



2009 CARBONCUT EVALUATION REPORT

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TABLE OF CONTENTS

PAGE

1	ABBREVIATIONS	3
2	EXECUTIVE SUMMARY	4
3	INTRODUCTION	5
3.1	The Challenge	5
3.2	The CarbonCut Vision	5
3.3	Purpose of this report	6
4	METHODOLOGY	6
4.1	Evaluation Objectives and Framework	6
4.2	Scope of Works	7
4.3	The CarbonCut Retrofit.....	9
5	Results - Environmental, Community and Economic.....	10
5.1	Environmental Outcomes	10
5.11	Utility Bill Data	12
5.12	Household Appliance Data	13
5.13	Water	14
5.14	Electricity	21
5.2	Community Outcomes	32
5.21	Service.....	34
5.22	Research	41
5.23	Obstacles to Residential Engagement	42
5.24	Employment.....	43
5.25	Capacity Building.....	48
5.3	Economic Outcomes.....	51
5.31	Logistics.....	54
5.32	Purchasing.....	54
5.33	Waste	55
5.34	Time Management: Travel.....	57
6	EXPLANATORY NOTES	58
6.1	BACKGROUND	58
6.2	Project Parameters	58
6.3	Glossary	59
	APPENDICES.....	60
	CREDITS	65
	REFERENCES	70
	List of Flow Charts, Tables & Graphs	71

1 ABBREVIATIONS

Table 1: Abbreviations in 2009 CarbonCut Evaluation Report

CFL	Compact Fluorescent Light
CO²e / kg CO²e	Carbon Dioxide equivalent / Kilograms of Carbon Dioxide equivalent
CPRS / CRS	Carbon Pollution Reduction Scheme / Carbon Reduction Scheme
CoPP	City of Port Phillip
DHS	Department of Human Services
EPA	Environmental Protection Authority
GHF	Greenhouse Factor
kL	Kilolitres
KwH	Kilowatt Hours
MJ	Megajoule
MMA	McLennan Magnasik and Associates
NGA	National Greenhouse Account (Factors)
PPEC	Port Phillip EcoCentre
SEW	South East Water
T	Tonnes
VEET	Victorian Energy Efficiency Target

2 EXECUTIVE SUMMARY

In 2009, the household energy reduction program 'CarbonCut' was delivered by the Port Phillip EcoCentre and local affiliate groups to over 200 low income households in the City of Port Philip. Funding for the program was sourced through a Melbourne Magistrate court order, received via the Victorian EPA.

The key components of the CarbonCut Project model include:

- Reducing carbon emissions and water consumption within the residential sector;
- Assisting low-income residents to reduce their energy and water bills over the short to long term;
- Achieving measurable short and longer-term environmental and economic outcomes;
- Developing effective and innovative pathways for achieving sustained behaviour change;
- Provision of educational opportunities for skill and knowledge transfers among community organisations and residents;
- Provision of skilled and locally based employment, training and career pathways;
- Building community capacity through linking local networks, supporting leadership among residents and fostering partnerships with local service and product suppliers;
- Creating and refining a measurable and transferable project model, to be used as a resource for delivery of the program in other regions

The total annual energy reduction achieved over the entirety of the program was 57,543 kWh, equating to the prevention of 132.7 tonnes of carbon emissions (CO²e) from entering the atmosphere. A total of 1709 kL of water will be conserved annually, through installation of water-saving devices and the total monetary savings achieved across all residents was calculated to be \$21,225, in the first year.

CarbonCut was also able to provide locally based, skilled employment opportunities and build networks with local suppliers, health services and community organisations. Through the process of consolidation, participant recruitment and project delivery, partnerships with local stakeholders and affiliates have been forged and strengthened (refer Table 13 Current Stakeholders). Support for the project was evident through partner support of subsequent funding submissions and general feedback provided to staff.

3 INTRODUCTION

3.1 *The Challenge*

At a time when household energy consumption has increased, and household electricity bills are expected to rise by up to 27% in the next three years (ESAA 2008), energy-efficient retrofits are essential for the welfare of low income households. Members of this demographic often have the greatest need for assistance, but the least capacity to afford and implement energy-saving measures. These measures not only reduce their ecological footprint but also avoid the onset of greater expenses resulting from the rising costs of utility bills.

Community programs have the potential to initiate community action and increase the uptake of sustainable behaviours and efficient resource use. A community approach achieves far greater benefits if effectively accompanied by education and building capacity among community members. With an efficient level of resources community organisations have the capacity to deliver:

- Significant greenhouse gases (GHG) and water reductions;
- Increased accessibility to energy-saving technologies and alternative energy sources;
- Maintain community engagement for sustained behaviour change;
- Build local networks and partnerships to allow local capacity-building and knowledge sharing;
- Deliver measurable and replicable outcomes;
- Support local community ambassadors to facilitate greater community participation
- Provide skilled employment opportunities and help meet the future demand in the 'Green Jobs' sector

3.2 *The CarbonCut Model*

CarbonCut is a community based program which trains teams to deliver household retrofits to local low income residents, helping to reduce their greenhouse gas emissions, water consumption and energy bills. Based on principles of community capacity-building and methods of sustained behaviour change, the installation of energy-saving devices is delivered through an educative process. Data from each retrofit is documented to provide the basis of a measurable and replicable project model to facilitate delivery in other regions. The program continues to foster methods of best practice; to address the needs of the targeted demographic and ensure delivery of key outcomes in a cost-effective manner.

3.3 Purpose of this report

The purpose of this report is to document the methodology and key findings of CarbonCut, as well as provide analysis and recommendations for future program delivery. This report evaluates triple bottom line - environmental, community and economic outcomes and explores methods of project refinement and development. A refined CarbonCut model will provide a viable approach on which local governments can rollout local carbon reduction programs. Currently most local government areas are yet to define their approach and would benefit from a thoroughly evaluated experience of CarbonCut. (Refer Explanatory Notes – 6.1 Background)

4 METHODOLOGY

4.1 Evaluation Objectives and Framework

There are a range of retrofit programs currently delivered across Victoria and it may prove helpful for related programs to draw on the experiences of one another. Collaboration and information exchange across all tiers of government and community will be essential to achieve emission reduction targets. The CarbonCut evaluation criteria are written in a format that:

- Is measurable;
- Assesses the projects' effectiveness in achieving its objectives;
- Provides the basis for development of future project models in other regions; and
- Enables comparison with other retrofit programs.

Evaluation framework assesses the outcomes delivered in relation to the following CarbonCut project aims:

- 1) To utilize the knowledge and experience gained from the 2008 CarbonCut Pilot Project to continue undertaking basic sustainable retrofits of low-income households, in a cost-effective program that combines both social and environmental outcomes
- 2) To reduce the amount of GHG's emitted into the atmosphere, residential water consumption and help tackle broader issues associated with climate change
- 3) To reduce energy and water bills and promote energy-saving behaviour change within low-income households
- 4) To continue strengthening community wellbeing through the positive interaction between young people and older residents, by means that are practical and qualitative
- 5) To promote and support youth leadership in response to the issues of climate change
- 6) To continue strengthening existing relationships with community agencies and forging new relationships with other organisations involved in community energy and well-being programs
- 7) To empower residents and youth to create a lasting impact in their communities using a replicable and transferable project model

4.2 Scope of Works

Introduction

The broad CarbonCut project aims were developed into achievable project deliverables for the 2009 program. Table 2 lists the anticipated deliverables, developed prior to the project commencement and provides a summary of the relative outcomes. Detail can be found in relative sections.

Table 2: Project Deliverables

DELIVERABLE	2009 CARBONCUT OUTCOME
1) Employment for growing team of skilled retrofitters, ongoing training program & long term employment opportunities	<p>Provided employment for:</p> <p>X2 Project Coordinators (shared position) - 40 hrs/wk x 26 wks X1 Project Manager - 8 hrs/wk x 26 wks X4 Trainee Retrofitters – 2days/wk x 9 wks X2 Language Translators sessional X2 Training Staff sessional</p>
2) Project model that is socially equitable, cost-effective, measurable and transferable	<p>Service recipients were recruited through key local agencies and existing networks, whom are working with the local community members</p> <p>Project was delivered within budget and timeline and also allowed for residents on waiting list to receive service</p> <p>Retrofit record sheets and internal databases facilitated data collection and calculation of short and long term energy, water and cost savings for residents</p> <p>Qualitative survey of employees and residents was undertaken to assess the quality of employment and retrofit service and effectiveness of behaviour change</p> <p>On-going revision and liaison with partners and stakeholders to assess and refine functionality of delivery</p>
3) Demonstration of the long term viability of the project, including cost-effective use of funding & resources	<p>Demonstrated through:</p> <ul style="list-style-type: none"> • Government initiatives directing resources and support into projects of this nature • Delivering measurable, long-term environmental outcomes • Exceeding household quota within budget • Employee, resident and stakeholder feedback, indicating interest in longer term involvement • Proven capacity to recruit employees, assist with the demand for Green Jobs • Capacity to recruit service recipients. Demand for this type of service is evident by the number of participants involved, participant feedback and participant waiting lists • Effective use of resources including existing networks, in-kind contributions, bulk purchasing of goods • Development of key stakeholder & local supplier relations
4) Educational workshops for residents to accompany existing services. Provide	<p>Residential workshops were conducted in conjunction with recipient recruitment at two public housing estates in the CoPP - Raglan Ingles & Inkerman Heights. These were successful in recruiting project participants</p>

<p>information on how to further reduce energy consumption & provide a support network to assist them in doing so</p>	<p>and knowledge exchange</p> <p>Significant portion of service recipients were of Russian origin and employees worked with a Russian translator to facilitate dialogue. Research was also conducted as to the demand for service within local Greek and Korean communities. Translators were available as needed</p> <p>Households were provided with written information and contact details to accompany verbal explanation & demonstrations. There was found to be a lack of information available regarding climate change and energy-saving techniques in languages other than English. Sessional translators, translated all relevant project information into Russian, Greek and Korean</p> <p>Two employees were interviewed on community radio stations to help recruit service recipients. George Phaedonis undertook an interview on a local Greek program of Southern FM Radio and Lisa Siciliano on SBS</p>
<p>5) Relatively immediate & lasting energy reduction outcomes</p>	<p>Across the entire project, annual carbon emission reductions were calculated to be 132.7 tonnes CO₂e which is equivalent to 265,409 black balloons and 1708 kL of water reductions</p>
<p>6) The capacity to re-engage participants of the 2008 Pilot Project and reassess energy bills</p>	<p>Good relationships were developed with residents serviced during the Pilot. This was evident through attendance and feedback received at the 2008 Project Evaluation Celebration. 2008 data collected is due to be re-evaluated in November of 2009 when pilot recipients will be revisited. This revisit will help to gauge if behaviour change techniques were adopted and to record any reduction in utility bills after a full year of billing from the initial retrofit</p>
<p>7) Positive community engagement methods using established & new means of promotion & media</p>	<p>Investigating effective methods for media and promotion via positive community engagement methods</p> <p>Program was effectively promoted through existing community networks, service providers and affiliates, and events such as Earth Hour At The Tower in early 2009</p> <p>Use of media releases, photos, PPEC website, YouTube documentary and local community newsletters, supporting the teams' recognisable branding</p>
<p>8) On-the-job training of two translators (Greek & Russian), in energy-efficiency principles & technologies</p>	<p>Provision of employment, support & training of two translators. Both employees performed duties beyond the scope of their position description, demonstrating an on-going commitment to the project and willingness to engage their communities. One now has a permanent position within the EcoCentre and the other maintains a close relationship, providing ongoing support</p> <p>The demand to provide quality service to non-English speaking communities has and will continue to be developed</p>
<p>9) Production of two multi-lingual publications (Greek & Russian) for low income households</p>	<p>All retrofit record sheets, safety and disposal information, general climate change & energy-saving techniques were translated into Greek, Russian and (some) Korean. Through the course of the 2008 and 2009, the local Russian community has become increasingly involved with general EcoCentre events. Languages to be covered were chosen opportunistically, based on availability of translators and perceived demand</p>

4.3 The CarbonCut Retrofit

Project outcomes were delivered using a simple retrofit model (see Table 3) based on achieving environmental benefits, effective community engagement and resource efficiency. All project outcomes were delivered in a cost-effective manner. The service recipient quota was set at 160 residents, which were to be serviced between May and July of 2009.

Retrofitting was undertaken during two days per week for a period of eight weeks. By week 8, the CarbonCut team had exceeded the quota by 20% and a significant waiting list to receive the service had accumulated. It was decided that a 9th week would be added to the retrofit schedule, extending the service to over 200 households. Efficient budgeting allowed for this extra week and only a minimal expenditure was made on materials.

Table 3: Components of Retrofit – Devices and Information Gathered / Distributed

DEVICE	PROVISION & FUNCTION
Water-Saving Showerhead	Up to 2 per resident. Supplied by SEW via CoPP as part of exchange program. Both hand-held & normal. 9L/min, Interbath brand installed
Fixaflush Toilet Weight	1 per resident. Supplied by SEW. Small weight inserted into toilet cistern, converting a full/half cycle flush into a manual flush
Compact Fluorescent Lamp (CFL)	Up to 6 per resident. Catered for various requirements (wattage, fitting, type of light). Phillips brand generally used
Draft Excluder / Draft Stopper	Up to 2 per resident. Drilled onto bottom of doors to exclude drafts & increase heating efficiency. The Raven RP3 model generally used
Foam Seal	Up to 2 per resident. Adhesive foam seal for door or window gaps to exclude drafts & increase heating efficiency. Can also reduce noise & smoke. Moroday and Raven brand used
Shower Timer	1 per resident, four minute shower timer. Supplied by SEW. Assists behaviour change, encouraging residents to monitor shower length
General Appliances	Appliance ratings / brands were recorded for: <ul style="list-style-type: none"> • Refrigerator • Washing Machine & Clothes Dryer • Split system (heating & cooling) • Heating • Hot water services Baseline data also collected for residents' electricity and water bills to gauge current usage patterns
Energy-Saving Techniques	Other components of the service delivered when relevant were: <ul style="list-style-type: none"> • Roof insulation checks • Switching off appliances on stand-by, with permission • Checking temperatures of hot water services and refrigerators and turning these down, with permission • Suggesting patterns of use, Eg. enclosing smaller living areas to heat during winter and adjustment of window coverings for better light • Checking leaking taps, toilets, seals on fridges and ovens.
Information	All information for residents was available in three languages - English, Greek and Russian (Korean upon demand). Residents received:

	<ul style="list-style-type: none"> • Copy of retrofit record sheet indicating what was/was not installed, date of service etc • Hazards, safety and disposal information for CFLs • Climate change information • Energy-saving techniques
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5 Results - Environmental, Community and Economic

Introduction

A Triple Bottom Line approach has been adopted for this evaluation (Environmental, Community and Economic). Key findings for each area discuss both positive and negative findings, mitigating actions that were undertaken and the assumptions upon which findings are based. Data calculations of estimated energy, water and monetary savings were derived from several key sources (refer section: References). Care has been taken to provide representative data figures, however all data provided is an approximate value.

Table 4: Summary of Estimated Energy, Greenhouse, Water and Monetary Savings

Based on a sample of 201 households	Energy Reduction per year (kWh)	Greenhouse Reduction per year (tonnes CO ₂ e)	Water Reduction per year (kL)	Cost Reduction per year (AU\$)
Average Per household*	287	0.66	14.4	\$105.60
Average Per household (average over 201 households)	287	0.67	8.5	\$107.74
TOTAL	57,543	132.7	1708	\$21,224.31

* Calculations are not averaged, but based on real number of residents who had received each particular device

5.1 Environmental Outcomes

Introduction

Data was collected and environmental outcomes discussed across three key areas:

- **5.11 Utility Bill Data** (patterns of electricity and water consumption sourced from residents)
- **5.12 Household Appliances** (walk-through audit data including appliance star ratings and energy sources: gas / electric / solar)
- **5.13 Water** (showerhead and fixaflush)
- **5.14 Electricity** (lighting and draught proofing)

Calculated savings of a particular device are only applicable to the houses where the device was installed. Whilst overall savings from the 2009 program have been calculated, each device is also discussed individually. Significant baseline data has been collected and will be used to inform future assessment of device performance.

Note. Data was collected in a systematic manner using Retrofit Record Sheets. However due to limitations (language barriers, time constraints and in some cases lack of instruction to the team), around 10% of Record Sheets were incomplete. To avoid possible error associated with or extrapolating figures, this data was excluded. This may account for a lower calculation of energy and water savings, than was actually achieved.

Table 5: Anticipated Environmental Benefits

Established in the primary stages of CarbonCut, anticipated benefits form the basis of the analysis criteria and relative outcomes can be weighted against these. Points of key learning related to specific outcomes are included, with detail found in relative sections.

ANTICIPATED BENEFIT	CARBONCUT2 OUTCOME	KEY LEARNING	SECTION
Reduction in home cooling and heating requirements and electricity costs	Achieved through installation of CFLs and draft proofing	Importance of consistency in data collection. Clarity and direction needed from staff to trainees. Needs clear instruction & monitoring. Language barriers & limited understanding from some residents	<i>Section 5.14 Electricity</i>
Reduction in individual and community's overall carbon footprint	Measurable energy reductions. Replicable project model & methods of data collection allow for footprint calculations. Adds to sense of individual contribution among residents. Responsibility and connection within their community & environment	Explore opportunities for achieving more complete retrofit of each household, and for longer engagement with households. Develop pathways for responsibility & ownership (education & behaviour change)	<i>Section 5 Results</i>
Reduction of GHG emitted into atmosphere	Demonstrated via all energy reduction technologies and techniques	Ensure efficiency of logistics, equipment purchasing & stock replenishment. Explore viability of more comprehensive auditing & including appliances in data calculations	
Reduction of water usage	Achieved through installation of low-flow showerheads, fixaflush and shower timers	Establishing more representative parameters & baseline data for assessment of water savings. Eg. length of shower, frequency per day, seasonal variations	<i>Section 5.13 Water</i>
Progressive transition to sustainable communities, through the utilisation of energy-saving technologies and sustained behavioural change strategies	Provided service and information to a demographic that lack resources to implement energy-saving techniques without assistance. Fostered community networks and partnerships	Explore opportunities to maintain residents' longer term involvement. Providing pathways, support & opportunities for involvement & further action. Innovative methods of engagement. Expand retrofitting service & capabilities. Different approaches to energy efficiency are required for different demographics and housing types	<i>Section 5.2 Community Outcomes</i>

5.11 Utility Bill Data

Introduction

Collecting information from household utility bills (total kWh, kL, tariffs and expenditure) helps to provide baseline data to identify current usage and trends in energy and water consumption. This data was collected across approximately 96 households and provided the opportunity to inform residents how to assess and monitor their own energy bills. Upon re-visit to one resident in November 2009, it was found that she had already seen a decrease in her electricity bill.

