

Reduce Your Juice FINAL REPORT



CITYSMART
Brisbane City Council's Sustainability Agency



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**Department of
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Executive summary

INTRODUCTION

Reduce Your Juice (RYJ) has transformed traditional energy efficiency programs into a model that effectively connects with today's digitally connected consumer.

The innovative program reimagines traditional energy efficiency approaches in a digital world. Incorporating an evolutionary recipe that embraces design thinking, integrated digital channels and a participant-focused experience which has shown impressive results for a part of the market that is growing rapidly – mobile connected consumers.

BACKGROUND

The Low Income Energy Efficiency Program (LIEEP) was a competitive merit-based grant program established by the Australian Government to provide grants to consortia of government, business and community organisations to trial approaches to improve the energy efficiency of low income households and enable them to better manage their energy use.

The Commonwealth's objectives for the Low Income Energy Efficiency Program were to:

- trial and evaluate a number of different approaches in various locations that assist low income households to be more energy efficient
- capture and analyse data and information to inform future energy efficiency policy and program approaches.

REDUCE YOUR JUICE

The Reduce Your Juice project sought to trial and demonstrate the use of a digital approach to energy efficiency engagement combined with the provision of energy efficiency rewards to assist low income households who rent to be more energy efficient.

Target market	Young adult, low income households that rent in greater Brisbane
Engagement channels	Digital (apps, social media, email, video etc.)
Method of intervention	Education and equipment replacement
Key point of difference	Use of meaningful gamification to create engaging environment and allow prolonged contact

The program ran for three years from July 2013 through to May 2016 and was valued at \$6,448,065 including \$5,540,281 from the Australian Government and \$1,212,711 from consortium partners.

This has been a collaborative project that brought together sustainability agency CitySmart, research partner QUT, social services peak body QCOSS, energy distributor Energex, and retailer The Good Guys to deliver a successful intervention, showing the importance of building strategic partnerships between industry and the research sector to create innovative, evidence-based outcomes.

IDENTIFIED BARRIERS

The RYJ program was developed by CitySmart and QUT to help 1,000 low income young adult renters across the Greater Brisbane area to overcome three key challenges

1. Low interest/Low involvement topic
2. Information failure
3. Capital constraint barriers to reduce their energy consumption.

Energy bills are one of the largest household expenses for the target group, second only to rent. Despite this, energy consumption doesn't rate highly on the agenda of the target group because they have more important, pressing concerns in their life and are therefore not highly involved with their energy consumption. This low involvement means lack of motivation and low inertia for altering energy use behaviours even when knowledge of the benefits of changing behaviour is high. The nature of energy consumption itself is problematic in that the target group can't visually see energy being consumed or don't interact with it until they receive their quarterly bill, thus going into crisis mode which typically achieves very little change. The lack of understanding and information means that the target group vastly underestimates the impact of high consumption appliances such as air conditioners, electric hot water and laundry appliances on their energy bills. Indeed, households that participated in the Reduce Your Juice program reported 40% higher energy bills than the average South East Queensland households.

Finally, as with all renters, the ability to make material change to your energy equation is defined by your built environment. As a renter, this limits the ability to invest in meaningful energy efficiency changes (higher cost capital investments projects).

The Reduce Your Juice program sought to address these barriers.

OUR APPROACH

In stark contrast to traditional energy efficiency approaches, RYJ was delivered in a non-conventional manner using digital games, entertainment and social media to engage participants in an apparently simple yet highly relevant experience that made the achievement of cost-saving benefits easy and rewarding for participants.

Acknowledging the nature of energy efficiency as invisible, intangible and undervalued amongst low-income households, RYJ sought to make the invisible visible, the intangible tangible and unvalued valuable. Participants progressed through a targeted, carefully designed experiential journey delivered via a multi-channel digital platform that incorporated a mobile app, email, SMS, rewards and a social media community. The program was designed to be fun, easy and impactful. On the exterior, the program appeared as a simple, fun and easy experience of games and gamified activities, communications, community, and rewards for participants. However, below the surface lay a sophisticated intervention developed through the application of evidence and theory, and implemented by a team of multi-disciplinary experts using multiple integrated digital systems and techniques.

Underlying the program is a custom behaviour change model which flips traditional approaches to behaviour change on their head by immersing participants in a continuous, experiential learning experience. Rather than traditional single element interventions such as once-off in-home consultations or informational flyers, RYJ is delivered in over 300 bite-sized digital interactions across multiple channels, allowing participants to digest small portions of information through a continuous approach to learning which easily melds into their digital lifestyle. The RYJ approach recognises energy efficiency as low involvement behaviour for participants within the broader context of their lives. This observation was derived from formative research conducted at the start of the project using focus groups and an online survey. As a result of this consumer insight, the approach taken in this project favoured a continuous interactive approach delivered in a fun, collaborative way to provide meaningful benefits for participants in divergence from traditional one-way, 'authoritarian' style programs of the past.

RYJ's use of serious games and gamification played out to be a game changer for participants, positively affecting their energy efficiency habits, attitudes and intentions to save them money on their electricity bills. With the majority of the low-income participants owning a smartphone and viewing the internet as a necessity at home, the relevance of a digital approach cannot be ignored, and the strategic use of gamification and games heralds a new approach to changing mundane behaviours such as energy efficiency for this traditionally hard to reach group.

Participation in the program was measured using integrated digital analytics which have disproven many traditional myths surrounding low-income energy efficiency. The research findings help paint an insightful picture of the modern, digitally-connected, low-income earner and provide rigorous results that open the door to broader application and scalability.

SUMMARY OF OUTCOMES

The Reduce Your Juice program met the Commonwealth's primary objective by definitively proving that an integrated digital engagement approach can assist low income households to be more energy efficient and produced remarkable results.

The program enabled CitySmart to take every participant on a six week, high touch learning journey where we gained:

- unrivalled access to participants (touching them often when they reached for their phone)
- permission to provide high repetition messaging (more than 300 per participant on average)
- an extended period of engagement (more than 4 hours on average)

Headline results include:

- 12.3% improvement in energy consumption on previous year
- \$54.82 average saving on quarterly electricity bills (\$219.28 annual saving)
- 22.5% improvement in energy habits
- 78% of starters completed the program
- 97.2% recommended RYJ to friends and family
- Significant improvement in attitudes, bill control, self-efficacy.

This report provides a data rich picture of the target group, a detailed account of the trial undertaken and outlines the array of different benefits from improved energy efficiency to provide an evidence base to inform future policy and program design.

The resultant energy productivity improvements delivered by the program has wide policy implications extending to socio-economic outcomes including health and well-being impacts, energy affordability and access, increasing disposable income, reduced greenhouse gas emissions that may represent desirable welfare gains that cater to other high priorities for government.

On a relatively small scale basis of delivery to 1,000 participants, each dollar invested by the Commonwealth yielded a dollar of benefit due largely to the high set-up cost. The economic viability of a digital approach significantly improves at scale, for example delivery to 10,000 and 100,000 participants would deliver \$2.02 and \$2.70 in benefits for each dollar invested, thus providing a strong economic case for future investment.

RECOMMENDATIONS

Recommendations to take into consideration in the development of future energy efficiency policy and program approaches:

1. Make digital engagement a part of the Low Income Household approach

Results from this program challenge traditional perceptions of the low income households including their access to and use of technology and the role it plays within their lives. Mobile technology in particular provides enormous opportunity to access this traditionally difficult to reach group. This has implications for how people access social services today and into the future.

2. Incorporate emerging digital engagement techniques and tools into future programs

Digital engagement on its own can be just as ineffective as traditional engagement if not executed well. Digital engagement techniques and tools have become sophisticated and highly measurable. For example, the use of serious games and gamification was a key innovation in engaging and influencing participants in this program. Their wider adoption suggests they must be incorporated into future programs.

3. Recognise that trust is a key component to engagement and with new digital engagement tools; trust doesn't need a physical presence

Building trust with an audience is one of the first steps in behaviour change. Traditionally we gain trust from face-to-face interventions such as in home visits or workshops. The program has proven we can create real trust without the need to physically present. Creating an exclusive social media group for participants gave them an environment to ask questions, listen and learn. As a group they self-corrected poor information and agreed with good suggestions and that in turn created a palpable trust.

4. Investigate the economies of scale that can be achieved from widespread implementation of effective digital delivery approaches

An integrated digital approach demonstrates strong returns on investment when delivered at scale. This approach may not be appropriate for all audiences however, it does demonstrate the potential to engage and influence a large portion of the population (not just low income households) at low cost, which would enable government to direct resources to support more intensive social service delivery to the most vulnerable members of society.

5. Ensure that future energy efficiency programs incorporate effective collaboration to ensure success

This program benefitted from a multi-disciplinary collaboration between industry and the research sector to create innovative, evidence-based outcomes. Reduce Your Juice was a sophisticated intervention developed through the application of evidence and theory, and implemented by a team of multi-disciplinary experts. This collaborative approach should be adopted where possible in the development of future energy efficiency policy and program approaches.

6. Ensure that energy efficiency programs include a calculation of the full value chain of energy productivity improvements

Improving energy efficiency can deliver a range of benefits for the target group and the broader community. Energy efficiency programmes are often evaluated only on the basis of the energy savings they produce, underestimating the tangible economic and social value created. Further funding and resources are required to build knowledge and sectoral capacity

to ensure that the full socio-economic potential of energy productivity improvements being delivered is better understood.

