the diversity of personalities, skills and capacities of the Energy Champions.

Limited time frame

Supporting people to take the difficult journey of moving from a local resident to an energy champion to a recognised leader in the community takes considerably longer than the 15 month time period available in the project. It was only by the end of the process that the EO had a clear understanding the EC's strengths and weaknesses and was in a position to conduct an audit of skill and capacity gaps in the group. This was the point at which the EO was keen to address these gaps through further support and training. Previous work on community capacity building in health promotion has highlighted the central role of incidental and informal training that may occur between program managers, coordinators and participants and the need for a flexible, iterative approach to capacity building (Hawe et al 2000). A longer time frame would have assisted to properly implement such an approach. Understanding the need for multiple avenues for education and training and capacity building is critical to effective community capacity building. In relation to GBS, this would have entailed providing a longer time frame in which to the conduct the project.

The short timeframe was particularly problematic given that SLT had no prior community development project management experience. SLT had few pre-existing contacts and networks in the CVR area. This was a significant challenge for recruiting a local EO and the recruitment of the ECs. Through GBS, SLT attempted to develop networks with other organisations within the community, but this proved challenging as many of the local schools were not interested and in one case the local council climate change officer failed to attend an event.

The EO commented that there were very few strong networks between existing service providers who tended to work in isolated silos. She suggested that perhaps greater collaboration between organisations might have been helpful. Having more of a physical presence in the community (the EO was only part time and thus not at the office every day) would have helped to join the dots between the organisations.

Insular nature of some EC networks

For some CVR residents there was a definite preference to engage with those ECs who were deeply entrenched in the community. While this was often an advantage, at times the more recently arrived ECs struggled to engage with the community. This was often disheartening.

There are people also in our team who had known each other for years, they'd grown up together. I was disadvantaged from the start because I was a newcomer. These people have got grandparents on the team, parents, grandparents, sisters, brothers, you name it.

Two doors up there's a lady there she's got these four houses involved with her house there. She's got a partner who lives in another house, she's got another person who lives in another house, a sister who lives in another, that's the kind of society thing we are.

Four generations of people and unfortunately, as I say, they grew used to each other and preferred to work with each other. That was a natural outcome of living and growing up together. (GBS001, 08/12/2014)

Limited capacity of ECs

As discussed in section 4.1, the varying abilities and capacities of ECs proved challenging. From the EO's perspective, ECs were often unreliable, failing to turn up to events they had signed up to run. At times the EO and other SLT staff had to step on at the last minute to run events. Similarly ECs would sometimes attend events but fail to take responsibility for their designated work. An example of this was observed by researchers when one EC who was supposed to be running a stall at a fair spent most of the time helping someone at a different stall.

ECs also had limited capacity to commit time to GBS, often due to young children, injuries, mental health problems or existing commitments to other projects.

[I am looking forward to the community activities but] the only thing that knocks me about is if I haven't slept well and my hip is hurting and I've got to go out somewhere then I dread it. But it's not so much the Power Rangers, it could just be anything that I'm committed to where, wow, I can barely walk today, do I actually have to go. (GBS003, 19/032014)

There was a couple [of ECs] that kind of couldn't commit themselves to it due to personal reasons. A few of them were, you know, so that was all right. I mean anyone could say, "Yes, I'd love to do it," and then two weeks later they find out they can't because of health issues or personal reasons or something. (GBS005, 08/12/2014)

Because of my illnesses. I had to withdraw a lot. (GBS011, 15/12/2014)

Some ECs were expressed frustration that other members of the team failed to meet their commitments.

Contracts should be made that they should do at least so many hours per se, I don't know, so many hours per month. People shouldn't be taking on a job that they just can't do, they're committed to too many other things. (GBS001, 08/12/2014)

Due to different capacities there was a discrepancy in the hours worked by each of the ECs. The CEO explained:

"I was trying to be fair to everyone but definitely there's quite a range in the hours that people did so there were people who did 180 hours in total and then you've got people who did 14 hours. It's quite a big range." (CEO, 16/12/2014)

For some ECs these discrepancies were problematic.

I felt that I wasn't fairly getting the same amount of hours as what was being offered to others; that I did not hear this from [the EO] and I did not verify it, but I did hear from two other power rangers that one power ranger in particular was being paid an astronomical amount for a certain week because she racked up something like 12 hours of work on Facebook alone, and it was like "What?!" and yet there was two or three of us that had absolutely no work. We had not a time sheet to put in. (GBS011, 15/12/2014)

Yeah. And that was pretty much consistent right from the word go. There was discrepancies in hours and one person might be racking up three to six hours and I'd be lucky if I'd pick up one hour.... Well we were all really sold the idea that the hours would be distributed as evenly as possible so that we were all on the same page. Obviously you know, there were one or two that perhaps that might not want the same amount of hours as the rest of us, they might only want one or two for the week, but for the rest of us, we were pretty much all under the understanding that it would be as evenly as possible. (GBS011, 15 Dec 2014).

Poor attendance at many community events

As can be seen above, community events were very poorly attended. ECs were often disheartened by the lack of obvious enthusiasm amongst local householders.

There wasn't as much interest as what we thought there'd be. We thought there'd be people jumping for it. But the ones that were interested were yeah, it looks cool. The barbecues, they were a failure pretty much, the sale classes were a failure as well. (GBS006, 17/12/2014)

I was really disappointed in. Not from our perspective on what we were doing or weren't doing, just the lack of community that... just didn't show. Most barbeques and some of the other activities that I did participate in, you would very rarely get more than a handful of people and out of that handful of people, maybe one might have been interested in signing up. I felt unfortunately with the barbeques in

particular, most of the participants were people that were already utilising the neighbourhood centre for other programs, so they were just coming out to get a free sausage or vegie burger and have a chat. (GBS011, 15/12/2014)

Some ECs thought that people were simply attending to receive a star on their rewards card.

And I felt like at the end some people would just come in because every time a person came to an event we were giving out a star on their reward and then at the end of it they would get a little present off [the EO]. And I felt like that at the end some people were maybe not – yeah, taking advantage a little bit. Not really coming for the right reasons. They would just come in, "Where's my star? I've got to go," kind of thing. That's how I felt at the end of it. And then we didn't have as many people coming. Where at the start of it I felt like people are really coming wanting to know, loving the information. You know, you'd get the box of goodies out. I call it the goodies. And you show them the light globes and the door strip and stuff and they'd ask you questions and it was really involved, but then at the end I just felt people were just lacking off a bit and then coming and, "Where's my star?" kind of thing. (GBS005, 08/12/2014)

The EO worked with the ECs to attempt to overcome barriers to participation. Anecdotally people were not attending due to lack of childcare and transport, but even when these were made available attendance remained low.

Formal participants in the GBS program were also texted prior to events, however often the lead time for this was too short.

Generally they come after one o'clock in the afternoon, usually around four for an activity that starts at ten or ten thirty the next day. On one occasion the text came around nine o'clock in the morning for something that was starting that afternoon, which is a little bit short notice and a bit easy on the information. Now I do have a recollection of there being a flyer or a notice sent out that said some of these things are coming up but at the time I looked at it and thought I've got no idea what that's about and didn't pay a lot of attention to it.

...

It would be good to know a little bit in advance yes. And certainly to have a phone number on that text so if you want a bit more information or a contact name, who's organising that particular event to find out about it. (GBS135 before interview 12/6/14)

While engaging with the community was difficult, it is worth noting that other service providers in the area had similar troubles and this may not have been specific to GBS.

It is also worth noting that while attendance at specific events was low, as noted above many survey respondents from the area valued the existence of the program and wanted more activities. It is likely that over time these may have become more popular. It is also likely that the very existence of activities, even if poorly attended, sparked energy efficiency and thermal comfort related conversations within the community.

Impact of research on the roll out of each approach

The research component of GBS significantly impacted on the roll out of the various approaches. Details of this are outside the scope of this report however a basic summary is provided below. The research impacted in the following key ways:

- a large administrative load (both for consortium and for project participants)
- EC time and resources directed to program recruitment rather than to community education
- grocery vouchers were often more of an incentive than the upgrades
- liaising with the government took a large amount of time
- CSIRO requirements took time away from working on project
- excluding social housing households from an inclusive community-based research project reduced buy-in to project and caused friction within the community.

Large administrative load

Organisationally some of the biggest challenges faced by GBS were related to the administration load. The paperwork and administrative processes generated as a result of the different reporting requirements of the various organisations involved significantly complicated the project.

Recruitment process

Recruiting participants into the research component of the project was administratively intensive. Potential participants were introduced to the project in a variety of different ways (See section 4.4 of Overview report)). Those people interested in the project were then asked to fill out a brief form and return it to SLT as an expression of interest (see Figure 8-6 below). If applicants were suitable they were then sent a package of forms to be returned. This pack included the UTAS Human Ethics Information Sheet, the UTAS Human Ethics Consent Form, the Federal Government Privacy Form, Landlord Consent Form, Billing Data Form and Permission to Use Photos Form. Once these forms had been returned, participants were then formally accepted into the program and allocated into the different groups as listed in Table 8-1 Number of participants completing the pre and post GBS activity survey. Detailed study participants were contacted by UTAS and researchers arranged to visit the home, install the data loggers, conduct the interview and, if the survey had not been returned, make sure it was done. Those who were part of the bulk group were sent a survey and asked to return this via a postage paid envelope to SLT.

Figure 8-6 GBS Expression of Interest form

GET BILL $MART

Application Form for the Get Bill Smart Project

If you are interested in participating in the Get Bill Smart Project, please complete this application form and leave it with reception, or post it to Sustainable Living Tasmania, 1/71 Murray Street, Hobart 7000.

Alternatively, you can contact Sustainable Living Tasmania on 62345566, email gbs@slt.org.au, or register online at www.slt.org.au/gbs or on Facebook at Get Bill Smart.

1. **Name:** _____
2. **Address:**
   Unit number/Street number _____
   Street name _____
   Suburb _____
   Postcode _____
3. **Phone Number:** _____ (home) _____ (mobile)
4. **Email Address:** _____

Surveys were collected by SLT and then forwarded to UTAS where they were entered electronically and processed; some participants were posted out grocery vouchers while others waited to be contacted by SLT for their home education and upgrades. During this time, those in Clarendon Vale and Rokeby were able to attend, or not, the community engagement activities run by the Energy Champions.

The administrative load of this part of the project was far greater than anticipated. UTAS employed an additional staff member at two days per week to manage the influx of surveys, to dispatch the required vouchers and to spend hours on the phone undertaking surveys with participants or reminding them that it needed to be returned before they received either their vouchers or the upgrades.

It is important to note that before SLT could arrange for home upgrades, surveys had to be received. As recruitment deadlines crept closer, staff at both SLT and UTAS spent many hours on the phone chasing research participants, reminding them to return surveys or offering to do the surveys with them over the phone. Participants had been given the option of doing the survey online however it was later discovered that in an attempt to reduce the paperwork this notice had not gone out in the initial mail outs. Participants were given the opportunity to do the AFTER survey online however this only reduced paper surveys by a very small amount as many participants either lack computer literacy or access.

Problems with recruitment process

There were several significant problems with the process as outlined above.

First, the large load of paperwork was often overwhelming for participants. Many people involved in this project have low literacy levels and to be asked to sign so many formal documents was problematic particularly as many were uncertain and suspicious about the possibility that there were hidden costs. Secondly, participants were likely to lose forms or forget to return them. Thus the two tiered mail out (forms first, then survey) meant that there were two choke points in terms of getting people fully on board with the project. The combination of research project and multiple different approaches significantly added to the administrative load. These problems were articulated and identified by the GBS program manager, the EO and the EC.

As the project manager explained:

Yeah, administration was like nothing I've ever experienced before, it was massive. And yeah, we felt the bulk of that because everything was being sent from here, everything returned to here. Every day at five to five I bolted out of the office with a bag of mail, every single day I was here and it really did my head in. And then you know, waiting to get stuff in the mail every day and then sometimes you'd get nothing and it's like, "Oh dear, we really need people to return their stuff". (SLT25/02/2015)

The impact of this was that SLT had to employ a further part time staff member to deal with many administrative elements.

The EO (16/12/2014) had less trouble with the extreme amount of paperwork:

Look I think the forms weren't so much an issue because we had the Power Rangers and me were going around and doing it face to face so we were helping people. We could sort of say "Look I'm sorry there are so many forms it's because it's a research project and blah, blah, blah." If we'd known at the beginning what I would have done differently is I would have been recruiting people that way right from the beginning. Rather than giving them a pack and leaving it with them...

Some of the administrative work by SLT was also compounded by the complexity of the project and the need to keep track of so many different people, undergoing four different intervention approaches in a variety of locations at various points in the recruitment phase. For example a large number of people were only just being recruited, while in the same period others were already receiving upgrades. A participant database developed by SLT (previously used for other SLT projects) assisted in this and according to the program manager was an essential tool for keeping track of participants.

The database, I think that the database needed to be the way it was because of the structure of the project. Like it was set up so that once the forms got sent out, you knew they were sent on what date. You had to wait for them to come back for you to progress through to the next stage. So I think without that database it would have been really hard to keep track of everything that was coming in and out. So even through sometimes we couldn't operate it how we wanted to at that time, for the bulk amount of participants it was essential otherwise we wouldn't have been able to roll out the project. So yeah, that was good. But yeah, just the volume of paperwork that came in and the scanning and having everything saved, you know, typical administration work but that all fell onto myself and then to Catherine because I just couldn't deal with it all. (SLT 16/12/2014)

Recruitment challenges

Recruitment proved to be extremely difficult in both Greater Hobart and in CVR. In the latter area, this was partly due to the fact that the funding body (the Federal Government) would not allow the project to include people from Mission Australia housing (a state-funded community housing provider). This was despite the project having been designed with these households in mind and Mission Australia being a part of the successful consortium of organisations applying for funding.

Ultimately this proved to be hugely problematic as 495 households where in households managed by Mission Australia and a further73 by Housing Tasmania. Form a total community of 1645 households some 35% of residents were ineligible for participation. Confusion was also caused by the inclusion of the Mission Australian logo on all GBS promotional material. Furthermore Mission Australia was geared to support work within their housing community, but not set up with connections outside this group. As it was, we achieved a participation rate of 16% from eligible households in CVR. This was not as high as initially hoped for, but still represented a significant portion of the community.

The other thing that made recruitment very difficult was not being able to include Mission Australia households and that was just an absolute shock and down fall because poor Mission Australia are supporting this project that can't give them any other benefit really. And they made up a massive proportion of households in Clarendon Vale and Rokeby and to not be able to include them in this project was a real shame because they're the people in

those homes, they're a massive part of the community and we had to say "No sorry" and they're like "But you've got Mission Australia written all over your material, I'm from a Mission Australia household, why can't I be there?" So that was really unfortunate. (GBS project manager, 28/10/2015)

Because recruitment was slower than expected, the program manager spent a lot of time travelling to different community organisations, putting up fliers and talking to community groups. Given the lower than expected participation rates in CVR, the Programs Manager became responsible for more than 50% of the recruitment.

