Energy Saver Study

SECCCA
South East Councils Climate Change Alliance

Final report – Executive Summary

Low Income Energy Saver Direct Care and Motivators Project

2 May 2016

This activity received funding from the Australian Government.

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The South East Councils Climate Change Alliance (SECCCA) supports communities, businesses and industries to the south east of Melbourne in responding and adapting to the impacts of climate change. SECCCA is an incorporated association of eight councils committed to delivering high-quality, innovative projects and research programs at a regional level.

SECCCA is:

Our vision is for the communities to the south east of Melbourne to produce zero net emissions and have a high capacity to adapt to climate change.

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Executive Summary

Introduction

The Low Income Energy Efficiency Program (LIEEP) was funded and managed by the Australian Government. The Energy Saver Study (formerly *Residential Energy Efficiency Motivators Program for Low Income Households*) was coordinated by the South East Councils Climate Change Alliance in Victoria. It was one of twenty LIEEP research projects that aimed to trial and evaluate a number of different approaches in various locations that assist low income households to be more energy efficient and capture and analyse data and information to inform future energy efficiency policy and program approaches. This 3-year project aimed to investigate the most effective ways to support low income householders to improve their household energy efficiency. The project also aimed to determine if the support provided to householders decreases the householders' energy costs and has benefits for their health, comfort and/or wellbeing. It also aimed to confirm whether delivery of a support program to low income householders is effective when done through local council Home and Community Care (HACC) departments.

This project received $4.4 million from the Department of Industry, Innovation and Science (DIIS) LIEEP funding Round 1 in April 2013.

This report is designed to provide information to government staff and politicians. It is to help inform future government policy and programs related to supporting and protecting vulnerable, low income community members, to help them reduce their energy and living costs, improve residential energy efficiency, community health and wellbeing.

Project rationale

Low income householders including council HACC clients (those that receive discounted gardening, cleaning, cooking or home maintenance services from council) which are often the most vulnerable in the community to the impacts of climate change, given their socio-economic status and the types of houses in which they live. These homes may be old, inefficiently designed or built (in terms of energy) or poorly maintained. These low income householders may face barriers to improving energy efficiency including no/little access to money, poor physical and/or mental health or they may have acute health conditions, a lack of mobility, limited knowledge of residential energy efficiency opportunities, limited/no English and they often live in homes where they need approval from landlords/property managers to undertake work on the home.

Approaches

The project was delivered in 3 stages:

- Householder recruitment and pre-intervention data gathering
- Interventions
- Post-intervention data monitoring and evaluation

This project recruited participants through already trusted and well regarded organisations: the local council Home & Community Care teams. Householders were then allocated to one of the 4 main study groups as follows (see Table I below):

- Group A: receive home improvements/retrofits (80)
- Group B: receive energy action information and support (80)

- Group C: receive home improvements **plus** energy action information and support (80)
- Group D: receive no support i.e. this is a scientific control group until after the monitoring period (80)

Energy monitoring equipment was then installed in 120 homes to collect and compare with data from energy distributors. 30 of these homes received custom designed In-home displays showing their energy use. A further 30 homes received off the shelf in-home displays. Another 60 homes were draught tested, with 26 of them receiving draught sealing and retesting to determine the effectiveness of draught sealing. A further 60 were assessed for their pre-intervention star rating and 28 had their star rating re-assessed after home improvements.

The intervention approaches the project used to assist low income householders in various locations to become more energy efficient (plus the associated co-benefits) included:

- Employ and train 6 Energy Liaison Officers (ELOs) to recruit and support 320 eligible householders that receive Home and Community Care services
- Deliver a tailored energy efficiency support program through local council HACC Services to reduce the existing barriers of finance, information, capacity, communication and lack of trust in existing providers.

The project captured and analysed data and information to inform future energy efficiency policy and program approaches. It compared between the 4 main intervention study groups to determine the most effective and best value approach to overcome capacity, cost and risk barriers.

The project developed a robust framework, tools, training and a training guide (*House In Order*) for ELOs in the delivery of the additional home retrofit and support services to clients.