7. Incorporate benchmarking into behaviour change programs.

When seeking behaviour change, the benefits of benchmarking your performance against others is well documented. The Reduce Your juice program experienced participants norming their behaviour through the trusted communities in social media and the results were evident. Digital engagement creates many timely benchmarking opportunities.

8. Recognise the growth in the digitally connected consumer segment.

Reduce Your Juice sought to target 18-35 years olds but discovered that the program has a reach that extends past this target group in each direction. Children were obviously highly adept at taking part in this program and there is evidence to confirm this however there were also a range of participants from older demographics who also took part effectively in this program. We are aware of the growing interest of older groups in social media and this coincides with a greater uptake of mobile connectivity.

INTRODUCTION

Abbreviations and acronyms

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
BCC	Brisbane City Council
BCM	BCM Partnership advertising and communications agency
CBSM	Community Based Social Marketing
CCeS	Centrelink Confirmation eService (Centrelink's Business Online Service)
CRN	Customer Reference Number (Centrelink)
CRM	Customer Relationship Management system
CSIRO	Commonwealth Scientific and Industrial Research Organisation
KPI	Key performance indicator
LIEEP	Low Income Energy Efficiency Program
M-game	Mobile game
NMI	National Meter Identifier
QCA	Queensland Competition Authority
QCOSS	Queensland Council of Social Services
QLD	Queensland
QUT	Queensland University of Technology
RYJ	Reduce Your Juice
SEQ	South East Queensland
WOM	Word-of-mouth

Definitions

Energy Quest

A gamified technique used in RYJ to motivate and guide participants in energy-saving activities related to the behaviours and games being undertaken. Energy Quests were communicated in the app games and via email and social media messaging.

Gamification

The use of game elements in non-game contexts to improve user experience and user engagement (Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011, p. 1).

Gamification is the application of game design elements such as point scoring, levels, rewards and rules of play, to encourage engagement with areas of non-game related activity, such as energy efficiency.

Game scaffolding

Game scaffolding is a technique used in game design to ease players into elements of game play. Scaffolding introduces players to the rules and streamlines the learning process.

Powerhack

A gamified technique used in RYJ to deliver 'lifehack' style shortcuts, cheats, tips, and tricks to help participants put the new ideas and behaviours they learned into practice at home.

Serious games

Any form of interactive computer-based game software for one or multiple players to be used on any platform and that has been developed with the intention to be more than entertainment (Ritterfeld et al. 2009, p.6).

Serious games involve simulations of real world situations to help solve a problem, in contrast to games designed for entertainment purposes.

Social marketing

Developing and applying marketing theories and concepts in addition to other approaches to influence individuals, communities, structures, and societies to bring about positive social change.

Social marketing is a behaviour change approach that uses the application of commercial marketing principles and techniques for social good.

Ultimate Energy Quest

The landlord engagement component of the program which measures research question 3 was framed as the 'Ultimate Energy Quest' for participants and was communicated using email and social media.

Unique email click through rate

A measure of email performance which shows the number of unique clicks on the links in an email as a percentage of subscribers. The number of clicks is unique to an individual, even if multiple devices are used.

Unique email open rate

Email open rate is the percentage of the delivered emails in a campaign that are opened by subscribers (tracked via an email system via the downloading of pictures or a tracking pixel). The unique email open rate counts the unique number of recipients that have opened the email rather than counting how many times each recipient opens an email.

About

Project name	Reduce Your Juice (RYJ)
Grant recipient, lead organisation	CitySmart
Consortium members	Queensland University of Technology (QUT) Queensland Council of Social Services (QCOSS) Energex The Good Guys.
Funding	RYJ received second round grant funding. Total valued at \$6,692,711. <ul style="list-style-type: none"> \$5,480,281 from the Commonwealth. \$1,212,711 from consortium partners.
Project duration	Three years - from July 2013 through to May 2016.
Infield timing	Program was conducted in two rounds of participants: Round 1 4 May 2015 – 5 August 2015 Round 2 31 August – 2 December 2015

Consortium members

CitySmart	Consortium lead <ul style="list-style-type: none"> Strategy Stakeholder management Program development, management and evaluation
Queensland University of Technology (QUT)	Research and evaluation partner <ul style="list-style-type: none"> Research design Data measurement Evaluation Social marketing expertise
Queensland Council of Social Services (QCOSS)	Recruitment partner <ul style="list-style-type: none"> Community and target group preliminary research Access to community organisations for recruitment Infield recruitment assistance
ENERGEX - Energy research and content	Energy partner <ul style="list-style-type: none"> Energy research data Energy content expertise Provision of participant meter data Landlord engagement Positive Payback Scheme offers
The Good Guys	Rewards partner <ul style="list-style-type: none"> Supply of energy efficient reward products Delivery of major rewards Partner with BoysTown to deliver and recycle whitegoods

Trial approach

CitySmart's project sets out to trial and demonstrate the effective use of digital media in combination with energy efficiency rewards to help its target group become more energy efficient.

The program is designed to help 1,000 low income young adult renters (aged 18-35) across Greater Brisbane to make better decisions about their energy use in order to become more independent and secure lasting energy savings.

RYJ takes an innovative digital delivery approach not tested before in the Australian energy sector, engaging low income young adults to overcome information barriers, split incentives and capital constraints to save energy. The program uses a combination of digital engagement with multiple interventions as opposed to many 'single element' programs.

The program redefines effective approaches to energy efficiency, evolving to meet the needs of today's digitally connected generation. The approach challenges the 'digital divide' misnomer surrounding people on lower levels of income and education, making participation simple, easy, and accessible through a mix of integrated digital channels.

The program design takes into account the involvement level and nature of energy efficiency for the target group in conjunction with their digital behaviour. Acknowledging the low involvement nature of energy consumption, the program seeks to stimulate learning and behaviour change via a fun, intrinsically motivating experience which uses a unique blend of games and gamified digital interactions. RYJ uses a mobile-led, integrated digital media approach to deliver bite-sized interactions designed to help participants learn in order to improve their behaviour.

RYJ trials the use of energy efficiency product rewards in comparison to other non-energy related 'lifestyle' reward products to address capital constraint barriers. Products are used as rewards for participants who complete designated actions at different points in the program.

The program sought to address split incentive barriers by incentivising both landlords and participants to upgrade the home's energy efficiency, with landlords offered access to rebates provided by Energex and participants incentivised with a monetary reward.

The use of digital technology provides a unique opportunity to reinvent the service model by making delivery more efficient and measurable. The digital platform enables service delivery to be replicated at relatively low marginal cost and provides a clear, data-driven view of the target group that can assist the development of future policy and the next generation programs delivered in this space.

Objectives

The program sets out to test and demonstrate:

- the effectiveness of the interactive digital learning
- the effectiveness of energy efficiency rewards
- the effectiveness of digital and social communication media
- the cost effectiveness of program components.

Scope

The scope of RYJ was to deliver the following activity:

- a. three interactive digital learning modules
- b. energy efficient rewards
- c. digital communications (sms, email & apps) and social media interaction
- d. optional assistance modules to engage landlords
- e. provide support to participants.

Limitations

The program intervention does not allow for testing of a treatment group that does not receive any reward products. This decision was made due to the high value of rewards on offer to participants and the potential negative social impact and response from participants assigned to miss out on receiving rewards. A treatment group not receiving any rewards also presents a complex communication issue when advertising and recruiting participants to take part in the program and is discussed further in the Control group section following.

Research and evaluation approach

The RYJ trial employs a combination of approaches including games, communications and rewards to achieve behaviour change. A variety of data was collected from different sources at different points in time to be able to analyse the effectiveness of the trial. CitySmart worked with research partner QUT to develop a rigorous research and evaluation approach for the trial that reflected research best practice. CitySmart then worked with QUT to develop the social marketing strategy to underpin the design of the program and BCM for the implementation of the strategy through game development.

Research method

A data collection and evaluation strategy was developed following a basic marketing research design process to:

1. Define the problem/opportunity
2. Design the research approach
3. Design the program
4. Collect data
5. Analyse and evaluate outcomes.

1. The opportunity

Energy efficiency is a significant issue for rental households on low, fixed and unreliable incomes. These households are particularly impacted by increases in retail energy prices as a result of poor quality housing, limited ability to reduce energy use through energy efficient appliances and fixtures, and the higher proportion of income they spend on this essential service.

Young adults comprise over 30% of low income earners nationally and are not especially targeted by energy efficiency programs. The opportunity existed to target this emerging group of adults to help establish their behaviour for the future. Evidence suggests that young adults have less energy efficiency knowledge and are less likely to take action, making the challenge more significant. In Brisbane, around 47% of young, low income adults rent their home and budgetary constraints often means their homes are not energy efficient.

The guidance on low income households from the Department defined the group as:

- Household income is in the bottom two quintiles of the Australian population
- Householder is in receipt of an Australian Government Concession Card
- Household income is mainly derived from income support payments

CitySmart researched the income ranges for the bottom two quintiles of household income through the Australian Bureau of Statistics (ABS) to quantify these income brackets. This research showed that as at November 2013, the household income ranges for these quintiles were:

- Quintile 1 (lowest quintile): Less than \$512 a week or \$26,624 per year

- Quintile 2: \$512 to less than \$975 a week or a maximum of \$50,700 per year.

