

## **Winning the Liveability Trifecta**

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#### **Abstract**

*In Australia's increasingly variable climate, our reliance on energy for comfort, health and well-being is pretty near complete. If you can't afford to modify your domestic environment, what can you do? Can you flee to an air conditioned shopping mall to escape a blistering run of forty degree days or does a cold snap leave you huddling in the one room in your house that you can afford to heat?*

*Getting the most bang for your energy buck becomes a matter of real importance, particularly when there aren't too many bucks. The South East Councils Climate Change Alliance (SECCCA) set out to discover the most effective way to implement energy efficiency in low-income households in the south-eastern suburbs of Melbourne. Working with council's Home and Community Care clients, 320 households were recruited to take part in the Energy Saver Study. Houses were fitted with energy monitoring devices so we could establish normal patterns of energy use, with the data beamed over to CSIRO for recording and analysis. Households then received varying levels of energy-smart retrofitting and/or behaviour change training with the monitoring devices continuing their recording of any changes as a result of the range of interventions that we carried out.*

*The results have led us to change the way we think of energy efficiency and household comfort. It is more serious than comfort. Participants are more likely to turn on their heaters and air-conditioners when they're not scared of the resultant bill, they report less illness in their warm, dry and less draughty houses, they keep their cool in summer and they invite friends and neighbours in. Staying healthy and improved social connectedness which assists ageing in place were perhaps surprising consequences of the energy efficiency study. Improving health, saving money and mitigating climate risk - you'd have to say that was the liveability trifecta.*

\* SECCCA is a collaboration of eight Councils, the Cities of Bayside, Casey, Greater Dandenong and Kingston and the Shires of Bass Coast, Baw Baw, Cardinia and Mornington Peninsula, to Melbourne's south and east. SECCCA develops and implements regional programs for climate change mitigation and adaptation. These programs are conducted on behalf of the more than 1 million people who comprise the communities of member councils.

The South East Councils Climate Change Alliance (SECCCA) is an incorporated association of nine councils to Melbourne's south and south-east. We conduct projects in mitigation and adaptation to complement, on a regional basis, the work that member councils do within their own municipal boundaries on climate change. Our projects have ranged from developing the business cases for implementing sustainable public lighting, working with the beef and dairy sectors to improve their environmental performance as they improve productivity, training council staff for fuel efficient driving, decision-making processes for dealing with coastal hazards to providing behaviour change programs for low-environmental impact living.

### **Sustainable Homes Program**

This last project, the Sustainable Homes Program, taught us a salutary lesson when it comes to energy efficiency and the general public.

In a greenfields residential development on Melbourne's south-eastern fringe, Clyde North's estate Selandra Rise (1) is being rolled out by a major developer. They have a clear need for the commercial success of their development, with the desirability of one estate over another in part determined by the breadth of the offer to new residents. In conjunction with a volume builder on the estate, they are carving out a market niche that includes in their range of homes a strong sustainable living option. They have built, as part of the display village on the estate, a zero-emissions 8 star house.

SECCCA staffs the Selandra Community Place (2) from Thursdays to Sundays when there is a strong throughput of intending residents for Selandra Rise and other greenfield sites across the region and elsewhere. Visitors to the house, which is not straw bale, rammed earth or mud-brick, say that it looks like any other house on the estate. They also comment that it certainly feels more comfortable for all of the sustainability measures - insulation, double-glazing draught-proofing, etc. They are approached by SECCCA staff and engaged in conversation about their housing intentions, building plans and living patterns. They are offered enrolment in SECCCA's Sustainable Homes Program, a free building consultation based upon a range of changes they could make to improve the environmental performance of the house they build and they can take away a set of information cards to include in the brief to their builder for the house they'd like to live in.

SECCCA receives a weekly report on how many attended, what questions were they asking and what services they would like. A striking finding is that many people have never considered sustainability issues before, it is not part of their experience and they often don't even know what questions to ask. They are not the usual suspects. What is orientation? How could insulation deliver us an operational benefit such that we should add a couple of thousand dollars onto the build price? Having a staff member to approach them and lead them through the discussion is of inestimable value. How to win the Energy Efficiency Trifecta, ie (i) install insulation, (ii) double-glaze windows and (iii) draught-proof the house, to gain maximum benefit is a welcome message. Whereas each measure will bring about an energy saving, adopting all three gives a much bigger synergistic benefit with consequent bigger dollar savings.