The model for recruiting in greater Hobart was utilised in community centres in low income areas. So that was quite time intensive for me because it was driving or cycling to all these places out and around Hobart, attending lunches, attending meetings etc., putting up posters. So it was a very time intensive way to recruit but I think that that's a key target for future projects. It turned out the recruitment in Clarendon Vale and Rokeby at the beginning seemed to be going really well. So I can remember meetings where [the EO] came in and she's like "We've got 100 people already" and it was amazing, we couldn't believe it. And then it was "We've got 150!" and then suddenly we realised that by joining people up to the project, they'd said they were interested and we maybe had an initial expression of interest from them but we hadn't received all of their initial paperwork and we hadn't received a survey. So that was a major issue in the project was the way that we rolled it out. (GBS project manager, 28/10/2015)

Energy Champion time and energy directed to recruitment rather than community programs

As mentioned in section 4.2.1 a significant amount of EC time was spent on recruiting community members to the research component of the project rather than engaging them in activates and discussions around energy efficiency and thermal comfort.

This was problematic, although it also proved a useful way for ECs to engage with community, especially when incentives such as grocery vouchers were offered. People seemed more receptive to energy efficiency information as it not only came with a financial incentive but also from a trusted source within the local community.

Grocery vouchers as more of an incentive than home education

The grocery vouchers were a huge participation incentive and, despite imposing a significant administrative load on the project, substantially assisted recruitment.

Problematically, however, ECs were encouraging community members to ask to be put in the voucher group. This showed that many residents exist in a state of ongoing financial crisis and participation was a good way to access financial resources. For participants who were tenants it is not hard to understand why they might have preferred the guaranteed grocery vouchers over upgrades to their home that they did not necessarily trust and that would ultimately benefit the landlord. Data from the BEFORE survey showed that 56% per cent of people participated for the vouchers.

Government liaison requirements

Reporting and communication to the funding body required significant administrative attention from both SLT and UTAS. It was primarily the responsibility of SLT to liaise with the Federal Government regarding changes to reporting requirements and timelines. The need to change project timelines due to recruitment challenges meant SLT/government liaison was a frequent activity.

We were in communication [with the Department] relatively often, milestone changes was a big thing that I underestimated with them and that was essential otherwise the project would have essentially failed. So I think it was a big achievement for the project to be able to get those changed and for them to be understanding. But it took a lot of work and especially because the project, when explained to someone, is quite complex and there's so many different numbers of people in different groups that that was part of the problem was they needed to understand the project first before they could change it. So that was slow but eventually we did get a response before the

milestone was due which is good. Saying that, I've been waiting five weeks for a response from the Department on another contractual issue and we just found out the reason I haven't been getting a response is four people in the Department have gone. So I think this is the fourth or the fifth project manager we've had at LIEEP. And now someone else is going to come on board... (SLT 16/12/2014)

Communication challenges were exacerbated by this constant change in Department personnel. Significant time was wasted re-explaining the considerable complexities of the project.

CSIRO reporting requirements

Although there were good reasons for the requirement that LIEEP projects data be uploaded for examination, significant problems were created by the CSIRO data schema, and these affected the UTAS research team's capacity to meet other project requirements.

Some of the most significant issues experienced by UTAS with the schema were:

- the requirement for the various LIEEP projects to submit data in a common format being imposed after project design had been completed;
- the increase in the amount of data required to be submitted beyond that specified in the contract, with ramifications for project budgets developed on the basis of more limited data submission expectations;
- the CSIRO the development of the schema after the design of the research instruments had been completed, necessitating considerable successive adjustments to the instruments in order to align with CSIRO requirements and descriptors;
- the data the design of the schema itself, which requires data in a format which is incompatible with that generated by the GBS research design, necessitating considerable additional effort to extract, clean and reinterpret data to match schema descriptors and tabulations and resulting in some compromise over the analytical utility of what is provided;
- with the CSIRO in relation to the problems with the schema, exacerbated by additional and unexpected time pressures imposed by the Government on LIEEP projects;

Exclusion of those in government housing

A significant challenge to widespread engagement with GBS activities in CVR was the exclusion of those in any government owned housing. While GBS branding included the Mission Australia logo, those living in Mission Australia housing were ineligible to participate in the research component of the project. Not only did this create a sense of division and exclusion within the community it also meant that those in government housing were likely to be uncertain about their eligibility to participate in the free activities.

For a project aiming to build community capacity and cohesion, the exclusion of a significantly disadvantaged section of the community was problematic.

Technological problems

There were some minor issues associated with the installation of data loggers in peoples' homes to enable the GBS team to monitor indoor temperature, humidity and energy use. For example, one participant's daughter (GBS014, 29 Jan 2015) was bothered by a light flashing on a logger installed in her bedroom and so the participant moved the logger to the spare room. In other instances where people were bothered by the logger light (GBS036, 30 Jan 2015; GBS022, 31 Jan 2015), the GBS team were able to place tape over it.

One participant (GBS021, 30 Nov 2015) was unhappy with the way the electrician had installed the data loggers in the meter board. Following the installation she was unable to close the meter board door. Her nephew installed a bracket to hold the cords away from the door.

8.8.4 Key Lessons

The CCB approach is in its early stages of development. SLT had previously never delivered such an approach to energy and comfort behaviour change. The following key lessons should be understood in this light.

The limited timeframe for EC training and subsequent project implementation impacted on the capacity of ECs to consolidate knowledge and practice.

Working with local people who understand disadvantage (and are themselves on various forms of government benefits) is important for gaining community trust and buy in, however different expectations about capacity are required.

Vouchers were important incentives for the GBS project but at times overshadowed the energy efficiency and thermal comfort messages.

The knowledge, skills and capacity of the Community Engagement Officer, particularly with respect to building the capacity of the Energy Champions and managing their ongoing contribution.

The visibility and legitimacy of the GBS brand within the Clarendon Vale and Rokeby communities, enhanced by the office space made available to the project at the Clarendon Vale Neighbourhood Centre.

Lengthy and time consuming interactions with the funding body and CSIRO added a considerable administrative and project management load, exacerbated by the many changes to the contract.

Much longer timeframes are required to maximise the effectiveness of Energy Champion recruitment, community engagement and participant recruitment strategies.

Low turn-out at community events should not be interpreted as meaning that events should not be run. Local residents place considerable symbolic value on these activities even if they do not personally attend. These activities support the legitimacy of the program when the ECs visit homes.

The matched goals between the CVR community and the GBS project (improving residents' thermal comfort within their homes and providing them with strategies through which they could reduce their expenditure on energy bills).

8.9 Conclusion

Organisationally the Get Bill Smart project can be considered a success.

Sustainable Living Tasmania successfully delivered in home education and upgrades (EDUG) to 249 households. This was a tried and true approach to improving energy efficiency and thermal comfort in low income households. SLT and their HEHs were confident in their approach and program participants primarily responded with positive feedback. Key lessons from this part of the project were:

- Ensuring that people did not feel judged for their lack of knowledge or capacity was essential in implementing a program in low-income areas
- Previous SLT experience delivering EDUG contributed significantly to smooth and successful deliver of education and upgrades
- Differing expectations of the length and intensity of the in home education and upgrades created some concern from participants, clear communication of time expectations is essential.
- The lack of reversibility for some infrastructure upgrades was problematic when the new equipment failed – loss of goodwill and a frustration with energy efficiency is a risk.
- Lack of clarity around who is eligible for high needs upgrades can lead to dissatisfaction amongst participants and stress on those judging high needs.
- A large administrative load meant upgrades were slow to be approved and Home Energy Helpers found their workload spread over a longer period of time

By comparison, Sustainable Living Tasmania had limited experience delivering the community capacity building approach (CCB), indeed this approach more generally is in its infancy. Key lessons from this part of the project were:

- A strong and skilled Community Engagement Officer is vital for managing the diversity of skills and personalities of the Energy Champions
- Energy Champions who are imbedded socially and culturally within the community are vital for legitimacy of the project and help to translate energy efficiency and thermal comfort messages.
- In a low income setting, local Energy Champions are not necessarily work ready

– many are on disability pensions, look after families, have health problems and/or other limitations on capacity. However these are the people who understand the community best. It is important to understand the value of working with people with this limited capacity and to provide the required support, training and management.

- Successful and positive branding of GBS improved community receptivity to the program
- One on one interactions were vital for increasing program participation and the activities of the ECs were integral in this regard.
- More time is needed to imbed the Community Engagement Officer within the community and to recruit the Energy Champions in order to achieve a strong team.
- The exclusion of a particular group of people from project involvement creates divisions and reduced the capacity of Get Bill Smart to really imbed the project (and key concepts) into the community. No community building activity should be exclusive.

There were some key lessons that were relevant to the Get Bill Smart processes more generally:

- The strong communication established between the consortium members (and the further strengthening and development of these relationships), allowed problems to be worked through and resolved as they arose and key learnings to be shared.
- The tight timeframes, which compromised the recruitment process for key project staff, including the CEO and the ECs.
- The high administrative load related to the larger Get Bill Smart project meant that much of the message was about project participant rather than energy efficiency and thermal comfort and diverted significant resources to project management.
- The grocery vouchers as program incentives were vital to ensuring participation rates however in some cases this moved the focus from the main messages of energy efficiency and thermal comfort
- Ongoing interactions with participants is vital for building trust, this can be effectively done through a variety of ways; face to face interaction, phone calls, text messages; and contact can be made for a variety of reasons; research, education, administration.
- The research component affected the delivery of the other elements of the project. While it imposed a considerable burden, particularly with regard to paperwork, on participants, it also offered another one-on-one contact point for participant engagement with energy efficiency and thermal comfort.
- The additional pressures and constraints produced by poorly coordinated data collection and submission requirements, which were incompatible with the data generated by the research design.
- Inflexible contractual requirements (such as the exclusion of Mission Australia housing) caused procedural problems and diminished possible outcomes.
- The most successful engagement strategy is one-on-one contact between project staff and participants and community members.

Section 9

PROJECT BUDGET

9. Project budget

9.1 Original project budget

The approved project budget was $1,956,108 in total, consisting of $1,748,717 LIEEP funding, $202,391 in-kind funding and $5,000 of consortium funding (cash). The budget detail is found below in Table 9-1.

Table 9-1 Original Project Budget

Category heading	LIEEP	CASH	IN-KIND	TOTAL
Community Capacity Building	181,971	-	44,288	226,259
Detailed Data logging and analysis	311,808	-	-	311,808
Energy Audit gifts	41,400	-	-	41,400
Energy Billing Data	29,900	5,000	-	34,900
Energy efficiency upgrades	307,154	-	-	307,154
IT equipment	6,000	-	-	6,000
Marketing and communications consultants	25,000	-	-	25,000
Miscellaneous	-	-	-	-
Office and venue hire	-	-	21,500	21,500
Office expenses	12,000	-	-	12,000
Staffing	770,004	-	136,603	906,607
Transcription services	35,190	-	-	35,190
Travel and accommodation	28,290	-	-	28,290
Total	**1,748,717**	**5,000**	**202,391**	**1,956,108**

9.2 Final project budget[22]

The final project budget is shown in Table 9-2 below. $1,748,717 of LIEEP funding was expended on the project. In-kind expenditure totalled $226,391 and consortium cash expenditure was zero.

Table 9-2 Estimated final project budget

Category heading	LIEEP	CASH	IN-KIND	TOTAL
Community Capacity Building	170,329	-	60,788	231,117
Detailed Data logging and analysis	232,820	-	-	232,820
Energy Audit gifts	47,894	-	-	47,894
Energy Billing Data	2,792	-	15,000	17,792
Energy efficiency upgrades	253,975	-	-	253,975
IT equipment	11,535	-	-	11,535
Marketing and communications consultants	15,817	-	-	15,817
Miscellaneous	330	-	-	330
Office and venue hire	-	-	14,000	14,000
Office expenses	21,981	-	-	21,981
Staffing	920,979	-	136,603	1,057,582
Transcription services	35,190	-	-	35,190
Travel and accommodation	35,076	-	-	35,076
Total	**1,748,717**	**-**	**226,391**	**1,975,107**

22 Please note final expenditure figures are currently estimates, including committed funds. Final figures will be unavailable until August 2016.

9.3 Discussion

Overall project expenditure was slightly higher than the original budget, largely due to a greater delivery of in- kind resources. The Get Bill Smart Project expended all LIEEP funding provided by the Commonwealth Government. Cash expenditure was lower than budgeted due to electricity providers providing electricity data for free (counted as in-kind support). In-kind support was higher based on good support from agencies and groups within the community engagement area.

Overall, the project budget provided a good level of funding for delivering the project outputs. Significant savings where made in some budget line items that were absorbed in greater expenses in other areas.

Overall the key driver for shifts in project expenditure was the unknowns at the point of project proposal. Many items such as the data-logging equipment could not be specified until full research design had been completed. The modified project timelines also impacted with some items requiring additional resources to be completed in a timely manner.

9.3.1 Main areas of savings

Data-logging equipment supply and installation

The data-logging equipment was supplied under budget. Further savings were made by reusing equipment from the champion households in the remainder of the bulk study. Unfortunately the equipment supplied required significant additional work to clean data before analysis, which resulted in increased consultant costs.

Provision of upgrades by third party contractors

There were a limited number of houses eligible for these upgrades. All possible households satisfying the criteria received curtains and/or insulation. Additional items such as improved rugs for floors were offered but declined. Some installs were cancelled, for example one participant would not clear some items stored under their home and thus under floor insulation could not be installed. Savings from this line item were used on additional upgrades installed by Home Energy Helpers.

Meter readers

This line item was originally a contingency due to uncertainty about the introduction of competition to residential electricity retailing in Tasmania and how this would impact on the project accessing participants' energy billing data. In the end, data was supplied for free from both the network operator (Tas Networks) and the electricity retailer (Aurora Energy).

Engagement officer

Given that the engagement officer spent considerable amounts of time on other project areas, some of the funding for this officer was allocated to project management expenses to reflect the time required in this area.

Marketing consultant

The marketing consultant provided exceptional value for money for the work completed. They also offered a 20% community discount for working with not-for-profit organisations in disadvantaged communities.

9.3.2 Main areas of increased spending

Project management

This project required greater staffing resources than budgeted at the beginning of the project. Areas requiring attention included project system setup, recruitment processing, database management and reporting.

Data Analysis consultants

An increase in spending on the data analyst position was a result of:

a) Difficulty cleaning detailed temperature data

b) Setting up billing data analysis tools

c) Time taken to run analysis and develop the detailed report

In home education and upgrades

The original budget for in-home education and upgrades had miscalculated the wage component of the project and neglected to include travel for casual employees (a requirement for delivery). Also additional materials were installed in homes as part of the project. Home Energy Helpers delivered this component at less than their usual hourly rate but overall staff costs exceeded those budgeted.

Governance and financial management

Costings for audited reports had not been budgeted into the project proposal. In addition, the sheer quantity of transactions to manage staffing and equipment increased the expense of keeping financial systems in place. Some extra time was allocated to the Energy Project Manager to ensure that project governance was managed to the expectations of the department.

Champions

Additional resources were allocated to the Champions recognising the role of the champions in door knocking and recruiting.