The equivalent *personal* income equated to earning a maximum of \$41,548 per year or \$799 weekly. Following this research, CitySmart defined the maximum income cut-off points for people to participate in the program as:

- \$41,500 personal income or
- \$50,700 household income.

As the program would involve participants registering online, income levels needed to be verified during registration. CitySmart had successfully applied for access to Centrelink's Confirmation eServices System (CCeS) to verify potential participant's credentials. The system could be used to personally identify participants, however it would only allow confirmation that a participant was in receipt of an Australian government concession card or an income support payment/benefit. Access to verify household income was not an option due to privacy restrictions.

CitySmart conducted analysis to cross check the maximum income levels that a participant could potentially receive when in receipt of an Australian government concession card or an income support payment/benefit, taking into account their individual circumstances and the rules published by Centrelink for each benefit.

Target group

RYJ targets a defined group of hard-to-reach low income earners to reduce their energy consumption. Target group parameters for participation are as follows:

- Low income
- Aged 18–35 years
- Currently renting and paying electricity bills
- Live in the Brisbane, Logan, Moreton Bay or Redland local government areas.

ABS data showed approximately 95,000 individuals that meet these criteria in the Brisbane, Moreton Bay and Redlands local government areas (the Logan LGA was added as a valid area at a later date). CitySmart's program sought to recruit 1,000 participants from this target group. Only one participant per household was eligible to participate in the program. Participants' CRN with valid Centrelink benefit was verified along with their birthdate and location using the CCeS system to ensure eligibility to participate. Alternatively for people without a Centrelink benefit, registrants provided proof of their low income status via an ATO Notice of Assessment, or valid Australian Health Care Card.

Intervention

CitySmart's program used a digital engagement approach with a combination of multiple interventions. The learning components were designed to address the barrier of information failure to help participants change their energy consumption behaviour and were delivered using a range of digital channels, including an app with mini-games and a supporting suite of integrated digital communications (email, social media and SMS).

Capital constraint barriers were addressed by offering energy efficient appliances as rewards for a subset of participants, helping them to save further energy at no or low cost.

To address split incentive barriers, a landlord engagement component assisted participants to engage their landlords to upgrade the home's energy efficiency, incentivising both parties through rebates.

Opportunity

To help young, low income renters save money on their electricity bills by changing their behaviour.



2. Research approach

Research questions were developed in conjunction with research partner QUT as the initial step in designing the research approach. The research questions were designed to guide the research design and achieve the project objectives. This section outlines the research questions and the research design.

Research questions

1. Can a digital engagement learning program change energy consumption behaviours?
2. What is the impact of communication and rewards on energy consumption behaviours of program participants?
3. Does an incentive for participants a) generate contact with landlords to install energy efficient appliances and b) result in landlords implementing an energy efficient intervention to gain a rebate?

Research design

The research approach was designed to effectively measure and analyse the program's objectives and answer the research questions. In this section, participants in the RYJ program are referred to as the intervention group. Research participants who were not part of the RYJ program but provided research data are referred to separately in the Number of participants in RYJ-related research table below. These additional participants include a control group, interview and online survey participants. The number of participants directly involved in the RYJ research was 2943 people who completed surveys/were interviewed however the number of people influenced by the program included the other household members of the RYJ participants. Thus the total number of people influenced by the research was 4248.

Number of participants in RYJ-related research				
Participant Groups	Sample Definition	Data type	Unit of Analysis	Sample Size
Market research	Low income 18-34 year old renters in SEQ	Online surveys	household	n = 505
Market research	Low income 18-34 year old renters in SEQ	Focus groups	household	n = 18
RYJ Intervention group	Low-income 18-35 year old renters in SEQ who agreed to participate in RYJ	Online surveys	Household	n = 1001
Control group	Low-income 18-35 year old renters in SEQ recruited by a market research firm	Online surveys	Household	n = 734
QUT honours thesis study interview group – RYJ games	Low-income families in SEQ recruited by a market research firm	Interview transcripts	Household	n = 17
QUT PhD thesis research group – games and customer value	18-35 year old Australians who own a smartphone	Online surveys	Individual	n = 668
			Total	2943

Baseline measurement

To enable the first stage of the testing of research question 1, mandatory pre and post program surveys completed by both a control group and intervention group six weeks apart. The pre-program data provided a baseline to evaluate any changes in energy attitudes, perceptions and behaviours over the program period. The intervention and control group surveys were completed at two different seasonal points (winter and summer) to account for any temperature effects. The data was analysed using Paired T-tests and repeated measures ANOVA to determine if changes between time periods were significantly different. Where dichotomous/binary data measured at two time points occurred, such as True or False for questions about Knowledge and Yes or No for Habits, McNemar's test statistic was used to determine if there were statistically significant changes.

Optional online surveys were conducted to provide explanatory data for the research analysis from a sample of participants and were also completed by the control group. These surveys went beyond the three research questions.

Control group

As any changes over the six weeks intervention period could be attributed to factors other than participation in the RYJ program, a control group with similar demographic profile was used. This enabled the second and final stage of testing research question 1. The control group completed two surveys six weeks apart however they had no involvement in the program. The control group was a separate recruitment process to the intervention group and was not a random allocation. This decision was made due to the financial value of rewards on offer and the potential for significant negative social impact should participants be randomly assigned to a control group that does not receive any rewards, which may have skewed results. This lack of randomisation between intervention and control group is an acknowledged limitation of the trial and an opportunity for future research into the impact of the program intervention without the reward or communication components.

The control group of 734 participants was recruited separately to program participants using a market research firm. The demographic and home ownership sampling criteria for this group was the same

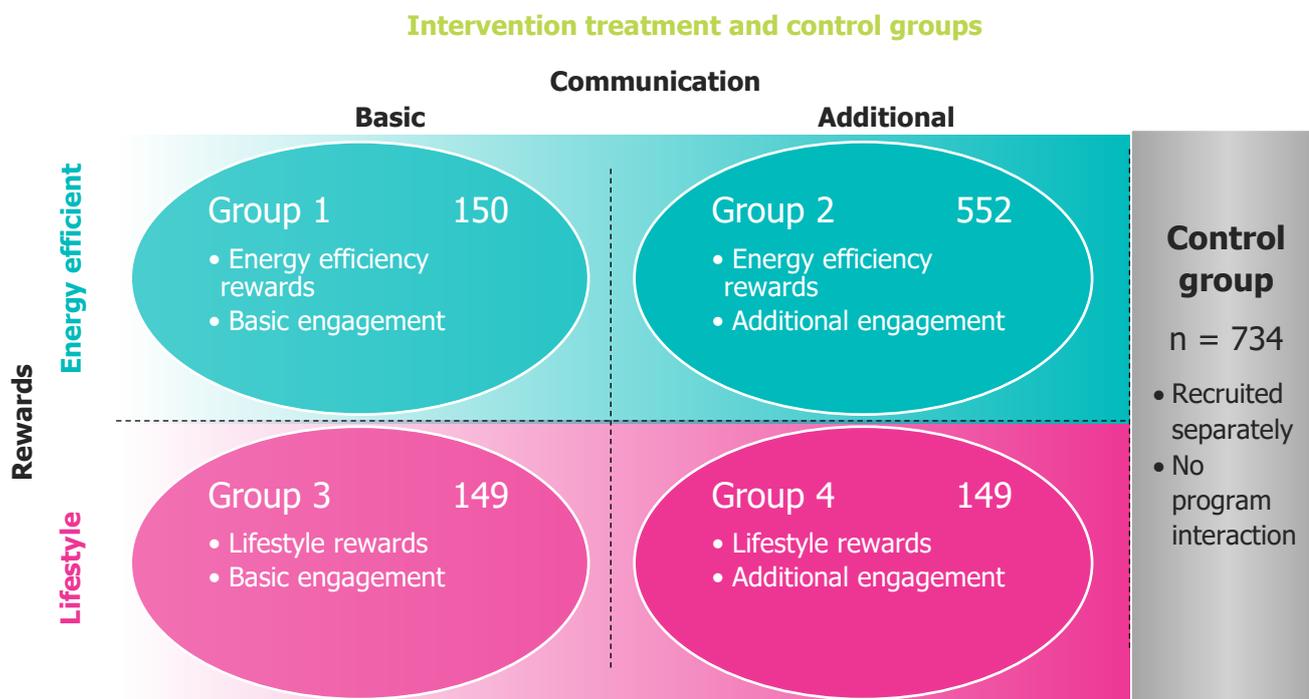
as for program participants. The control group was used as a comparison to test for differences with the intervention group and did not receive any of the program interventions. The data was analysed using Paired T-tests, McNemar’s test, and repeat measures ANOVA.

Treatment groups

Four distinct treatment groups were used to test research question 2 through difference testing based on the level of communication and type of rewards received by participants. Treatment groupings enable sound methodological evaluation to compare different aspects of the intervention at multiple data collection points across time and draws on a quasi-field experiment approach.

The intervention group was divided into treatment groups to allow for testing within participants to occur. Intervention participants were randomly allocated into one of four treatment groups. The 1001 intervention participants were allocated randomly to either the full program (additional communication and energy efficiency rewards) or one of the three remaining treatment groups upon successful registration. The decision to place approximately half the respondents into one treatment group was made to expose the largest group of participants to the full program intervention to give them the best chance of completing the program. In the analysis to test the influence of the communication and rewards, a random selection was drawn from the full program group to gain an even balance of respondent numbers across the four treatment groups. The data was analysed using ANOVA.