“CarbonCut is a good idea. It’s been three months since and already my bill is under \$100. It is the first time since I moved in that my bill has been under \$100. This makes a very big difference for me.” (Tom Hills Court resident, Edith. 2009)

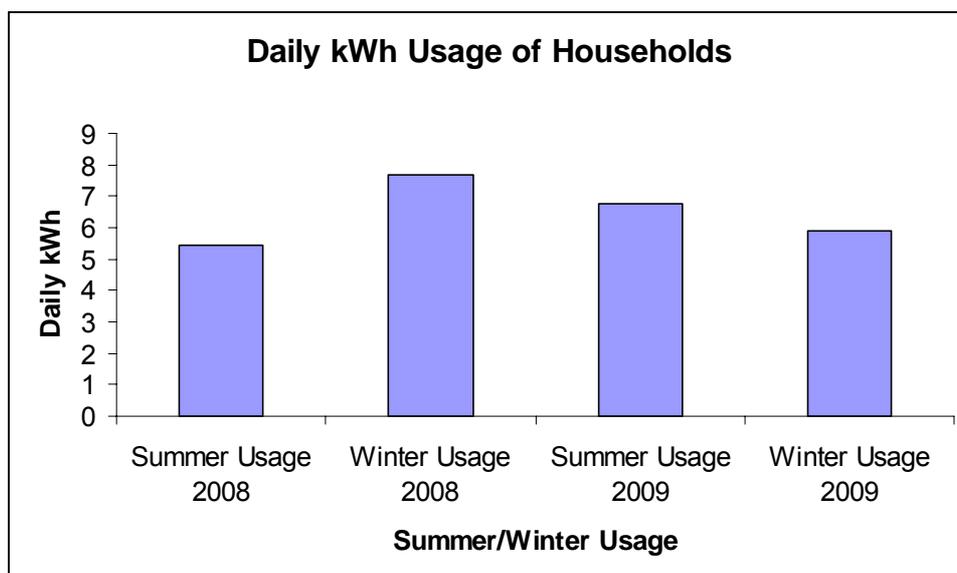
Feedback indicated that residents found this information valuable and encouraged them to observe seasonal and yearly fluctuations in their usage. Formal follow up assessment of changes in utility bills will be conducted after one year and indicate whether reductions and behavioural change strategies have been effective and sustained.

Key Findings and Mitigating Actions

As collection of baseline data has only recently been completed, follow up assessment of energy and water bills is not yet possible and no mitigating actions have been taken.

The EcoCentre currently lacks capacity to provide comprehensive data analysis of energy and water bills. The following actions have been taken to address this in the short term:

- Provide training for existing employee’s in accredited auditing and carbon accounting techniques;
- Establishing partnerships with existing auditing organisations and tertiary institutions;
- Expanding the scope of the existing CarbonCut training.



Graph 1: Average Residential Summer and Winter Electricity Usage in the CoPP

Graph 1 indicates the electricity usage patterns of service recipients, based on data collected from 95 residents' utility bills. The average daily summer usage per household for 2008-2009 was approximately 6 kWh, the average winter usage for the same period was approximately 7 kWh. The lack of seasonal fluctuation in usage may be due to error in data collection, where figures were not season-specific. Low kWh usage may be due to: small living quarters, minimal number of residents per household and minimal appliances installed. This can be directly related to the demographics of the householders serviced and their low income status. It has been found that higher income households consume much greater amounts of electricity and water, based on the fact that higher wealth is closely correlated to increased consumption rates and consequently an increased environmental impact (ACF 2007).

5.12 Household Appliance Data

Introduction

The CarbonCut retrofit record sheet collected the following data:

- Star energy ratings for: Refrigerator; Washing Machine; Dryer and Split System (wall heater/air conditioner) (Refer to Appendix 4: General Appliance Use)
- Type of heating and hot water service: Gas, Electric or Solar
- Insulation: Current state of roof insulation, Eg. intact or incomplete

Key Findings and Mitigating Actions

Where appropriate and following consultation with the resident, the team had the option of performing several energy-saving measures for the resident:

a) *Adjustment of hot water system*

In cases where hot water systems are turned up to maximum heat, an excess of electricity is needed to heat the water and an increase of cold water is required to create a usable showering temperature. The alternative is to turn down the overall temperature of the system which reduces the energy and water requirement. Australian Standards require storage water heaters to be set at no less than 60°C. Instantaneous gas water heaters can be set to lower temperatures however guidelines must be followed (Powercor Australia and CitiPower. Accessed Oct 2009).

Outcome: Few hot water heaters were adjusted, due to either a difficulty in locating unit or the adjustment not being applicable within the building type. Any adjustments were agreed to by the resident and recorded on retrofit record sheet.

b) *Check of leaking taps and toilet*

If a leaking toilet was suspected, a simple dye test could be conducted to confirm this. (A small amount of dye dropped into tank, will appear in the toilet bowl of a leaking toilet.)

Outcome: Due to lack of plumbing qualifications, the team was limited in their capacity to fix leaks, however the resident was advised about the problem and building maintenance was contacted for three residents.

c) *Check of roof insulation*

Insulation not intact or complete reduces the efficiency of maintaining the required heat within a room and even small gaps will cause significant heat loss.

Outcome: Retrofitters had the option of using a ladder and torch to check insulation by sight from the top of manhole, but CarbonCut OH&S does not permit retrofitters to exit the ladder and enter the roof cavity. Insulation checks were not frequent due to the high number of multi-storied dwellings serviced. In the case of insulation found not intact or was incomplete, retrofitters advised the resident and informed them about the government rebates currently available.

d) Adjustment of refrigerator temperature

Turning refrigerator temperatures up by one or two degrees, will reduce energy consumption of the appliance. Enhancing efficiency of this appliance is also achieved by reducing sun exposure (may require moving away from window) and efficient pattern of use (not opening unnecessarily as cool air is lost with every opening.) Adjusting the settings according to season was also explained, Eg winter settings can be much higher as compared to summer.

Outcome: Adjustment of fridge settings was a technique used infrequently and only undertaken with extreme caution and the resident's understanding, due to the risks associated with temperature maintenance required for particular foods. Retrofitters used thermometers to assess refrigerator temperatures. The low number of refrigerator adjustments was likely due to the resident not wanting the adjustment. Those adjusted, were recorded.

e) Adjustment of heating or cooling appliance settings

Wall split-systems are often left switched on 24 hours per day, constantly operating to equalise the temperature of a room.

Outcome: When this was found to be the case, residents were advised to switch the appliance off when not required. Other options discussed included: switching off pilot lights during summer, considering behavioural patterns when heating or cooling space (addition of rugs, closing doors, use of thick curtains and pelmets).

f) Adjustment and notification of appliance standby power

Average standby values of general household appliances include (The Sustainable Energy Authority Victoria. Accessed Sept 2009):

Television, stereo 10w/hr	10 w/hr
Printer, VCR	8 w/hr
Computer monitor	5 w/hr
Microwave, Clock radio	4 w/hr

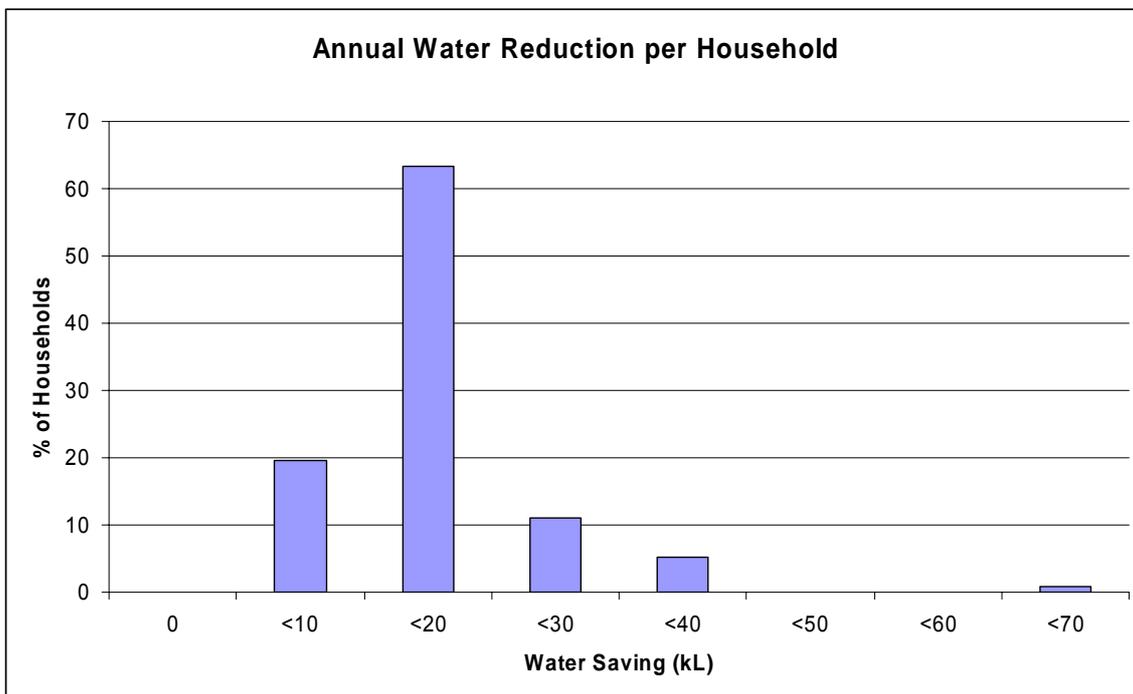
Outcome: The team explained and demonstrated standby power to the resident where applicable. Language barriers were often an obstacle, however this was found to be one of the simpler energy-saving techniques able to be demonstrated via body language. It was found that many residents were already aware of standby power and turned off appliances when not in use.

5.13 Water

Introduction

Through the installation of 3 Star showerheads and fixaflush toilet weights, total annual water savings were estimated to be 1708.8 kL across the 201 serviced households. The average annual water savings for those who received the installation will be 14.5 kL/yr and the average over the 201 households will be 8.5 kL/yr . A majority of households, approximately 63% achieved water savings between 10 kL/yr and 20 kL/yr per annum. The greatest water saving was achieved by one

household recording a reduction of between 60 and 70 kL/yr. Eighty-four households achieved no water saving because neither device was installed.



Graph 2: Percentage of Households and Corresponding kL Saved (Showerhead & Fixaflush)

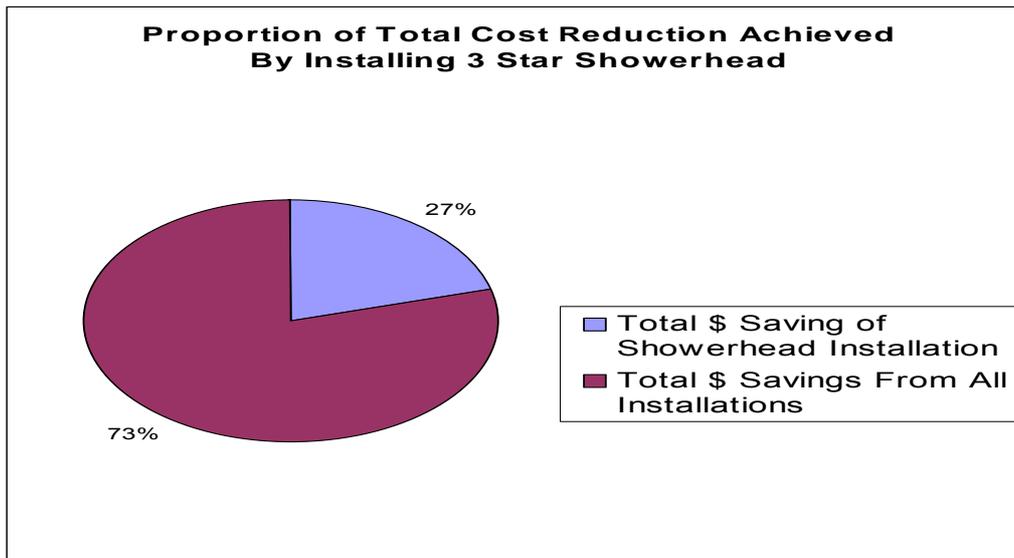
Showerhead

Functions	Supplier	RRP
9L/min	CoPP – *Interbath model	\$103.76 / per Interbath Intouch

*Interbath showerheads are supplied by the CoPP as part of their showerhead exchange program. Local government showerhead exchange programs are linked into carbon credit schemes, as using lower flow heads, means using less hot water and thus less energy and contributing less greenhouse emissions. All showerhead recipients must complete an exchange form, helping to document number exchanged and allow council to claim this residential reduction in energy use as part of their reduction in energy use and thus qualify for credits. Residents have the option to tick a box if they do not wish their reduction to be used for this purpose. For more information see http://www.portphillip.vic.gov.au/showerhead_exchange.htm

Key Findings

A total of ninety-three showerheads were installed, with thirty-eight of them being normal showerheads and fifty-five being handheld. Based on flow rate assumptions, this equates to an overall reduction of 1,488 kL's per year and household reduction of 16 kL per household per year (only applicable for those who received the installation). Savings were dependant on the number of showerheads installed and the number of residents living in the household. Monetary savings across all residents due to showerhead installation will be approximately \$5632 per year, averaging \$61 per household, per annum. Showerhead installations accounted for 27% of the total monetary savings achieved over the entire project. Refer below to Graph 3.



Graph 3 – Pie Chart: Proportion of Monetary Savings achieved through Showerhead Installation

Due to the delayed return-correspondence of a key project stakeholder, the installation of showerheads was postponed until the second week of retrofitting, causing a number of eligible residents to miss out on the installation. It was found that many residents were aware of the water saving showerhead product, probably due to the good promotion of the showerhead exchange program. **Feedback indicated that many residents had wished to participate in the exchange program for some time, but were reluctant to perform the installation themselves.**

Around fifteen service recipients were dissatisfied with the new showerhead and recontacted staff to either exchange back to old showerhead or adjust new showerhead. Those that were exchanged back were removed from data count. Explanations for dissatisfaction included:

- Dislike of different water flow
- Improper functioning of device

Upon return visit to these households, staff would discuss the problem and the options available. In many cases, clear advice regarding the different flow settings lead to recipient satisfaction with their new shower head. In other cases the showerhead was removed and re-installed. In a few cases, the former showerhead was replaced.

During the course of the retrofit weeks, it became apparent that the Interbath model of water saving showerhead was presenting significant problems. Inadequacies included:

- a) White colour coating easily damaged with tools
- b) Combination of lower quality plastic joining fittings and washers increased likelihood of leaks
- c) Showerheads disassembled for installation were sometimes impossible to reassemble to the same quality. Eg. An arm detached from a head for ease of installation, was difficult to re-attach and achieve a leak-free installation
- d) Lack of correspondence between old fittings and new fittings

An additional issue encountered with showerheads was that some instantaneous hot water systems were incompatible with the new appliance, making installation not possible.

Mitigating Actions

Over the course of the retrofitting weeks, the team developed several methods to address difficulties, including:

- a) Re-use of washers from old showerhead (older rubber washers were of higher quality than plastic washers supplied by Interbath);
- b) Leaving metal hose of old hand-held showerhead installed (again, higher quality than supplied);
- c) Increased application of teflon tape;
- d) Not unnecessarily disassembling fittings prior to installation.

Assumptions & Parameters

Table 6: Assumptions Used to Calculate Showerhead Water Savings

ITEM	PARAMETER	ASSUMPTION	REFERENCE
Flow Rate	Old showerhead flow rate WELS rated Water-saving showerhead flow rate (3 Star)	15 L/min 9 L/min	SaveWater. Accessed Oct 2009
Shower Length	Shower time based on seasonal & similar program averages Number of weeks based on the assumption that the resident will not be at home all year	Length: 6 mins Frequency: once per day / 7 days / 50 weeks per year 50% shower flow based on 50% cold and; 50% heated water used when showering	CarbonCut data collection 2009 Dept. of Climate Change NGER (Measurement) Determination 2008
Installation	When not installed	<ul style="list-style-type: none"> • Did not require, water saving model already installed • Required a water saving showerhead, but did not want • Required and wanted, but incompatible with hot water system and unable to be installed 	CarbonCut data collection 2009
Resident	Number of residents recorded on Retrofit Record sheet	Ranged from 1 to 3 residents Av number of residents: 1.35 per household (n = 201)	CarbonCut data collection 2009

	When not specified, the number of residents was based on the average number of service recipients per household from data collected	Assumes number of residents in household does not significantly increase	
Type of Hot Water System	Calculations based on: <ul style="list-style-type: none"> • 22 Electric hot water systems • 19 Gas Hot Water Systems • 160 Solar/Gas Hot Water Systems Solar/Gas /Electric factors were calculated into data	Greenhouse Factor- Electricity: 1 kWh = 1.21 CO ² e- Assuming 100% efficiency Gas: 1 MJ = 0.051 CO ² e- Assuming 70% efficiency Solar: 65% efficiency	Dept. of Climate Change NGER (Measurement) Technical Guidelines 2009
Tariff	Water tariff: Electricity tariff: Gas tariff:	Cost of water per kL: \$2.40 / kL Cost of electricity/kWh: \$0.17 Cost of Gas/MJ: \$0.184	Residential water bill, South East Water 2009 Essential Services Commission. Accessed October 2009 Residential gas bill, AGL Energy Ltd 2009

Shower Timer

Functions	Supplier	RRP
4mins, encouraging residents to monitor & reduce length of shower	SEW	\$3.00 / per timer

Key Findings

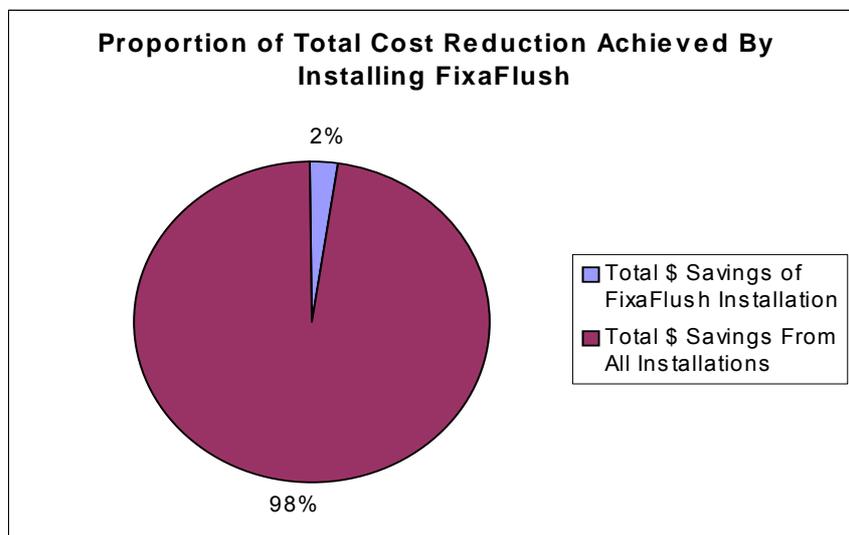
The total number of shower timers installed was forty nine. Used as a behavioural change tool, the timer encourages residents to shorten and monitor the length of their shower. Other retrofit programs may use 4 minutes or other alternative times for shower length calculations. However, due to the type of service recipients and seasonal considerations, 6 minutes was used for these calculations. It was assumed that the shower timer would help to reduce length of shower, but probably not to as low as 4 minutes.