An RMIT PhD research project was undertaken simultaneously which identified and described individual and socially shared householder practices. It quantified outcomes in indoor temperatures, energy use, energy costs and householder health and explained how householder practices influenced these outcomes.

An additional Swinburne University Masters research project was added to the project during 2015 exploring social influence on household energy practices. Social influence was being researched through the householder's social network. Interviews regarding social influence patterns on householder actions and their Most Significant Change have been completed and preliminary findings identified.

Characteristics of the target audience

The householders were predominantly retired, aged and had either a chronic or acute health condition. Most but not all were single females. Some were physically and cognitively very able and had the capacity to plan, organise and arrange their life.

Table I: Household study groups and activities

Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7
1A (30 households)	energy audit	air-barrier testing (15 houses only)	draught sealing (15 houses only)	star-rating assessment (15 houses only)	energy retrofit		energy monitoring equipment
1B (30 households)	energy audit	air-barrier testing (15 houses only)		star-rating assessment (15 houses only)	basic energy retrofit (post-Activity)	behaviour change program	energy monitoring equipment
1C (30 households)	energy audit	air-barrier testing (15 houses only)	draught sealing (15 houses only)	star-rating assessment (15 houses only)	energy retrofit	behaviour change program	energy monitoring equipment
2A (50 households)	energy audit				energy retrofit		
2B (50 households)	energy audit				basic energy retrofit (post-Activity)	behaviour change program	
2C (50 households)	energy audit				energy retrofit	behaviour change program	
1D Control Group (30 HHs)	energy audit	air-barrier testing (15 houses only)		star-rating assessment (15 houses only)	basic energy retrofit (post-Activity)		energy monitoring equipment
2D Control Group (50HH's)	energy audit				basic energy retrofit (post-Activity)		
TOTAL	320	60	30	60	320	160	120

Results

Councils

It was worthwhile and important that councils participated in the study. All councils were able to identify and recruit householders. Three different models were used to deliver the project across the six councils. Five councils appointed an Energy Liaison Officer and placed them within the councils' Home and Community Care team. One council outsourced their HACC services to a private provider that co-supervised their Energy Liaison Officer. The sixth council was willing for their HACC Home Maintenance team to provide home retrofits to householders. Councils provide good access to client data which can lead to targeted and successful recruitment.

The study helped to improve the credibility of the council among householders who received the retrofitting and behavioural change activities. It improved communication and established links within the councils. It raised awareness and provided information and ideas to both council staff and clients. Both councils and the householders benefited from the project and had increased knowledge and capacity as a result of the project

Companies can be contracted by councils at very competitive rates to supply goods and services. This procurement can be replicated in the future by governments/organisations at the relevant scale.

Future funding of householder support regarding energy efficiency, home safety, comfort, maintenance and modifications could be provided to and via the future HACC providers (CHSP providers, which may be wider than local government from 1 July 2016 onwards).

Impacts of interventions

The combination of home retrofit and behaviour change interventions achieved statistically significant energy efficiency outcomes (compared to control group) including averages of 10-11% reductions in total energy use, 13-18% less gas use and similarly cheaper bills, 14-18% lower greenhouse emissions due to gas use and increasing living room temperatures by 1.6°C in winter. LED light upgrades resulted in 22-36% reductions in lighting electricity use, 22% cheaper bills and lower greenhouse emissions.

'Retrofit only' interventions achieved a statistically significant energy efficiency outcome of 7% reduction in total energy use based on distributor data (compared to control group), whilst simultaneously increasing winter indoor temperatures by an average of 1-1.9°C.

It was noted anecdotally that some 'retrofit only' householders began to improve/increase their energy efficiency actions/practices in their home after they received their retrofits, even though they were not provided with behaviour change support. This could be interpreted to indicate that householders' that receive energy efficiency retrofits/support for little/no cost to themselves are more likely to take actions to improve their energy efficiency at home.