For the intervention group the treatments are a 2 (basic vs additional communication) by 2 (energy efficient vs lifestyle rewards) factorial design. The intervention treatment and control groups are shown in the intervention treatment and control groups figure following.



While all groups engaged in the core element of app games, the four groups are differentiated as follows.

Basic versus additional communications groups

The basic communication groups only received all core communications deemed to be essential to the program. This included an acceptance email, unveil final reward email, warm up email, game unlocked and game tips emails, survey related email invitations and reward related emails. Reminders emails were served to all groups on an as needed basis (i.e. only if they had not completed the required actions).

The additional communication group received all basic communications as well as 9 additional email and SMS communications, namely:

- Additional warm up email 'what's wasting your watts'
- 3 x Powerhack emails (one per game with a Powerhack idea and link to Energy Quest competition)
- 3 x game ending soon emails (sent a few days prior to each game closing to remind participants to play)
- 2 x game unlocked SMS (for Power Raid and Fully Loaded with direct link to play app games).

Energy efficient versus lifestyle rewards groups

The energy efficient rewards group received energy efficiency reward products that would help reduce their energy consumption while the lifestyle rewards groups received products not directly related to saving energy, providing lifestyle based enhancements instead. All reward related emails received during the program were tailored to suit the energy efficient or lifestyle rewards groups. Accompanying print collateral for energy efficient or lifestyle rewards was also tailored to suit, including associated Powerhacks designed for each type of rewards. See the Participant rewards table following for the rewards participants received for completing progressive stages of the program.

Participant rewards

Earned for completing stage	Energy efficient rewards	Lifestyle rewards	
Welcome pack (completion of pre-program survey)	Shower timer, digital thermometer, LED mini-fan, cardboard piggy bank, measuring tape, fridge magnet, bag, print collateral.	Shower timer, digital thermometer, LED mini-fan, cardboard piggy bank, measuring tape, fridge magnet, bag, print collateral.	 <p>WELCOME PACK</p> <p>Calico bag, light up fan, shower timer, tape measure, digital thermometer, piggy bank.</p>
Temperature Defender game	Pedestal fan and door snake	Cooler bag and 2 x mason jars	 <p>COOL REWARD</p> <p>ENERGY QTY=700</p> <p>LIFESTYLE QTY=300</p> <p>Pedestal fan and draft stopper</p> <p>Cooler bag and 2 mason jars</p>

Fully Loaded game	Solar charger and energy saving powerboard	Turbo charger, headphones and picnic blanket	<p>SWITCH REWARD</p> <p>ENERGY QTY=700</p> <p>LIFESTYLE QTY=300</p> <p>Solar charger and power board</p> <p>Headphones, turbo tube and picnic blanket</p>
Fully Loaded game	Portable and over door drying racks, pegs and peg basket	Beach chair and icy pole moulds	<p>WASH REWARD</p> <p>ENERGY QTY=700</p> <p>LIFESTYLE QTY=300</p> <p>Peg basket, pegs, hanging dryer and drying rack</p> <p>Beach chair and icy pole maker</p>
Final reward – completion of all previous stages and post program survey.	Replacement energy efficient fridge or washing machine	Weber BBQ, trolley, cover, tool set and gas bottle voucher	<p>FINAL REWARD</p> <p>ENERGY QTY=700</p> <p>LIFESTYLE QTY=300</p> <p>Fridge or washing machine</p> <p>BBQ pack – WeberQ with trolley cover, gas bottle voucher and tool set.</p>

Landlord engagement

The 'split incentive' is a major barrier, both for tenants and landlords who do not have sufficient motivation to install energy efficient upgrades. There is a divide between the cost and benefit of retrofitting rental homes as landlords do not directly benefit from the energy savings gained by investing in energy efficient fixtures. The tenant wants to reduce ongoing costs but can't make any alterations to the property.

The landlord engagement element was an optional activity which allowed participants to engage their landlord to install energy efficient fixtures or switch tariffs to reduce the energy bill at their property. By doing so, landlords would receive a rebate through Energex's Positive Payback scheme (ranging from \$150 - \$350 to tackle tariffs and older or high consumption appliances including: Hot water systems, Air conditioning, Pool pumps. Tenants would be rewarded with \$100 (through an eftpos gift card from RYJ).

The landlord engagement activity took place when participants were wrapping up the RYJ program. The email and Facebook communications were timed to be sent out after the participant earned their major reward so that they are likely to feel more empowered in taking action about their energy situation. The email provided engaging call to actions for both the tenant and the landlord and attempted to clearly communicate the win-win situation. A reward was offered if:

- The tenant forwarded the email on to landlord/agent, and
- The landlord took action before 31 December 2015.

The process designed was as follows:

- After earning their final reward in the program, RYJ participants receive an email with three rebate options, designed to send to landlord/real estate agent.

- Landlord takes action and implements required actions of Positive Payback scheme.
- Landlord applies for Positive payback reward with Energex (through their website).
- Energex gives payback rebate to landlord once application has been processed.
- CitySmart sends Energex participant addresses/NMIs.
- Energex matches NMI addresses from the program with addresses that have claimed the payback rewards, confirms details with CitySmart.
- RYJ participant earns reward (\$100 eftpos voucher).
- Landlord must have claimed payback reward before 31 December 2015.

Research question 3 was tested using data collected by Energex which matched participant's addresses with the take up of the Positive Payback scheme incentives by landlords.

Digital analytics were also used to monitor participant engagement with the Landlord engagement offer during the program.

3. Designing the program

To create an effective social marketing program design, a foundation of consumer insight was required in order to create a program best suited to the needs of the target group. This is detailed further in the Social marketing approach section under Program design.

A combination of primary formative market research (qualitative and quantitative studies) and secondary research (Australian Bureau of Statistic census data, literature reviews and published reports) was employed during the early stages of the project to extract customer insights and gain a thorough understanding of the target group. The research focused on profiling low-income earners to:

- Understand attitudes and behaviour in relation to energy use
- Understand attitudes and behaviour in relation to online/internet use
- Identify use of different online channels and social media
- Identify interest in potential program features (incl. incentives)
- Determine key factors influencing interest in participating in the program.

Working in conjunction with QUT, a review of current literature and available information was conducted covering behaviour change approaches, digital engagement, successful programs (both energy and non-energy related), and the social landscape which was used to inform the marketing strategy.

A qualitative workshop was also conducted with relevant agencies and industry bodies to explore their understanding and perceptions of the target market including their current behaviours and drivers, motivators and barriers for participating in the program and recommended means of approaching, communicating with and recruiting the target group.

4. Data collection

The data collection and analysis methodology developed for the trial focused on collecting sufficient data from a range of sources to address the research questions. In addition, adequate data was collected to operationally manage the program. An important criteria in developing the data collection strategy was to ensure data validity and reliability was maximised and biases were minimised, see following table.

Strategies used to overcome potential research bias and error

Issue	Explanation	Strategy to minimise bias/error
Common-method bias	Associated with self-reported data and the result of using similar methods e.g. multi-item scales within the same survey at the same time. Can generate incorrect significance results.	Use of different time points Use of different types of data to triangulate results e.g. energy data, survey data and game data.
Sampling frame error	The sample should be defined in the same way as the population being studied. All people in the population need to have an equal chance of being selected.	Profiling of young low-income renter population in Brisbane done as a benchmark Use of consumer panels to collect data where possible Broad multi-channel recruitment approach Random allocation of intervention participants to treatment groups
Measurement validity	Measurement validity assesses the degree to which questions measure what they are supposed to measure	Use of previously validated measures Multiple rounds of cognitive testing of items with low income earners prior to data collection Factor analysis was conducted to ensure validity thresholds were met.
Measurement reliability	Reliability refers to the reproducibility of the measurement when repeated at random.	Use of measures that had established reliability levels Pilot testing of measures at different points in time Reliability analysis was carried out to ensure Cronbach Alpha and item-to-total correlation thresholds were achieved.
Non-response bias	Non-response bias occurs in surveys if the answers of respondents differ from the potential answers of respondents who do not answer the survey.	The measures that addressed the research questions were compulsory for participants to ensure full representation. For the optional surveys, participants were incentivized to answer the surveys with the chance of winning an iPad Mini.

Data Considerations

Considerations for data collection included:

- Participant data to verify entry into the program and delivery of program communication and rewards
- Data requirements in CSIRO's LIEEP schema
- Participant measures developed by QUT to analyse the program
- Analytical data for continuous improvement of the program
- Energy consumption data to track behaviour change
- Participant feedback

The following table outlines the four types of data collected for the LIEEP trial, the frequency of collection and the usage of the data.