That they don't even know what questions to ask about sustainability means that what is in the heads of those of us in the environmental/sustainability/energy business is not normal. If we want to enlist people into thinking and doing things differently, we must assume a starting position much earlier in the progression to an informed life. We have to give very basic reasons to change

This is a lesson that we have taken into subsequent projects, including our Energy Saver Study, a project funded by the Australian Government's Clean Energy Futures Program.

### **Energy Saver Study**

There's a whole discussion about the use of market mechanisms to drive economic and social policy in particular directions – we'll leave that for other times and other places. I wish to talk about one consequence of the implementation of a market mechanism to drive energy generation away from carbon-based sources. The years of operation of the Clean Energy Futures program (aka the carbon tax) saw energy prices rise. For those already in financial hardship, a rise in prices can be a challenge but when it is for something as fundamental for living as is energy, low income households can be in trouble? To try and get warm or eat? Hmmm, frequently asked question.

Funds raised through the Clean Energy Futures program were applied in a number of directions; funding alternate energies, supporting export industries with particularly high carbon exposure and compensating low income households for whom energy prices posed great challenge. The Australian Government, through the Department of Industry, established the Low Income Energy Efficiency Program (LIEEP) to fund a national effort on the part of 20 organisations in the not-for-profit sector to see how this compensation might best occur.

Within the LIEEP program, the South East Councils Climate Change Alliance (SECCCA) received funding to investigate whether retrofitting houses was the best answer to this question or perhaps it is changing the way that people operate their houses. SECCCA was funded with \$4.4 million to establish the Energy Saver Study (ESS) (3) to see if retrofitting, behaviour change or a combination of both was the best way to support low income households.

SECCCA staffed the project with:

a Project Coordinator on a 1.0 FTE time fraction with complete oversight of the discrete project,  
a Team Leader on a 1.0 FTE time fraction to manage  
the group of Energy Liaison Officers, the six staff on a 0.5 FTE time fraction allocated to each participating council and embedded with their service delivery department and  
a Research and Training Officer on a 0.5 FTE time fraction to maintain oversight of the energy efficiency technologies involved and to develop and deliver behaviour change programs.

The first challenge in the investigation was the recruitment of subjects to the study. The target demographic has many characteristics – let me generalise. They are depression-era people with frugal habits, hence already at the low end of energy users. They are vulnerable to any number of spruikers coming door-to-door with deals that often sound too good to be true and they are security conscious and less likely to allow strangers into their homes. The response was to work through SECCCA member councils' Home and Community Care (or Aged and Disability Services) departments. Each council provides a range of community services to low income community members, services provide by council staff who have built up trusting relationships with their clients. By placing a SECCCA Energy Liaison Officer on a 0.5 FTE time fraction within each councils HACC/ADS department meant that we could leverage that relationship and add energy efficiency to the suite of services provided.

Three hundred and twenty householders across 6 councils were recruited to the project. Their characteristics were, in general, as follows:

Under-insulated (ceilings, sub-floor)

Draughty

Have inefficient halogen/incandescent lights & appliances (heaters/coolers/hot water service/fridges)

Have unserviced heaters/coolers/hot water service

80% have single female occupants >70 years

The majority of low income householders were:

often quite energy conscious

Using little energy hence large reductions were unlikely

Living in homes that are unsafe i.e. too cold / hot (<18°C and >30°C) WHO recommends 20-21°C for elderly as <16°C = high respiratory disease risk and <12°C = high cardiovascular disease risk

They were assigned blind identification numbers and then allocated randomly to one of four study groups;

- (i) retrofit, where houses were audited and then retrofitted with such technologies as draught sealing, insulation, shading, energy efficient appliances
- (ii) behaviour change program, where how to operate in a more energy efficient manner was explored in relation to the conditions in the houses
- (iii) retrofit and behaviour change, with appropriate retrofitting as indicated by the audits and then the same program in how to operate the house energy-efficiently
- (iv) control group, with neither retrofit nor behaviour change to correct for anomalous weather conditions.