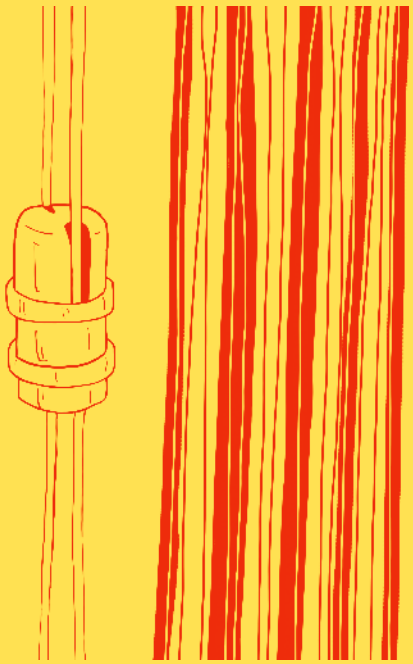
Travel expenses

Additional unforeseen travel expenses included travel to 3x LIEEP forums in Canberra, Newcastle and Adelaide.

Miscellaneous changes

There are a number of smaller changes in the budget that are the result of the minutiae of project delivery. This includes higher phone and postage costs but savings in items such as SMS services.

Section 10



SYNTHESIS OF RESULTS

10. Synthesis of results

The synthesis of results section draws together the results from each sub-report section and is structured according to the initial Get Bill Smart project objectives:

1. Understanding how different energy efficiency approaches can assist low income households to reduce their energy consumption,[23]
2. Understand the processes, key determinants for success, barriers, and drivers for each energy efficiency approach,
3. Understand how benefits from thermal and energy efficiency improvements are utilised by low-income households in a cool temperate climate; whether households choose reduction of energy use or increased thermal comfort; and, the impacts of these improvements on health and wellbeing,
4. Assist low-income households in Rokeby, Clarendon Vale and Greater Hobart to be more energy efficient,
5. Provide employment, training and commercial opportunities for local residents and businesses.

10.1 Understanding how different energy efficiency approaches can assist low income households to reduce their energy consumption

While the CCB approach was effective in delivering energy saving messages to vulnerable and socially isolated households, the EDUG approach was more effective in delivering actual energy and thermal comfort savings. **Notably, when these two approaches were combined, EDUG + CCB, the energy and thermal comfort savings were increased.**

23 This objective has been reworded for clarity and to assist in structuring a response.

Key factors that may have enhanced energy and thermal comfort savings include:

- multiple opportunities to receive energy efficient and thermal comfort messages and consolidate this knowledge;
- increased capacity to follow-up on measures received through home upgrade; and
- more exposure to role models in the local community who have been able to reduce their energy use.
- In this section, we outline the impact of each approach in terms of assisting low income households to reduce their energy consumption.

10.1.1 Community capacity building approach (CCB)

- The CCB approach provided people with multiple exposures to energy saving conversations (both one on one and in group settings) with energy champions, home energy experts and neighbours (see Project Processes and Organisational Analysis Report).
- The CCB approach emphasised strategies and measures for staying warm, reducing energy and saving money (see Project Processes and Organisational Analysis Report).
- The CCB approach normalised energy efficiency and thermal comfort conversations and language within the community (see Detailed Report section 5.2.3 and Case Study 27 – Pam and Family).
- The CCB approach did not deliver effective energy or comfort savings.
- The results for non-energy benefits were mixed. The CCB approach did not result in the survey recording increased community connectedness nor did it increase people's awareness of local people with thermal comfort and energy efficiency expertise (see Bulk Report Section 5.4.10 Perceptions of Community). However, local efforts to engage people ensured that energy messages reached a wide range of people, including those who are vulnerable, socially isolated and typically disengaged from community activities (see Project Processes and Organisational Report section 8.8.1 and 8.8.2).

- The 1 year cost benefit ratio for electricity savings for this approach is 254 suggesting on energy savings alone this is the least effective GBS approach (see Cost Benefit Analysis section 7.4).
- The total cumulative cost benefit ratio is 127. This indicates that $127 needs to be invested to make $1 saving on electricity and water bills (see Cost Benefit Analysis section 7.4).
- It was impossible to calculate the improvement in health benefits due to improvements in energy efficiency and thermal comfort but it is likely that these figures would change the cost benefit ratio of this approach.

10.1.2 In-home education and upgrade approach (EDUG)

- The EDUG approach entailed one-off visits from experts who provided education and installed relevant upgrades (see Project Processes and Organisational Analysis Report).
- The EDUG approach emphasised strategies and measures for staying warm, reducing energy and saving money (see Project Processes and Organisational Analysis Report).
- The EDUG approach delivered effective energy and comfort savings. Energy productivity has improved in this group through reduced energy consumption and increased thermal performance/comfort (see Cost Benefit Analysis report section 7.3.3).
- The EDUG group reduced their average energy usage by 1.4 kWh per day (see Bulk Report section 5).
- The EDUG group improved thermal comfort by reducing draughts in their home, they had less moisture on their windows (see Bulk Report sections 5.4.3 and 5.4.4).
- The EDUG approach also increased people's knowledge of keeping their home thermally comfortable in winter and summer (see Bulk Report section 5.4.6).
- The results for non-energy benefits were mixed. The EDUG approach did not result in increased community connectedness. However, people who did receive a home upgrade were more likely to agree that there are people in their community with knowledge of thermal comfort than those who had not received a home upgrade (see Bulk study section 5.4.10).
- The 1 year cost benefit ratio for electricity savings for this approach is 10, which is a 10 year simple payback based on energy savings alone (see Cost Benefit Analysis Report section 7.4).
- The total cumulative cost benefit ratio is 0.86. This indicates that $0.86 needs to be invested to make $1 saving on electricity and water bills. (see Cost Benefit Analysis report section 7.4
- Based on the cumulative cost benefit ratio EDUG is the only approach yields a positive financial cost benefit, whilst also delivering improved thermal comfort. However the health benefits were unable to be accurately measured but would have improved the performance of the other approaches.

10.1.3 Combined approach (EDUG + CCB)

- The Detail Study findings and the Bulk Study suggest that the combination of EDUG and CCB approaches together may work better than when the approaches are used alone (see Detailed Report and Cost Benefit Analysis Report section 7.4). The data points to this but we were not able to prove this statistically given information came from the qualitative in-depth data in the Detailed Report rather than a statistical analysis. The EDUG + CCB approach entailed visits from experts who provided education and installed relevant upgrades. It also provided people with multiple exposures to energy saving conversations with energy champions, home energy experts and neighbours.
- The EDUG + CCB approach emphasised strategies and measures for staying warm, reducing energy and saving money.
- The EDUG + CCB approach delivered effective energy and comfort savings. Energy productivity has improved in this group through reduced energy consumption and increased thermal performance/comfort (see Detailed Report case studies 1-11 and Section 4: Comparative Analysis Findings).
- The EDUG + CCB group had average electricity saving of 2.8 kWh per day . (bulk study, section 5.4)
- The EDUG + CCB group experienced improved thermal comfort by reducing draughts in their home, they had less moisture on their windows (see Bulk Report sections 5.4.3 and 5.4.4 and Detailed Report Section 4).
- The 1 year cost benefit ratio for electricity savings for this approach is 10, which is a 10 year simple payback based on electricity savings alone (see Cost Benefit Analysis Report, section 7.4).
- The total cumulative cost benefit ratio is 1.3. This indicates that $1.30 needs to be invested

to make $1 saving on electricity and water bills. (see Cost Benefit report, section 7.4)

- It was impossible to calculate the improvement in health benefits due to improvements in energy efficiency and thermal comfort but it is likely that these figures would change the cost benefit ratio of this approach.

10.2 Understand the processes, key determinants for success, barriers, and drivers for each energy efficiency approach

In this section, we provide a summary of the key learnings in relation to each of the approaches.

Community Capacity Building Approach

Key learnings:

- It takes a lot of time to engage a community in a project of this scale. The short time frame meant that the events promoting energy efficiency were used to recruit people to the project, instead of the recruited people attending the events and engaging in this way (see Project Processes and Organisational Analysis Report sections 8.9and 7.9.3).
- Reviewing the community engagement plan periodically proved an essential process. This allowed the CCB focus at the end of the project to move from hosting large, centralised community events that had low attendance rates, to door knocking every eligible household in the Clarendon Vale and Rokeby community to provide energy efficiency education and a Stay Warm Save Money booklet.
- Low turnout at community activities appears to reflect people's preferences for one on one interactions rather than community and group forums. Evidence of this can be found in the Project Processes and Organisational Analysis Report section 8.9.1. However, community activities, even those poorly attended, can build the project profile in the community and improve people's receptiveness towards other approaches from project staff such as door knocking.
- The use of community champions in a CCB project depends significantly on the motivation, health and capacity of the Community Energy Champions to maintain their role within the project. If these qualities are not within the Community Energy Champions, then the role of the Community Engagement Officer becomes essential in the CCB (see Project Processes and Organisational Analysis Report section 8.9).
- Restricting the number of households (due to government ownership) in a community to be involved in a project is a major barrier to its success (see Project Processes and Organisational Analysis Report section 8.8).
- Grocery vouchers are an excellent driver for action in low income community projects (see Project Processes and Organisational Analysis Report section 8.9.3).

Whilst financial success for a "stand alone" community capacity building approach to energy efficiency has not been demonstrated in the Cost Benefit Analysis the community Capacity Building Approach combined with in-home education and upgrades almost has a financial payback based on cumulative energy and water savings. When these financial benefits are combined with thermal comfort and health co-benefits an argument could be made for delivering a project with this combination of approaches.

For a Community Capacity Building approach to be successful, it needs to be:

- A long term approach (3-5 years) that provides opportunities for project staff to trial different approaches and reset project goals.
- Community led.
- Sufficiently resourced to enable training and up-skilling.
- Embedded in an organisational that can provide HR and information support.
- Accommodating of individual preferences for communication channels (e.g. community notice boards and social media).
- Accommodating of individual preferences for group forums and one on one interactions when delivering education and support.
- Have strong linkages with organisations with both community development and sustainability skillsets

In-home Education and Upgrades Approach

Key learnings:

- This approach delivers moderate energy savings (1.44 kWh/day). However it has the most favourable cost-benefit ratio of 0.8 (see Cost Benefit Analysis Report section 7.4)
- Use highly skilled staff to educate and upgrade homes to be more energy efficient and use high quality, effective upgrade materials.
- In-home energy upgrades such as those installed via GBS are successful at reducing energy bills and contributing to peoples increased thermal comfort (see Detailed Report section 4).
- Upgrades need to be climate/location specific. The particular energy saving options and education where developed for a cool temperate climate and a particular tariff structure.
- Acquiring landlord consent from private renters can prove difficult and time consuming (see Project Processes and Organisational Analysis Report section 8.8.6).
- Providing a free in-home energy upgrade is an excellent driver for action in low income communities, especially in cold winter climates like Tasmania, where heating costs make up a large portion of power bills.
- Programs need to be adaptive to the needs of residents.
- Households with large energy usage are likely to have the most energy saving benefits (see Detailed Report).
- Households with lower original energy usage will use in-home education and upgrades to improve the thermal performance of their home without necessarily saving energy or money (see Detailed Report section 5).
- Thermal comfort benefits such as reduced draughts and moisture on windows are correlated to improved health incomes and could be a justification for programs in their own right (See Cost Benefit Analysis 7.5.2)
- Households made sophisticated decisions related to managing energy and optimising their heating options.

For an in-home energy upgrades approach to be successful, it needs to be:

- Sufficiently resourced to enable upgrades and training and up-skilling of staff.
- Run through and organisation.
- Skilled home energy helpers who can assess and tailor to householder contexts.
- Have strong linkages with organisations with both community development and sustainability skillsets
- Engaging the right staff. Ensure quality advice is provided that is tailored according to need. Householder engagement requires a very particular skillset- we recommend experts with compassion and interpersonal skills. Employ experts who are able to be empathetic (not patronising) in low income/vulnerable household settings. HEHs from GBS have the skills to achieve much of the tailoring needed with the support of systems that support their decision making related to tailoring (eg identifying high needs households, and households who need more or less education).
- Streamline administration to participants ensuring eligibility criteria are minimised. Ensure programs are open to all home ownership tenures. Reduce blockages to participation.

Overall determinants for all approaches

The GBS study has outlined key determinants for success for any approach:

- Enough time needs to be allowed for householders to think through ideas and to engage with thermal comfort and energy efficiency changes.
- Experienced NGOs, experienced home energy experts and community engagement officers are key to success.
- Time needs to be budgeted for a program to become known and trusted in a community. NGOs understand that this means a program needs to be in a community for over two years to take real effect.
- Energy efficiency support organisations running energy efficiency activities need to visit and make contact with householders a number of times (every three months or so) for best effects to be made of support given.
- Strong community connections allow for trust of the organisation running programs and for connections to be made with householders.
- Programs need to be transparent and trustworthy.
- Various information flows need to be encouraged and information needs to be shown to be legitimate.

- Trust needs to be established between organisations and householders. GBS established trust with the Energy champions approach and SLT being in contact with householders and regular contact from researchers.
- Income levels affect householder's ability to engage with certain support and suggestions for energy and comfort changes (see Detailed Report).
- Tenure significantly affects householder ability to engage with certain support and suggestions for energy and comfort changes (see Detailed Report).
- Health of occupants affects householder ability to engage with certain support and suggestions for energy and comfort changes (see Detailed Report).
- Housing quality and age of house (especially thermal performance) always affects energy efficiency and the extent that upgrades and energy efficiency changes can help a household (see Detailed Report).
- Occupants will move house and this cannot be avoided. Low income households move more often than other household groups. Instability in housing makes it very difficult for householders to engage with making energy efficiency and comfort changes, so programs will have to take a greater role.
- Occupant numbers affect overall use and use per person - consider and incorporate per occupant numbers.
- Older and younger people and people who are unwell are often much more affected by uncomfortable houses and often require more heating to stay well.
- Occupant house use patterns affect energy use, for example a house may have day time occupants or work at home occupants, or be void of people during the day.
- Appliance, especially heater and hot water, appropriateness, quality and efficiency all affect energy efficiency support activity outcomes.
- Availability of affordable high quality fuels for heating, electricity, gas and wood affects the energy efficiency and comfort of many householders in Tasmania.
- Personal and household capacity varies greatly and may mean that there is great difference between households in what can be achieved without help.
- Payment methods for bills affects how people process energy use as it is the main form of feedback they receive about their energy use.
- Payment methods that are not suited to the household tend to adversely affect management of energy and perceptions of affordability.
- Daily energy use practices, e.g. heater use practices are essential to understand as this affects the way technologies and practices are understood.
- Home energy use practices were observed in GBS to be persistent before and after changes in many households (see Detailed Report). Changing energy use "practices" may need a lot of effort in programs.
- Feeling safe and in control within the home is a top priority for householders, hence programs need to recognise these as priorities, always engage respectfully and take care to respond to householder requirements. In many instances this trumps both the financial savings and the comfort savings that can be made (see Detailed Report)
- Comfort means different things to different people and this affects take up of programs, practices and technologies (Gabrielle et al. 2016).
- Complexity of everyday lives of occupants is a real issue and makes it hard for householders to always prioritise a support program's activities. Ensuring real household needs are being attended to with a program assist householders to engage (see Detailed and Project Processes and Organisational Analysis Reports).