Fixaflush Toilet Weight

Functions	Supplier	RRP
Weight inserted in cistern converting full-cycle flush to manual flush	SEW	\$15.00 / per fixaflush

Key Findings

The total number of fixaflush devices installed was fifty-eight. Based on toilet flow rate assumptions, it is calculated that 4 kL's of water will be saved per household per year, equating to overall annual savings of 221 kL's across all households; approximately \$528.23 per year. Graph 4 shows that this equated to 2% of the total monetary savings achieved over the entire project. Residents were generally not previously aware of the fixaflush device and some residents held reluctance to the installation. The team explained and demonstrated the device, where language barriers were not limiting. Other limitations in installing the device included incompatibility with the toilet system and inability to remove cistern lid.



Graph 4 – Pie Chart: Proportion of Monetary Saving Achieved through Fixaflush Installation

Despite the potential savings, in ratio to the number of households serviced, installation of the fixaflush was relatively low. This may have been due to:

- a) The resident not fully understanding the function or benefit of the device;
- b) The resident disliking the requirement of a manual flush (having to hold down button);
- c) The team being unable to open lid of cistern (avoided possibility of damage);
- d) Language barriers limited capacity to explain the device to non-English speakers (in this case, the written translated material was not sufficient).

Mitigating Actions

An increase in publicity and information of the device would likely assist in the popularity of its installation. The major barrier to achieving a higher number of installations seemed to primarily be

a behaviour change issue. Methods to overcome these obstacles will be explored in future programs.

NB. Central Tablelands Water study conducted in the mid 1990s saw plumbers install 5000 cistern weights (similar to 'fixaflush'). It was felt that most were removed due to residents not being used to the adjustment of the manual flush and it was concluded that a visual instruction sign would help combat this plus a cultural shift which would have since occurred. (Gibbons 2008)

Assumptions & Parameters

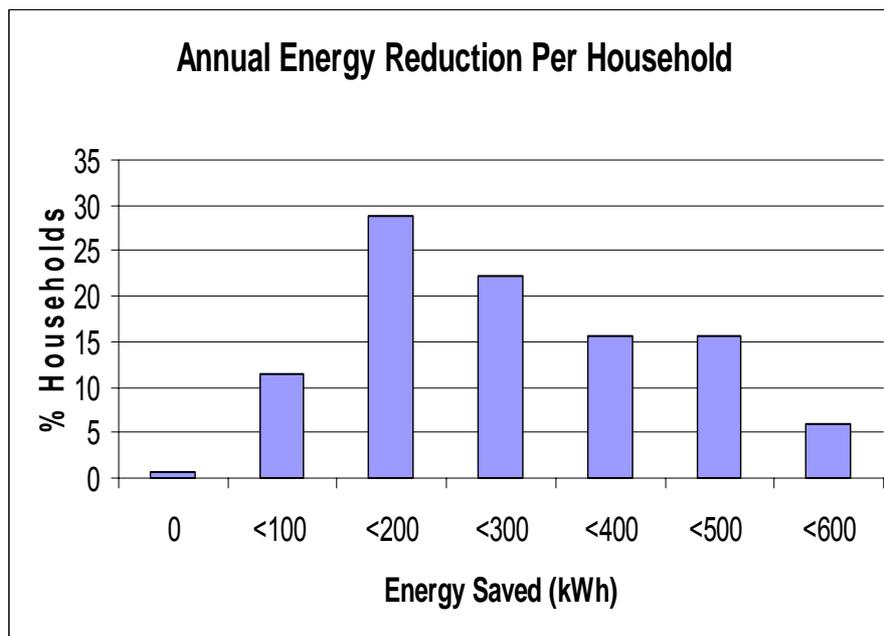
Table 7: Assumptions Used to Calculate Fixaflush Water Savings

ITEM	PARAMETER	ASSUMPTION	REFERENCE
Flow Rate	Average toilet litres per flush:	Average 31.2 L/day (19.3 L/day dual flush 42.3 L/day single flush)	Gibbons 2008
	Average toilet litres per flush with fixaflush installed	Average 23.28 L/day	
	Calculations were derived by subtracting a calculated saving from an average toilet flow rate, which would determine the number of litres saved per day (calculations were based on average toilet flow rate 31.2 L/day)	31.2L - 23.28L/ day x 7 days per wk x 50 wks per year	Gibbons 2008
Frequency	Calculations were based on the number of devices installed, as indicated on the Retrofit Record Sheet	Number installed ranged from 0 to 3. Average number was 1 per household	CarbonCut data collection 2009
Installation	When not installed:	<ul style="list-style-type: none"> • Incompatibility with toilet system • Compatible but resident did not want the installation 	CarbonCut data collection 2009
	When installed:	Assumes device remains installed Assumes no toilet leaks	
Resident	Number of residents based on data from Retrofit Record Sheet.	Assumes number of residents does not significantly increase	Gibbons 2008
	When number is not specified, the number of residents was based on the average of: Effectiveness of device as a behaviour change tool:	1.35 people per household Assumes the action of the manual flush brings awareness to user that full-cycle flushes not needed to achieve result. Removal of finger from toilet button prior to completion of full-cycle	
Tariff	Water tariff:	\$2.40 kL	Residential water bill, Melbourne Water 2009

5.14 Electricity

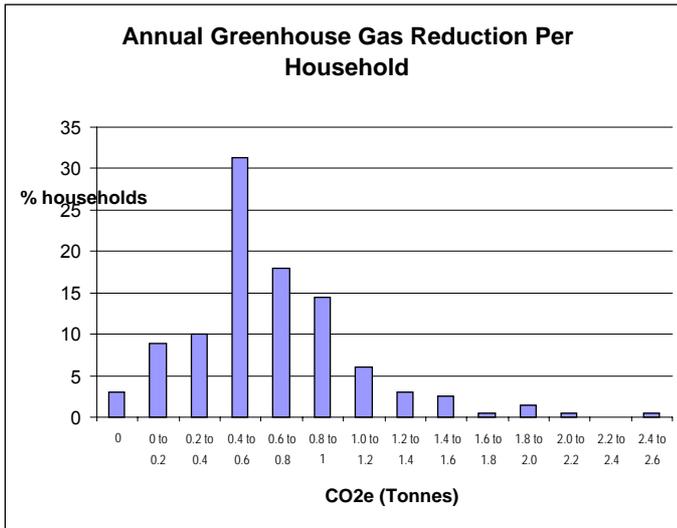
Introduction

Through the installation of Compact Fluorescent Lamps (CFL's) and 3 Star showerheads a total annual saving of 57,542 kWh of energy reduction will be achieved in the first year. The average energy saving per household was calculated to be 312 kWh, with approximately 28% of households achieving energy savings of between 100 and 200 kWh. A total of 5 households will achieve savings of over 600 kWh (up to 1000 kWh) per year which demonstrates considerable reductions. Graph 5 indicates the annual energy reduction for households.

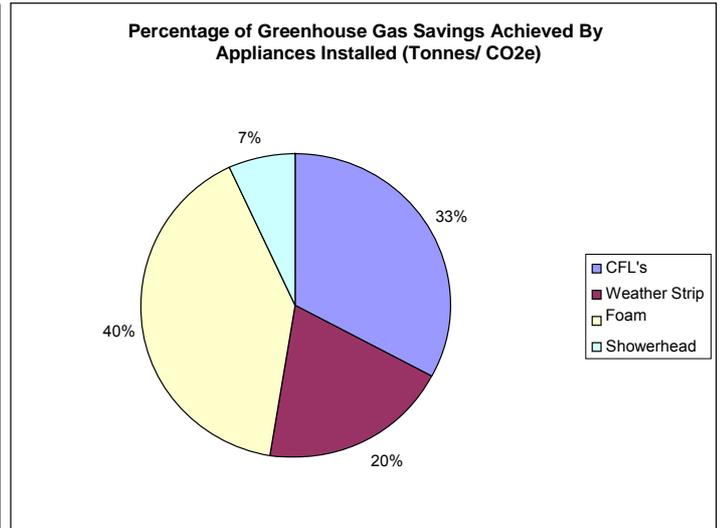


Graph 5: Kilowatt Hour Savings Achieved Per Household (CFLs & Showerhead)

Electricity consumption (kWh) was converted to greenhouse gas equivalents (Tonnes/CO²e), to determine the influence of electricity use on carbon emissions. This measure has been used to calculate the reduction in tonnes of CO²e from installing CFL's, showerheads and draft proofing. The total reduction in CO²e over the 201 households serviced will be 132.7 tonnes (T) /pa - approximately 265,400 black balloons. Approximately 31% of households achieved a greenhouse gas reduction of between 0.4 - 0.6 T CO²e, with the average calculated to be 0.7 T per household, per annum. Two households achieved savings greater than 2.4 T CO²e (refer to Graph 6). Graph 7 shows the proportion of annual greenhouse savings achieved according to specific devices installed. Interestingly, foam installation around doors and windows were calculated to achieve the highest CO²e reduction of 40% with CFL's installation contributing to 33% CO²e reduction per annum.



Graph 6: CO2-e Savings Per Household



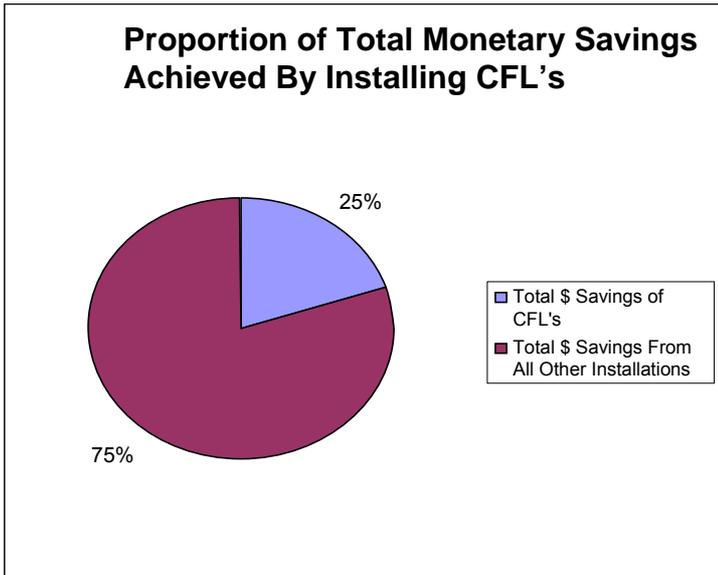
Graph 7 – Pie Chart: Percentage Reduction Per Device

Lighting

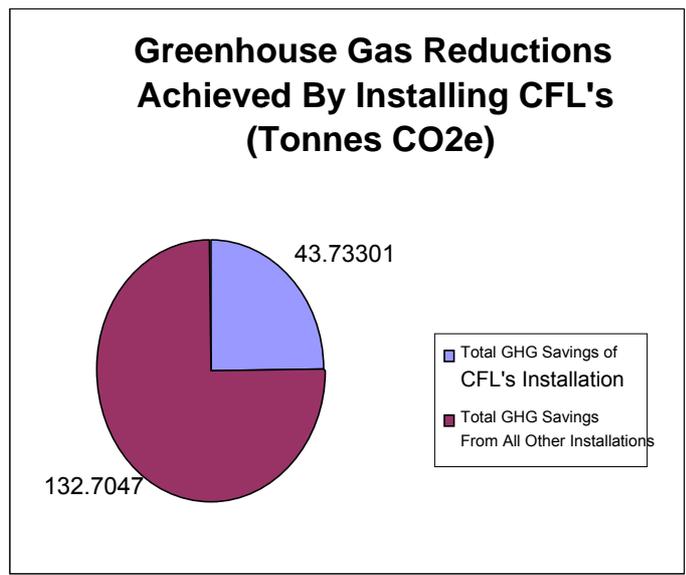
Function	Supplier & Types	RRP
CFL technology produces an equivalent light output to incandescent, at a higher efficiency. Eg 100W incandescent = 18W CFL (minus power factor)	Various suppliers Brand: primarily Phillips 6000 hr Cool daylight/Warm light 8W – 23W & 28 W halogen	Various Av \$3.40 / per globe

Key Findings

The total number of CFL's installed was 742, equating to an average of 3.74 per household. Based on calculations of the data for globe exchanges within individual households, the estimated overall reduction in carbon emissions (through reduced electricity consumption) will be 43.7 T CO²e per annum. The average annual carbon reduction per household was 0.25 T CO²e which is equivalent to 506 black balloons (Refer to Graph 9 below). Reduction in CO²e will allow for total monetary savings of \$5341.44 across the 201 household serviced, per annum. This equates to a 25% saving of the total program monetary savings (\$21,224.31) which were direct result of globe installations.



Graph 8 – Pie Chart: Proportion of Monetary Savings



Graph 9 – Pie Chart: Greenhouse Gas Reductions

Around one quarter of residents already had new CFL globes installed in their home. Though some residents had purchased CFL globes for themselves, a significant portion of residents had been visited by an electricity supplier within the last few months to exchange. Many of these residents were unsure as to the name of the service provider and were rarely left with any paperwork or details. This in turn created a significant amount of confusion among householders, as many residents associated the CarbonCut team with an energy supplier. Difficulty was encountered in explaining:

- That CarbonCut was not associated with other service providers/electricity companies
- The role of the PPEC as a local community-based organisation and the services it provides

Other current globe exchange programs, coupled with the good media coverage and distribution in shops, meant that residents were generally aware of this device and satisfied with their new CFLs. However information regarding: breakage and disposal, places for purchase, calculating light output equivalents and lifespan, appeared to be new information to most residents. Around seven households were unsatisfied post-retrofit and re-contacted CarbonCut staff to either:

- Exchange back to incandescent globes
- Exchange CFLs for different wattage
- Exchange CFLs for different type of light (cool / warm)

All of these individual requests were met by the team who undertook secondary visits to residents and retrofit record sheets were amended accordingly. Where possible, re-visits were scheduled to occur en route to other appointments in the area. However, this was not always possible and a degree of inefficiency is associated with making secondary visits.

During most retrofit days, one visit was made by staff to a supplier to replenish stock. Difficulties in meeting the demand for the large range of globe requirements was constant, as the needs varied significantly between different housing estates, different floors in the same estate and unpredictable individual preferences of residents.

The priority was to exchange globes that receive the highest use in the home, but in cases of insufficient stock for required fittings, globes were installed in lower-use areas. In a few instances,

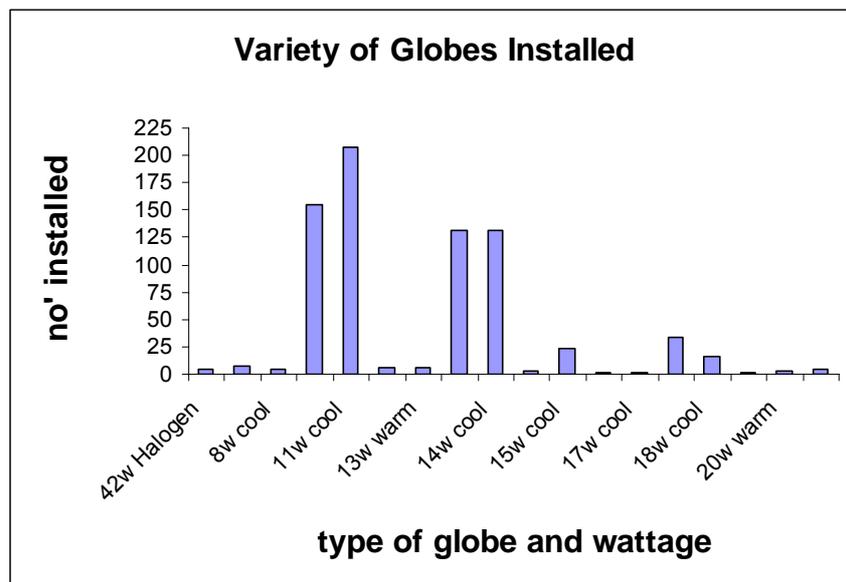
less than six globes were installed (if the household had less than six lights or correct globes were not at hand).

Key difficulties regarding globe stock associated with:

- a) Purchasing smaller quantities of globes on a regular basis during the first half of the project. This was due to initial lack of storage space, budget considerations and delays in making bulk purchase;
- b) Under-catering with equipment supplies when loading stock at beginning of day;
- c) Limited space to carry excess equipment and materials in transport vehicle;
- d) Residents expressing satisfaction on the retrofit day, but discovering later that they were not satisfied with the CFL;
- e) Extra residents being added to the retrofit schedule during the day (word of mouth), causing stock to run down more quickly;
- f) More time required for stock organization and planning than originally envisaged.

Mitigating Actions

Catering for preferences in globe colour and differing light fittings proved challenging, although some trends were observed. Elderly service recipients seemed to prefer cool coloured globes. We related this to the fact that these globes give off a whiter and brighter of light and are preferable when vision may be limited. The service recipients of Russian background also found this colour of light to be more appealing to the eye. The most common globe used was the Phillips 11 w cool, with over 200 of these being installed and the most common fitting was the bayonet cap.



Graph 10: Proportion of Different Types of Globes Installed

During the initial weeks of retrofitting, staff attempted to supply as wide a variety of globes as possible and undertook frequent, small equipment purchases. Efficiency of logistics and budgeting in this area of equipment purchase requires review and refinement. Significant improvements

could be made through more extensive planning and knowledge of individual requirements pre-retrofit. Staff attempted to trial this during the extra 9th week of retrofitting, whereby residents were asked to provide details about their light fittings over the phone, pre-appointment. However it can be difficult for some people, especially elderly, to check their own fittings. Other possibilities to address these issues are:

- Review data to develop a ‘typical requirement’ profile for public housing estate units, to be followed with investigation of specific estates;
- Where necessary, conducting a pre-retrofit walk-through audit to record specific requirements for each household;
- Bulk purchasing prior to retrofit service delivery and developing relations with suppliers who are willing to exchange stock when necessary;
- Undertake a lesser number of retrofits per day to ensure adequate time, equipment and personnel for each household;
- Ensure thorough explanation from the team to the resident is undertaken, regarding the specific features of the CFL globes (such as different types of light and 10 second delay in reaching full lighting capacity);
- Demonstrate the light output to the resident (by closing curtains) and ensuring complete satisfaction *before* leaving residence.

Assumptions & Parameters

Table 8: Average Hours of Use Per Day (Summer / Winter Average)

NB. Averages were calculated using a combination of data sources (CarbonCut data collection 2009 and Victorian Energy Emission Target Act (VEET) 2007.) Averages were used when the Retrofit Record sheet data was incomplete

ROOM / TYPE	HOURS of USE PER DAY
Bedroom	2
Bathroom	1.5
Living Room	4
Dining	2
Hall	2
Toilet	1
Kitchen	4
Lamp	2
Study	2
Outdoor	2
Laundry	1
Garage	1
Room not recorded	3

* Summer and winter use averaged to create yearly average. Significant outliers in data were treated on a case by case basis; some remained, others were modified in line with averages. Methods of this data collection require revision for future projects.