Two years of data on their energy use, both gas and electricity, were collected before the interventions. This was matched with real-time data collected via monitors in the house, often down to circuit level. In this way, a detailed picture of energy use could be compiled so that pre and post intervention could be compared. The data was all sent to project partner CSIRO, where it was received and analysed. With the control of variables that was a feature of the project, the consequences of the intervention could be quantified.

What interventions were made in the houses depended on the findings of energy audits conducted by energy auditors contracted to the project. They assessed the houses for the heating and cooling technologies that were used, they looked at the efficiency ratings of the appliances, including hot water systems and televisions, other contractors pressure tested houses to assess how leaky they were. Why spend money heating or cooling the air in the house only to see it leak away through poorly fitted windows and doors and air vents that were doing too good a job?

The auditors made recommendations on what retrofitting could be installed with the project's Research and training Officer looking over the recommendations to see that they were value for money technologies and could improve the energy efficiency of the house. The recommendations were also assessed to ensure that they would fit within the budget allocated to houses in that sub-section of the study.

Contractors were brought into the houses involved with their visits mediated by the ELOs so that the householders could be confident and assured that the retrofitting work that was done was all within the project. Alternatively, the ELOs delivered the behaviour changing program to the householders with whom by now they had built up mutually respectful relationships.

## Results

Following the interventions, we gathered the best part of another year's data to track what interventions had delivered what results. And this is what we found:

'Home retrofits **plus** behaviour change' most effective i.e.

10% reduction in total energy use

15% reduction in gas (save \$100-160/year)

Indoor winter temp +1.6°C

'Retrofits only': somewhat effective

Indoor winter temp raised between 1->2°C

7% less energy use

Behaviour change did not deliver results of statistical significance.

### **Participant responses**

There was very strong support for the project from the participants.

*"You wouldn't think that a small thing like a draught excluder around a door or window could make such a difference."*

*"I didn't realise I didn't have enough insulation .... now I don't have to get the heater on till 9pm instead of 5.30pm ... I am still comfortable."*

*"It felt like Christmas ... the key benefit for me will be the financial saving."*

*"Thankyou so much for the hot water system. Best shower I have ever had since I moved into this house."*

Participant Claire, a disability pensioner who suffers from anxiety is vulnerable to heat risk in her early 1900s home. The home underwent retrofits as follows: insulation, draught sealing around doors, window, wall vents and floorboards.

*"I'm rapt! I slept so much better as the house isn't as noisy"*

*"My grandchildren aren't afraid to stay over anymore as the house doesn't whistle in the wind"*

*"My friends are more comfortable when they stay because it is quieter and warmer"*

Alex commented that *'my electricity bills are low compared to past bills .. and also contacted my supplier and persuaded them to give me not \$40 off each account but 40% discount.'*

Another couple who participated in the project commented that they no longer sleep on the couch all winter in the one room that they can afford to heat, they've moved back into their bedroom and sleep on a proper bed.

One householder offered home energy efficiency support and to facilitate this was supported firstly with his alcoholism, diet and financial situation. He received home retrofits and developed a new found pride in his home, withdrawing \$300 from his gambling account and installing an external window furnishing as well to improve the indoor temperature during the coming summer

We had other participants who also lived in the one room of the house they could afford to heat. More worryingly, in one house we found, after removing a highly inefficient gas heater, scorch marks on the wall paneling behind the heater and charred clothing in the adjoining built-in wardrobe. The need for frequent and thorough testing was described in an article in the magazine *energysafe* (3). When maintenance also costs money and there's not much of that to go around, maintenance is too often dropped off with potentially fatal consequences.

### **Resources**

The various web-pages of the project provide a range of resources of support for implementing energy efficiency in houses everywhere. The project is presented in some detail on the project website (4) with the Executive Summary (4a) providing a succinct overview of the project. Further webpages include energy savings tips and video clips (4b) to explain what to do and how to do it and House in Order (4c), a manual that comprises residential energy efficiency 101.

We developed some clear recommendations for governments wishing to provide support for low-income and vulnerable households.