The cumulative cost benefit analysis (Table 10-1, below) demonstrates that the most financially effective approach is the in-home education and upgrades. This is followed by the same approach combined with community capacity building.

Table 10-1 Cumulative Cost benefit analysis (Level 3)

	Community Capacity building with in-home education and upgrades	In-home education and upgrades	Community Capacity Building
Total cumulative (electricity + water) savings	$1596	$1400	$11
Cost to deliver $1 of savings (cost-benefit)[24]	$1.32	$0.86	$126.93

10.3 Understand how benefits from thermal and energy efficiency improvements are utilised by low-income households in a cool temperate climate; whether households choose reduction of energy use or increased thermal comfort; and, the impacts of these improvements on health and wellbeing.

To identify benefits and how they were utilised (the trade-offs made) this section identifies measureable changes observed, overall benefits of GBS activities identified and then outlines key trades made between energy savings, thermal comfort and other home life needs and activities. Findings noted here are drawn from the detailed study unless otherwise noted.

24 Level 3 cost benefit analysis, using cumulative electricity and water savings.

10.3.1 Measured outcomes

Measured changes were observed in: overall electricity use, heater use, heating efficiency, hot water, change to comfort zone, moisture levels. Overall EDUG +CCB came out with the best performance (in both household and on a per occupant basis) (see Detailed Report sections 4.1.1 and 4.2.2).

The data referred to below *excludes* those detailed households who have wood or gas heating or moved house during the project (a total of 35 detailed households – see Detailed Report section 4.2.1) unless noted otherwise.

Overall electricity use

Peak cold weather electricity use increased for all four groups in the after period. EDUG + CCB increased their total electricity use by 3.79kWh/day (11.3%), REP increased by 2.78kWh/day (9.2%), CCB increased by 3.59kWh/day (6.3%) and EDUG increased by 1.53kWh/day (6.2%). When looked at on a per occupant basis EDUG + CCB actually *decreased* their energy use by 2.58kWh/day (19%), EDUG increased electricity use by 0.28kWh/day (2%), CCB increased electricity use by 1.5kWh/day (7.9%), while the REP group increased electricity use by 4.22kWh/day (20.8%).

Heater Use

When it came to heater use, EDUG + CCB increased their total heating electricity use by 4kWh/day (29.2%) (which correlated with an increased time spent in the comfort zone compared to the other groups), REP increased by 2.44kWh/day (12.7%), EDUG increased by 0.67kWh/day (7.2%) and CCB increased by 1.88kWh/day (6.2%). When looked at on a per occupant basis EDUG + CCB *decreased* their heating energy per occupant by 1.1kWh/day (16.7%). All other approaches increased their heater use. EDUG increased their use by 0.17kWh/day (3.1%), CCB increased their use by 0.47kWh/day (4.6%) and the REP group increased their use by 3.06kWh/day (24.2%).

Of note was that data in the detailed report showed that HEHs had success with encouraging householders to shift heating strategies. HEHs suggested that householders transfer heating to more efficient heaters that were available in the house and to heaters using a more affordable tariff; heating use went up but energy bills remained stable as energy was used more efficiently. This is also suggested by the Bulk study findings.

Heating efficiency

Excluding houses that used wood fire and gas as their main heating, the EDUG + CCB group had the most significant increase in heating efficiency (25%). The EDUG group's average efficiency increased by 7.6%, CCB's by 0.5% and the REP group's efficiency decreased. Before and after heating efficiency changes showed a clear pattern of diminishing returns from extra heating energy input into houses. As increased energy was pumped in, less came back as improvements to indoor temperatures. This pattern was related to the poor standards of thermal resistance of the building shells of the houses.

See the Detailed Report (section 4.2) for a more in-depth explanation of heating efficiency.

Hot water

On a household comparison of *all* households in the detail group, hot water increased most notably in the CCB group compared to REP group. The EDUG group's use also increased. The EDUG + CCB group's use decreased but decreased less than the REP group. On a per occupant basis compared to the REP group, the EDUG + CCB group was the only one that reduced its use. Both the CCB and the EDUG increased their use when compared to the REP group on an occupant basis.

During in home visits HEHS retrofitted water efficient shower heads, hot water tank insulation and hot water pipe insulation. These upgrades did support improvements in a range of houses (when viewing houses case by case). The bulk data also suggests that Hot Water (Tariff 41/42) usage decreased in the EDUG + CCB and EDUG groups. We could not ascertain statistical significance for this pattern.

Comfort

When looking at all households including those with non-electric heating and comparing them with the REP group the EDUG+CCB and the CCB group improved their comfort levels. Both the CCB and the EDUG groups had slightly reduced comfort on average. When all houses with wood and gas heating as their main heating are taken out (that is the 35 houses reported in the energy use data above): the EDUG +CCB group had the most increased comfort and other groups had slight reductions of comfort levels. However, EDUG +CCB's time in the comfort zone did come with a correlating increase in heater use.

Moisture levels

Surface condensation, moisture and mould issues were reported by a range of householders from all groups. Humidity and moisture were ok in most houses but were actually borderline problems that require further investigation. Most detailed houses living in older and under-insulated houses presented with temperatures that only just stayed away from meeting dewpoint (and therefore stayed just away from serious condensation problems). Management by householders helped to limit moisture issues through practices such as installation of moisture beads, heating, wiping windows, opening windows. The temperatures in most newer (post 2003) houses stayed well away from dew point in general when graphed. The SLT upgrades did not seem to affect moisture levels adversely in general – but more investigation of the GBS data is needed on moisture levels and mould. One house with moisture and mould issues did report increased mould and moisture after an in-home education and upgrade visit, but there were other construction issue impacting this outcome.

10.3.2 Benefits identified

The different houses in the study had various successes and faced various challenges. Benefits noted from after data provided by the detailed group include:

- energy use reductions (see Detailed Report and Bulk Analysis Report),
- energy cost reductions (see Detailed Report and Bulk Analysis Report),
- increased time spent in the comfort zone (temperatures between 18°C and 24°C) (see Detailed Report),
- perceived improvement in comfort (see Detailed Report),
- health improvements (including reduction of stress) (see Detailed Report),
- heating efficiency improvements (see Detailed Report),
- increased confidence finding information on energy efficiency and comfort (see Detailed Report and Bulk Analysis Report),

- improved sense of control of energy in the home (see Detailed Report and Bulk Analysis Report),
- improved sense of capacity to manage various aspects of the home (see Detailed Report and Bulk Analysis Report),
- improved moisture levels in the home (see Detailed Report),
- repeated exposure to energy efficiency information (see Detailed Report and Bulk Analysis Report),
- connections with energy champions (see Detailed Report and Bulk Analysis Report),
- pride in the knowledge and capacity of community (a positive association with an area that does not perpetuate stigma) (see Detailed Report and Bulk Analysis Report),
- a strong sense that people 'out there' care about 'people like us (see Detailed Report and Bulk Analysis Report)', and
- physical home upgrades (including draught proofing, water efficient shower heads, Eco switches, hot water insulation, ceiling insulation and curtains).

Improved time in comfort zone occurred for a range of households across the groups. Improvements to thermal comfort were very much needed in many cases due to low indoor temperatures that failed to support occupant health. GBS detailed study participants overall were living with an average time in the comfort zone of 37% in the after period. This was a small improvement on the before period (4%). The overall median was only 32% in the after period (also a slight increase on before). These comfort averages and medians figures are low and indicate that during winter inside temperatures in detailed study households were below World Health recommendations for substantial periods of time. While 32% may sound like a good portion of time for those who are often out during the daytime, for many in this study who were unemployed, at home with children or retired, this means being cold for a significant proportion of time at home. This problem with low indoor temperatures in Tasmania is reflected in other studies that also found Tasmanians tend to live in indoor temperatures that are colder than World Health Organisation (WHO) standards (Watson 2013).

10.3.3 Energy use reduction or improved comfort: trade-offs made

Trade-offs were made by many houses when the opportunity arose. When energy efficiency improved or energy costs went down householders used the extra 'slack' available. Householders tended to use any positive changes to energy efficiency or affordability to improve thermal comfort, particularly for wellbeing and health. We observed that in their complicated lives householders want, in general, to be healthy and functional. If their situations allowed them a chance to make a positive change for health or wellbeing, they used it. Householders traded energy and comfort against each other (see heating comparisons in Detail Report), but they also traded energy saving with other things too (including other household bills, groceries and treats for children and household performance related to moisture and mould).

Better thermal performance in newer houses built post-energy efficiency building regulations meant less trade-offs were needed to be made by householder between comfort and health. Heat pumps[25] also assisted to make the energy versus comfort trade-offs a little less problematic. Despite heat pumps not giving out such a comforting heat they did tend to heat rooms more efficiently. Occupants with newer houses that had wired in radiant/fan heaters however, still felt they had to make a choice between comfort, health and energy costs.

Surface condensation and mould reductions or avoidance of these often had to be traded with other performance in the home. Houses were often moist or mouldy because of the house age, conditions, related thermal performance, heater effectiveness and problematic venting (or lack of it). Trade-offs were made between drying out the house and keeping warm (and keeping the moisture inside). Uncomfortable draughts likely kept houses just dry enough to stop moisture issues. So there was a trade off in the poor quality housing of 'do we let the air through and be cold?' or, 'do we heat and keep the moisture in?'

Choice of the heaters used was important and also ended up being a trade-off related to energy and comfort in the home.

25 Heat Pumps AKA Reverse Cycle Air Conditioners used in heating mode use around 1/3 of the energy to heat a space compared to resistive heating

The pros and cons had to be weighed up: plug in heating cost more per kWh but could be used when there was no wired in heating or in rooms that wouldn't otherwise be heated; wired in heaters were often more effective but were permanently positioned in the living areas or a hallway. Trade-offs were therefore made between heater types, effectiveness, costs and locations. Heater performance was undermined by inappropriate heating for the context, poor performance in heaters and poor thermal performance of the housing. HEHs' suggestions about transitioning to more effective heaters, better ways of using heaters and cheaper tariffs were acted on by householders and show how householders thought through and acted on important trade-offs.

Occupant micro politics, such as differences between occupant priorities, negotiations with landlords and caring for animals, all affected home comfort and energy use practices. We observed, for example, that:

- when only one householder was keen to save energy or make changes or one occupant was primarily responsible for paying energy bills, then energy saving actions were often overridden by other occupants,
- new occupants often created a jump in energy use and a loss of control over energy efficiency practices,
- tenants would put aside ideas of energy upgrades if landlords didn't support them or if tenants thought landlords would disapprove, and
- animals and their movements and needs regularly affected energy use and were prioritised over energy efficiency practices.

Moving house for better comfort (and a better heater) was more of a drastic trade off we observed. Householders were prepared to put up with the hassle of a move because their old homes were so uncomfortable. Realistically new homes were not significantly better, but comparatively they were a big improvement.

Key influences related to all the trade-offs made included:

- Time available
- Number of times SLT was in in contact with each household
- Community connections
- Information flows and legitimacy of information
- Trust between organisations and householders
- Income level
- Tenure
- Health of occupants
- Housing quality and age of house (especially thermal performance)
- Occupant numbers and ages
- Occupant house use patterns (e.g. home during day or not)
- Appliance, especially heater and hot water, appropriateness, quality and efficiency
- Availability of affordable high quality fuels for heating, electricity, gas and wood
- Personal and household capacity
- Payment methods for bills and related feedback on electricity consumption
- Daily energy use practices, (e.g. heater use practices)
- Persistence and of daily habits after support activities
- Safety and stability within the home
- Complexity of everyday lives of occupants.

10.3.4 In summary

Overall benefits of GBS energy efficiency activities were gained in a variety of areas related to energy, heating, comfort, confidence with information, thermal and moisture performance of the house, community and personal connections, improved thermal conditions in the home, health and stress, and increased choices/options for energy use and comfort.

Mostly, in what are often low energy use houses, householders took opportunities to use extra energy, rather than save it. They used energy most often so they could attain thermal comfort and support related health needs. Alongside thermal comfort and health householders used extra energy for other reasons, most importantly, to support poor housing and appliance performance, because other occupants were not invested in energy efficiency or there were new occupants, for animal care, and because of a lack of investment by landlords.

Householders were often trying to stay warm enough so they could stay healthy and generally function in their lives. This priority indicates that when given a chance householders want to be well and productive.

10.4 Assist low-income households in Rokeby, Clarendon Vale and Greater Hobart to be more energy efficient.

This project worked with 498 low income householders many of whom were unemployed and living below the poverty line (See Bulk report, demographic analysis).

The project assisted low income households in Rokeby, Clarendon Vale and Greater Hobart in the following ways:

- 272 houses received an in-home education and upgrades by participating in the EDUG and EDUG + CCB approaches.
- In total 61houses received improved insulation.
- In total 26 houses received new curtains.
- A further 15 houses who participated in the REP group received an in-home education and upgrade as a prize after the study period.
- 498 households who completed surveys received grocery vouchers.
- Approximately 340 people received a Stay Warm booklet.
- A range of minor energy efficient measures were provided to people at community forums.

The project also provided intensive assistance to twelve low income people in Rokeby and Clarendon Vale who were recruited to be local energy champions. The champions were employed casually throughout the duration of the community capacity building implementation. They received:

- Training in energy efficiency and communication.
- In-home education and upgrade.
- 4received improved insulation.
- 4 received new curtains.

The project also assisted low income households to significantly reduce their energy usage:

- EDUG group reduced their energy use by 1.4kWh per day on average ($112 PA).
- EDUG group saved a cumulative $1400 on electricity and water bills over the equipment service life.
- EDUG +CCB group reduced their energy use by 2.8kWh per day on average ($218 PA).
- EDUG + CCB group saved a cumulative $1596 on electricity and water bills over the equipment service life.

10.5 Provide employment, training and commercial opportunities for local residents and businesses.

The Get Bill Smart Project provided 34 jobs for residents in the Greater Hobart region. 12 of these where specifically targeted at the project area in Clarendon Vale and Rokeby. The project also engaged and spent $277,000 on local Tasmanian businesses. In detail the project:

- casually employed 12 local energy champions over 15 months ($56,457).
- casually employed 10 local energy auditors over 12 months ($89,488).
- contracted energy data analysis that employed 7 people over a period of 3 years ($100,458).
- employed 2 research staff at the University of Tasmania for monitoring and evaluation (average 1 FTE).
- employed 9 project staff at SLT(various levels of commitment) over the project (average 2.5 FTE).
- purchased technical data logging equipment and commissioned product development from 4 companies ($126,761).
- purchased $64,013 worth of energy efficiency materials from Australian businesses.
- subcontracted an additional $90,955 of energy efficiency materials (mainly insulation and curtains) from Tasmanian business.
- spent in total $277,487 on Tasmanian businesses (NB excludes UTAS and SLT staff).