RJY data collection		
Type of data	Description	Frequency & Usage
Participant data	Data provided by the participant throughout the program. Includes: <ul style="list-style-type: none"> Registration data (e.g. name, date of birth, address, phone number, email address) Profile data (e.g. bill size, household composition, income, education, employment, appliance footprint, dwelling characteristics, etc) Behavioural measures (e.g. attitudes towards energy, energy habits, intentions, motivation, ability, etc) Digital literacy and gaming behaviour Referral source Program feedback 	Participant data was collected mainly at registration, pre- and post-surveys. Data was used for verification, communication, rewards distribution, continuous improvement and analysis.
Analytics	Data collected as a result of participants engaging with the program. Includes: <ul style="list-style-type: none"> Registration website analytics (e.g. referral source, time on page, sessions and visits) Game analytics (e.g. game play duration, game points, game sessions, characters selected, badges attained, trophies attained) Email and SMS communications (e.g. sends, opens, click-throughs, unsubscribes etc) 	Collected each time the participant engages with the program digital platform over the program. Data was used to determine rewards earned, provide feedback to the participants and continuously improve the program.
System generated data	Data that was generated, defaulted or calculated by the system. Includes: <ul style="list-style-type: none"> Identifiers (e.g. participant ID, dwelling ID, appliance ID etc) Timestamps (e.g. program sign-on date, program withdrawal date, survey completion dates, last time game played) Age (e.g. calculated from date of birth) Treatment group allocation Reward records earned Participant withdrawal details 	Generated at various points along the program. System data was used to assign participants to a treatment group, execute certain business rules, as well as generate identifiers and fields required for the CSIRO LIEEP schema.
Program support data	Data collected to allow the RJY team to administer the program. Includes: <ul style="list-style-type: none"> Customer support query data Reward fulfilment Energex Positive Payback rebate data Energy consumption data 	<ul style="list-style-type: none"> Customer Support data was collected adhoc throughout the program and used to respond to customer inquiries. Reward fulfilment was at end of pre and post surveys and games, and the data was used to distribute the rewards. Energex Positive Payback was after wave completion, and was used to evaluate the landlord engagement research question. Energy consumption data was collected daily following the end of the wave, and was used to answer the research questions.

Types of data collected – detailed

Registration	Profile building/warm up	Games Switch, Cool, Wash	Landlord Engagement	Wrap Up
Participant data: Name Date of birth Phone number Email address Address Centrelink CRN Tenure Password Consent	Participant data: Gender Employment Education Income Rental start date Appliance type Dwelling structure Number of occupants Household composition Bedrooms Bathrooms Living rooms Appliance details Space cooling details Space heating details Water heating details Energy habits CSIRO attitudinal questions Attitude to energy behaviours	Participant data: Address changes	Analytics: Comms (sent, open, click-throughs) Google analytics (time on page, sessions and visits)	Participant data: Address changes Number of occupants Household composition Employment Income Energy habits CSIRO attitudinal questions Attitudes to energy behaviours Energy knowledge Energy behaviours Program feedback Bill size and frequency Bill control Comfort Motivation Opportunity Ability
System generated: Identifiers Sign-on timestamps Age Treatment group ID	Energy behaviours Energy knowledge Bill control Comfort Motivation Opportunity Ability Price concern Social norms Self efficacy Stages of change Involvement with communication Word of mouth Game amusement value Game social value Game information value Game challenge Game feedback Game behaviour monitoring Value perception of rewards Game usage	System generated: Reward records	Program support: Energex Positive Payback rebate data	System generated: Survey timestamp Reward records
Analytics: Comms (sent, open, click-throughs) Google analytics (referral source, time on page, sessions and visits)	Gaming behaviour Digital literacy Household budget items Internet necessity Energy meter type Bill size and frequency Energy retail Program referral source	Analytics: Game play duration Game points Game session numbers Characters selected Badges attained Comms (sent, open, click-throughs)	Program support: Customer support Reward fulfilment	Analytics: Comms (sent, open, click-throughs)
Program support: Customer support	System generated: Identifiers Survey timestamp Reward records	Program support: Customer support Reward fulfilment	Program support: Energex Positive Payback rebate data	Program support: Customer support Energy consumption data Reward fulfilment

Data collection legend

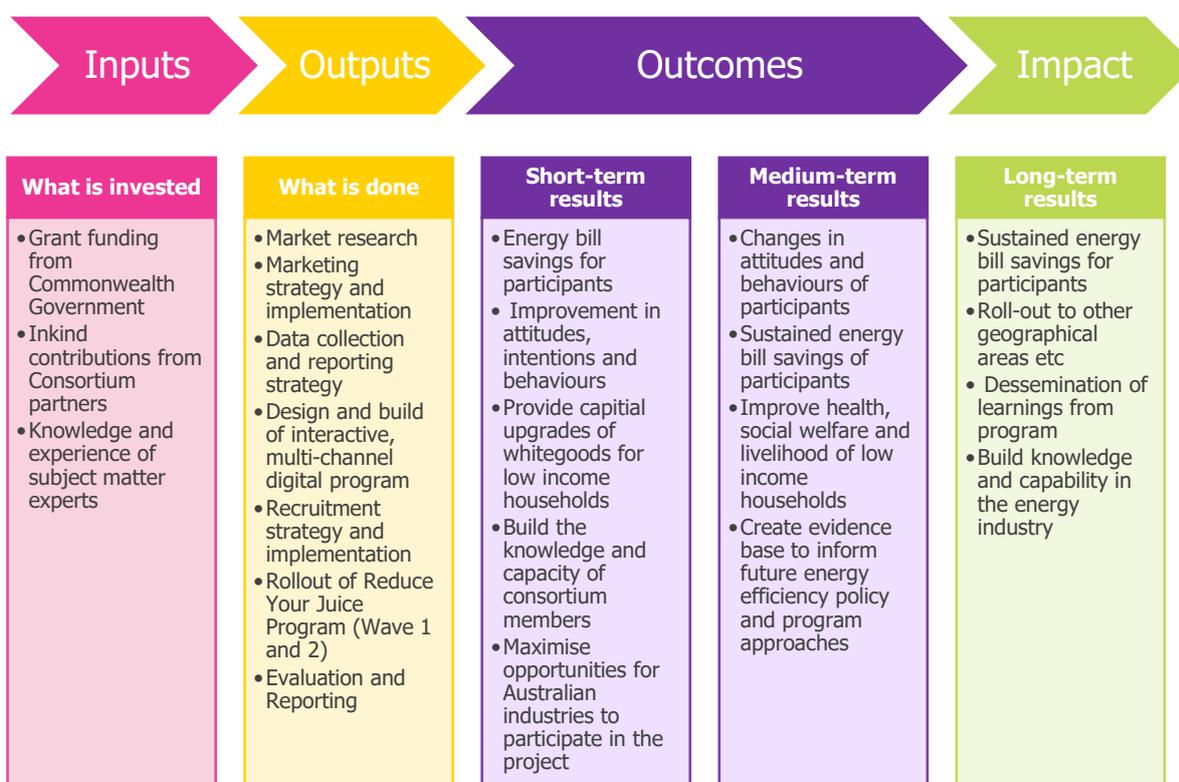
- **Participant data:** information provided by RYJ participant
- **Analytics:** data collected from game play, email communications and Google analytics
- **System:** data that was generated, defaulted or calculated by the system
- **Program Support:** program support data (customer support, reward fulfilment, energy consumption data)

5. Evaluation

Selecting an appropriate and rigorous evaluation approach is critical for determining the effectiveness of a program. Many social marketing programs do not adequately plan or resource the evaluation component which leads to a lack of scientifically rigorous evidence or the measurement of the wrong outputs. The ultimate result of this flaw is an inability to determine if public funding has been well-spent and if the program has indeed achieved the desired objectives in a credible manner. Thus a significant amount of time and resources were invested in determining the evaluation approach for RYJ.

The approach selected was the logic model, an approach used by funders of complex social programs both in Australia and internationally to evaluate the effectiveness of the program. The model consists of four stages that are causally related; inputs, outputs, outcomes and impact. The first stage is the most controllable and is short-term while the final stage is the least controllable and is long term. The level of difficulty of measurement increases at each stage of the model. The first two stages inputs and outputs are process measures and should be measured progressively to enable non-linear development. The use of two waves of implementation with the first wave being a smaller pilot enabled process evaluation to be undertaken with adaptive changes made prior to full implementation in wave 2. The second two stages are outcome measures and are the core of overall evaluation.

Logic model of RYJ evaluation



Measures

To overcome common method bias, there were multiple forms of measurement used; self-report instruments, energy usage data, SMS and email communication, Facebook engagement and game analytics. All data was linked to the unique participant ID enabling data matching to occur as well as triangulation.

Qualitative feedback mechanisms were built into the program and the post program survey to observe and gauge participant response. This included an online Facebook community and feedback through email, survey responses and a customer support service.

The measurement instruments were selected after a twelve-month intensive search in the literature to identify best practice for assessing the key variables of interest. The measurement instruments were previously validated in published peer-reviewed journal articles. The measures reflected a range of different types of sources.

Source of measures

Measure	Stage of program
Demographic and household profile	Registration survey
Age	
Income	Post-program survey
Occupation	
House size	
Number of residents	
Household Info	
Stage of change	
Household Budget Items	
Energy use	Registration survey
Self-reported energy behaviour	
Current energy consumption - Energex	Energex data
Current energy consumption – electricity bill	
	Post-program survey
Energy attitudes and knowledge	Registration survey
Energy Knowledge	
Attitudes	Post program survey
Intentions	
Psychological factors influencing energy attitudes and behaviours	Pre-program optional survey
Bill Control	
Comfort	Post program optional survey
Motivation	
Opportunity	
Ability	
Price Concerns	
Social Norms	
Self-Efficacy	
Technology literacy	Post-program T2 survey
Smartphone usage	
Mobile gaming skill	
Feedback on program	Post program survey
Involvement with communication (Powerhacks)	
Word-of-mouth (program)	
Satisfaction with program	
Customer value derived from the program	
Value perception of program rewards	
Design principles audit	
Innovative	
Fun and entertaining	
Relevant	
Easy/simple	
Responsive	
Informative and positive	
Game analytics	During program
Game sessions	
Game duration	
Badges	
Scores	
Status levels	
Avatar selection	
Game preference	
Communication analytics	During program
Email open rates, click through rates	
Facebook analytics: clicks, likes, comments, shares, messages	
Sentiment	

Social marketing approach

Using the results from the qualitative and quantitative research, a social marketing strategy was undertaken to provide a path to achieving the objectives of the LIEEP project. The goal was to create a unique and innovative approach that provides a relevant, meaningful and purposeful experience for the target group.