Table 9: Assumptions Used for Light Globe Calculations

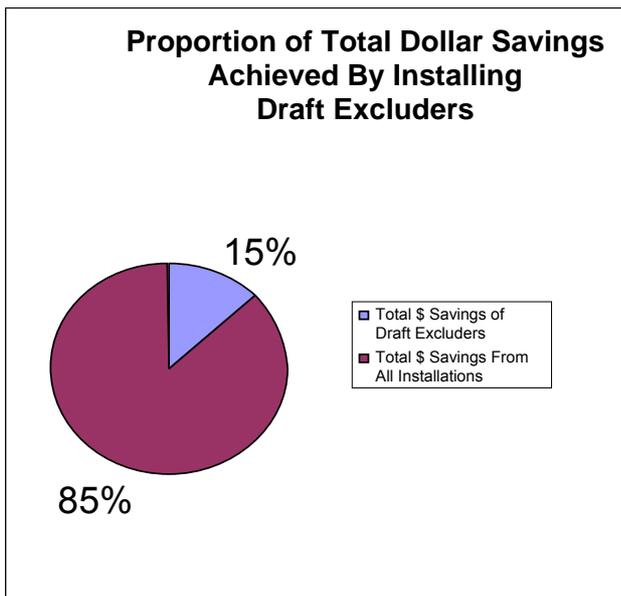
ITEM	ASSUMPTION	REFERENCE
Usage or Running Time	<p>Average usage hours for each room was recorded on the Retrofit record sheets at the time of globe installation</p> <p>Record sheets indicating usage of 6hrs & above were assumed be to winter usage. Annual usage was estimated by averaging winter & summer usage</p> <p>Eg. 8 hr winter use / 4hr summer use = 6 hr yearly use</p>	CarbonCut data collected 2009
Data Collection	<p>The following data was collected at the time of globe installation:</p> <ul style="list-style-type: none"> ▪ globe installed • globe replaced • colour (warm or cool) • wattage • fitting (bayonet cap or edison screw) • number of globes not replaced (for reasons why, see Key Findings above) 	CarbonCut data collected 2009
Type of Globe	<p>Phillips brand, 6000 hour lifespan were predominantly used</p> <p>Assumes CFL to be replaced with the same wattage globe at the end of lifespan, ensuring the resident's reduced electricity usage is sustained</p>	CarbonCut data collected 2009
Formulas	<p>Greenhouse Factor: 1.21</p> <p>Power Factor of CFL, which causes wattage to consume at higher level than is labelled, was not included into calculations.</p>	National Greenhouse Accounts (NGA) Factor Workbook Nov 2008
Missing Data	<p>Where record sheets fail to indicate globe replaced, we assume that the fitting was empty; which in some cases has added wattage & expenditure to the household</p> <p>Water savings resulting from reduced electricity generated are not factored into results</p>	CarbonCut data collected 2009
Tariff	Electricity tariff: \$0.17	Essential Services Commission. Accessed October 2009

**Draft Proofing
Draft Excluder / Weather Seal**

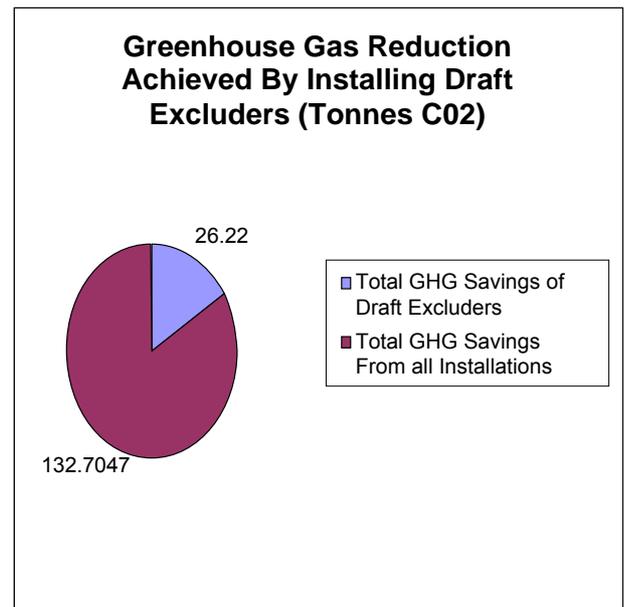
Function	Supplier	RRP
Device is cut to size and attached to the bottom of door to seal gap, inhibit drafts & reduce heating & cooling requirements	<p>Various suppliers</p> <p>Bulk purchase: Keeler Hardware</p> <p>Brand: predominantly Raven, model RP3</p>	<p>Various</p> <p>Av \$14.30 / per seal</p>

Key Findings

The total number of draft excluders installed was 69, with the majority being the Raven RP3 model however a small number of adhesive and similar models were also used. Research suggests that a draft excluder on the external doors of a room creates a total seal and can decrease heating and cooling requirements by up to 15-20 %. This is based on a 188.48 cm² gap around the whole door frame (Moraday Master Distributors Pty Ltd 2008). The estimated reduction in carbon emissions achieved through reduced heating and cooling requirements will be 26.2 T CO₂e across all households. The greenhouse savings per household was calculated to be 0.5 T CO₂e, equating to an annual saving of \$50 per household or 15 % of total monetary savings achieved.



Graph 11 - Pie Chart: Proportion of Monetary Savings



Graph 12 – Pie Chart: Greenhouse Gas Reduction

Most residents were familiar with the device, with no recorded cases of the resident not wanting it when installation was required. Approximately 50% of recipients understood how the device functioned, with the other 50% benefitting from an explanation. In households where the device was already installed, the majority were functioning effectively. A number of these however were found to be malfunctioning and required minor alterations. Some of the residents had been unaware of the malfunction and others were aware but **not able to repair it themselves**. Where the device was unable to be installed, this was due to:

- a) Fire-proof door frames which could not be drilled into. This would breach the 'fireproof' integrity of the frame
- b) Poor condition of the door due to rotten wood or too large a gap, making installation difficult or impossible
- c) No gap under door

The benefits of draft proofing were particularly evident for residents of high-rise estates, whereby external corridors become wind tunnels and cause severe drafts during winter. Resident feedback indicated a significant reduction in drafts coming under doorways post-retrofit. Some residents from one group of units reported a significant difference after just one night.

"My feet are no longer cold!" (Bank St resident, quoted in June 2009)

The added benefits of the draft excluder (brought to the team's attention by residents) also include a reduction in noise and cigarette smoke.

This was found to be a difficult device to calculate the energy savings of, due to:

- The variable conditions under which they are installed. For example it cannot be assumed that a complete seal of a room or house is achieved through installation of one draft excluder;
- Missing data regarding which door received the installation, doors where residents already had draft excluder and other doors that still require a draft excluder but did not have one installed;
- Minimal general data and previous research on the device, has meant a lack of formulas for calculations and consequently uncertain results. Energy and monetary savings achieved are often highly variable and depend on room type, insulation, type of heating (gas or electric) and living patterns (doors opened or closed).

Mitigating Actions

Part way through the 8-week retrofit schedule Retrofit Record Sheets were amended to record specific doors on which draught excluders were installed. Future programs will require clarity and diligence for recording this information.

Draft excluder installations on internal doors of main living areas were infrequent. When this did occur, the effectiveness of achieving a reduction in heating and cooling requirements will be partly dependent on patterns of use and living behaviours. For example, draft excluders installed on two living room doors to seal the room will not be effective if these doors remain open. The team offered advice on isolating key living areas to prioritise seasonal heating or cooling requirements.

In cases where device was unable to be installed, it would have been helpful to have alternative models of draft excluders applicable to structural conditions. For example, where drilling into door frame was impossible, an adhesive draft excluder could have been used (higher purchase cost was a consideration for adhesive models). Staff did experiment with several types of excluders. Pre-retrofit walk-through audits with households would allow for better planning and catering for variation.

Assumptions & Parameters

Table 10: Assumptions Used to Calculate Draft Excluder Savings

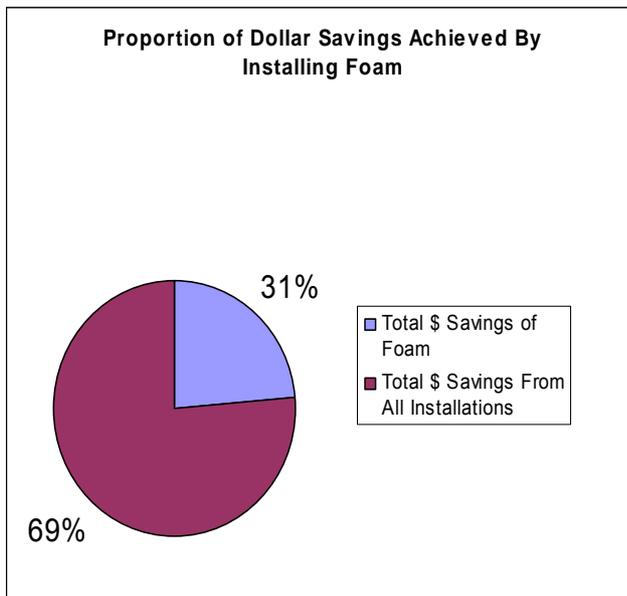
ITEM	PARAMETER	ASSUMPTION	REFERENCE
Placement and Seal	All draft excluders were placed on external doors of house (with the exception of one internal door)	Complete seal of gap was achieved Resident was consulted regarding installation on internal doors if gas heating and maintaining oxygen flow were cause for concern	CarbonCut data collection 2009
	Average gap under door	Calculations based on 16 mm at the bottom of average door	Moraday Master Distributors Pty 2008
Installation	When not installed:	<ul style="list-style-type: none"> • Device or equivalent was already installed • Device or equivalent installed, though required adjustment or re-installation for proper functioning • Device not required due to lack of gap • Device was unable to be installed due to type of door frame (eg. fire proofed) 	CarbonCut data collection 2009
Resident	For installation on internal doors, it was assumed that residents would keep doors closed to seal the room and maintain heating or cooling efficiency	Other areas of the room whereby heating may leak (gaps in insulation, windows, floorboards) were not recorded or factored into calculations	
Formulas	Criteria for installing a product on door frame, includes each edge around doorframe and under door	Calculations = No. of draft stoppers installed x greenhouse factor of 1.38	Victorian Energy Emission Target Act (VEET) 2007 Moraday Master Distributors Pty 2008
Tariff	Electricity tariff:	16 cents per kWh	Essential Services Commission. Accessed October 2009

Foam Seal

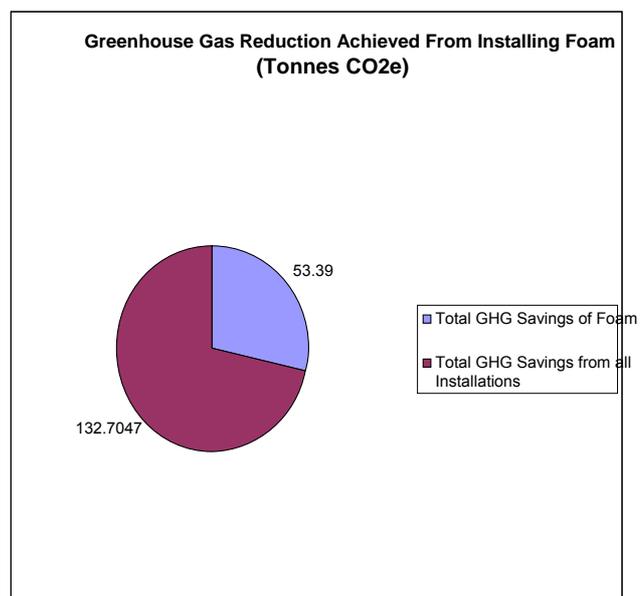
Function	Supplier	RRP
Adhesive foam strip applied around doors & windows	Various suppliers. Brand: primarily Moraday & Raven 6mm/9mm	Various Av \$3.42 per door / 5m pack

Key Findings

The total number of foam seals installed was 140.5. The majority were adhered to the frames of external and internal doors however some windows were also sealed. Due to the type of dwellings serviced, sealing of windows was less required. The 6 mm x 9 mm foam was found to be the most suitable; however some thicker types were also used where appropriate. The estimated annual greenhouse saving for all households will be 53 T CO₂e (Refer to Graph 14), equating to an average annual saving per household of approximately 0.5 T CO₂e. The total estimated dollar savings across all households is approximately \$6,520.91 per annum. This equates to an annual saving per household of approximately \$53 or 31% of total cost reduction (Refer to Graph 13).



Graph 13 – Pie Chart: Proportion of Monetary Savings



Graph 14 – Pie Chart: Greenhouse Gas Savings

The same difficulties exist for calculating heating or cooling energy saved through application of foam seals, as for draft excluders. Again, this is based on the variability of conditions under which they are installed. (Refer above Section: Draft Excluders regarding these considerations.)

Key problems associated with the foam installation were found to be:

- Insufficient cleaning of door frame surface prior to application, causing poor adhesion;
- Insufficient checking to ensure door closes properly, post-installation and adjustment to foam when this was the case;
- Missing data, in cases where foam was already installed on door, but not recorded.

Mitigating Actions

- Difficulty in closing doors was in most cases easily amended by cutting small sections of foam from around door locks or corners, without jeopardising the integrity of the seal. In some cases this still proved insufficient and the foam was removed;
- Further research of baseline data for foam and draft excluder calculations is required;
- Accurate recording methods at time of service is required;
- Final checks to ensure door is closing properly, as feedback from questionnaires noted a number of complaints regarding door closure;
- Different types of foams to be researched for future use

Assumptions & Parameters

Table 11: Assumptions Used to Calculate Savings Achieved through Foam Installation

ITEM	PARAMETER	ASSUMPTION	REFERENCE
Placement and Seal	Either front or back door. Except when Retrofit Record sheet indicated otherwise	All foam seals were adhered to external doors, with one exception on an internal door	CarbonCut data collection 2009
	6mm / 9mm type of foam used is designed for door & window gaps 3 to 6mm	Size of gap varied with individual doors. The most common sized gap was found to be 3 to 6 mm wide	Moraday Master Distributors Pty Ltd 2008 Victorian Energy Emission Target Act (VEET) 2007
Installation	When not installed was due to: Up to two seals were budgeted for each household	<ul style="list-style-type: none"> • Not required due to lack of gap • Existing foam seal • Required but not desired by resident • Door would not function properly with foam installed 	CarbonCut data collection 2009
Material	Quality polyester foam	The material of this product flattens over time and use. Where this was the case with existing foam, the team replaced it for the resident	Moraday Master Distributors Pty Ltd 2008
Tariff	Electricity tariff:	16 cents per kWh	Essential Services Commission. Accessed October 2009

5.2 Community Outcomes

Introduction

The CarbonCut Program Community Outcomes are measured within the areas of:

- 5.21 Service
- 5.22 Research
- 5.23 Obstacles
- 5.24 Employment
- 5.25 Capacity Building

Establishing representative indicators to measure these outcomes is a key focus in the development of the program and an area where resources will be directed in future. Given the short time since the program was delivered, assessment of the degree to which behaviour change has been sustained among participants is premature. However, the majority of outcomes were assessed using indicators that are immediately measurable.

Pathways for achieving behavioural change under the current model may be limited by the relatively short time of recipient-employee engagement. However the relatively low commitment required from the service recipients (time, cost, resources) may in fact provide access to a wider or otherwise non-engaged demographic. This benefit transfers into a more inclusive and sustainable project model with capacity for a 'ripple on effect,' whereby recipients encourage friends and family members to take action and transfer information throughout their community.

Table 12: Anticipated Community Benefits and Outcomes for the CarbonCut2 Program *

ANTICIPATED BENEFIT	CARBONCUT2 DELIVERED OUTCOME BY:
Links older, younger and culturally diverse groups within the community	<ul style="list-style-type: none"> • Encouraging youth leadership and providing skilled training for employees • Providing the opportunity for young people to meet and work with older residents from diverse backgrounds • Making employment accessible to those who may have recently been out of the job market. Provide 'Green Jobs' to the local community • Providing a quality service for non-English speaking residents, demonstrated in resident feedback surveys and appreciation of language translator • Providing energy fact sheets in four different languages
Increases the participation and inclusion of disengaged communities	<ul style="list-style-type: none"> • Successful recruitment of residents most in need, Eg. Community and public housing residents • Providing a greater feeling of social wellbeing, increased self worth and greater inclusion within the community, demonstrated in resident feedback surveys, gratitude and relief shown by many recipients at time of service
Links behaviour within the home to climate change	<ul style="list-style-type: none"> • Making residents aware of current energy usage patterns • Engaging & educating residents on how to further reduce

	energy consumption
Educates the community to avoid waste of water, energy and resources	<ul style="list-style-type: none"> • Conducting two community workshops with residents. Service recipients referred program to their friends and family members • Providing practical application of energy saving measures
Increases social connectivity amongst EcoCentre affiliates and members, government agencies & equipment providers, younger, older and culturally diverse communities	<ul style="list-style-type: none"> • Establishing new partnerships with community stakeholders (source of service recipients). Demonstrated through partnerships with local equipment suppliers, partnerships with SEW, COPP and other affiliates • Providing ongoing opportunities for engagement between program participants and the CarbonCut team, through celebrations, BBQs and functions at the EcoCentre • Establishing a working relationship with the Victorian EPA
Enables social equity for households who would otherwise be unable to afford such energy efficiency measures	<ul style="list-style-type: none"> • Monetary savings achieved is most beneficial to the households serviced as demonstrated in customer feedback surveys
Improves health and well being of householders through creating comfortable and safe home environments and providing social opportunity for marginalized residents	<ul style="list-style-type: none"> • Accessing target groups that often miss out on services • Commitment to provide non-English information sources • Increasing comfort demonstrated through resident feedback surveys
Supports and strengthens capacity of local community organisations and groups	<ul style="list-style-type: none"> • Gaining feedback from stakeholders and on-going commitment for future partnerships. CarbonCut assists community organisations to provide services to their members • Building local knowledge hub gained through the practical experience of delivering CarbonCut and engaging with local community. Allows the Program to deliver auditing and retrofit expertise to the specific requirements of local housing estates and demographics • Development of transferable model with focus on local employment and tools for servicing differing cultures and demographics
Multi-agency or group partnership in program planning and delivery	<ul style="list-style-type: none"> • Investigating new project partners and destinations for program delivery. Working to develop transferable and replicable project model with the capacity for delivery in other communities
Service recipients and residents of Port Phillip - benefit through obtaining free retrofit of home, advice and behaviour change	<ul style="list-style-type: none"> • Providing a cost-free service otherwise inaccessible to in low-income sector • Provision of information sheets, advice and demonstration to every resident • Undertaking resident feedback surveys (over 100 residents participated) to assess effectiveness of service delivery

	<ul style="list-style-type: none"> • Providing opportunities for households to reduce their ecological footprint in response to climate change
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* Refer to Appendix 5 for two case studies and the criteria used in assessing Community Outcomes

5.21 Service

Introduction

CarbonCut delivered a total of 201 retrofits to the target group of low-income residents, many of which resided in community housing estates in the CoPP. The demographic was primarily English and Russian, but residents were also Ukraine, Greek, Hungarian and Italian people and incorporated a variety of concession types (refer 6.2 Project Parameters). Service recipients were of a range of ages, though the majority was of the middle to elderly demographic. In relevance to energy and water consumption, residents were asked to indicate the number of people living in their home. The majority were found to be either solo, or living in pairs.