Section 11

RECOMMENDATIONS

11. Recommendations

11.1 A large scale residential energy productivity program

The evidence shows that a program that delivers in-home education and upgrades (EDUG) is effective for improving energy productivity. Such a program would return the Governments investment in energy and water savings alone (cumulative cost benefit ratio of 0.86). When combined with the known improvements to condensation and thermal performance and their links to health outcomes, such a program becomes compelling

A community capacity building approach when combined with in-home education and upgrades (EDUG + CCB) is also valuable as it reinforces messaging and increases the impact of the project. Whilst the cost benefit ratio is not as favourable as in-home education and upgrades (EDUG) alone it is argued that some elements of a community capacity building approach would improve project impact.

A successful program would:

- Involve in-home education and upgrade visits. Upgrades have been shown to generate tangible benefits to households (see Bulk and Detailed Reports). The upgrades suite would be similar to those undertaken under Get Bill Smart.
- Heat Pump upgrades should be considered as part of the program, given the sustained energy savings and thermal improvements they deliver (see detailed study section 5.3.3)
- Ensure multiple repeated opportunities to engage each householder. Create engagement with households prior to and post home upgrade visits to ensure householders understand the scope of works and then understand how to augment upgrades made (see Detailed and Project Processes and Organisational Analysis reports).
- Ensure quality advice is provided that is tailored according to need. Householder engagement requires a very particular skillset – we recommend experts with compassion and interpersonal skills (see Detailed and Project Processes and Organisational Analysis reports). Employ experts who are able to be empathetic (not patronising) in low income/vulnerable household settings. HEHs from GBS have the skills to achieve much of the tailoring needed with the support of systems that support their decision making related to tailoring (eg identifying high needs households, and households who need more or less education).
- Be large scale, delivering home visits in the thousands rather than the hundreds.
- Be a multiyear program (3-5 years) that creates a "learning environment" for delivery organisations so they are empowered to refine and improve approaches over time (see Project Processes and Organisational Analysis report)..
- Streamline administration to participants ensuring eligibility criteria are minimised. Ensure programs are open to all home ownership tenures (see Project Processes and Organisational Analysis report).
- Deliver CCB approach in a streamlined manner, small teams of energy champions based in community houses with support at a regional level by a community engagement officer/s (see Project Processes and Organisational Analysis report).
- If possible Energy Champions visit participants before and after the EDUG visit. This will ensure the household is ready for the visit and also assist reinforcing concepts at a later date (see Project Processes and Organisational Analysis report).
- Tailor approaches to climates – each region has its own energy efficiency typology that needs to be addressed.
- Understand the driver for a program and tailor approaches to this. I.e. if energy savings are the only measure, focus on PAYG customers with large energy bills (see bulk study section 5.4.4). If population health is the driver, focus on older dwellings and low energy users. Multiple aims require a multi-method, multi-scaled approach (reducing energy use is easier in households that use more energy, however this risks ignoring vulnerable low energy users with poor comfort and limited capacity).

- Ensure householders are able to understand the processes of the program and choices that may be made about upgrades. Ensure communications and structures are transparent, that decisions are consistent and understandable (see Project Processes and Organisational Analysis report).
- Link energy productivity programs with health agency programs in recognition of the strong links between thermal comfort and health. Work in the area of the social determinants of health could be a basis for this (see Detailed and Cost Benefit Analysis reports).
- Partner with research organisations to longitudinally study the health impacts of the program (for example see University of Otago health and housing studies[26]).

In summary after review, the GBS team believe that EDUG coupled with a modified CCB component would offer the most potential benefits to the community.

11.1.1.1 Targeted program options

Our research indicates the following approaches would have solid energy savings. In addition, a number of these approaches would have thermal comfort improvements.

- Change all the showerheads in the country to low flow. Over the life of a showerhead it will save over $300 of water, notwithstanding significant electricity savings (see cost benefit analysis)
- Convert electric heaters to heat pumps. For example SLT recently ran a community bulk buy program for heat pumps that reduced the purchase and install price by around 20%. This program was operating successfully, until it interacted with a State government rebate for "No Interest Loans" on energy efficient appliances. 100's of applications where received within days. See http://www.slt.org.au/bulk_buy for details. Rebates and community mobilising can create energy efficiency outcomes in a market based environment.
- Insulate ceiling and floors in Tasmanian houses

26 http://www.otago.ac.nz/wellington/departments/publichealth/staff/otago024457.html

11.2 Policy recommendations

Policy recommendations are listed below.

Improve the thermal performance of houses in Tasmania (and southern Australia) through:

- Phase out energy-intensive hardwired resistive heaters in cold climates as they are inefficient, expensive and ineffective.
- Subsidise heat pump purchase.
- Ensure minimum rental standards include roof insulation, reasonable draught proofing, hung curtains in the living area and hot water efficiency.

Integrate community engagement and capacity building in collaboration with in-home education and upgrades by:

- Ensuring all community capacity building projects have sufficient time for recruitment and training, and to integrate key ideas, concepts and behaviours into the community (see Project Processes and Organisational Analysis report).
- Providing strong local leaders in low income areas who are physically situated within the community and with significant resourcing and support, to manage, mentor and train low capacity community members to become (and continue to be) community champions (see Project Processes and Organisational Analysis report).
- Acknowledging key priorities and drivers of behaviour within different communities and demographics (see Project Processes and Organisational Analysis report).
- Genuinely valuing the importance of respect and care for the successful engagement of people with energy efficiency and thermal comfort behaviours by ensuring appropriate time and capacity for initiating and maintaining relationships (see Project Processes and Organisational Analysis report).
- Ensuring that metrics designed to measure program success go beyond simple attendance numbers and easily measurable engagements (see Project Processes and Organisational Analysis report).
- Placing a value on difficult to measure such as the slow movement of knowledge through social networks, the small changes that happen over time as a result of exposure to ideas

and norms, the motivation people give each other through good experience and the shift to different 'normal' ways of doing things (see Project Processes and Organisational Analysis report).

- Identifying ways that governments can work with community networks, being sensitive to the fact interactions with government in low-income areas are generally avoided (see Project Processes and Organisational Analysis report).
- Ensuring that existing knowledge about local culture, practices, limitations, expertise and challenges are integrated into program design and implementation (see Project Processes and Organisational Analysis report).
- Supporting capacity exchange within the community to allow existing knowledge to be shared and developed (see Project Processes and Organisational Analysis report).

Integrate health priorities with energy efficiency aims:

Trade offs in GBS and overseas evidence shows that benefits of energy efficiency upgrades in cold climates are predominantly taken as thermal gain. (see Detailed Study section 4.4.5) Energy savings are taken in this way because health and function are important to householders. Improvements to the warmth and comfort of the home are linked to improvements in health and reduction in mortality (Gasparrini et al., 2015). It is argued that this thermal gain can improve health outcomes on a broad scale reducing the drain on health systems.

The health gains from improved thermal comfort are significant. Studies from New Zealand have linked energy efficiency programs (such as installing insulation) with savings to the health system. Grimes et al., (2011) found that for every $8 spend on energy savings there was a related $608 in health benefits[27]. This linkage is strong and the health benefits tend to overwhelm the energy benefits by several magnitudes. In a review of the NZ "Heat Smart" Program the health benefits are attributed to be 99% of the project benefits. These health benefits include reduced mortality, less hospitalisations and reduced pharmaceutical use (Grimes et al., 2011).

Similarly in a study of 1350 households that had recently installed ceiling insulation, Howden-Chapman et al., (2007) concluded that

> "Insulating existing houses led to a significantly warmer, drier indoor environment and resulted in improved self rated health, self reported wheezing, days off school and work, and visits to general practitioners as well as a trend for fewer hospital admissions for respiratory conditions".

The World Health Organisation also acknowledges the importance of properly maintained houses for healthy living. In particular they provide policy advice in order to combat condensation and mould and their impact on health outcomes:

> "Dampness and mould may be particularly prevalent in poorly maintained housing for low-income people. Remediation of the conditions that lead to adverse exposure should be given priority to prevent an additional contribution to poor health in populations who are already living with an increased burden of disease."
> (WHO, 2009, p xv[28])

We argue that thermal comfort changes are a significant component of the GBS program and the impacts of these should not be discounted relative to changes in energy use. In fact health outcomes are likely larger than energy outcomes. In order for this to be recognised at a program **level improving thermal comfort needs to be treated as a "health intervention"**.

Opportunities for linking thermal comfort and energy efficiency with health programs are currently limited, especially as preventative health or so called "Social determinants of health" receive much less funding than emergency or general practice care. A potential policy initiative could be the creation of Social Impact Bonds[29] issued at a population level to change health incomes by improving the thermal performance of households. We have not critically examined this possibility however further research into this may help to consolidate linkages and improve further policy directions.

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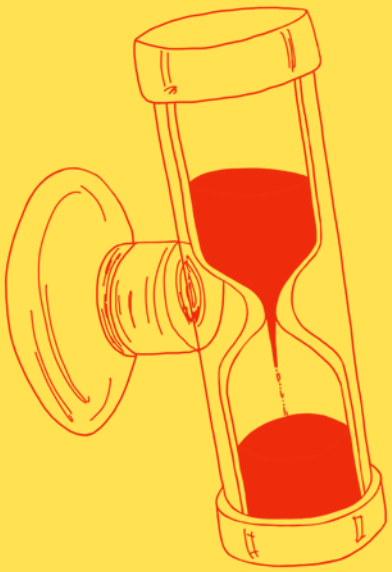
27 Low scenario, Table 30, pp 26 http://www.healthyhousing.org.nz/wp-content/uploads/2012/05/NZIF_CBA_report-Final-Revised-0612.pdf

28 http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf

29 http://www.socialventures.com.au/investment/social-impact-bonds/

Section 12

CONCLUSION



12. Conclusion

Get Bill Smart successfully trialled a community capacity (CCB) approach with an in-home education and upgrade (EDUG) approach in Greater Hobart. Through monitoring this trial we now better understand (with evidence) the processes, key determinants and possible outcomes that affect energy efficiency interventions program like Get Bill Smart in the Tasmanian context.

Despite householders often living in very poor housing stock and despite working with householders with limited capacity to make energy and comfort changes, Get Bill Smart activities were still able to create various positive outcomes for householders. GBS evidence showed that in-home education and upgrade visits by Home Energy Helpers improve energy productivity by reducing energy use and increasing thermal comfort. This effect is even greater when community capacity building (with energy champions) is mixed with in-home education and upgrade visits. **A successful future program can include all aspects of the in-home energy efficiency visits and modified components of the community capacity building.** It is envisaged this approach would have a cumulative cost-benefit ratio of around 1 as well as delivering thermal comfort and health benefits. Combining the energy savings and health benefits will deliver a substantial net benefit to society.

GBS evidence has outlined key structural barriers challenging moves made for energy efficiency in the Tasmanian context. Critically poor thermal performance of the stock and persistent socio-economic challenges still undermine energy efficiency and comfort efforts by householders and NGOs. Participants live at relatively low indoor temperatures, often under World Health Organisation recommendations and on very low incomes. It cannot be emphasised enough the significant limitations that such poor housing stock places on the capacity of householders to engage in energy efficient behaviours and to be comfortable in their homes. Just achieving one of these aims is difficult in such poor housing, with such limited financial capacity, while achieving both together seems near impossible.

GBS showed that for low income householder's affordability and health needs are closely affected by home energy use and comfort and therefore also need to be engaged with in energy efficiency in housing is to be achieved.

To overcome structural barriers the GBS team suggest to following policy initiative:

- **Improve thermal performance of existing houses**
- **Develop a long term energy efficiency program based on current practice**
- **Refine and develop community engagement within a long term energy efficiency program, and**
- **Integrate health priorities with energy efficiency aims through all policy initiatives.**

Through a long term energy efficiency program with community engagement, improvement of the housing stock, and recognition of health priorities embedded in home energy use and home comfort there is an opportunity to transition householders towards better health and better productivity.

Section 13

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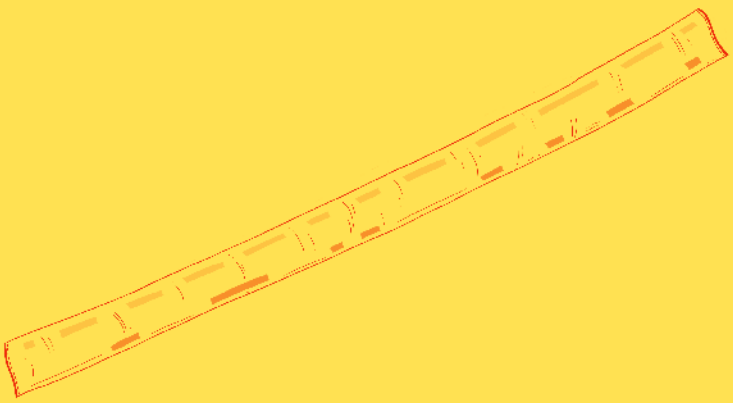

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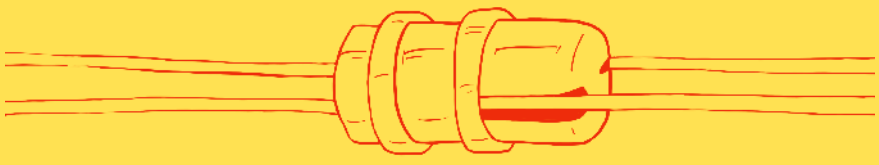
Section 14

APPENDICES

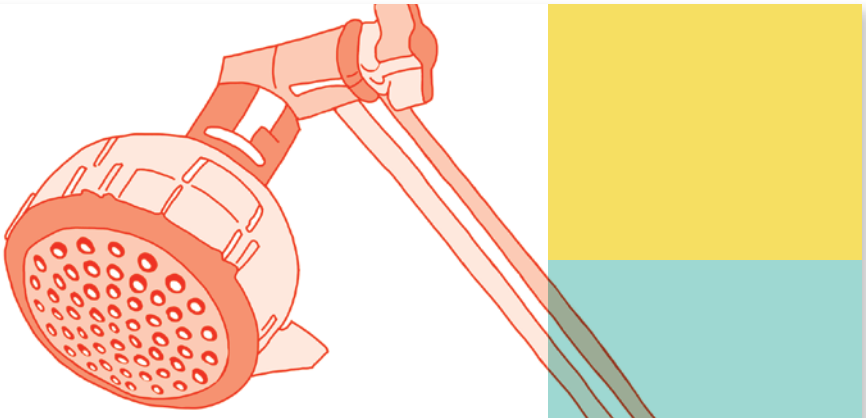


14. Appendices

Appendix 1 – Stay Warm Save Money Educational Booklet

Appendix 2 – Energy Champion Case Studies

Appendix 3 – Assumptions for cost benefit analysis



YOUR GUIDE TO

STAYING WARM & SAVING MONEY

GET BILL $MART

This easy guide to cutting your power bills has been developed by **Sustainable Living Tasmania** (SLT). SLT is a not-for-profit organisation that has been spreading the word on sustainability for 40 years. We deliver programs and advice on home energy efficiency, food security and transport. We also host Tasmania's annual Sustainable Living Festival.