The strategy informed the design and development of the program and incorporated aspects of social marketing, behaviour change, communications, psychology, and digital thinking. Central to this strategy was the identification of an appropriate theoretical framework that reflected customer insights, showing a low level of involvement with reducing energy consumption.

A 'User-Centred Approach' was employed whereby the 'target group' or 'user' was placed at the centre and the program built around them, taking into consideration both their unique needs and limitations. To deliver this approach, CitySmart acquired a deep knowledge of the target group, to understand their digital and energy attitudes, behaviours, enablers, drivers and barriers. With a strategic design rooted in the principles of proven behaviour change approaches the program was designed to be convenient, fun, addictive and rewarding.

The program uses intrinsic and extrinsic motivators to engage and inspire the group, through a digital engagement approach aimed at changing a number of key energy behaviours that deliver the highest impact in energy reduction within the control of a renter.

Agile marketing

An agile marketing approach was taken to program. This was especially relevant given the innovative, experimental nature of the program and number of unknown or unproven elements being used.

The marketing strategy was used to underpin development of the program, however a philosophy of responding to change, instead of stringently following a plan, was key to the innovative process. As elements in the project were progressively decided or altered, the team was prepared to change priorities.

Acknowledging the unknown elements in advance, the program delivery was broken into 'waves' of participants, where a smaller initial cohort of participants could be used as a pilot that would allow for monitoring and improvements to be made to following waves. The digital execution of the program supports this approach, with data designed to be monitored and analysed for iterative improvements. Program KPIs and check points were built into planning and the skills of the cross-functional team used to regularly monitor, evaluate and respond to conditions quickly.

While RYJ is built to appeal to a demographic target market, the program needs to work for different types of participants with differing lifestyles. Attempting to predict the behaviour of a broadly defined target market is problematic and talks to the need for a holistic view of customer behaviour.

Customer-centric

A core premise of development for the RYJ program was to always put the customer at the heart of the approach. The program sought to understand and respond to the needs of its participants in order to achieve its objectives. To help achieve this, the program was developed with the view that simplicity is essential to the customer experience.

With the digital landscape evolving quickly over the course of the project, RYJ borrows from elements of Design Thinking which is human-centred, purposive, iterative, creative and analytical. Design Thinking sees activity as ultimately social in nature with the customer at the centre of the experience. Using a similar 'build-measure-learn' feedback loop, RYJ was created with a philosophy to test, learn and improve throughout the development of the program.

Customer insights

Placing the customer at the heart of the approach, a substantial piece of market research was undertaken with representatives of the target group to more fully understand their lifestyle and relationship to energy efficiency. The combined qualitative and quantitative research results were used to create customer insights for the RYJ target group, which informed the creation of a marketing strategy using an evidence-based approach. A high level summary of the customer insights is included in the table following.

Customer insight	Examples
Cost of living challenges	<ul style="list-style-type: none"> • In terms of household bills, energy bills were second only to rental expenses. • High amounts of underemployment and unemployment. • Lack of control and stability, due to income versus cost of living, as well as employment and rental situation.
Digital footprint	<ul style="list-style-type: none"> • As members of Generation Y, the group enjoys instant gratification. • Unlike the traditional picture of low income earners, they were materially endowed, with a high number of devices and appliances in the home. • Highly digitally engaged and connected, prioritising social connections and entertainment. • In terms of material possessions, the group don't identify as 'low income'.
Energy mindset, knowledge and behaviours	<ul style="list-style-type: none"> • Many felt their electricity bills were higher than they would like and wanted to lower them. • Lack of certainty over how much energy different appliances used. • Low confidence in things they could do to save energy. • Most believed they were already doing all they could to save energy. • Motivations to save energy was financial, the environment was not a consideration for most. • Most saw energy as a necessity to maintain a level of comfort and lifestyle and had ingrained energy habits. • Low interest and involvement in energy.
Control	<ul style="list-style-type: none"> • The group were sceptical of government programs and authority. • Felt they were victims of energy companies and prices and therefore there was not much they could do.

Segmentation

To improve the likelihood of success for the program, a segmentation of the target group was performed from the market research to identify those most likely to benefit from the program. The target group was segmented into three groups based on the size of their electricity bill (need) and their intent to reduce their energy use (interest). The three resulting segments were:

- **Whatevs:** lower bills, low intent to reduce energy use
- **Breaking Even:** medium bills, medium intent to reduce energy use
- **Help me!:** High bills, high intent to reduce energy use.

The segmentation helped show the variety of people within the target demographic and highlighted those most likely to participate and benefit from the program. The characteristics of the Help me! group was used to develop the marketing and recruitment strategies to target those most likely to benefit from the program.

		Intent to Reduce Energy Use		
		Low (1-4 rating)	Medium (5 & 6 rating)	High (7 rating)
Electricity Bill Size	Low (<\$301)			
	Medium (\$300-\$500)	Whatevs... (38%)	Breaking Even (34%)	Help Me! (28%)
	High (\$501+)			
		Avoid	Engage	Target

The Help me! group are characterised by:

- Higher energy bills, with difficulty paying the bill — above the average bills which increases with the number of people in the household
- Higher interest in the program
- 70% of this segment is aged 25–34 years
- Household composition is often families and single parents — where children are present and use electricity but do not contribute financially to the bill
- Spending more time at home – part-time employed, unemployed or performing home duties.

Behaviour change approach

The customer insights were then used to identify the appropriate theoretical frameworks to inform the underlying behaviour change approach for the program. The overarching customer insights on the role of electricity use in the lives of low income renters showed energy efficiency to be:

- A low involvement 'product' (until the bill arrives)
- low risk or consequence by not changing behaviour
- not central in people's lives
- something for which most were not willing to make effort to change or learn.

Behavioural learning approach

The research insights indicated that a 'behavioural' approach to facilitate learning and change would be more appropriate than a high involvement cognitive approach which relies on thinking and processing information. Therefore, a behavioural learning theoretical framework of instrumental (operant) conditioning was selected. This theory posits that individuals are motivated by rewards following a behaviour rather than information or attitude change. With the target group not being sufficiently motivated to invest time in acquiring knowledge, knowledge and attitude change was unlikely to precede behaviour - instead the behaviour precedes the formation of knowledge and attitudes towards energy. The second theoretical framework used reflected the nature of digital engagement; the experiential learning hierarchy whereby people learn by doing rather than from thinking.

These two behavioural theories were combined to form a fit-for-purpose program model to fulfil the project requirements and appeal to the needs of the target group - Instrumental learning (where behaviour is shaped through positive reinforcement and reward) complemented by an experiential learning approach (learning by doing).

Instrumental learning

Instrumental learning was incorporated to improve the likelihood that behaviour change will be sustained over time, with rewards and incentives used to encourage participants to perform positive behaviours and avoid negative outcomes. Positive reinforcement is used to shape the desired positive

(energy efficiency) behaviours whilst making the negative (high energy consuming) behaviours extinct.

This approach involves 'implanting' new ideas, as well as challenging old ideas and beliefs. Behaviour is reinforced in both the short-term (using positive feedback and earning rewards) and in the longer term as people use their energy efficiency rewards and see their energy bills decrease.

Experiential learning

As a digital interface is the primary means of engagement for learning, the experiential learning hierarchy was particularly relevant (Do-Feel-Learn). Knowledge is acquired after the behaviour and is more 'incidental learning' rather than cognitive learning. The experiential learning hierarchy-of-effects places the behaviour and the emotional response as a central aspect of attitude formation, with people learning and acting due to their direct experience and as an integrated function of thinking, feeling, perceiving and behaving.

Knowledge is created by the interactions between an individual's subjective, personal experiences and their environment. This includes an element of observation and reflection, where people derive meaning from their direct experiences. People learn through a continuous, adaptive process where ideas are formed and reformed through experience, implying that all learning is relearning.

Reflection and further learning can be facilitated and enhanced using continual feedback – an essential element to reinforce and progress learning. Using immediate, personalised, relevant feedback the link between action and effect can be enhanced to improve the consciousness of behaviour.

Target behaviours

Methodology adapted from Community Based Social Marketing (CBSM) was used to ensure the intervention would be targeted towards the best areas for change for the target group. A large number of potential behaviours were analysed and scored based on their impact (cost saving), ease of change (including barriers and benefits), and penetration within the target group. The complexity and nature of performing each behaviour was also considered as part of the analysis (e.g. simple, short term, complex, repetitive, long term, or habitual).