In addition, some of the "low income" householders that received a smaller "thank-you/retention $495 retrofit" at the end of the study co-contributed to this between $100 - $4000 themselves to replace/upgrade faulty/inefficient appliances of their own initiative. This could be interpreted to indicate that i) not all local government Home and Community Care clients are necessarily poor i.e. they may be low income but may have savings that are

available for energy efficiency improvements to their homes and ii) that supporting low income householders with relatively small retrofits can trigger them to undertake more significant energy efficiency actions/works themselves at their own cost, rather than at the government's cost i.e. has a low cost: benefit ratio.

Households receiving 'behaviour change only' intervention didn't show a noticeable improvement in any of the energy measures, although the average number of energy efficiency actions by householders in the behaviour change study groups did increase from 16 to 19 actions during the project.

Householder feedback

The retrofits met the expectations of householders and improved their comfort. Householders indicated their strong endorsement of the Energy Saver Study in the post-intervention survey. Over 95% of householders would recommend a similar program to others. When asked why, the major reasons were it helped lower energy bills, they enjoyed the visits by project staff, it helps keep people in their homes, they trust the home care service and it was educational.

Future delivery

The existing HACC delivery model will not exist from 1 July 2016 and will be replaced by the Commonwealth Home Support Programme (CHSP). Future funding of householder support regarding energy efficiency, home safety etc could be provided to and via the CHSP providers. They will determine how the householders' goals are put into practice and are likely to offer home maintenance/modification services (but need to be funded by the Australian and/or state governments to do so).

Future providers will need to either make themselves aware of the goods and services required to deliver residential energy efficiency, safety and client wellbeing, or be trained/supported to do so. This will need to include identifying how a home can be modified and made safe in terms of indoor temperatures, affordable energy bills, satisfactory performance and low operating costs.

Additional research findings

The RMIT PhD study has identified that the contextual factors (i.e. the physiological capabilities of the householder, the modes of energy bill payment and the social construction of the adequacy of indoor temperatures) are additional pathways to health outcomes that go beyond the material qualities of the dwelling. The study identified coping and adaptation practices that may be able to build resilience.

The combination of a retrofit to the building envelope and the upgrade of the heating system may be more effective in providing benefits in warmth, affordability and householder satisfaction than just retrofits to the building envelope. Further work is needed to establish the validity of this.

The attention in residential energy efficiency initiatives should shift to the systems-approach of housing, energy and health. Initiatives that target energy consumption have to be sensitive to the prevalence of cold homes in Victoria, its causes and its effects.

The retrofits of fuel poor households may fall short of expectation due to the pre-bound effect. Voluntary under heating in this study concurs with the results of other studies. Non-heating of bedrooms, and allowing living room temperatures to drop below recommended levels during the night, seem to be practices that are socially shared. Exposure to temperatures below certain thresholds constitute a health risk, especially for older people. This may help explain Australia's winter excess death rate, which is surprisingly high considering Australia's temperate climate.

From the Swinburne Masters Research the overall story of Most Significant Change chosen by householders was to manage the use of standby power.

Challenges

A wide range of challenges facing the study were identified. Many were transitional and overcome overtime, while others possibly restricted the outcomes of the study. Challenges included:

1. the complex nature of the study
2. the tight and changing timeframe and the workload of the ELOs who were all employed part-time
3. involving and communicating effectively with vulnerable householders in the project, the ELOs needed to develop trust, overcome householder resistance to participate, understand and work effectively with participants
4. the amount and diversity of data required by the project design and accessing the data over a wide project area and limited timescale
5. dealing in vulnerable peoples' homes with private sector contractors and tradespeople who are time poor and profit driven - their work was often invasive of people's homes and lives
6. safety issues such as electrical hazards, gas leaks and carbon monoxide emitting heaters, asbestos, working at heights, lone worker issues, multiple contractors onsite simultaneously and the age of homes
7. ensuring tenants security of tenure was protected

Future research opportunities

A priority for future research is to trial the efficacy of different intervention subtypes i.e. trial each of the different home improvement retrofits against each other, and different behaviour change methods against each other to identify the most effective interventions. Studies are also recommended into epidemiological patterns of indoor cold and health outcomes and to investigate the ability of coping strategies to protect people from cold related ill health.