### **Recommendations**

After three years of a complex project, considerable clarity emerged as to the best ways to go about supporting this particular demographic within our communities. They can be summarised as:

Be quite specific in targeting particular demographics as they have specific needs.

Be clear about the desired outcomes of the project and plan strategies to achieve them

Be prepared to consider variations in the project as a single program will not suit the range of needs Recruit participants via trusted organisations with whom they are in existing relationships

Listen to and understand the householders' situations, need and preparedness to change

Provide both home 'retrofit plus behaviour change' support where possible or at least, 'retrofits'

In the Australian Government's move to deliver the Commonwealth Home Support Program , include energy efficiency support as 'Home Maintenance' and 'Home Modifications'

The widespread dissemination of the Energy Saver Study will achieve multiple objectives i.e. energy efficiency, greenhouse gas emission reductions, improving home safety, reducing climate risk, assisting people to age in place and overcoming social isolation.

### **Financial Risk Adaptation Project**

The City of Kingston is a member council of SECCCA but was not involved directly in the Energy Saver Study. They were however involved in a further project '*Kingston case study: options to reduce heatwave risk and energy consumption*' (5) to develop business cases based around options for the most beneficial way to provide relief from heatwaves.

Following is an excerpt from the Case Study prepared by Marsden Jacob Associates.

*Heatwaves are a major cause of illness and premature death in vulnerable community members, especially the elderly. 'Ageing in place' is the preferred policy direction of both State government and the City of Kingston. However, current heatwave policy restricts Council staff from visiting homes during heatwaves due to the risks posed to staff. Council must therefore find ways of supporting residents to protect themselves at home during heatwaves. The potential for heatwaves to increase in frequency and severity with climate change in the future adds to this imperative.*

*Four options were developed and assessed relative to the base case:*

- *Option 1. Replace current heating systems with reverse cycle split system air conditioners in elderly, low income households.*
- *Option 2a. Option 1 plus limited weather proofing and behaviour change education.*
- *Option 2b. Option 1 plus more extensive weather proofing measures and behaviour change education.*
- *Option 2c. Option 1 plus complete weather proofing and behaviour change education.*

*A cost benefit analysis (CBA) was used to assess the economic viability of Options 1, 2a, 2b and 2c. The CBA assessed both market and non-market benefits and costs.*

*The results reveal that - excluding the potential health benefits of the options - none of the options achieve a positive Net Present Value. This means that based simply on energy savings and greenhouse gas emission reductions, it would be difficult to justify implementing any of the*

options. Option 2a achieves the best outcome of all of the options though, marginally better than Option 2b.

A key rationale behind implementing the program however, is the potential for achieving improved health outcomes through the program.

Applying a 3% real discount rate, the results show that Option 2a (the option with the best NPV) needs only to reduce the annual health impacts of heatwaves on elderly people (over 65s) in Kingston by an estimated 4-5% (depending on the climate scenario) for the program to be considered worthwhile (i.e. to generate a positive NPV). Thus it is reasonable to suggest that implementing Option 2a is likely to achieve a net community benefit overall.

Overall, results of the analysis suggest that there is a quite strong case for implementing a program designed to reduce the impacts of heatwaves on vulnerable elderly people in the City of Kingston. Either Option 2a or Option 2b would appear to be the preferred option of the four options assessed. This suggests that the installation of significant weather proofing measures and education of householders on energy use behaviour should be important aspects of a program in addition to the installation of RCACs.

Benefits of heatwave program assessed in this study will mainly be realised by the householders targeted by the program and to some extent by state government and the broader community (reduced health costs and reduced energy assistance payments). Few if any direct benefits of the program will accrue to the Kingston City Council. Nevertheless, implementing a program such as this would be broadly consistent with Council's social policy. This suggests that careful consideration in program design will need to be given to cost sharing and funding arrangements.

## **Conclusion**

We set out to reduce greenhouse gas emissions and improve household energy efficiency in households where there was limited capacity for the householders to do this for themselves. We ended up certainly improving energy efficiency, we saved our householders money through reduced bills and we gave them responses to climate risk – improved comfort and well-being and health. This was indeed winning the Liveability Trifecta.

## **References**

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