The development of this guide was originally sponsored by the Tasmanian Government. Rights to reproduce and alter the booklet have been granted for the purposes of this project.

The Get Bill Smart Project is assisting low income households to be more energy efficient. It is funded by the Department of Industry as part of the Low Income Energy Efficiency Program. Get Bill Smart is being delivered by a consortium of three organisations; Mission Australia, Sustainable Living Tasmania, and The University of Tasmania.

For more information visit: www.slt.org.au/gbs

Sustainable Living Tasmania: Level 1, 71 Murray St, Hobart. Ph (03)6234 5566

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This activity received funding from the Department of Industry as part of the Low Income Energy Efficiency Program. The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information.

Contents

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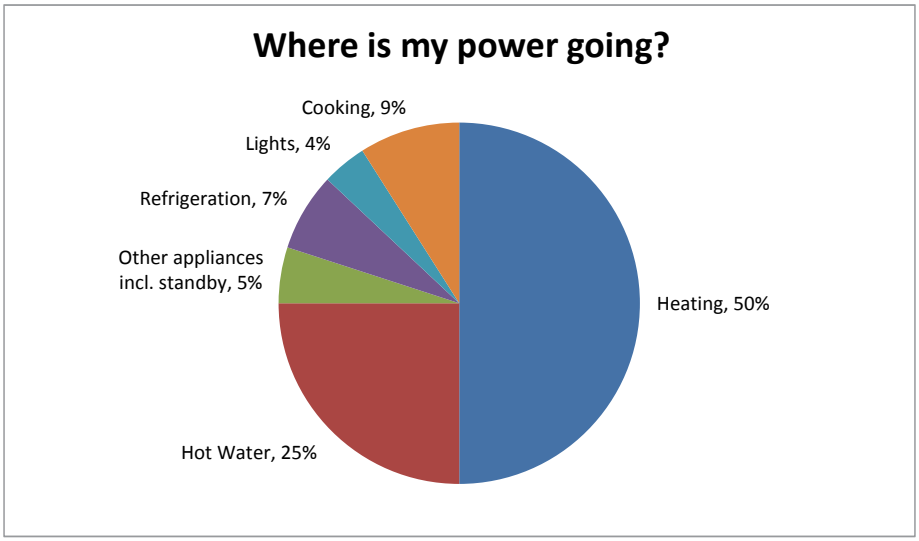
Save money & stay warm

There are lots of simple ways to reduce power costs – even if you live in a rental house. While each action is small, combined they can help save hundreds of dollars on your power bills.

This booklet can help you to decide which options will work best for you. Not all of these actions will suit each house and some require the approval of the property owner or a plumber.

Heating and hot water are the major power costs for most Tasmanians, especially in the winter months. You can also save money on lights, cooking, fridges and much more. Find out in this book what you can do.



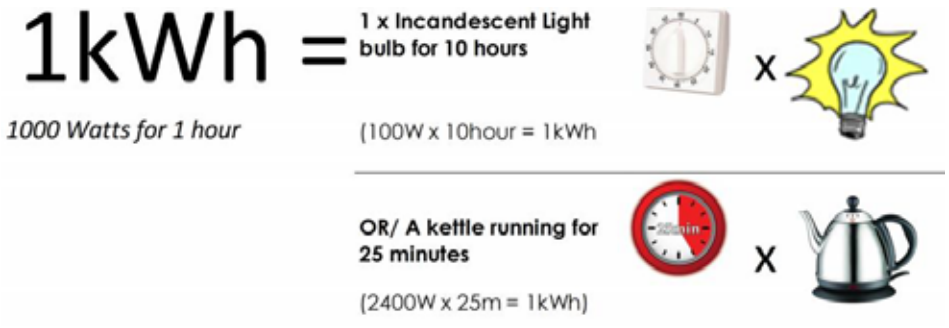
(Information based on average Tasmanian home)

How much energy do I use?

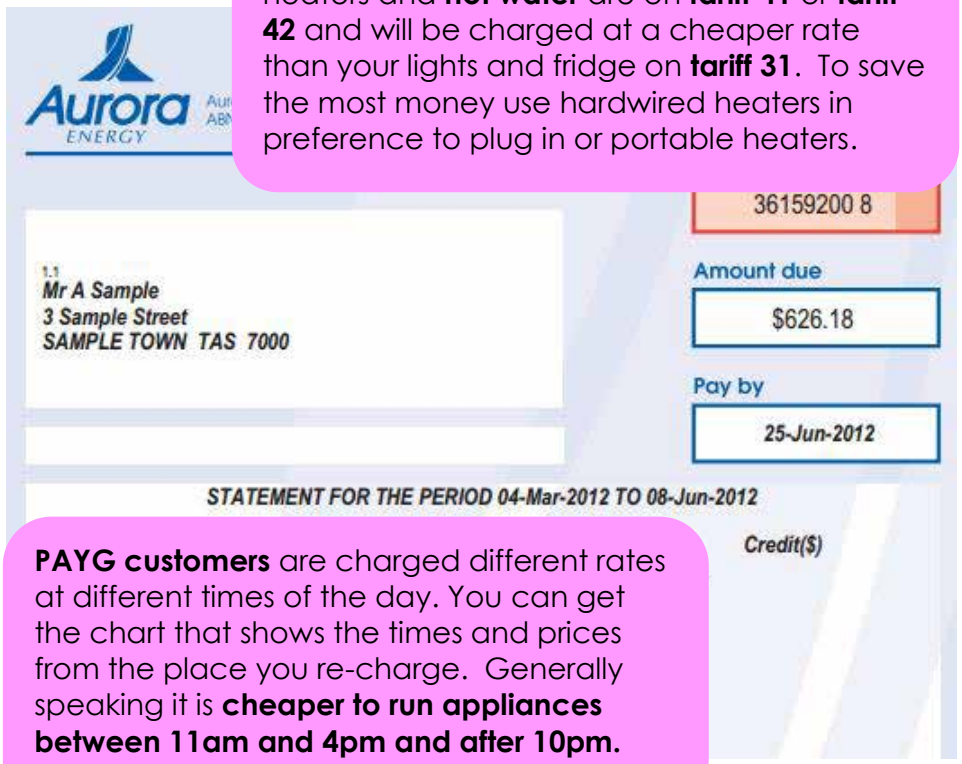
very day the average 4 person house in Hobart uses around 42 kWh in winter and 27 kWh in summer. That's around $3100 per year in electricity bills. You can see the average and compare your bill at **www.energymadeeasy.gov.au**

About your electricity bills

Electricity bills are measured in Kilowatt hours (**kWh)**. It is a measure of "power use" multiplied by the amount of "time" that it is used. It equals 1000 Watts for 1 hour.



For people on **Quarterly bills** your **"hardwired"** heaters and **hot water** are on **tariff 41** or **tariff 42** and will be charged at a cheaper rate than your lights and fridge on **tariff 31**. To save the most money use hardwired heaters in preference to plug in or portable heaters.

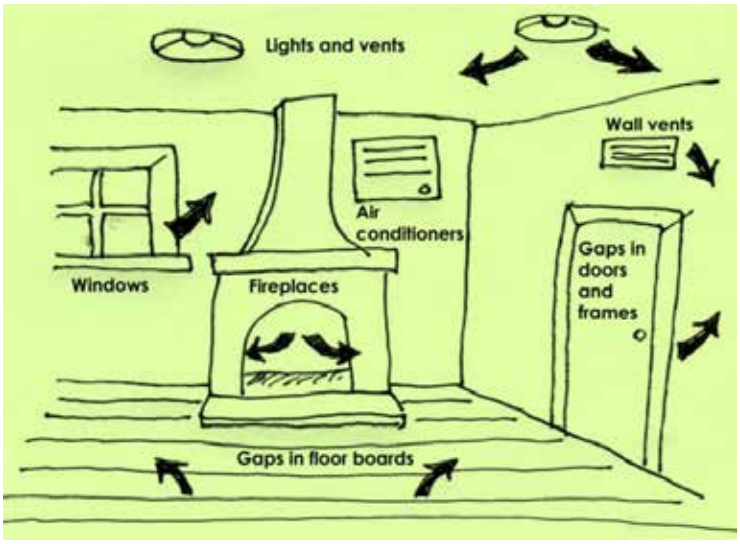


PAYG customers are charged different rates at different times of the day. You can get the chart that shows the times and prices from the place you re-charge. Generally speaking it is **cheaper to run appliances between 11am and 4pm and after 10pm.**

Keep warm

Cold air can creep into your home through gaps and cracks around doors and windows.

Seal the gaps to keep warm air in and cold air out.



Where's the draught?

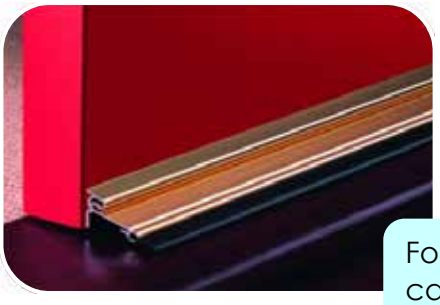
Can you feel cold air coming in? Find the draught by holding an incense stick near doors, windows and other joins. Does the air move the smoke?

Cover gaps

Block a gap at the bottom of your door with a **door snake** or rolled-up towel.

Use tape to seal around the sides of doors and windows. You can buy this at a hardware store.

If the gap is uneven, use a **weather strip.** It has a rubber seal (like on your fridge)

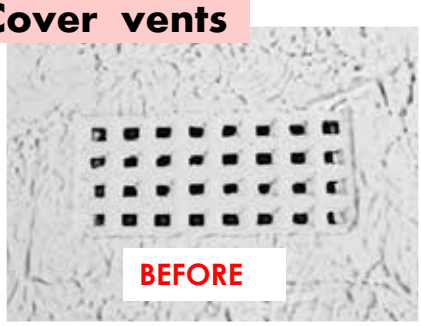


For the bottom of outside doors, you can use a **weather seal or brush strip.**

Cover your floor

Rugs or carpet help to keep floors warm.

Cover vents



Cover old vents with cloth tape or contact adhesive. **Don't try this if you already have condensation issues**

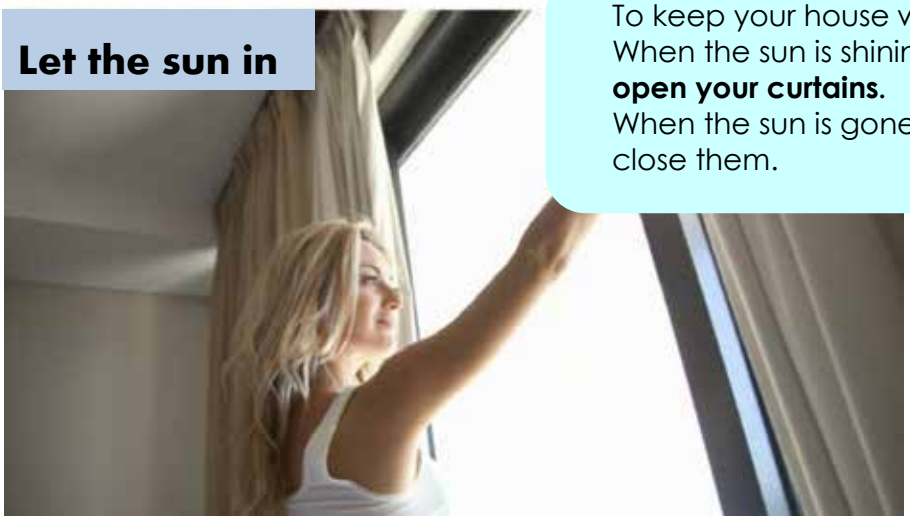
How much could I save?

Mike and Jane live in a weatherboard home. They stopped draughts from doors and windows by using door snakes, putting sealing tape on windows, and covering vents. This made a big difference to their heating costs.

TOTAL SAVINGS PER YEAR = $74
(based on standard Aurora tariff of 26.807c/kWh)

Windows

Let the sun in



To keep your house warm:
When the sun is shining, **open your curtains.**
When the sun is gone, close them.

Use thick curtains

The best curtains are **full-length** (down to the floor) thick or lined. There should be no gaps.

You can often get good curtains cheaply from op-shops.

Most **blinds** don't keep the heat in because they have large gaps

Use pelmets

Pelmets trap air between the curtains and the window. They help stop heat loss through the window.
The most common type is a **wooden box pelmet** that sits over the curtain rail.

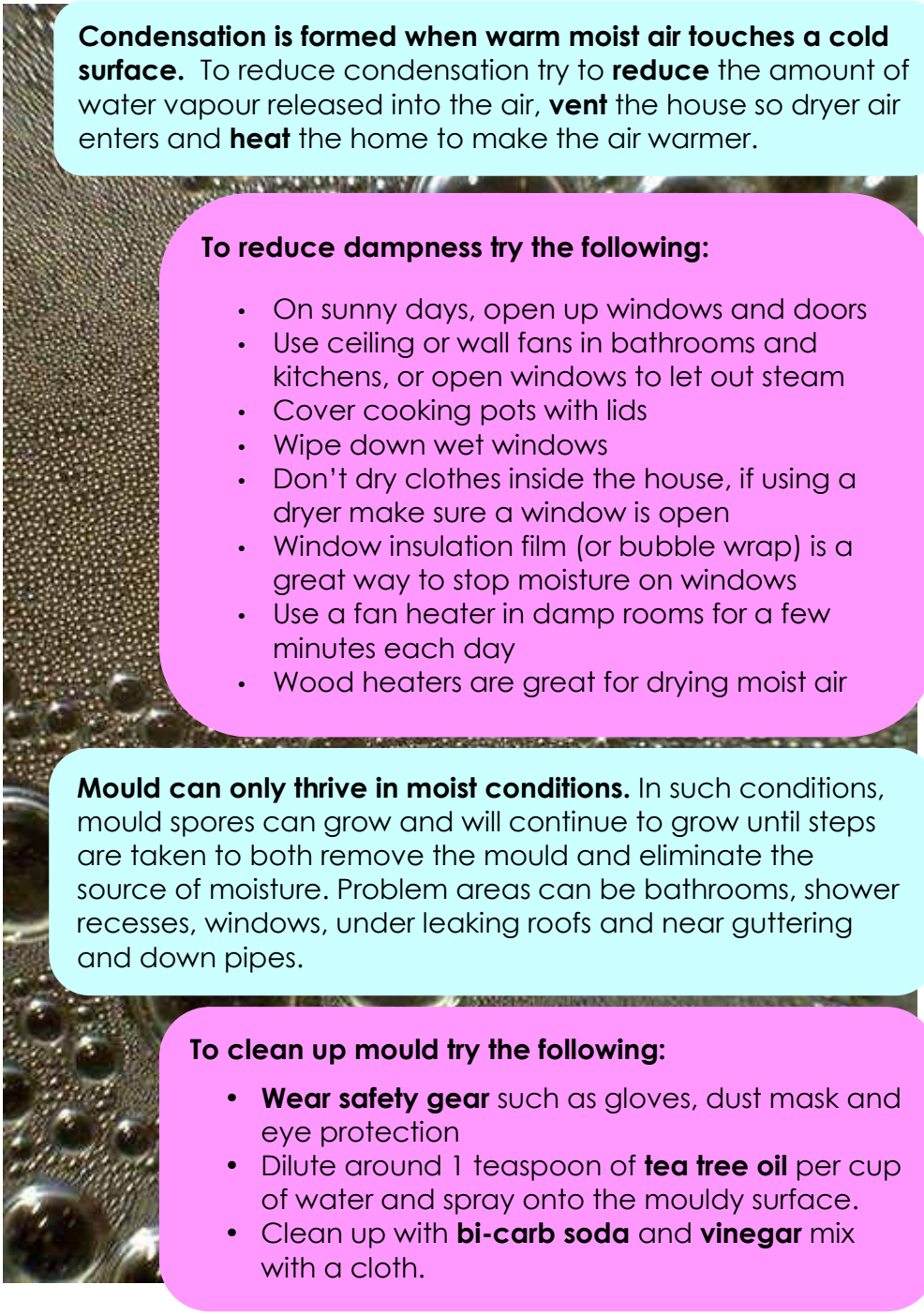
A **ledge pelmet** sits on top of the curtain rail, out of sight.
It can be made from thick cardboard, foam, or wood – anything that blocks the space

Double glazing the easy way

Window **insulation film** can help keep warm air in. **"Clear Comfort"** is a see-through plastic which you attach to your window frame and then shrink it to fit with a hair dryer. Or try using bubble wrap for instant double glazing! Just hold it in place with velcro tabs or a light mist of water.