Behaviours were shortlisted based on their scores with priority given to the cost benefit and ease/likelihood of performing the behaviour. Following the scoping session, behaviours were logically grouped into 3 clusters which formed the primary focus for the program:

Cool

- Use a fan rather than the air conditioner
- Set your air conditioner to 24 degrees in summer

Switch

- Switch off lights
- Switch off appliances to avoid standby

Wash

- Use a clothesline or drying rack, rather than the dryer
- Wash full loads of washing
- Wash in cold water

From the short list, additional supplementary behaviours were also included to help provide context and further demonstrate and reinforce the primary behaviours:

Cool

- Close curtains and blinds to keep the temperature down
- Close windows and doors if using the air conditioner

Switch

- Turn of the second fridge/freezer

Wash

- Take shorter showers (hot water use – target 4 minutes)

Stealthy learning

With the target group not particularly interested in energy efficiency or motivated to change their energy consumption behaviours, the program sought to take a stealthy approach to behaviour change by making things easy, fun and worthwhile for participants. To encourage participants to embrace learning in a low involvement category, the program drew upon participants' intrinsic motivations so they want to learn for themselves rather than feeling forced to learn or change. To avoid being perceived as forced change or work, the program replaces traditional terminology such as 'behaviour change', 'learning' and 'challenge' with more playful and proactive terms such as 'Powerhack' and 'Energy Quest' to help engage people on their own terms.

RYJ makes energy efficiency interesting to participants using a fun and entertaining approach and provides participants with a meaningful benefit for changing their behaviour (cost savings).

The behavioural learning approach for RYJ is a combination of instrumental and experiential learning done in a discrete way (stealthy learning) whereby participants do and experience (virtual world of game), reflect and analyse, conceptualise and then apply and experiment (real world), see following model.

RYJ behavioural learning approach



Program design

Following the development of customer insights, segmentation and a behaviour change approach for the intervention, the design of the program was undertaken. In developing the program intervention, the limited success of previous traditional information-based energy efficiency programs and campaigns was acknowledged and examined to learn from past shortcomings.

RYJ sought to create a new and innovative approach to the issue of energy efficiency using a combined digital program intervention to change the behaviour of the target group based on a unique and purposeful behavioural change model.

Program insights

To examine the market and learn from the successes and failures of other programs, a best-practice review was undertaken of a variety of popular and effective interactive digital programs (both commercial and social marketing). This review included sustainability, health, safety and travel programs as well as popular apps and games. The programs were examined to identify the key elements of best practice that should be incorporated into the program, with the common elements identified as:

- A simple, visual approach
- Use of tailored, interactive features and content
- Continuous engagement and reminders
- Online community / collective engagement
- Customised, instant feedback
- Social sharing and pledges
- Use of brand advocates
- Motivation and encouragement
- Ability to meet the needs of those at different stages of the journey
- Use of progression and reward or an aspect of competition.

Program design principles

Based on the research and insights, guiding program design principles were developed to underpin the development of all aspects of the program.

RYJ set out to be:

Innovative

- Create a new, novel way of interacting with participants to achieve behaviour change.
- Present information in a different, clever and novel way which provides value to participants – we are not reproducing the same old energy efficiency information.
- Use digital channels in a new, fit-for-purpose way which suits the nature of energy consumption for the target group.

Fun and entertaining

- Use fun to engage participants and build intrinsic motivation to change.
- Remember that despite energy being a big cost impact, the target group are not very involved in energy.
- Be interesting, use entertainment to engage with the audience as that's what they care about.
- Engage participants with irreverent content that is entertaining yet meaningful.

Relevant

- Provide a tailored and personalised experience that caters to the nature of energy use (invisible, intangible and not talked about or valued).
- Participants may not care as much about saving energy as the implementing team does. Use language and style that talks to the audience; be fun but useful.
- Tie into the current popular events and sentiment to take advantage of current excitement and popular sentiment that can give RYJ's content social currency.
- Help make energy visible and talked about. Use a community to encourage collective peer engagement and content that was more relevant and impactful.

Easy and informative

- Make it easy for participants so they didn't have to put in too much effort.
- Focus on the right behaviours to have the biggest dollar impact, break down the barriers, and reposition the benefits in a meaningful way.
- Provide the right experience to help participants learn.
- Deliver content in short bursts that can be consumed in downtime to fit in with people's busy lifestyles.
- Keep it simple (not simplistic), use a visual execution to cater for short attention spans.

Responsive

- Respond to participants' needs.
- Take a flexible, agile approach to marketing. Test, fail quickly and improve and evolve content that works.
- Make the experience as interactive as possible with two-way feedback and responsiveness.

Positive and helpful

- Be helpful but not annoying, encourage and support participants on a journey to build learning and improve confidence.
- Feedback to give recognition and reward, make people feel good about their achievements to further motivate action.
- Be credible and trustworthy (RYJ is impartial), avoid authoritarian style to counter potential scepticism.

Engagement approach

Rather than using a single element intervention, RYJ employed a combination of interventions with a mix of relevant behaviour change tools for the target group. To create an intrinsically motivating experience for participants, RYJ brought together a unique mix of serious games and gamified program elements such as community, communications and rewards.

An engagement strategy was used to break down audience engagement into discrete stages to decide the best approach for each different step, and consider barriers and incentives to progressing participants through each stage towards their final goal. RYJ sought to continuously engage participants over the length of the program so they can make better decisions about their energy use in the longer term to secure lasting energy savings and become more independent. Breaking the program into components made it easy for participants to interact with the program in their downtime so it was more manageable and achievable to complete the program. Stages include:

- Recruitment
- Registration

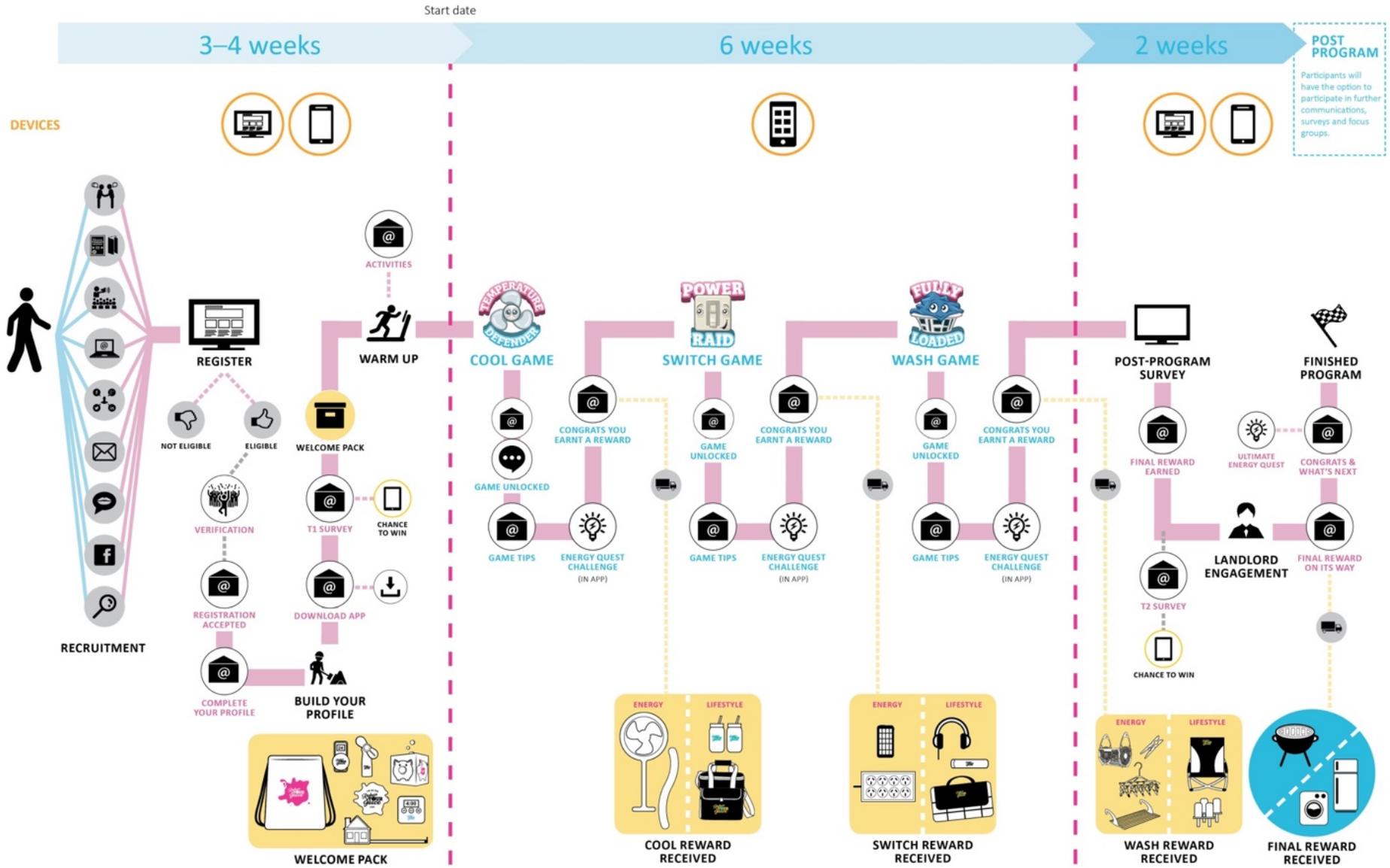
- Pre-program survey
- Warm up
- Digital program – games, communications, rewards
- Post-program survey
- Wrap up.

A progressive journey

The program was designed to progress participants through a journey in small achievable portions. This fractured approach is designed to fit seamlessly into participant's lifestyle. Much like levels in a game, the program is designed to progress participants through stages using communications, incentives, feedback, reminders and rewards. Each major step is rewarded with both tangible and intangible rewards to provide feedback and a sense of accomplishment for participants as part of their overall journey.