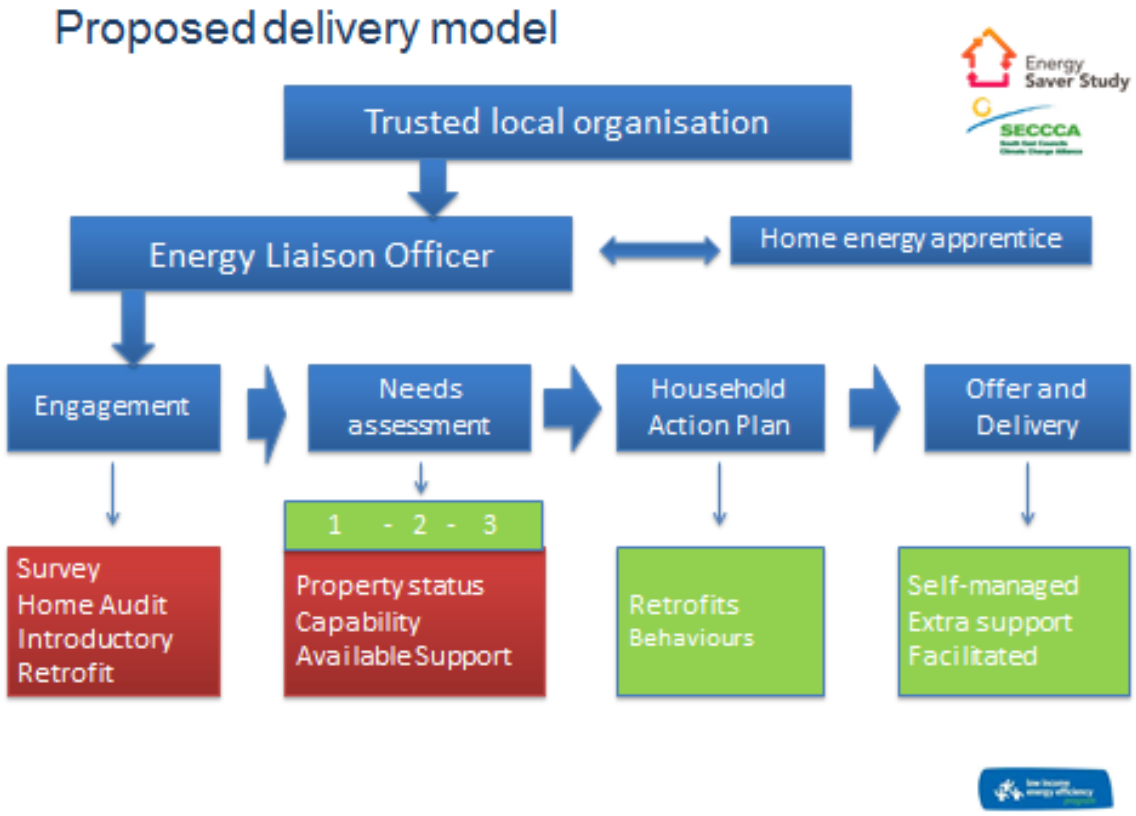
Recommendations

For future policy and program design the project makes the following recommendations:

- focus on strategies which provide home retrofit **plus** behaviour change support programs to low income households as this is the most effective pathway
- focus on a broad range of simultaneous outcomes including improve energy efficiency, energy bill costs, indoor temperatures and safety, householder health and wellbeing i.e. aim to make homes warmer and more comfortable during cold weather,

as well as cooler and safer during extreme hot weather, rather than just more energy efficient