Another option is to **cover unused windows** with material, especially during winter.

CONDENSATION and MOULD



Condensation is formed when warm moist air touches a cold surface. To reduce condensation try to **reduce** the amount of water vapour released into the air, **vent** the house so dryer air enters and **heat** the home to make the air warmer.

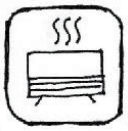
To reduce dampness try the following:

- On sunny days, open up windows and doors
- Use ceiling or wall fans in bathrooms and kitchens, or open windows to let out steam
- Cover cooking pots with lids
- Wipe down wet windows
- Don't dry clothes inside the house, if using a dryer make sure a window is open
- Window insulation film (or bubble wrap) is a great way to stop moisture on windows
- Use a fan heater in damp rooms for a few minutes each day
- Wood heaters are great for drying moist air

Mould can only thrive in moist conditions. In such conditions, mould spores can grow and will continue to grow until steps are taken to both remove the mould and eliminate the source of moisture. Problem areas can be bathrooms, shower recesses, windows, under leaking roofs and near guttering and down pipes.

To clean up mould try the following:

- **Wear safety gear** such as gloves, dust mask and eye protection
- Dilute around 1 teaspoon of **tea tree oil** per cup of water and spray onto the mouldy surface.
- Clean up with **bi-carb soda** and **vinegar** mix with a cloth.



Heating

Heat yourself

Put on a jumper, thermals and woolly socks instead of turning up the heater. The more clothing you have on, the less you need to spend on heating.

Only heat the rooms you use

Why heat your whole house?

If you spend most of the day in one part of the house, just heat that area.

Close the doors to the rest of the house.

If there's no door, **hang a blanket** or curtain in the archway or hall.

How much could I save?

Narelle heats the living room and keeps doors to other rooms shut whenever possible. This has reduced her heating bill by 40%.

Warm up your bedroom with the heat from your living room **just before you go to bed**.

A **hot water bottle** warms you under the covers, where you need it most (but for safety, always use a bottle cover).

Every Degree Counts

Set your heater to the lowest comfortable temperature, this is **"1 degree above being cold"**

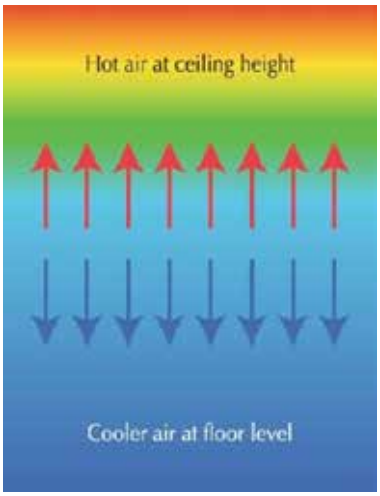
You can do this by lowering the temperature a degree and then wait 15 minutes, and lower again until it is **"just comfortable"** and set the thermostat at that temperature

Every degree adds 10% to your heating bill
If the room is "toasty warm" it should ring alarm bells

Use a timer.
Set it to switch the heater on ten minutes before you get up, or arrive home. Set it to turn off at night.

Mix the air to stay warm

A big problem when heating a room is **"Stratification".** This is where hot air rises and keeps the ceiling warm. But it also means the air near the floor is cold. Improve this by **"mixing the air"** by using heaters with fans. But don't blow the fan directly where you sit as it will make to feel cooler.



Use the right heater

Which heater is best for you? Use the best heater for your heating needs, and keep costs down. For people on quarterly bills it makes sense to use your "hard-wired" heater before using a plug-in heater

Heat Pumps

Heat pumps are the cheapest form of electric heating, but can cause draughts.

For best results:

- Turn off overnight or if you are away from the house for more than a few hours
- Turn the thermostat down to "1 degree above cold"
- Direct the air at the floor to mix the hot and cold air

"Pureheat "

"Pureheat Royal/Belmont" heaters use quite a lot of energy (6, 7 or 8kW models). If you have one of these heaters you should use it wisely to keep your power bill down. These heaters have two main settings **"Space Heat"** and **"Radiant heat"**. Each is suited for a task. You can turn both settings on, but you will use more energy!

Space Heat
If you are trying to heat the room or larger spaces turn on the "space heat". **Make sure you use the fan:** The fan only uses a little energy but helps spread the heat around.

The most efficient way to use these heaters is to have the thermostat set to **"low"** and turn the right hand switch on and off to maintain a **"just comfortable"** temperature. If this isn't hot enough, turn on the thermostat to **"high"** to engage the second element (be careful to set this to zero when you are not using the heater)

Radiant Heat
This is good if you sit near the heater for short periods of time. It feels warm and cosy but only heats people close by.

Fan Heater

Fan heaters are **"plug-in"** and warm the air quickly.
For best results, run the heater on HIGH until the room is warm. Then turn it to LOW.
These heaters dry the air so are good if there is condensation in your home.

Column Heater

Column heaters are "plug in" and slowly heat the air. They are one of the **most costly** ways to heat a space. **But they may be good for someone with asthma.**

For best results:

- stand the heater in the middle of the room
- use the thermostat to set on the lowest comfortable temperature
- turn it off if you're out of the room

Wood Heater

Wood heaters can be efficient and cheap to run if used correctly. For best results:

- Start with lots of small pieces of wood until you have a big fire. When starting a fire or adding more wood, allow the fire to burn brightly for 20 minutes before turning it down.
- Use only dry wood.
- Wood heaters work best if you don't put too much wood in.
- If the heater has a fan –use it to spread the heat around

These simple steps will help to reduce smoke and improve health in your community.

Hot Water

Set hot water at 60°C

Ask a plumber, electrician or your landlord to set your hot water temperature at **60 degrees.**

If it's lower than this, bacteria can build up.

How much could I save?

Julie and her two children have a hot water tank outside set at 76°C. The temperature was turned down to 60°C.

TOTAL SAVINGS PER YEAR = $29

(based on standard Aurora hot water tariff of 16.757c/kWh)

Cover hot water pipes

Use **foam tubing** to stop heat loss from your hot water pipes. Called lagging, this tubing fits easily over the pipes. You put it onto the pipes for a meter or so where they leave the tank. You can get it from a hardware store.

To put it on:

1. cut along the length of the lagging to open it up
2. slip it onto the pipe
3. use electrical tape or cable ties to hold it on snugly.

Wrap up your tank

Keep your **hot water tank warm** by wrapping it up. You can buy a cover for your tank or use insulation batts. ***Make sure you don't cover the pressure outlet valve! This is important for safety.***

Short showers

Shorter showers of three or four minutes mean less hot water so less cost. You can use a **timer** to keep track

Have **shallow baths**. Baths use more water than showers.

How much could I save?

Dave and Kaylene each have five minute showers each day. They replaced their old 17L/min showerhead with a water saving showerhead which uses 9L per minute.

TOTAL SAVINGS PER YEAR = $139
(based on Aurora hot water tariff 16.167c/kWh)

Water saving shower head

Use a **water-saving shower head** that uses 7-9 litres per minute. To measure your own shower flow rate, fill a bucket for 15 seconds, then multiply the litres measured by 4 to get litres per minute

Use flow restrictors on your taps

Flow restrictors for all your taps will reduce water use.

Move your mixer tap

Remember to leave your **mixer tap** turned all the way to the COLD side.

If it's left in the middle it runs warm water. This costs you money.

Fix the drip

Fix **dripping** hot water taps.

A drip every 2 seconds can waste over a thousand litres of hot water every year. This is as much water as 10 baths!

Lights

Turn lights off

Use energy efficient lights

Compact fluorescent lights (CFL) use about a quarter as much power as "normal" light bulbs. (Keep away from cheap brands as some aren't well made and won't last)

LED lights fit most light sockets. These are energy efficient and last a long time.

Use **low-energy fluorescent tubes**. They don't flicker, have natural light colour and use a lot less energy.

The right light for the job

Use natural light when you can.

If you're reading, **use a lamp** with a lower-power light bulb.

How much could I save?

Tony changed his security light from a 150W Halogen to a 23W CFL. Using the light 10 hours per night the light payed for itself within 3 months.

TOTAL SAVINGS PER YEAR = $130
(based on standard Aurora tariff of 27.785c/kWh)

What to do if your energy saving light breaks

Energy saving (fluorescent) lights contain very small amounts of mercury, so it is important to clean up carefully if you break a globe. If one breaks:

1. Open windows and leave the room for 15 minutes.
2. Wearing rubber gloves, sweep up (don't vacuum) the broken material.

   If small pieces are in the carpet, use a damp cloth or sticky tape to pick them up.
3. Put the pieces into a sealed plastic bag. Take it to be recycled or put in outdoor rubbish bin.
4. Wash your hands and face. If you get any pieces of broken globe on your clothes, put clothing in rubbish bin or wash carefully by hand with soap and water.

The first time you vacuum the area where the bulb was broken, remove the vacuum bag afterwards. Put the bag in the outdoor rubbish bin.

Where can globes be recycled?

For a small fee, CFL lamps can be recycled at Sustainable Living Tasmania.

1/71 Murray Street, Hobart

Appliances

Buy energy efficient

Large appliances such as fridges, washing machines and dryers cost a lot up-front. But they can last 10-15 years. The energy efficiency of the model you buy will make a big difference to the running costs and power use over its lifetime.

Before you buy, ask yourself – is it energy efficient?
For **any appliance**, ask yourself: can I turn it off when I'm not using it?

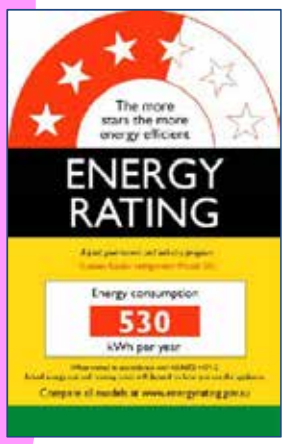
Use a **laptop computer.** They use much less power than a PC.

Use a **smaller TV**. Big TVs use a lot of energy.

LCD and LED TVs use a lot less power than plasma TVs.

How many stars?

If you're buying white goods, check the energy label to see how many kWh (kilowatt hours) per year it uses. The lower the better A fridge (or freezer) with a 5-star energy rating uses half as much energy as one with a 1 star.



You can even calculate how much an appliance costs to run. Power costs about 25c per kW. This means that a fridge with energy rating 530kW per year will cost about $147 per year to run:

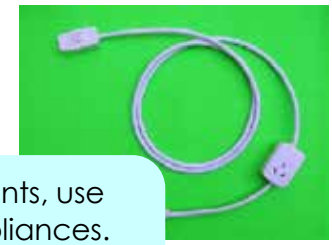
530kW by $0.2785 = $147.26

Don't leave on standby

Standby power is the energy used by appliances when they are not in use.
Even though it's a small amount for each appliance, it all adds up. On average, the cost is 12% of your home's total energy use!
Switch appliances off **at the power point** when they are not being used.

It can be a pain to turn off computers because they take a long time to start up again.
Try clicking on **Hibernate.** The computer will switch off completely, but starts up quickly when you turn it back on.

Use an Ecoswitch

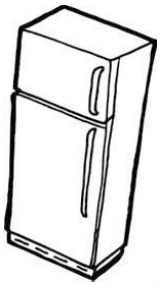


For hard to reach power points, use an **Ecoswitch** to turn off appliances. It's great for TVs, and reduces fire risk from appliances on standby.

How much could I save?

Troy and Danni have a 90cm TV, set top box and DVD player that are left on standby for 16 hours per day. They can't reach the power point behind the cupboard to turn them off. They purchased an Ecoswitch so they could turn appliances off easily.

TOTAL SAVINGS PER YEAR = $24
(based on standard Aurora tariff of 27.785c/kWh)



Fridges & freezers

What's the temperature?

Keep your fridge at around 5°C and defrost it regularly. Make sure your freezer is set at -15 to -18°C.

Seal fridge doors

Make sure fridge and freezer doors have **good seals** that do not leak cold air.

If you can easily slide a piece of paper or dollar note in your fridge door, the seals need replacing.

How much could I save?

Carolanne has a two door fridge and freezer unit in her kitchen that she often hears running. She checked the seals and replaced them. This made a big difference to the cost of running her fridge.

TOTAL SAVINGS PER YEAR = $27
(based on standard Aurora tariff of 26.807c/kWh)

Clean the heat sink

Keep the **heat sink** (the metal grill on the back of the fridge) clean and free from dust and lint.

This will help it to run more efficiently.

Keep ventilated and cool

Fridges and freezers are cheaper to run if placed in the coolest part of the kitchen. Allow space at the back and on top for air to circulate and keep the unit cool.

Consider locating fridges and freezers in unheated rooms.

Turn off that extra fridge

Do you really need that second fridge or freezer? Usually these are older models that don't run efficiently. Unplug it or get rid of it.

Cooking

Use lids on pots and pans

Lids keep the heat in so food doesn't take as long to cook. This saves energy.

Think before you fill

It takes a lot of energy to boil water. Fill your kettle with only the number of cups of water needed.

Use the microwave

A **microwave** can reduce cooking costs by up to 75%. Consider using the microwave instead of the oven or stove.

Thaw it

Thaw frozen food before cooking (in the fridge). This saves on cooking time.

Washing clothes

Wash with COLD water

Washing with cold water gets your clothes just as clean, and will cut your power bills.

Use front loading

Front loading washing machines are usually more **energy and water efficient** than top-loading machines.

You can compare models by looking at the information on the star-rating stickers. Always check how many kilowatt-hours (kWh) the appliance uses.