Criteria used to assess the effectiveness and quality of service delivered to the target group includes:

- 1) Ability to develop an effective service recipient recruitment strategy, targeting those vulnerable to the rising costs of utility bills and needing assistance to install energy-saving technologies
- 2) Efficient service recipient recruitment, utilising community networks and project partners
- 3) Ability to fill gaps or meet demand for services not currently available to target group
- 4) Ability to build community networks and encourage residents to reduce their energy and water consumption, seek more information and engage in local environmental initiatives
- 5) Effective means of engaging residents and delivering information
- 6) Developing indicators to assess residents' understanding of the project, the retrofit process, the devices, the consequences of climate change and energy-saving behaviour. Assess whether knowledge on the subject has increased through their involvement and engagement with CarbonCut employees
- 7) Ability to deliver a program that is valued and considered important within the community
- 8) Ability to provide a positive experience for residents and a good process of engagement between service recipients and employees
- 9) Assessing customer satisfaction and comprehension of the program
- 10) Ability to engage service recipients on a longer time basis and to assess if behaviour change techniques were successful

The majority of the 183 residents serviced within the first 8-week retrofitting period received a feedback survey, in either Russian or English and a self-addressed, stamped envelope for return. Of these distributed a total of 109 were returned (half English, half Russian) with 9 of those being either completely or virtually blank. Reasons for returning blank surveys were mostly a) not interested in completing or b) had difficulty completing. The survey (see Appendix 6) included

thirteen questions from which relevant material was extracted to assess and discuss in relation to the criteria. Results from each question are relative to the number of respondents who provided an answer to the particular question. The numbers of blank responses for questions was also recorded, for review of future survey content and format.

Several service recipients provided verbal feedback to the CarbonCut team. Quotes included:

“Old people were surprised to see young people, not laughing at them, or making fun of them. They feel that they connected with them... helps them not feeling hopeless”

“Some people make fun of them because they can’t speak English. These people have strong family connections....they feel like it is their family or children helping them”

(Russian speaking resident of Park Towers and active member of the CoPP community)

“I’d like to appreciate Lisa and Jill’s attention. Good attitude for my problem. I would like to have the same level of attention in the future.”

(Russian resident of Inkerman Heights, St Kilda)

“Thankyou to Lisa and Jill and team for their service”

“Big thanks”

(Residents of Park Towers, South Melbourne)

“I’ve been waiting for years for a service such as this. The draughts have been unbearable. I registered my name with DHS to have a weather strip put on, quite a while ago and then you just came from nowhere”

(Resident of Tom Hills Court, Port Melbourne)

Discussion of Service Recipient Surveys

The three types of survey questions included (see Appendix 6 for sample survey):

- Rating respondents agreement between 1 (strongly disagree) and 7 (strongly agree)
- Indicating yes, no or don’t know
- Commenting with a written response

The following survey discussion focuses on the most significant participant responses. For example, it is beneficial to note the residents who rate something as ‘Very Important’ or ‘Strongly Disagree’, than those who indicated mid-range answers (rating a 3 or 4). The number of respondents to each particular question is indicated by a (n=...) and will not always equal the total number of surveys received. Likewise, the number of responses discussed will not always equal the total number of respondents, as only the more significant answers are discussed.

Q1. Asked respondent to indicate how they heard about the CarbonCut Program, the purpose being to identify the most effective means of service recipient recruitment (n=100):

Of those who responded to this question:

- Forty-one indicated a *neighbour or friend*
- Twenty-five indicated *other*
- Fifteen indicated *community centre / community worker* and;

- Fourteen indicated *letter in mailbox*

The most common responses to 'other' were (n=25):

- Landlord (fourteen)
- Poster in their housing estate or flier in letterbox (six)
- CarbonCut employees (four)

Other responses included CarbonCut sign-up events (Earth Hour at The Tower), local newspapers and community newsletters. Interesting responses included advertising in 'Menora' (Russian magazine) and on television. These results indicate that an effective method of service recipient recruitment is through utilising local community networks and word of mouth referrals to family and neighbours.

Q2. Asked respondents to rate several statements indicating how they felt about their home after the CarbonCut Retrofit. Ratings ranged from 1 (strongly disagree) through to 7 (strongly agree)

Do you think that your house

a) Is generally more comfortable? (n=77)

Thirty-nine respondents rated a 7 (strongly agree) and another twenty-four rated either a 5 or 6 to this question. Six respondents did not agree, rating between 1 and 3 and four indicated 'Don't Know' to this question. Twenty-nine people left this question blank and a possible explanation for this may be the ambiguous phrasing of the question which may require future amendment. It may also be a little premature for residents to know whether they were more comfortable in their home or not and may be better asked in several months time.

b) Has a better shower? (n=67)

Fifty-three respondents rated a 6 or 7 indicating they strongly agreed, the remainder were generally very satisfied. Three respondents rated a 1 (strongly disagree) and six rated a 3 (disagree) for this question. Forty-one respondents left this answer blank.

c) Has warmer rooms? (n=60)

Forty-five respondents left this question blank, perhaps indicating confusion with wording residents being unsure how measure or judge differences in room temperature. The efficiency of draft proofing, is dependant on behavioural living patterns (such as closing doors and isolating rooms to heat) and therefore residents who do not consider their living patterns, may find the effectiveness of draft proofing difficult to monitor or measure. Having said this, thirty-nine residents still gave a rating of either 6 or 7. Four respondents rated between a 1 and 3 for this question and five indicated 'Don't Know'.

d) Is less drafty?(n=67)

Forty-seven respondents rated that they strongly agree, with only four people rating between a 1 and 3 and six people indicating 'Don't Know.' Thirty-seven respondents left this question blank.

e) Has better light? (n=75)

There was a high response rate to this question, with fifty-seven people rating a 6 or 7, indicating a good level of satisfaction with the CFL globes. Eight respondents indicated dissatisfaction, rating between a 1 and 3 and five did not know. Fewer respondents (thirty) left this question blank.

f) Has cooler rooms? (n=34)

This question was included more as a reference to assess whether respondents were reading questions properly or not. Respondents gave a broad range of answers, with nine people rating 'strongly agree' and another ten rating agree (5 or 6). Eleven respondents rated between 1 and 3. Many respondents were confused, with eighteen indicating 'Don't Know' and fifty-eight leaving this question blank.

Q3. Asked respondents which products were/were not installed during the retrofit, the purpose being to assess residents' understanding of what occurred during the retrofit and to compare data to Retrofit Running Sheet (n=97)

At the time of writing, comparisons between records had not been made. However key findings from the question were:

- Only four residents indicated 'Don't Know' as to whether any one device was or was not installed which indicates that the remainder understood what occurred in the retrofit
- Of the residents indicating to 'No, I already have this device', the most common devices were; showerhead (seven) and globes / draft stopper (six).

Q4. Asked residents to indicate any problems they had with installed devices, the purpose to identify residents that may require re-visiting (n=64)

Of those who responded, the most common response was 'no/none' (forty-three people).

- The most common device with a problem was found to be light globes (eight) and showerheads (six), with draft stoppers and foam also causing problems (three)
- One resident claimed to have problems with 'all of them' and another with a fixaflush
- Three residents made positive comments about how the job was performed or their satisfaction with a particular device
- One resident also stated their unrelated issue with their 'flyscreen'

Q5. Asked respondents to rate (1-7) how well they think they understand what climate change is, with the purpose of identifying a baseline level of knowledge of the service recipients (n=102)

The majority of responses (seventy-two) fell in the top half of the scale between 5 and 7, indicating a perceived high level of understanding among respondents. Eleven respondents indicated 'Don't know' and 4 indicated 'Not at All'.

Q6. Respondents were asked to rate (1-7) how important they considered particular aspects of the program to be, the purpose being to identify what residents value in community programs

a) Chance to reduce carbon emissions and address issues of climate change (n=66)

Fifty-two respondents indicated that they strongly agreed with this aspect, with a further twelve agreeing by rating a 5 or 6. Thirty-eight did not respond and eight did not know.

b) Free light globes and free home retrofit (n=72)

Similar trend to a) with fifty-two indicating strongly agree and another fourteen agreeing. Thirty-three did not respond and six did not know.

c) Social interaction and opportunity to meet new people (n=55)

Seven respondents rated a 1 to this question forty six indicated 'Don't Know'. A significant number of people; forty-nine, still indicated between 5 and 7 (agree - strongly agree).

d) Free energy-saving advice and information (n=59)

High numbers left this blank (forty-seven people) and also indicated strong agreement (forty-three.)

e) Improved sense of belonging within the community (n=54)

Six respondents did not know, forty-eight rated between 5 and 7 and a significant number (forty-nine) failed to provide an answer.

f) Chance to participate in community project (n=57)

Fifty-one respondents indicated that they agreed / strongly agreed with this statement, which is positive feedback. Again, a high number (forty-eight) failed to complete.

Q7 a) Asked respondents to indicate whether they think they would have gained a service such as this if not for CarbonCut. The purpose was to identify whether the target group are having their needs already met by other services, or if CarbonCut is helping to fill a gaps in existing services (n=91)

Of those who responded to this question, sixty-eight indicated 'No, I have been waiting for this service for a long time,' eighteen indicated 'Don't Know' and five indicated 'Yes'.

Of those who specified the length of time they had been waiting for a service such as this;

- Four answered between 1-3 months
- Four answered between 3-6 months
- Two answered 3-10 years
- Two answered years/ages

Two residents also stated;

- 'Department of Housing disinterest' and
- 'Had been watching information television, trying to work out how to receive this service'

Q7 b) Asked respondents to suggest other services or installations applicable to their home, with the purpose of identifying retrofit aspects to be provided in future project models (n=87)

Of those who responded to this question, the majority answered 'Don't Know' (thirty-eight) as to whether there were other possible services. Of those who answered yes (seventeen), the requests related to saving energy or water included;

- Assistance cooling house in summer
- window drafts
- timed power board
- refrigerator seals
- energy-saving information for children
- insulation

Q8. Asked respondents to rate their agreement (1-7) statements concerning reducing their utility expenditure, carbon emissions and understanding of information

a) CarbonCut retrofit is a good way to save money on energy bills (n=74)

The question had a fairly good response rate, with only twenty-four left uncompleted. Sixty-three respondents strongly agreed by indicating a 6 or 7 and just four indicated that they did not agree (between 1 and 3). Twelve respondents did not know

b) Retrofit will reduce carbon emissions, water usage and help climate change (n=64)

Similar trend to a) above, but with a higher volume of blank answers (thirty-three.) Thirteen people did not know and fifty-five rated strongly agree with a 6 or a 7. Again, only four rated between 1 and 3.

c) Without CarbonCut I would NOT have been able to afford and undertake retrofit myself (n=71)

Twenty-nine respondents left this answer blank and ten did not know. The majority agreed with the statement, with ten ratings of 6 and fifty-two of 7 which strongly agree

d) Without CarbonCut I would have been able to undertake the retrofit myself (n=60)

This question saw a change in results, with twenty-seven people disagreeing and rating between 1 and 3. Still fairly high numbers of blanks (thirty-nine) and eleven 'Don't Know's' Twenty-six respondents still answered strongly agree, which raises some cause for suspicion that respondents may not have properly read the question.

e) These programs are vital and valued in community (n=80)

This question was answered the most positively by respondents, with sixty-nine indicating strongly agree with a 6 or a 7. Just two people rated between 1 and 3. Seven people did not know and twenty-three left this question blank.

f) The information I received was easy to understand (n=78)

Sixty-eight people strongly agreed that the information was easy to understand, twenty-four left this blank and eight did not know. Six people rated between 1 and 3 and two respondents commented that they had not received any information.

g) I understand how the installed products work (n=83)

The vast majority (seventy-two) respondents indicated that they strongly agreed with this question and twenty-three failed to answer. Four people did not know and five people disagreed, indicating between a 1 and 3.

Q.9 Asked respondents to comment on any issues with the booking of their appointment and was included purely for managerial purposes (n=94)

Of those who responded, all answered 'No' or 'Don't Know', with the exception of 3 who answered 'Yes' with one of them indicating the team was in another appointment during their appointment time.

Q10. Asked respondents to indicate whether they would recommend the service to friends or family, with purpose to identify the effectiveness and degree to which referrals are made through service recipients. Also indicates a degree of customer satisfaction and good community networking. (n=85)

The majority of respondents indicated 'Yes', with two commenting 'and I do!' and 'I am happy to recommend.' Of those who indicated 'No' (six) comments included; 'they can look after themselves,' 'because of what happened and how it was explained' and the fact that it doesn't equate to much in the bigger scheme of things. Of those who answered 'Don't Know' (seven) comments included 'because I don't like the new globes.'

Q11. Asked respondents to indicate if they found the CarbonCut team to be friendly, helpful and efficient, the purpose being to identify the experience of resident during their engagement with the CarbonCut team (n=98)

Of those who responded to this question, seventy-two indicated 'Yes' to all three attributes – friendly, helpful and efficient. No respondents answered 'No' and three respondents indicated 'Don't Know' to one or more attributes. Comments included; 'Very Friendly.' Where there was only one response, it was most commonly indicated for a) Friendly.

Q12. Asked recipients to rate their overall satisfaction with the project (n=95)

The majority of respondents to this question (seventy people) indicated that they were 'very satisfied' with the CarbonCut Retrofit and a further eighteen rated a 5 or 6, indicating a high level of satisfaction. Only four respondents gave a low rating of between 1 and 3.

Q13. Requested respondents to make any other comments about CarbonCut. Comments were varied however those of similar nature have been grouped together. (n=65)

Comment Type Positive	Frequency
"Thankyou"	21
"Continue the service"	5
Happy with team, ("polite", "professional", "helpful," "doing a great job")	8
"Thankyou for saving me money"	1
Wholly satisfied / delighted	2
Thankyou for translator Anna	4
Particularly good for single / pensioners / elderly	2
Important / useful	1
Satisfied with a particular device	2
Acknowledges need for action of climate change	1
Enlightened to the need for reduced energy consumption	1
Don't Know	1
Not interested / difficulty completing survey	4
Wants more information about CarbonCut	1
Comment Type Negative	
Feels it to be futile, poor government spending	1
Complaint with device(s)	6
Concerned with health danger of CFLs	1
Requests	
Information about cheapest energy suppliers /companies	1
Information about heat exclusion methods	1
Window insulation	1
Access ramp	1
Central heating	1
General assistance	1
Assistance with garden	1

5.22 Research

Research was undertaken to assess the needs of two language groups that could be potential service recipients; Greek and Korean. Greek was identified to be part of the demographic serviced during the Pilot Project and Korean was chosen opportunistically due to personnel resource availability.

Research and investigation indicated a lack response within the local Greek community when offered the CarbonCut service. Methods of research included:

- Contacting Greek Church and community groups, offering the service to their members (via phone and email);
- Poster fliers in public places frequented by the local Greek community;
- Two interviews undertaken on Greek programs of community radio stations;
- Word of mouth referral through existing Greek networks.

Reasons for lack of Greek service recipient recruit were identified as possibly being:

- Local Greek people do not fall into low-income demographic;
- Already receive adequate services and assistance;
- Content of program did not meet the needs of this demographic.

Research and investigation also indicated a lack response from the Korean community when offered the CarbonCut service. Methods of research included:

- Contacted a variety of Korean organisations, societies and churches, via phone and email;
- Contacted the Korean Student Association of Melbourne University and several other student associations of other universities;
- Contacted the Korean program of SBS radio station.

Key Findings

All contacts (excluding university student unions), responded to say that they would spread word of the program and post the recipient recruitment flier on notice boards. Contact with SBS did not progress past reception desk however the Melbourne office indicated that they would forward the idea to promote the program onto the Sydney office for review. Research indicated that Korean populations in Melbourne are quite scattered and not prolific in the CoPP, though the closest Korean Church is located in Elsternwick. Relevant program documents were translated and a variety of Korean documents and organisations were sourced and filed for future use.

The three neighborhoods with the highest non-English speaking populations are East St Kilda (3,409), St Kilda (2,927) and Port Melbourne (2,127). According to the 2001 ABS Census on Population and Housing, the City of Port Phillip is home to 78,227 people of which: 28.5% (22,331) were born overseas 19.5% of people speak a language other than English at home.

The breakdown of language groups residing in the City of Port Phillip were found to be:

1. Greece 1,527 (2.0%) Middle Park / Albert Park
2. China 984 (1.3%) East St Kilda
3. Poland 871 (1.1%) St Kilda

4. Ukraine 708 (0.9%) East St Kilda
 5. Russia 696 (0.9%) East St Kilda
 6. Indonesia 598 (0.8%) St Kilda Road
 7. Italy 590 (0.8%) Port Melbourne
 8. Germany 581 (0.7%) St Kilda
 9. India 557 (0.7%) East St Kilda
 10. Malaysia 458 (0.6%) (Not stated)
- (City of Port Philip: Multicultural Strategic Framework 2006)

5.23 Obstacles to Resident Engagement

The resident engagement rate was more than adequate, with the households serviced exceeding the original service recipient target rate.

Key Findings

The two key difficulties that were found to be a limiting factor, regarding capacity to engage resident were:

- Misunderstanding and confusion among residents, differentiating between the CarbonCut Program, the Department of Housing (DHS) and other service providers;
- Limited capacity to engage with non-English speaking residents.

In several cases, the confusion differentiating CarbonCut was not always able to be clarified - as is evident in the requests/comments made on the feedback surveys. A number of residents' had been visited recently by other service providers, commonly for light globe exchange. Observation found that these globes were not always of a high quality and a number of residents indicated that the globes *'our team had installed had broken and already needed replacing.'* Confusion is not surprising, due to the fact that public housing tenants are accustomed to sourcing assistance from DHS, recent increase in media regarding similar local programs and increasing number of house calls undertaken by other service providers. The consequence of the confusion was that residents would either:

- a) Over-assume the programs' capabilities and were subsequently disappointed when we could not deliver and;
- b) Request the team to amend or follow-up other incomplete works

Being able to clarify this confusion was more difficult with non-English speaking residents. Translated material and conversation with a translator was made available, however resources were still not sufficient in some cases. This was particularly evident in employee survey feedback that indicated the teams' frustration associated with explanations and achieving behaviour change strategies with non-English residents (refer 5.24 Employment). Staff also observed some frustration from residents when trying to understand some explanations. Future programs will require an increase in resources in the area of translations.