- redefine and fund the role of organisations that provide future CHSP home maintenance/modification services to provide combined energy efficiency support programs (branded as home safety and affordability of living) as a core responsibility of supporting the community to age in place (thereby improving the safety of the homes)
- provide leadership, resources and organisational change support to existing/potential providers to facilitate this redefinition of CHSP role and responsibility
- ensure that as part of the process to identify and support first the most vulnerable people, assessment of clients' eligibility to receive support services takes into account the client's current income, the value of their assets and their access to cash
- investigate/consider the proposed home energy efficiency support delivery model as indicated below which:
    - recruits low income households through an existing trusted organisation (local government and/or CHSP service providers, not-for-profit NGO's)
    - supports clients via both and Energy Liaison Officer and low-cost Energy Efficiency Apprentice/Trainee, together with energy efficiency rebates/low cost finance options
    - provides support based on client capacity and needs, the condition and design of each home and the opportunities for the improvement of energy efficiency, comfort, energy costs, health and wellbeing
    - resource/educate/inform existing CHSP assessment, team leader, direct care and home maintenance workers of the opportunities and benefits to improve the energy efficiency of homes and in doing so, increases their capacity to provide clients with relevant resources and support
    - support CHSP providers to have and provide useful energy efficiency information to clients about how they can improve the energy efficiency at their home, as well as the additional benefits of energy efficiency i.e. reduced energy bills, improved comfort, health and wellbeing



Proposed future energy efficiency support delivery model

Project outcomes

The most significant outcomes for the project included:

Category of intervention and average cost	Outcomes (compared to control study group)
Combination of Retrofit plus EAP ($2885)	From monitored data: • 10% lower total energy use/day (4.36kW) • 13% lower gas use/day (4.8kWh) • 13.1% lower gas bills/day (31 cents/day or $113.15/yr) • 13.0% lower greenhouse gas emissions/day due to gas consumption (0.95 kg CO2-e) • 1.6 °C higher average temperature in living rooms in winter • 22.1% lower electricity use/day for lighting due to LED lighting upgrades (0.21 kWh) • 0.28 kg CO2-e lower GHG emissions/day due to LED lighting From distributor data: • 11.4% lower total energy use/day (4.8kWh) • 18.5% lower gas use/day (7kWh) • 18.6% lower gas bills/day (45 cents/day or $164.25/yr) with a payback period of 17.4 years • 18.5% lower greenhouse gas emissions due to gas consumption (1.39 kg CO2-e) From householders: • Met their expectations • Improved the comfort of their home • Recommend the program to others if delivered in the future • A high degree of satisfaction with their involvement in the Energy Action Program • Most (over 70 percent) indicated it improved their understanding of saving energy • It was useful in helping them reduce their energy consumption • Increase in the number of actions to improve energy efficiency
	From monitored data: • Did not show a statistically significant difference in energy, electricity, or gas consumption, or energy, electricity, or gas bills when compared against the control group. • 1.9 °C higher average temperature in living rooms in winter and householders felt more

Retrofits ($2348)	comfortable • 0.33 kWh lower daily electricity consumption for lighting due to LED upgrades • 35.9%lower electricity use for lighting • 9.5 cents/day ($34.68/yr) lower electricity bills for lighting (9 year payback period) • 0.42 kg CO2-e lower GHG emissions/day due to LED lighting From distributor data: • 7.1% lower total energy use (3.8kWh) with a 7.4 year payback period (savings on energy bills) • 14% lower gas bills/day (87 cents/day or $317/year) • 3.8 kg CO2-e lower GHG emissions/day due to reduced total energy use • 0.96 °C higher temperature in the living room in winter From householders: • Met their expectations • Improved the comfort of their home • Recommend the program to others if delivered in the future
Behaviour change ($711)	• Did not show a statistically significant difference in energy, electricity, or gas consumption, energy, electricity, or gas bills or daily greenhouse gas emissions when compared against the control group. • Did not show a statistically significant difference the average temperature in the living room during the winter months when compared against the control group • Did not show a statistically significant difference in electricity consumption (or electricity bills or GHG emissions) for lighting when compared against the control group From householders: • A high degree of satisfaction with their involvement in the Energy Action Program • Most (over 70 percent) indicated it improved their understanding of saving energy • It was useful in helping them reduce their energy consumption • Increase in the number of actions to improve energy efficiency • Recommend the program to others if delivered in the future