Use a solar dryer

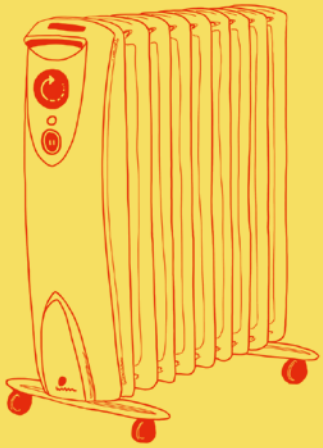
Use a **clothes line** for drying clothes. In winter, find an undercover area and set up clothes racks.

If you need to use a **dryer**, try to partly dry on a clothes line first. Always put a full load in the dryer.

How much could I save?

Linda uses her clothes dryer for four hours every week on average. She changed to the clothes line and a portable clothes rack inside.

TOTAL SAVINGS PER YEAR = $64
(based on standard Aurora tariff of 26.807c/kWh)



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THE POWER RANGERS

Bec's Case Study

Experience:

"I have noticed with the new showerhead, insulation of the hot water cylinder and thermostat reduction that I get a lot more out of my hot water.

"I've spent $130 on new kitchen and bathroom taps, which, in time, will save me thousands."

Upgrades Received:

Hot water temperature reduced
Water saving showerhead
Front door seal
Draught proofing of windows and doors
Curtains

Behaviours Changed through Education:

Close curtains when appropriate.
Only warm rooms when using them.
Close doors of rooms I am heating.
Monitor my Pay As You Go meter.
Switch off appliances at powerpoint when not in use.

Household Demographics /Statistics:

Free standing 3 bedroom home
1 six-year old child, two teenagers—13 and 14, and one adult

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THE POWER RANGERS

Debra's Case Study

Experience:

"Between the upgrades and my own actions, my bill this winter was $460 instead of last winter at $780!" (savings of $320)

"I have been very happy with all the help and advice I have received."

Upgrades Received:

Energy efficient lighting
Draught proofing
Eco-switch
Valvecosy installed
Roof insulation completed (house was only partially insulated)
Hot water tank insulated
Hot water pipes insulated
Thermostat adjusted
Curtains in lounge room

Behaviours Changed through Education:

Now turns off all power points (except phone and alarm) when not in use.
Got rid of second freezer.
Stopped using dryer so much.
Got rid of electric blankets.
Now washes in cold water and chooses appropriate water level and wash time.

Household Demographics /Statistics:

Free standing 3 bedroom brick home
Single parent with 12-year old daughter

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THE POWER RANGERS

Gill's Case Study

Experience:

"I have been surprised by the amount of power different appliances use by using our power meter."

"I have been surprised by how much more effective draught proofing our house has been on power savings."

Upgrades Received:

Energy efficient lighting
Draught proofing
Eco switch
Water heater thermostat adjusted

Behaviours Changed through Education:

Turn off power when not in use, including eco switch at night-time.
Timed showers.
Keeping lounge door shut when heat pump/air-con is in use.
Putting dryer on at economic times of the day.

Household Demographics /Statistics:

Free-standing Besser brick home
2 adults with 3 children of 14, 18, and 21 years old

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THE POWER RANGERS

Harry's Case Study

Experience:

"With the upgrades and my own actions, I have saved $210, which is 55% less than the average 2 person household for a medium house."

"I am very happy with the upgrades, help, and advice I have received."

Upgrades Received:

Energy efficient lighting
Draught proofing
Eco switch
Water heater insulated
Energy efficient showerhead
Curtains/blinds for living room/kitchen (still to be installed, looking forward to further energy savings)

Behaviours Changed through Education:

Used thermometer to set temp of fridge/freezer and heat pump for more energy efficient use.
Greater awareness of energy usage (running costs, compliance plate) when purchasing household items).
Daughter no longer uses electric blanket.

Household Demographics /Statistics:

Single parent with adult daughter

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THE POWER RANGERS

Kay's Case Study

Experience:

"The draught proofing of the front and back doors has made a big difference in warmth and comfort levels."

"The shower head changes are great with the use of a timer."

"Focusing on turning off the switches and using the eco switch will help with the next power bill."

Upgrades Received:

Energy efficient lighting
Draught proofing
Eco switch

Behaviours Changed through Education:

Closing doors, windows, and vents to keep heat in.
Timing showers.
Turning off switches when not in use and using the eco switch.
Only using heaters when in the room.

Household Demographics /Statistics:

Free-standing wooden house
Single woman and dog
Casual overnight stay of granddaughter and other relatives who have longer showers than I do!

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Kylie's Case Study

Experience:

"*Using a shower timer for 4 minute showers saves on hot water.*"

Upgrades Received:

Energy efficient lighting
Draught proofing
Eco switch
Hot water tank and pipes insulated
Curtains in lounge room

Behaviours Changed through Education:

4 minute showers.
Turn off power point when not using appliances.
Keep curtains closed when it is hot to keep the heat out in the summer.
Open curtains on sunny days to warm up rooms.

Household Demographics /Statistics:

3 bedroom brick home
2 adults and 3 children

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THE POWER RANGERS

Rosemary's Case Study

Experience:

"I have noticed that 'door draughts' are gone since the door strips were fitted."

"So far, I have been saving money on my Pay As You Go. Winter will be more interesting."

Upgrades Received:

In December 2013:
Eco switch
Draught proofing door strips
Energy saver light globes
Thermometer

Behaviours Changed through Education:

Thermometer to check fridge, freezer, and room temperature.
Use eco switch every day.
Checked how long it took to shower (5 minutes).

Household Demographics /Statistics:

3 bedroom breeze brick house with corrugated roof and non-concrete foundation

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THE POWER RANGERS

Tash's Case Study

Experience:

"With the upgrades and my family taking a few small steps, we have saved $260 compared to this time last year!"

Upgrades Received:

Energy efficient lighting
Draught proofing
Hot water pipes insulated
Water saving showerhead
Valvecosy installed

Behaviours Changed through Education:

Lights get switched off when not using room.
4 minute showers.
Power points gets turned off when not using appliances.
Heat pump turned off when not needed.
Ceiling fans used to cool instead of air-conditioning.

Household Demographics /Statistics:

3 bedroom brick home
Family of 2 adults and 2 children

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THE POWER RANGERS

Vic's Case Study

Experience:

"Have had a reduction in daily power usage."
"Learning how to calculate appliance power consumption is really helpful."
"It is empowering to know what appliances are costing."

Upgrades Received:

Draught proofing
Eco-Switch
Hot Water pipes insulated
Roof Insulation

Behaviours Changed through Education:

Using Eco-Switch to incorporate non-essential power in lounge room.
Switching off unused power points – especially chargers for phones, computers etc.
Using curtains to insulate at different times, e.g. open curtains when sun is on that area to maximise heating. Close to retain heat. Do the opposite in summer.

Household Demographics /Statistics:

Free standing 2 Storey brick veneer and weatherboard 5 bedroom home.
Married couple with 18, 17 and 12 year old children.

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Appendix 3- Get Bill Smart Cost Benefit Analysis Assumptions

APPROACH LEVEL PROPORTIONS

		In-home education and upgrades					Community capacity building					In-home education and upgrades + Community capacity building					Representative group				
Category heading	Total Expenditure	**PROJECT LOADING**	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	**PROJECT LOADING**	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	**PROJECT LOADING**	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	**PROJECT LOADING**	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial
Community Capacity Building	$233,466	**0%**	0%	0%	0%	0%	**53%**	35%	52%	61%	100%	**47%**	35%	52%	61%	100%	**0**	0%	0%	0%	0%
Energy Audit gifts	$47,376	**0%**	0%	0%	0%	0%	**50%**	50%	50%	50%	100%	**0%**	0%	0%	0%	0%	**50%**	50%	50%	50%	100%
Detailed Data logging and anal	$205,796	**34%**	0%	0%	0%	100%	**18%**	0%	0%	0%	100%	**16%**	0%	0%	0%	100%	**33%**	0%	0%	0%	100%
Energy Billing Data	$17,792	**34%**	0%	0%	0%	100%	**18%**	0%	0%	0%	100%	**16%**	0%	0%	0%	100%	**33%**	0%	0%	0%	100%
Energy efficiency upgrades	$254,785	**68%**	84%	84%	84%	100%	**0%**	0%	0%	0%	0%	**32%**	84%	84%	84%	100%	**0%**	0%	0%	0%	0%
Marketing & communications c	$21,817	**20%**	0%	30%	30%	100%	**30%**	0%	30%	30%	100%	**30%**	0%	30%	30%	100%	**20%**	0%	0%	0%	100%
Office and venue hire	$14,000	**0%**	0%	0%	0%	0%	**53%**	100%	100%	100%	100%	**47%**	100%	100%	100%	100%	**0%**	0%	0%	0%	0%
Office expences	$15,655	**20%**	20%	30%	30%	100%	**35%**	20%	30%	30%	100%	**35%**	20%	30%	30%	100%	**10%**	20%	30%	30%	100%
IT equipment	$11,961	**34%**	0%	0%	0%	100%	**18%**	0%	0%	0%	100%	**16%**	0%	0%	0%	100%	**33%**	0%	0%	0%	100%
Staffing	$1,073,874	**34%**	0%	6%	12%	100%	**18%**	0%	6%	12%	100%	**16%**	0%	6%	12%	100%	**33%**	0%	0%	0%	100%
Transcription services	$35,190	**34%**	0%	0%	0%	100%	**18%**	0%	0%	0%	100%	**16%**	0%	0%	0%	100%	**33%**	0%	0%	0%	100%
Travel & accommodation	$35,076	**34%**	0%	0%	0%	100%	**18%**	0%	0%	0%	100%	**16%**	0%	0%	0%	100%	**33%**	0%	0%	0%	100%

APPROACH LEVEL COSTS

	In-home education and upgrades				Community capacity building				In-home education and upgrades + Community capacity building				Representative group			
Category heading	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial
Community Capacity Building	$ -	$ -	$ -	$ -	$ 43,779	$ 64,418	$ 76,031	$ 124,422	$ 38,368	$ 56,456	$ 66,634	$ 109,044	$ -	$ -	$ -	$ -
Energy Audit gifts	$ -	$ -	$ -	$ -	$ 11,844	$ 11,844	$ 11,844	$ 23,688	$ -	$ -	$ -	$ -	$ 11,844	$ 11,844	$ 11,844	$ 23,688
Detailed Data logging and analys	$ -	$ -	$ -	$ 69,147	$ -	$ -	$ -	$ 36,632	$ -	$ -	$ -	$ 32,104	$ -	$ -	$ -	$ 67,913
Energy Billing Data	$ -	$ -	$ -	$ 5,978	$ -	$ -	$ -	$ 3,167	$ -	$ -	$ -	$ 2,776	$ -	$ -	$ -	$ 5,871
Energy efficiency upgrades	$ 146,029	$ 146,029	$ 146,029	$ 173,999	$ -	$ -	$ -	$ -	$ 67,799	$ 67,799	$ 67,799	$ 80,785	$ -	$ -	$ -	$ -
Marketing & communications cor	$ -	$ 1,309	$ 1,309	$ 4,363	$ -	$ 1,964	$ 1,964	$ 6,545	$ -	$ 1,964	$ 1,964	$ 6,545	$ -	$ -	$ -	$ 4,363
Office and venue hire	$ -	$ -	$ -	$ -	$ 7,461	$ 7,461	$ 7,461	$ 7,461	$ 6,539	$ 6,539	$ 6,539	$ 6,539	$ -	$ -	$ -	$ -
Office expences	$ 626	$ 939	$ 939	$ 3,131	$ 1,096	$ 1,644	$ 1,644	$ 5,479	$ 1,096	$ 1,644	$ 1,644	$ 5,479	$ 313	$ 470	$ 470	$ 1,566
IT equipment	$ -	$ -	$ -	$ 4,019	$ -	$ -	$ -	$ 2,129	$ -	$ -	$ -	$ 1,866	$ -	$ -	$ -	$ 3,947
Staffing	$ -	$ 20,675	$ 44,880	$ 360,821	$ -	$ 10,953	$ 23,776	$ 191,149	$ -	$ 9,599	$ 20,837	$ 167,524	$ -	$ -	$ -	$ 354,378
Transcription services	$ -	$ -	$ -	$ 11,824	$ -	$ -	$ -	$ 6,264	$ -	$ -	$ -	$ 5,490	$ -	$ -	$ -	$ 11,613
Travel & accommodation	$ -	$ -	$ -	$ 11,786	$ -	$ -	$ -	$ 6,244	$ -	$ -	$ -	$ 5,472	$ -	$ -	$ -	$ 11,575

PARTICIPANT LEVEL COSTS

	In-home education and upgrades				Community capacity building				In-home education and upgrades + Community capacity building				Representative group			
Category heading	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial	Level 1 - direct trial	Trial component	Total Business	Level 4- Total trial
Community Capacity Building	$ -	$ -	$ -	$ -	$ 492	$ 724	$ 854	$ 1,398	$ 492	$ 724	$ 854	$ 1,398	$ -	$ -	$ -	$ -
Energy Audit gifts	$ -	$ -	$ -	$ -	$ 133	$ 133	$ 133	$ 266	$ -	$ -	$ -	$ -	$ 72	$ 72	$ 72	$ 144
Detailed Data logging and anal	$ -	$ -	$ -	$ 412	$ -	$ -	$ -	$ 412	$ -	$ -	$ -	$ 412	$ -	$ -	$ -	$ 412
Energy Billing Data	$ -	$ -	$ -	$ 36	$ -	$ -	$ -	$ 36	$ -	$ -	$ -	$ 36	$ -	$ -	$ -	$ 36
Energy efficiency upgrades	$ 869	$ 869	$ 869	$ 1,036	$ -	$ -	$ -	$ -	$ 869	$ 869	$ 869	$ 1,036	$ -	$ -	$ -	$ -
Marketing & communications c	$ -	$ 8	$ 8	$ 26	$ -	$ 22	$ 22	$ 74	$ -	$ 25	$ 25	$ 84	$ -	$ -	$ -	$ 26
Office and venue hire	$ -	$ -	$ -	$ -	$ 84	$ 84	$ 84	$ 84	$ 84	$ 84	$ 84	$ 84	$ -	$ -	$ -	$ -
Office expences	$ 4	$ 6	$ 6	$ 19	$ 12	$ 18	$ 18	$ 62	$ 14	$ 21	$ 21	$ 70	$ 2	$ 3	$ 3	$ 9
IT equipment	$ -	$ -	$ -	$ 24	$ -	$ -	$ -	$ 24	$ -	$ -	$ -	$ 24	$ -	$ -	$ -	$ 24
Staffing	$ -	$ 123	$ 267	$ 2,148	$ -	$ 123	$ 267	$ 2,148	$ -	$ 123	$ 267	$ 2,148	$ -	$ -	$ -	$ 2,148
Transcription services	$ -	$ -	$ -	$ 70	$ -	$ -	$ -	$ 70	$ -	$ -	$ -	$ 70	$ -	$ -	$ -	$ 70
Travel & accommodation	$ -	$ -	$ -	$ 70	$ -	$ -	$ -	$ 70	$ -	$ -	$ -	$ 70	$ -	$ -	$ -	$ 70