Mitigating Actions

The following actions have been identified to assist in better delivery of Community Outcomes:

- Revision of service recipient survey, to include confidentiality clause and possibly more demographic details such as age, country of birth, number of children, employment status, source of income;
- Increase language resources, such as increase number of translators;
- Continue ongoing liaison with community workers and local stakeholders, to assess if CarbonCut is best meeting the needs of their clientele and assisting them in their work;
- Ensure resident understand the function of each device and ensure that a demonstration is given on equipment installed. Eg. Type and brightness of light, flow rate and shower settings etc;
- Revision of booking schedule, ensuring sufficient time is delegated to each appointment to prevent the scenario of recipients and team waiting in between appointment;
- Ensure service recipient satisfaction before leaving premises to prevent return visits to unsatisfied recipients;
- Establish clarity with resident as to what CarbonCut is about and able to deliver

5.24 Employment

Introduction

The key indicators used for assessment of quality of employment opportunities provided are:

- Provision of on-going or long term employment;
- Adequate training to equip employees with necessary skills to complete tasks successfully;
- Exposure to complimentary training opportunities;
- Chance to utilise existing skills whilst developing new and useful ones;
- Assist in development of career pathways;
- Enjoyable and supported team environment, conducive to fulfilling work requirements;
- Opportunity to engage with members of the public and partake in what employees consider to be meaningful work.

The effectiveness in delivering outcomes will be based on a discussion of analysis of the employee surveys and staff observations noted during retrofitter training workshop and the work days. 'Mitigating actions' discuss the options to address issues.

Each Retrofitter was expected to equally share responsibility in:

- Undertaking residential retrofits: installation of devices, completion of retrofit record sheet, explanation and demonstrations to service recipients;
- Organisation of materials and equipment at the start and end of each work day including packing and unpacking the work vehicle at the start and end of each work day;

- Assist staff in monitoring equipment stock levels

Key Findings and Mitigating Actions

Staff Observations

Staff made the following key observations during the process of applicant recruit, training and program delivery:

- a) Decision-making of the final retrofitter team took longer than anticipated, following the retrofitter training workshop
- b) Employee recruitment advertising did not detail the retrofitter position description adequately. Requires inclusion of a key selection criteria
- c) Options to hasten the interview process should be considered in future. Interviews took several weeks, significant time invested for a short term program
- d) Increased time required for communications and customer service training. This would better equip employees to deal with customer enquires and challenging situations. Feedback from one applicant indicated inadequate warning was provided for the 'role play' component during the training workshop – (feedback of this nature assists in ascertaining who is appropriate for this particular position)
- e) Increased time required for handy work training to ensure employees are completely confident with the installation of devices prior to program commencement. The extra day of training and 'on-the-job' method of learning proved insufficient
- f) Review lecture material covered during training workshop. Feedback indicated some applicants found general information unnecessary
- g) Effort was made to designate at least one position specifically for an Indigenous person. Pathways to achieve this in future programs requires investigation
- h) Develop means to provide longer term employment, training opportunities and maintain engagement with employees, independent of funding outcomes
- i) Extend length, detail and assess viability of providing accredited training. Eg. Incomplete data collection demonstrates the need for more clear instruction as how to complete retrofit record sheets. Applicants require more background information on the program so as they are better equipped when communicating with the public

Analysis of Employee Surveys – By Leo Hong

In order to assess the project from the perspective of the trainee retrofitters and their gains or losses through the employment experience, three surveys were conducted. The aims were to investigate:

- how the retrofitters benefited from the employment opportunity;
- how effectively the EcoCentre organized the program delivery;
- how effectively expectations were fulfilled;
- what can be improved

Survey 1 conducted at the beginning of the project, focused on what the employee's initial expectations were

Survey 2 conducted mid-way through the project, focused on what the employee's had discovered through the progression of the project, the reality of the working conditions and whether reality aligns with their expectations

Survey 3 conducted at the end of the project and focused on what the employees had felt they gained and whether it aligns with their career pathways

Survey 1

In the beginning of CarbonCut, all retrofitters expected some kind of career opportunity and / or career development and were all interested in environmental and community related work. The training provided met expectations and interest was indicated in undertaking further training. This shows that one experience can motivate a person to take further action and that behavior change can result simply from an increase of awareness. Most retrofitters already had a good understanding of climate change, carbon reduction issues and energy-efficiency techniques. This had been facilitated through secondary and tertiary education and promotion in media. Recruitment through bulletin boards at education facilities proved an effective means of attracting applicants. Three quarters of participants were found to have a previous interest in retrofitting and auditing and CarbonCut provided the opportunity to experience this in the workplace.

Key Findings

- The CarbonCut training was valuable to all of the participants;
- All participants agreed that the training was excellent;
- All participants showed positive interest in taking further training and $\frac{3}{4}$ answered as very likely and definitely;
- All participants had a positive sense of improved wellbeing through this project;
- All participants strongly believe that CarbonCut can make a difference in the community;
- Half knew about similar program such as at Jika Jika Community Centre and the Moreland Zero Carbon Program;
- Three quarters answered that the training changed their perception and one quarter already had similar ideas and the training helped them build on previous knowledge

Survey 2

As the retrofitters undertook their work, they have developed their interest in energy efficiency and community work within the context of their future careers. The training and experience helped them to identify career pathways and build more confidence to pursue them. This confidence is based on developing not only technical skills but also social and communication skills. Half of the retrofitters indicated a positive change in their everyday behavior and a good working environment. However, surveys did highlight the logistical issues regarding transport and the need to cater more time to each appointment.

At least half or more retrofitters indicated improved general confidence, self esteem, communication skills, conflict resolution and negotiation skills. This is fairly good, but still more emphasis on conflict resolution and negotiation skills is required. In terms of operating CarbonCut, the survey results show that staff have done just enough as far as catering for a team of four. Feedback suggests that when the program and team grows, more thorough planning, scheduling and organisation will be required. Also, having more flexibility to cater for unexpected situations such as households requiring longer appointments.

Key Findings

- Half indicated that the work was not helpful in developing methods for conflict resolution;
- Half indicated that they were passing information onto friends and family;
- One quarter was impartial to future employment in retrofitting, energy reduction or behavioural change programs (though interested in all types of environmental work). This indicates that interest was maintained by three quarters of the employees;
- Half indicated lack of organisation in early stages of program in regards to transport, equipment and tools. Eg. Having to wait around in between appointments. Improvement was noted, but further improvement could be obtained;
- All indicated that CarbonCut has helped them identify possible career pathways;
- All indicated to have gained skills that can be used in future work places. Skills identified were:

Technical: auditing, retrofitting & handy work, changing light globes & shower head, drill use, draft proofing, stock taking

Social: increased ability for teamwork, behavioural change strategies for use with public, working with people from different backgrounds, servicing solitary and non-English speaking people, enhanced communication skills, greater understanding of different social groups (age, culture, income)

- All indicated that sufficient time was allocated to training;
- All indicated that the EcoCentre has provided sufficient OH&S training and considerations in the program.

Survey 3

These third surveys provided the most comprehensive feedback. All retrofitters indicated the skills required to be a CarbonCut leader are: **organisational, interpersonal, communication, handyman skills, good knowledge in sustainability issues and project planning**. Other general skills stated as being important were: **budgeting, problem solving, better understanding of the low-income demographic, ability to facilitate action against climate change and listening, with all retrofitters agreeing that the program provided opportunity to develop these skills further**. All retrofitters consider themselves to be competent future leaders for this program and all indicated interest in future CarbonCut programs, with one noting them selves as an asset to the program.

One employee indicated the benefits in witnessing how staff conducted themselves with residents and the ability to relate to staff based on the fact that they were previously retrofitters. All indicated that they endeavour to remain in a similar field of work five years from now.

Key Findings

Applicants indicated positive aspects of the program to be: **satisfaction helping people; democratic, engaging and friendly work environment; enjoyable, opportunity to utilise skills and being employed locally.** Expectations of the employment included: **nervousness regarding handyman work - but overcome through encouragement, working in the field that compliments studies and a chance to work at a grassroots level.** The biggest motivations during the project were found to be: **meeting new people and providing service, knowledge of helping people to save energy and money and making direct positive impacts.** Expectations were generally met, such as working at a community level, but shortfalls occurred regarding delivering service; for example not fulfilling expectation and not always being able to perform complete retrofits on households.

Team members indicated the negative aspects to be:

- Too many households scheduled per day. Inability to provide quality service; insufficient time designated for each households;
- Difficulty overcoming language barriers and not being able to build on the behavioural change component;
- Inefficiency in logistics of transport. Idle time spent waiting for pickups & extra equipment;
- Time dominated by conversation with resident that was unrelated to the project;
- Equipment purchase could have been more substantial so it did not cause limitations and more organised prior to the appointment;
- Partial retrofits were not efficient in terms of labour and environmental outcomes;
- Organisational issues; not enough time with clients to communicate behaviour change techniques. Inefficient use of time.

Suggestions to improve the program included:

- Russian language training
- Provision of more information to households, regarding what the program is trying to achieve. 'Eighty percent just appeared to want free items'
- More training in people skills
- Expand target community
- Have one vehicle per pair
- Plan to work on one housing estate at a time so that it can be more focused and efficient
- In terms of behavioural change, have some retrofitters from Russian community or train Russian translator to be a retrofitter.
- Putting more focus on delivering information, 80% of visits were just about the retrofitting itself

- Book schedule within the limits of the team. Though there is difficulty not knowing the size and detail which the job requires, a pre-scope of the premises may mitigate such problems. The team found it difficult to work under pressure and found that having to rush reduces work quality
- Need to have realistic schedule to be able to achieve. Detailed work list for each household is needed to estimate time
- Increasing capacity to perform other works, Eg installing curtains, external shading
- Scope for energy audit or appliance metering, targeting the biggest users



5.25 Capacity Building

Introduction

Community capacity building is a key feature of all PPEC's programs and likewise is a vital aspect of CarbonCut. Measurable indicators have been identified as:

- Providing local based employment and training opportunities;
- Sourcing equipment and stock from local business;
- Identifying and providing opportunities for skill and knowledge exchange between residents and members of the community;
- Identifying, providing training and support for community ambassadors to take on roles of leadership and mentoring for fellow residents;
- Identifying opportunities for residents to establish networks of support;
- Satisfaction of stakeholders and partners and willingness to continue and develop relations;
- Assisting partners in delivering their services

Verbal appreciation was expressed by stakeholders, though this was rarely documented. What was, documented was feedback from a key local stakeholder:

“Thank you for the retrofitting work you did at Crawford, and also the care and the understanding of the residents shown by yourselves and your employees.”

Key Findings and Mitigating Actions

Advertising for the employment positions was primarily through education providers. Although the degree of advertising was minimal, a significant number of applicants applied for the position from across Melbourne. When selecting team members, their location of residence was taken into

consideration, but not the deciding factor. Employees lived in Elwood, Coburg, Northcote, Lysterfield, Port Melbourne, South Melbourne, Beaumaris and Frankston. A transferable project model, delivered elsewhere will focus on recruiting employees locally.

Service recipient recruitment fliers located in community hubs and communal areas of public housing estates, were found to be one of the best methods to recruit households. This was indicated in the resident feedback surveys where they were asked how they heard about the program. This shows that community notice boards are an effective method to engage people in the local area. The two workshops that were conducted (doubled as a sign-up opportunity for residents) were also found to be a potential opportunity for residents to begin sharing ideas.

Part of the local Russian community that now has a strong relationship with the program (some recipients were involved in the 2008 Pilot), have participated in two other community events (including Earth Hour at the Tower,) which provided networking and knowledge-share opportunities. The strong network that exists within the local Russian community may not be as strong among the English speaking participants. However feedback surveys did indicate a significant number of residents heard about the program through a friend or neighbour and many residents communicate closely with local social workers and support agencies. Both Anna and George (Russian and Greek translators) are examples of strong community ambassadors and resources will be directed in supporting more ambassadors in future programs.

Local business was used to provide equipment and stock where possible and resources will be directed into ensuring the capacity for this is increased in future programs. The measurable satisfaction with partnerships was expressed through verbal feedback and stakeholders' willingness to provide Letters of Support for future funding submissions.

Longer term options being investigated include the PPEC becoming a Registered Training Provider.

Table 13: Current Stakeholders

NB. No survey to attain stakeholder feedback was undertaken. However, verbal feedback indicated positive stakeholder experience

Stakeholder	Involvement	Benefit of Involvement
SouthPort Uniting & Church	Provided service recipient contacts and valuable feedback	SouthPort Uniting Care – supports their members & assists in their care & support programs. Also provides a social opportunity for elderly / isolated member residents.
Port Phillip Community Group (PPCG)	Organized the Earth Hour event which was the launching pad for conducting residential workshops & recipient recruit	CarbonCut assisted with the 2009 Earth Hour at the Tower Event. Recruitment fliers were also posted within PPCG hubs. Involvement designed to increase comfort in the home, provide a social opportunity for members and connect
St Kilda Community Housing, St Kilda Community Centre & Southport Community Housing Group	Provided service recipient contacts and valuable feedback	Posted recruitment fliers within hubs and liaised with staff. Involvement designed to increase comfort in the home, provide a social opportunity for members and make long-lasting connections
Park Towers Housing Association	Launching pad for 2009 retrofits and workshops	Provided service for Park Tower residents, employment for one resident, social opportunities for some residents (Russian Choir)
City of Port Phillip – local council	Provided financial support for Pilot, media, information & technical support	CarbonCut assists council to implement aspects of their carbon reduction initiatives and promote strong community messages
South East Water	Supplied showerheads, and in-kind contribution of fixaflush and shower timers. SEW Staff provide ongoing support & technical advice	CarbonCut assists in delivering their showerhead exchange program and distribution of other devices
Local Suppliers	Earls Hardware Keeler Hardware	CarbonCut supports local business by using where possible
Port Phillip EcoCentre	Provides staff, meeting venue, equipment and tools, administration resources and access to local networks	CarbonCut assists PPEC achieving its aim to work with the community to improve and protect biodiversity and the natural environment and build capacity among local communities

5.3 Economic Outcomes

Introduction

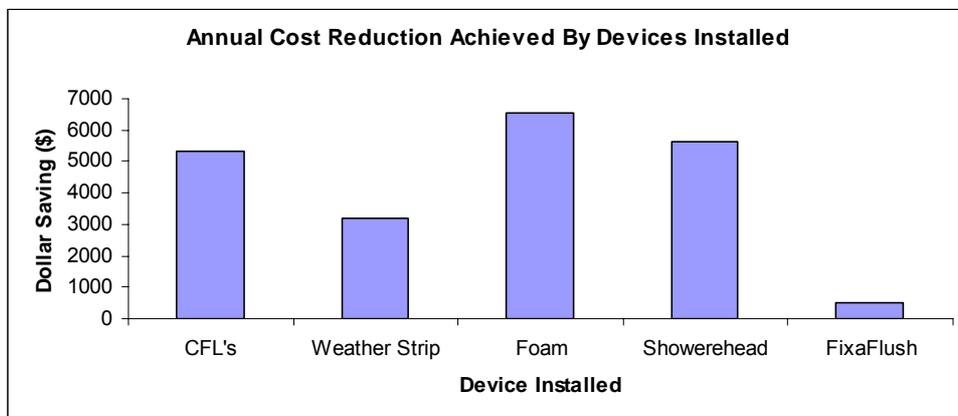
The anticipated key Economic Benefit of CarbonCut was a reduction in residents' energy and water bills achieved through a cost-effective project delivery model. This report has also assessed other relevant Economic Outcomes including:

- **Logistics**
- **Purchasing**
- **Waste**
- **Time Management**

The dollar value of just the devices used in a complete CarbonCut retrofit equates to \$177.60 per household, however in cases of incomplete retrofits the real dollar value averaged \$153 per household. The dollar value of cost of delivery for a complete CarbonCut Retrofit was approximately \$348 per household, including materials, labour, managerial costs, logistics and general administration overheads.

Key Findings

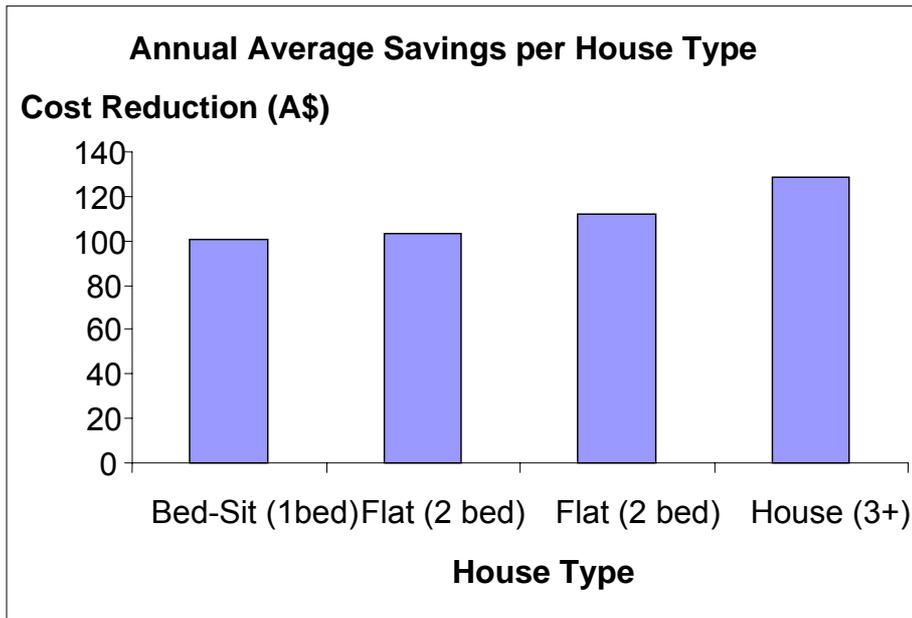
The average annual savings for each household, achieved through installation of energy-saving devices is \$105. Graph 15 shows the variation of annual savings achieved for the resident, from installation of each device. Foam installation contributed the largest monetary savings and fixaflush the least. These figures are dependant on the number of each device installed.



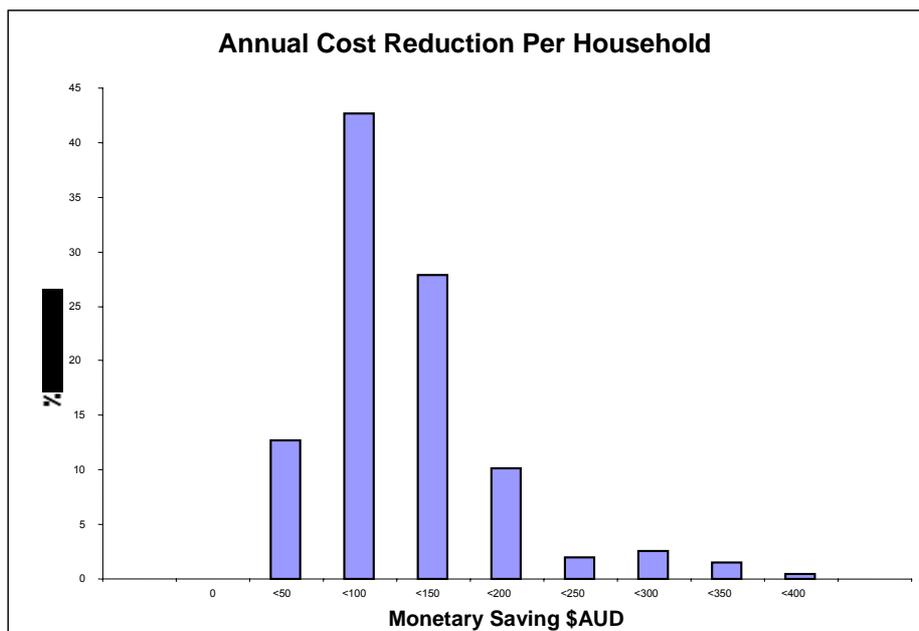
Graph 15: Relative Savings Achieved through Each Device

Houses showed a considerably larger saving in comparison to a bedsit or flat (Refer to Graph 16). This directly relates to the number of residents within the household, the size of the dwelling and a higher number of retrofit items installed.

Annual savings show considerable variation across different housing types and ranged from \$10 to \$386 per household, with the average approximately \$105. It was estimated that 42% of households saved less than \$100 dollars, 26% saved less than \$150 and 4% achieved savings over \$300 / pa (Refer to Graph 17).



Graph 16: Annual Average Savings Relative to Each Housing Type



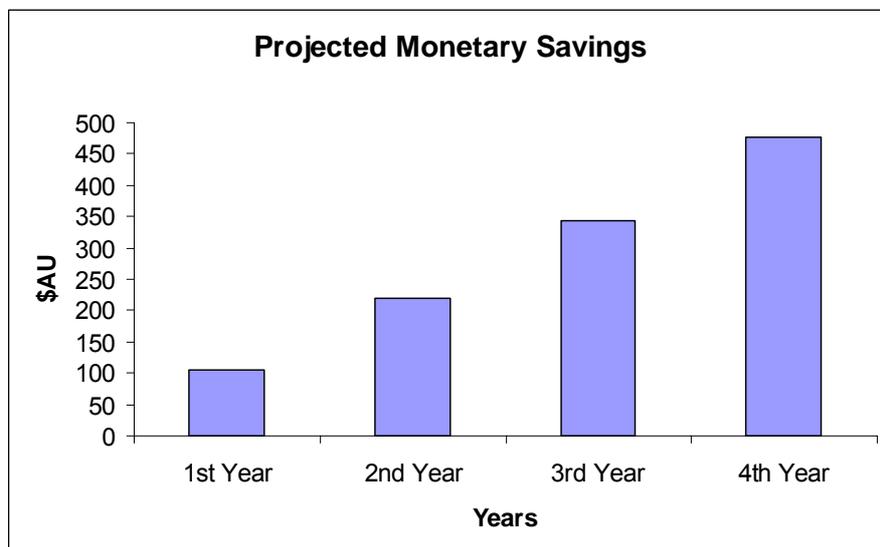
Graph 17: Percentage of Households Relative to Monetary Savings

The variable (in some cases low) annual savings for each household was due to the following factors:

- households generally have less energy-consuming appliances, Eg Computers - meaning that this demographic does not consume a significant amount of energy in the first place means there is less scope to achieve considerable financial savings;
- Many households serviced were one bedroom bedsits which sometimes limited how many energy saving devices were able to be installed. Incomplete retrofits occurred in a number of households, reducing the overall average savings;

- Calculations are based on the precautionary principle. This principal was also applied to estimating hours of usage (Eg. for globes and length of shower);
- Calculations do not cater for an increase in number of residents per household. Extra residents (Eg. family and friends over holiday periods) have not been catered for.

Projection of household savings, were calculated up to the year 2013. Assuming a total rise in electricity costs of 27% by the third year, it has been calculated that savings would increase to \$343 over this period (ESAA 2009). This projected figure is based on the savings achieved through the installation of energy-saving devices (\$105) and does not take into consideration the total cost of service delivery (\$348). A discount rate of 7% has been applied to the data (Reserve Bank of Australia 2009 Accessed Sept 2009) (Refer to Graph 16). Return of investment of \$348, will be achieved in approximately two years. In the case of projected savings, labour and material costs being taken into consideration, the annual savings for residents would be even greater. The cost of energy and water has been predicted to double by 2015, due to the implementation of the Carbon Pollution Reduction Scheme (CPRS 2009 Accessed Sept 2009) and through anticipated temperature rise as a result of climate change (ESAA 2009 Accessed Sept 2009). These predictions highlight the importance and relevance of home retrofitting programs.



Graph 18: Projected Savings - Years One to Four

Mitigating Actions

The following actions were identified to assist in increasing economic efficiency and possible monetary savings for the resident:

- Revision of timeline and delivery of outputs allowing for pre-planning and walk through audits prior to appointments;
- Development of 'typical requirement' profile model indicating trends in energy consumption and retrofit requirements. For example, particular estates require specific globes and fittings. Prior knowledge allows for more complete retrofits to occur and with more efficiency;
- Investigate the potential to extend the scope of retrofit and include more devices and techniques, such as installation of Clear Comfort (window insulation);

- Overcome language barriers, allowing for better explanation of devices to non-English speakers;
- Ensure all necessary data is consistently collected across households, thereby minimising the need to make assumptions.

5.31 Logistics

Key Findings

Over nine weeks of the program spent retrofitting, it took 17 days to service households. The total kilometres travelled were 974km, including all retrofit appointments and equipment purchasing. This equated to an average of 4.96km travelled, per resident. The two inefficiencies in logistics planning were found to be:

- a) Methods of Purchasing (see Section 5.32 Purchasing) and;
- b) Secondary visits to some service recipients to rectify issues.

Mitigating Actions

The following actions were taken to achieve better logistical efficiency:

- Ensure all devices have been thoroughly demonstrated, understood and accepted by each resident, prior to leaving the residence;
- Amendment to Retrofit Record Sheet to include and require a signature upon departure:

I _____, consent for the CarbonCut crew members to install a water saving shower head in my shower and are aware that they are not accredited plumbers. I understand that this is a single visit and I am happy with this service.
- Booking of the retrofit appointment schedule using more efficient geographic considerations. This was often achieved, by spending a whole day retrofitting within one community housing estate. This will become increasingly important when service extends beyond the CoPP;
- Purchase of transport vehicle by staff to reduce vehicle hire / transportation costs;
- Better planning and bulk purchasing of equipment to reduce travel required for purchasing

5.32 Purchasing

Key Findings

The total value of materials and equipment purchased for the 2009 project was \$6488, including light globes, draft excluders, foam seal and tools. CarbonCut was fortunate to receive significant in-kind donation of some equipment and materials. Bulk purchasing options and product research was undertaken throughout the program to assess the variation in product performance and establish relationships with local product suppliers.

Bulk purchase was found to be problematic due to:

- Insufficient time designated to research and decision-making prior to program commencement;
- Trends in resident's preferences proved unpredictable. Time could have been designated to establishing specific requirements over the phone or by walk-through audit;
- Language barrier inhibiting requirements to be established over the phone and difficulty establishing preferences during the retrofit itself;
- Lack of storage space for materials during the initial stages of project;
- Budget not catering for over-purchasing of stock (with no assurance of project continuation, excess stock could be wasted);
- Insufficient time designated to establishing supplier partnerships with assured possibility of stock exchange where necessary;
- Staff time in between appointments spent purchasing materials, which at times disrupted the retrofit booking schedule, consumed unnecessary kilometres and caused delays in team transportation in between appointments;
- Inadequate time designated to identify trends in particular housing estates. Though this was discussed in an informal manner, no 'Common Models' were constructed for reference.

Mitigating Actions

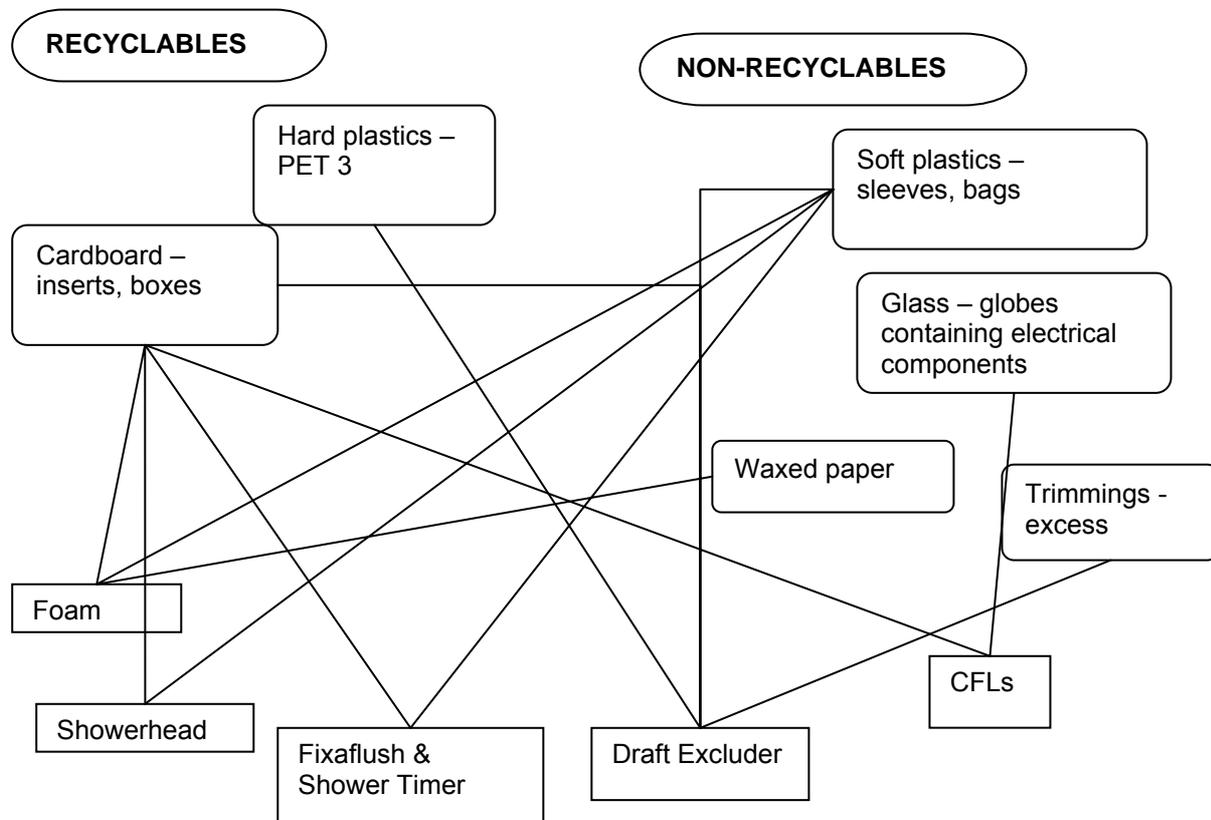
- Investigate purchasing based on research and calculating specific requirements and utilise 'typical requirement' models for specific housing estates;
- Two bulk purchases were made (globes and draft excluders). The volume and type of the former was insufficient and further purchasing and stock exchange was required. The latter was well-planned and sufficient but resulted in excess stock at the projects' end due to the late stage of purchase;
- Continue establishing relationships with direct suppliers, allowing for bulk purchases packaging waste reduction;
- Translation of more project documents to assist the team in explanation to non-English speaking residents' during the retrofit. It was found that not all residents would read the material during the retrofit.

5.33 Waste

Key Findings

The majority of recyclable waste was fed into the PPEC recycle bins at the end of each retrofitting day. Some waste was discarded into waste bins at community housing estates during the course of the day if room was becoming limited in the transport vehicle. All attempts were made to ensure that recyclables were placed in recycling bins, though this was not always the case.

Flow Chart 1: SOURCES OF WASTE - Indicates recyclable and non-recyclable waste generated from each device



Mitigating Actions

Through the course of the program, efforts were made to reduce waste disposal into landfill by purchasing materials with minimal packing. Actions taken to reduce packaging included:

- CFL's – (where possible) were purchased in boxes of higher quantities (packs of 6). Due to the fragility of the product, it is impossible to significantly reduce the packaging;
- Draft Excluders - bulk purchase of trade packs (x 10) through a local supplier, which significantly reduced wastage;
- Foam – Staff researched and negotiated with suppliers, the viability of purchasing bulk foam on reels to reduce the unnecessary packaging. Due to the late stage in the project, the purchase was not made - though the relationship is now established for use in future programs;
- Initial investigation into recycling facilities for both incandescent globes and CFLs, found that some facilities do exist in Victoria however at the time of research depots were located a significant distance away. Further research indicated that a local facility may be coming into operation within the CoPP.

5.34 Time Management: Travel

Key Findings

The average retrofitting day was 8 hours, over a total 17 days, equating to 136 hours spent retrofitting. This equals to an average of 1.5 hours spent per household, including a) physical installation of devices, b) explanation and demonstration to resident, c) completing two copies of retrofit running sheet, d) packing / unpacking of equipment and e) travel. The retrofit schedule was designed with the aim of maximising efficiency of logistics however this was not always successfully achieved. The following inefficiencies were noted:

- Insufficient time catered for traffic conditions;
- Extra time required in some households;
- Ordering of retrofit booking schedule, usually booked in an attempt to cater to individual resident's availability;
- Undertaking secondary visits to rectify issues, upon the request of some residents.

Mitigating Actions

During the initial stages of the program specific appointment times were made with households. Lateness caused disruption and complaint from some residents. Through the course of the retrofitting weeks, booking methods were amended to designate larger timeframes or simply booking morning or afternoon appointments. This flexibility proved crucial.

6 EXPLANATORY NOTES

6.1 BACKGROUND

The Port Phillip EcoCentre (PPEC) is committed to nurturing local-based environmental and socially sustainable projects; building pathways and fostering mutually beneficial relations; encouraging cross-level participation; responsibility-sharing and community engagement. In 2008, the PPEC in conjunction with the City of Port Phillip (CoPP), SouthPort Uniting Care and local affiliate groups developed the CarbonCut Pilot Project. Founded on the principals of community capacity-building to achieve progress on environmental initiatives and sustained behaviour change. The success of the trial pilot led to the development of CarbonCut2, funded under the Victorian Environmental Protection Authority's (EPA) Inspiring Environmental Solutions grant scheme. The EcoCentre's ten years experience working at a grassroots level to facilitate and support projects, includes two years establishing pathways and developing the CarbonCut program model. During early-mid 2008 extensive research was undertaken, exploring the currently retrofit programs operating across Australia and internationally. The initial model was developed and based on the CYES – California Youth Energy Services program, who have serviced over 5000 residents since the year 2000. This process of research and project development at a grassroots level, places the PPEC in a strong foothold for future delivery of the program and to provide leadership to other organisations. The CarbonCut team acknowledges the contributions of many individuals and groups who have assisted in the completion of a successful CarbonCut2.

6.2 Project Parameters

Table 14: Over-Arching Project Parameters Considered in Calculations

ITEM	PARAMETER	FACTOR / CONSIDERATION
Patterns of Usage (Device / Appliance)	Subject to seasonal variation. Affects hours of use of heating, cooling, lighting etc Seasonal averages were established regarding usage	CarbonCut pilot project: summer 2008 CarbonCut2 : winter 2009 (June, July & Sept)
Program Reach	Housing Types: Codes:	Most recipients reside in public housing estates, few houses <ul style="list-style-type: none"> • House/Town House – standard 3-bedroom house • Unit – free standing • Flat – multi-story • Bedsit – single room & bath. Assisted living
	Service Recipients: Codes:	Pilot Project funding required servicing residents in the CoPP. CarbonCut2 funding allowed for service outside this area. However efficiency of logistics and utilisation of existing local networks, resulted in service of only CoPP households <ul style="list-style-type: none"> • Single-parent Pension • Aged Pension • Unemployment Pension

	(separated into language groups where translated material required)	<ul style="list-style-type: none"> • Disability Pension • Low Income Health Care Card • Carer Pension • Student Concession • Disability Pension • Widows Pension
Employment	Retrofitter Trainees:	Recruitment considerations: <ul style="list-style-type: none"> ▪ potential longer-term commitment to program ▪ previous work experience & training ▪ enhancing career ▪ communication skills & initiative
Devices	Various brands were trialled, with purchase aims prioritised by the hierarchy of:	<ul style="list-style-type: none"> ▪ highest quality ▪ minimal waste ▪ most affordable ▪ patronage to local suppliers

6.3 Glossary

Table 15 Glossary

TERM	CARBONCUT DEFINITION
Behavior Change	<p>Transforming unsustainable patterns of behavior to sustainable patterns. In the case of CarbonCut, this is targeted residential energy and water use. Best delivered through education and inclusive, self-sustaining techniques which build community capacity.</p> <p>Effective behaviour change must be:</p> <p>Achievable, Maintainable, Mainstreamed, Innovative, Long-term</p>
Carbon Credits & Carbon Certificates	One carbon credit is equal to one tonne of carbon. Credits and certificates have been created to trade as part of an International Emissions Trading Scheme, aimed at quelling levels of atmospheric GHGs. GHG emissions are capped and then the economic market allocates the emissions among a group of regulated sources
Carbon Neutrality	Actions that reduce GHG emissions equal carbon credits; actions that contribute GHG emissions equal carbon debits. Credits may be deducted from debits. When the total debits balance against credits and equals zero, an organization can be considered carbon neutral
CarbonCut Pilot Project	In 2008, twenty households in the CoPP were retrofitted as part the CarbonCut program trial. Funding from the City of Port Phillip Council
CarbonCut Retrofit Service / Retrofitting	Installation of energy-saving devices and simple modifications within a building or home; with the aim of reducing energy and water usage. Coupled with behaviour change methods, retrofitting can act as effective way to reduce carbon emissions over the long-term and save on energy and water bills
CarbonCut Team 2009	Refer Appendix 2
Category of Energy User	Categories of individuals, businesses or industry into those who consume a 'high level' of energy, 'medium level' or 'low level' of energy
Climate Change	A regional change in temperature and weather patterns. Current science indicates a discernible link between climate change over the last century and human activity. Specifically in relation to the burning of fossil fuels (Natural Resources Defence Council. Accessed Oct 2009)
Draft-Proofing	Includes installation of aluminum draft 'stopper' / 'excluder', drilled onto bottom of door and foam seal adhered around door and window frames to seal gaps
Energy Efficient Technologies / Energy	The technological industry is producing many new energy and water saving devices. For devices used in CarbonCut retrofit

Saving Devices	
Energy Saving Techniques	Residents are encouraged to adopt energy-saving techniques, such as switching off appliances on stand-by mode, isolate room to cool, ensure sufficient window and floor coverings etc
Environmental Protection Authority (EPA)	Government agency aimed at the protection, care and improvement of the environment. (The Victorian EPA. Accessed Sept 2009)
Greenhouse Abatement	Reducing the quantity GHG emissions released into atmosphere. Abatement actions can be either preventative; avoiding the initial release of greenhouse emissions or assistive; removing emissions already in the atmosphere
National Greenhouse Account Factors (NGA)	Prepared by the Department of Climate Change, indicating typical value of GHG emissions for each kilowatt of energy generated. Converts kilowatts to GHG emissions for that can be used for calculations
Port Phillip EcoCentre (PPEC)	Non-profit community managed environment group, providing a base for a number of affiliate groups involved in a range of activities that promote biodiversity and community action. Located in St Kilda, the PPEC has a long history of involvement in local environmental issues and a good deal of technical expertise and history of effective project delivery
Port Phillip EcoCentre Coordinator	Mr Neil Blake
Power Factor	The power factor is the relationship between the active power and the apparent power and is a measure of how effectively electrical power is being used in a system. Expressed as a number between 0 and 1 (frequently expressed as a percentage, e.g. 0.5 pf = 50% pf). CFLs have do not account for power factor in labeling (Sustainable Energy Authority Victoria. Accessed Oct 2009)
Retrofit Record Sheet	Record sheet used to collect data and information from each retrofit. One sheet per household, with two copies - one for resident to keep and one for CarbonCut records
Service Recipients	Recipients of the CarbonCut service were all residents residing in the CoPP and fall into the low-income bracket
'Typical Requirement' Profile Model	It became relevant that establishing a 'common model or type' for major/frequented housing estates would be important for future projects. A common model would be developed from research conducted prior to the retrofit to ascertain the common requirements for residents within estates
Utility expenditure / consumption	Residential utility consumption, includes electricity, water and gas (solar where applicable)

APPENDICES

APPENDIX 1

Table 16: 2009 Project Timeline

Date	Action	Participants
Jan	EPA grant application process	Neil Blake, Lisa Siciliano & Jill Robinson
Feb	Grant application delivered & funding successfully obtained	Neil Blake & Lisa Siciliano
Mar - Apr	Project consolidation. Service recipient recruitment begins. Greek translations of material	Lisa Siciliano, Jill Robinson, George Phaedonis & project stakeholders
16th Mar	Advertisement of trainee retrofitter position (First response 24 th Mar)	Lisa Siciliano, Jill Robinson & relevant stakeholders

28th Mar	First service recipient sign-up session at Earth Hour, Port Melbourne	Neil Blake, Lisa Siciliano, Jill Robinson & Anna Rogalina
6th May	Preliminary evaluation meeting at EcoCentre	Jim Stockton (MMA), Kate Brook (MMA) Lisa Siciliano, Jill Robinson & Joel Meadows (Greenhand)
5th - 6th May	Retrofit Training Workshop – Greenhand Institute	All applicants, Joel Meadows, Kevin Summers & Jill Robinson
11th May	Trainee Retrofitters hired	Andy Ryan, Nick Bishop, Kate Carpenter & Neel Bivalkan
22nd May	First round of employee questionnaires conducted	Leo Hong
29th May Week 1	Retrofitting schedule begins	CarbonCut Team 8 residents serviced (x1 day)
3rd - 5th Jun Week 2	Reach service recipient quota – recruitment ends, appointment schedule full Showerheads added to retrofit Toolkit complete Russian translations	24 residents serviced Anna Rogalina
17th - 19th Jun Week 4	Fixaflush and shower timer added to retrofit Bulk purchase made – CFLs Evaluation Strategic Planning Meeting	SEW Middendorp Jim Stockton, Kate Brook, Neil Blake, Leo Hong & Jill Robinson 34 residents serviced
23rd - 24th Jun Week 5	Bulk purchase – draft excluders Russian translations Retrofit Record sheet altered for CFLs	Keeler Hardware Anna Rogalina & Lisa Siciliano 22 residents serviced
30th Jun	Advanced Energy Auditing Workshop – Greenhand Institute	Joel Meadows, Lisa Siciliano, Jill Robinson, Wendy Van Dort (PPEC), Alicia Hooper (CoPP) & Dale Cummings
1st - 3rd Jul Week 6	Evaluation meeting Revise Retrofit Record Sheet Second round of employee questionnaires	Kate Brook & Jill Robinson 33 residents serviced Leo Hong
6th Jul Week 7	Running sheet amended	19 residents serviced
13th - 14th Jul Week 8	Media compilation – photos, interviews & information End retrofitting	Tessa Tombourou & CarbonCut Team 22 residents serviced
15th Jul	CarbonCut Snapshot Report completed and distributed	Jill Robinson, Neil Blake & Caroline Packham (PPEC)
17th Jul	Third round of employee questionnaires	Leo Hong
20th Jul	Evaluation begins	
3rd Aug	Evaluation meeting at MMA Office	Lisa Siciliano, Jill Robinson, Jim Stockton, Rachael Connor (MMA) & Kate Brook
5th Aug	CarbonCut media uploaded on EcoCentre website	Dave Giles (PPEC) & Jill Robinson

7th Aug	Budget revision complete	Jill Robinson
8th Aug	Russian survey translation complete & service recipient survey delivery begins	Anna Rogalina, Lisa Siciliano & Jill Robinson
28th Aug	Majority surveys returned	
3rd – 4th Sept Week 9	Waiting list is retrofitted	CarbonCut Team 24 residents serviced
Nov	Evaluation complete	CarbonCut Team, Neil Blake, Leo Hong, MMA Staff

APPENDIX 2

Table 17: 2009 Project Team

Position	Name	Key Accountabilities and Responsibilities
Project Manager & PPEC Coordinator	Neil Blake	Oversees all aspects of program roll out. Mentoring of coordinators. Document editing, direction & support
Project Coordinator	Lisa Siciliano Jill Robinson	The coordinators fill virtually the same role: co-writing funding applications, refining project roll-out, assistance in recruitment and training, supervising household visits and mentoring trainees physically performing the retrofits where required
Retrofit Trainees / Team	Nick Bishop, Neel Bivalkan, Kate Carpenter & Andy Ryan	Work in pairs undertaking retrofits, share responsibility of equipment organization. Participation in delivery of residential workshops. Employed for 9 weeks (not including training)
Co-Coordinator Mentor	Michelle Yang – CarbonCut Pilot Project Coordinator	Completion of Pilot evaluation, assistance in recruitment of more team members and training, mentoring of coordinators in initial stages of CarbonCut2
Administration Officer	(shared role)	Part-time, undertakes administrative tasks including liaison with stakeholders, suppliers & participants, booking of retrofit appointments, data entry
Translators - sessional	George Phaedonis Anna Rogalina	The Pilot found Russian and Greek to be the main non-English languages in the local area. Training & employment provided to translators during the program. Aims to skill more people to be CarbonCut ambassadors in their community
Energy Audit Trainer	Joel Meadows of The Greenhand Institute	Provided training of team including overview of climate change, building design, energy auditing techniques, green job & training opportunities
Communications Trainer	Kevin Summers – local actor and motivational speaker	Provided effective and personable communication skill session. Communications seen as crucial component to training
Project Support	Leo Hong	Work placement student, providing extensive project support, beyond the life of placement. Designed, developed and undertook employee surveys. Analysis of results. Forming a crucial component of evaluation report

APPENDIX 3

Table 18: Data Sources and Methods of Collection

Qualitative Data	Method of Collection	Quantitative Data	Method of Collection
Service recipient surveys – English & Russian	Distributed & collected via: <ul style="list-style-type: none"> - Door knocking & assisting with completion, or direct hand-over during retrofit - Letter box distribution - Central point of contact within a group of residents (eg. social worker), critical where letterboxes are not accessible to public - Supply of self-addressed, stamped envelope 	Retrofit Record sheet	Record sheet completed during every service. X1 copy for resident, x1 copy for staff. Converted into excel spreadsheet for analysis & energy saving calculations All data management, collation and analysis undertaken by Lisa Siciliano
Employee surveys – x3	Developed by Leo Hong with assistance from MMA Staff. Distributed at three stages. Collation and analysis undertaken by Leo, with assistance from MMA	Formulas	Sourced from CoPP Sustainability Officer Julian Donlen, VEET Schedules & MMA Staff. Researched and applied by Lisa Siciliano
Service recipient phone & conversation feedback	Recipients initiated this contact with CarbonCut staff	Codes (for data management purposes)	Under advisory of MMA staff, all codes established & applied by Lisa Siciliano
Employee interviews	Media undertaken by Tessa Tombourou, who conducted interviews with CarbonCut Team & wrote media release	Internal database system	All documents and information kept in confidentiality on PPEC internal database
General feedback conversation & observations	Conducted regularly between staff, employees and support staff	General Research	Online & Phone. Includes: SEW, CoPP, Sustainability Victoria, Neighbourhood Renewal Program, Sustainable Homes Project, Resource Smart, SaveEnergy, Brotherhood of St Laurence, Environment Victoria and the DSE

APPENDIX 4

Table 19: General Appliance Information

Appliance	Energy Usage	Source
Washing Machine	Most energy from washing machine goes into heating water. 3-4 tonnes of GG produced/year to power electric water heater	Sustainable Homes 2009
Thermostats	Lowering thermostat heater by 1 degree can reduce energy use by 10%. Raising of cooler by 1 degree can reduce energy usage by 10%	Sustainable Homes 2009
Refrigerators & Freezers	The optimum operating temperature for a fridge is 3 to 5°C. Below this costs more to run and frost up. The recommended range for freezers is -15 to -18°C	Sustainable Homes 2009
Hot Water Systems	Monthly costs assume a water usage of 180–260 litres/day	Sustainable Homes 2009
Insulation	Measured by its thermal resistance ® & given R value. In Melbourne it is recommended that you get insulation of R3 value for the ceiling, R 1.5- 2 for walls and R 1 for subfloor (where there is a wooden floor).	Sustainable Homes 2009
Gas	Natural gas av. 64 366 MJ/year/household	Sustainability Victoria 2009
Electricity	5727 kWh/year/household	Sustainable Homes 2009

APPENDIX 5

Table 20: Case Studies - Criteria for Assessing Community Outcomes

CASE STUDY 1* CRITERIA	CarbonCut Demonstration	CASE STUDY 2* CRITERIA	CarbonCut Demonstration
Behaviour modification progression a) pre-contemplation b) contemplation c) preparation d) action e) maintenance	Focuses on d) and e)	Increasing people's pride and participation in the community	Aims to achieve through support of local ambassadors Making behaviour change accessible and rewarding Measurable results
Behaviour modification can suffer from re-cycling of stages. Relapse should be considered	Provision of ongoing support networks. Some residents have utilised contact phone numbers. Innovative & engaging behaviour change	Lifting employment, training & education opportunities and expanding local economic activity	Servicing local providers Creating local jobs and training opportunities
Longitudinal patterns of behaviour change a) stable – person	Programs aims to support & encourage stage b)	Enhancing housing and the physical environment	Aims to increase comfort in the home

<p>remains in same phase for some time</p> <p>b) progressive – linear movements from one stage to the next</p> <p>c) regressive – back wards to an earlier phase</p> <p>d) recycling – 2/more revolutions thru stages of change over a period</p>			
<p>Self-change requires external influence & individual commitment & establish effectiveness of intervention</p>	<p>Provides cross-cultural access, general inclusiveness</p>	<p>Improving personal safety</p> <p>Promoting health and wellbeing</p>	<p>House visits double as opportunity to assess resident's wellbeing</p> <p>Interrelating human health and environmental health</p>
<p>Obstacles in behaviour change: inadequate motivation, defensiveness & inability to relate</p>	<p>Provides multiple benefits – social interaction, health & comfort. Innovative methods of access into community</p>		

Appendix 6 – Service Recipient Survey



Thank you for participating in the CarbonCut Project of the Port Phillip EcoCentre

Using the stamped, self-addressed envelope provided, please fill out the following survey and post it back to:

CarbonCut Coordinators: Lisa and Jill

Your feedback is valuable and greatly appreciated!

Now that you have been a recipient of the CarbonCut Retrofit service, we wish to ensure that these products continue to perform well and we may contact you in the future to assess their ongoing performance. Please let us know if you do not wish to be contacted in future.

Thank you again for your participation in the program, and for providing helpful feedback to allow us to continue the CarbonCut program in the community.

Warm Regards,

Lisa and Jill

Lisa Siciliano and Jill Robinson
CarbonCut Co-Coordinator
Port Phillip EcoCentre
55A Blessington St
St Kilda 3182
Ph. 9525 3102



Address: _____ Suburb: _____

1) How did you hear about CarbonCut? *(Please tick all boxes that apply)*

- a) Neighbour or friend
- b) CarbonCut poster (please specify where it was located) _____
- c) Community centre or from a community worker
- d) Council
- e) Letter in mailbox
- f) Can't recall
- g) Other (please specify) _____

2) Using a scale of 1 to 7, where 1 means you Strongly Disagree and 7 means you Strongly Agree, please rate the following statements.

After the CarbonCut Retrofit, do you think that your house
(Please circle appropriate number. If unsure, please circle 'Don't Know')

Strongly Strongly

	disagree			agree				
	1	2	3	4	5	6	7	Don't know
a) Is generally more comfortable	1	2	3	4	5	6	7	Don't know
b) Has a better shower	1	2	3	4	5	6	7	Don't know
c) Has warmer rooms	1	2	3	4	5	6	7	Don't know
d) Is less drafty	1	2	3	4	5	6	7	Don't know
e) Has better light	1	2	3	4	5	6	7	Don't know
f) Has cooler rooms	1	2	3	4	5	6	7	Don't know

3) Which products were installed in your home during the CarbonCut Retrofit? (Please tick the appropriate box)

	Yes, installed by CarbonCut	No, I already had this item	No, I do not have this item in my home	Don't know
a) Light globes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Foam seals (around door)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Draft stopper (bottom of door)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Showerhead	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Shower timer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Fixaflush (weight in toilet)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Energy-saving information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Other product (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4) Were there any items you had problems with?

5) How well do you think you understand what climate change is?

(Circle appropriate number on scale, where 1 is Not At All, and 7 is Very Well)

Not at all			Very Well				
1	2	3	4	5	6	7	Don't know

6) On a scale of 1 to 7, where 1 is Not Important and 7 is Very Important, how important are the following aspects of the CarbonCut program...

(Circle appropriate number on scale, where 1 is Not Important, and 7 is Very Important)

	Not important			Very important				
	1	2	3	4	5	6	7	Don't know
a) Chance to reduce your carbon emissions and address issues of climate change	1	2	3	4	5	6	7	Don't know
b) Free light globes and free home retrofit	1	2	3	4	5	6	7	Don't know
c) Social interaction and opportunity to meet new people	1	2	3	4	5	6	7	Don't know
d) Free energy-saving advice and information	1	2	3	4	5	6	7	Don't know
e) Improved sense of belonging within the community	1	2	3	4	5	6	7	Don't know
f) Chance to participate in an exciting community project	1	2	3	4	5	6	7	Don't know

7) a) Do you think you would have gained a service such as this if it were not for CarbonCut?

- Yes
- No, I have been waiting for a service such as this for (how long)
- Don't know

b) Are there other areas of your home that require alteration or can you suggest other services that could possibly be provided as part of the CarbonCut Retrofit?

- Yes
- No
- Don't know

If Yes, please provide details _____

8) Using a scale of 1 to 7, where 1 means you Strongly Disagree and 7 means you Strongly Agree, how strongly do you agree with the following statements?
(Please circle appropriate number)

	Strongly disagree			Strongly agree				
	1	2	3	4	5	6	7	Don't know
a) CarbonCut Retrofit is a good way to save money on your energy bills	1	2	3	4	5	6	7	Don't know
b) CarbonCut Retrofit will reduce carbon emissions, water usage and help Climate Change	1	2	3	4	5	6	7	Don't know
c) Without CarbonCut I would <u>NOT</u> have been able to afford and undertake the retrofit on my home by myself	1	2	3	4	5	6	7	Don't know
d) Without CarbonCut I would have been able to afford and undertake the retrofit on my home by myself	1	2	3	4	5	6	7	Don't know
e) Programs such as CarbonCut are vital and valued within the community	1	2	3	4	5	6	7	Don't know
f) The information I received was easy to understand	1	2	3	4	5	6	7	Don't know
g) I understand how the installed products work	1	2	3	4	5	6	7	Don't know

9a) Was there any confusion regarding the time of your appointment, or type of service etc?

- Yes
- No
- Don't know

9b) If Yes, what was the confusion? _____

10a) Would you recommend the CarbonCut Retrofit to friends or family?

- | | |
|------------|--------------------------|
| Yes | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| Don't know | <input type="checkbox"/> |

10b) If No, why not? _____

11) Did you find the CarbonCut Team to be: *(please tick appropriate box)*

- | | Yes | No | Don't know |
|--------------|--------------------------|--------------------------|--------------------------|
| a) Friendly | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Helpful | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Efficient | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

12) Overall, how satisfied were you with your CarbonCut Retrofit?

- | | | | | | | | |
|--|----------------------|---|---|---|---|-------------------|------------|
| | Very
dissatisfied | | | | | Very
satisfied | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | Don't know |

13) Are there any other comments you'd like to make about CarbonCut?

CREDITS

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List of Flow Charts, Tables & Graphs

Flow Chart 1: Sources of Waste

Table 1: Abbreviations found in 2009 CarbonCut Evaluation Report

Table 2: Project Deliverables

Table 3: Components of Retrofit

Table 4: Summary of Estimated Energy, Greenhouse, Water and Monetary Savings

Table 5: Anticipated Environmental Benefits

Table 6: Assumptions Used to Calculate Showerhead Water Savings

Table 7: Assumptions Used to Calculate Fixaflush Water Savings
Table 8: Average Hours of Use Per Day (Summer / Winter Average)
Table 9: Assumptions Used for Light Globe Calculations
Table 10: Assumptions Used to Calculate Draft Excluder Savings
Table 11: Assumptions Used to Calculate Savings Achieved through Foam Installation
Table 12: Anticipated Community Benefits and Outcomes for CarbonCut2
Table 13: Current Stakeholders
Table 14: Project Parameters
Table 15: Glossary

Graph 1: Average Summer and Winter Electricity Usage Patterns
Graph 2: Percentage of Households and Corresponding kL Saved
Graph 3 – Pie Chart: Proportion of Monetary Savings Achieved Through Installation of Showerhead
Graph 4 – Pie Chart: Proportion of Monetary Savings Achieved through Fixaflush Installation
Graph 5: Kilowatt Hour Savings Achieved Per Household (CFLs & Showerhead)
Graph 6: CO2-e Savings Per Household
Graph 7 – Pie Chart: Percentage of CO2-e Reduction Per Device
Graph 8 – Pie Chart: Proportion of Monetary Savings CFL's
Graph 9 – Pie Chart: Greenhouse Gas Reductions CFLs
Graph 10: Proportion of Different Types of Globes Installed
Graph 11 – Pie Chart: Proportion of Monetary (Draft Excluders)
Graph 12 – Pie Chart: Greenhouse Gas Reductions (Draft Excluders)
Graph 13 – Pie Chart: Proportion of Monetary Savings (Foam)
Graph 14 – Pie Chart: Greenhouse Gas Savings (Foam)
Graph 15: Percentage of Households Relative to Monetary savings
Graph 16: Annual Average Savings Relative to Each Housing Type
Graph 17: Percentage of Households Relative to Monetary Savings
Graph 18: Projected Savings Year One - Four

Appendix 1: Table 16: 2009 Project Timeline
Appendix 2: Table 17: Project Team
Appendix 3: Table 18: Data Sources and Methods of Collection
Appendix 4: Table 19: General Appliance Information
Appendix 5: Table 20: Case Studies - Criteria for Assessing Community Outcomes
Appendix 6: Service Recipient Survey