Program elements were designed to provide participants continual feedback and recognition of their achievements. This continuous, incremental progress built intrinsic motivation and made change seem achievable for participants. By completing smaller, easier tasks first and increasingly working towards more challenging actions, participants progressively built their self-efficacy and developed a sense of control as they progress through the program. Messages aimed to improve participants' self-efficacy so they could build their knowledge and feel more confident and empowered in their actions, thus improving the likelihood of longer term change. The detailed customer journey overview map is included following.

Customer journey map



Program elements

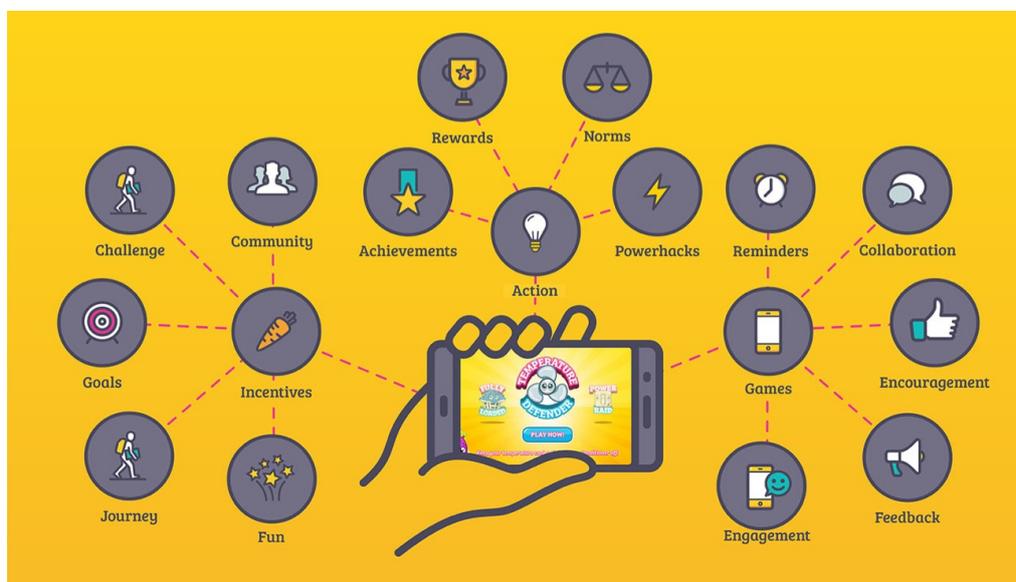
Brand, language and narrative

The RYJ brand underpins the foundations for the program, tying together key elements to create an engaging customer experience to resonate with this target group.

A brand strategy includes the brand story, which is the central narrative for the program: take back the power; reduce your juice. In this way the RYJ brand is a program brand, serving as an authentic call to action. Brand benefits, personality and values were prescribed to guide the development of key messaging and language for the program that aligned to the target group's needs. Messaging was designed to be supportive, empowering, simple, positive and fresh and the brand style was fun, vivid, and personal to achieve cut-through, build interest and motivate action.

Games and gamification

The RYJ program uses a mix of behaviour change tools and techniques including games, gamification, communication and rewards to encourage engagement and progression through the program.



The nature of energy efficiency being invisible, intangible, low involvement and not highly discussed or valued lends itself to the use of both games and gamification to create a fun, interactive and engaging experience to drive behaviour change.

The distinction between *games* and *gamification* should be noted at this point.

- Serious games involve simulations of real world situations to help solve a problem, in contrast to games designed for entertainment purposes.
- Gamification is the application of game design elements such as point scoring, levels, rewards and rules of play, to encourage engagement with areas of non-game related activity, such as energy efficiency.

Serious games

The RYJ mini games form a core component of a broader gamified program. RYJ uses 'serious games' to virtually engage players to learn about the energy efficiency behaviours targeted. Serious games involve simulations of real world situations to help solve a problem, rather than being a game designed for entertainment purposes.

Serious games are particularly relevant given the invisible, intangible nature of energy consumption in the real world. RYJ employed three mini games to 'virtually' engage participants in the three key areas for behaviour change, using simulation to demonstrate and reinforce energy related concepts such as cause and effect of behaviours on energy consumption.

Games were designed to be intrinsically motivating for players as they provided a sense of satisfaction and achievement, and built competence and recognition for doing the right thing. The games used mechanics to engage participants in fun, challenging, addictive and rewarding game play designed to produce a positive and creative experience to encourage learning. Players received immediate feedback and were rewarded for their actions to build a sense of personal control over the activities and outcomes. Participants played each of the games one at a time to focus their attention on each area for two weeks. Each new game 'unlocked' after participants completed the previous game, providing a sense of anticipation and a reason for repeat engagement.

Feedback components such as points, badges, sounds and effects were used to reinforce the behavioural learning by providing positive and negative feedback to different game play actions. These elements act as engagement loops to provide continuous, immediate feedback that facilitates learning-by-doing. Game badges were included for a range of game play skill based actions, as well as other non-skill related actions such as playing the game for the first time. This ensures players were not entirely rewarded based on how good they are at playing the games, giving all players a more equal chance of earning these rewards. Two game play time-based badges rewarding 10 and 30 minutes of play were added as enhancements to the app for Wave 2 participants in response to players having difficulty gauging how long they had played.

Avatars were used to give participants the choice of a character in the game to make the experience more engaging. The Watt family are fun, colourful characters that are anthropomorphised so that participants can relate to them.

As the games are helping participants learn how to *save* energy, the common virtual currency of 'juice' was developed to signify energy across the games so players could learn what impacts their energy through the different elements of game play. Having virtual currency is used to help fill a knowledge gap for the target group as it builds an understanding of how energy is consumed. The 'juice bar' is a common element through all games which is similar to an energy or 'life' mechanic often used in games. Once participants use all their juice through different game actions, the game ends which reinforces the need to save energy.

Whilst each game has instructions to walk players through how to play and achieve the (learning) objectives, games were built using simple, commonly understood gaming premises to make it easy for players to understand how to play. For example the Cool game, Temperature Defender, used the premise of Space Invaders - letting the (bad) suns through had the negative effect of heating up the room and making the evil 'scare conditioner' appear and use a lot of juice, while allowing the (good) ice cubes and fans through had a positive impact of keeping the room cool and using less juice. The fan is used a positive element to reinforce it as the hero over the evil villain to reinforce the behavioural learning.

Game scaffolding (a common element used in game design) was used to assist in on boarding players into each of the games, making the games easier to play and understand. In addition to instructions, scaffolding came in the form of fun, punchy educational messages displayed directly prior to each

game play session (as the game appears to load) which makes it easy for players to understand the ensuing game play and learning goals.

Game play actions were rewarded using a feedback system of points and badges to recognise players' achievements. Players received scores for achieving challenging aspects of the games and badges were used to recognise a range of different non-skill based achievements such as playing for the first time and making it halfway, as well as game skill achievements based on each game. To aid in the larger engagement and progression of players over time, status levels of bronze, silver and gold were awarded based on the number of badges earned. Players on the lower levels of achievement were enticed to progress to higher achievement levels by taking further action. The idea that other participants were doing better than them was used to motivate repeat action to attain higher status levels.

Gamified program



RYJ uses a combination of gamified elements to create a consistent, multi-faceted experience for participants. Gamified program elements use components of game design to engage participants to change their energy behaviour. In addition to the RYJ app games, these elements include the community, Powerhacks and quests, and rewards which are connected using communications (email, social media, SMS, push notifications and surveys) to create an integrated, programmatic experience.

Communications

Program communications were gamified as part of the approach to behaviour change, incorporating the language and game narrative to broaden the game experience across multiple channels. Communications used the graphical style from the games along with fun, simple language designed to make the subject matter easy and engaging for participants. Consistent visual language used throughout the program was bright and vibrant, with brand elements such as the Watt characters designed to make it more personal and bring energy efficiency to life.

Like the app games, the digital communications were delivered in short bursts designed to fit in with participants' lifestyles. While communications were delivered in a fun and entertaining style, they were always used to serve a specific purpose in the program and provide value to participants. Key messaging took into account the needs of participants at different stages of the program, such as encouraging participation, supporting learning, enabling progression, facilitating feedback or to maintaining sustained engagement over time.

In addition to linking core elements of the program, communications were designed to keep participants engaged over time and progress them through the program journey. Email and social media communications kept participants informed about the current stage of the program (game unlocked, game ending soon), reminded them to play more to progress, and rewarded them for their accomplishments.

Communications channels provided a direct link which brought participants back to the app games over the program, rather than relying on participants to remember to use the app. Email and Facebook messages were used to provide further context to the game play learnings and prompt participants to reflect and draw meaning from their game experiences. Messages reinforced how to

play and gave game tips aligned to the learning objectives. Communications were a vital connection between the online world of game play and participants' real-life behaviours and environment, helping participants conceptualise the simulated behaviours more realistically in their own environment and giving them ideas to 'apply and experiment' the new behaviours in their own lives.

The customer support function for the program was delivered via digital communication, providing participants assistance with program issues or questions via email and social media. The customer support function was an essential channel for gaining customer feedback and insight during the program.

Community

The community element was used to draw together various elements of the program within a collaborative, shared environment for participants. A RYJ Facebook page was used to reach participants in an environment where they spend time, making it easy for them to follow the program and engage with content.

A Facebook presence provided the opportunity for two-way interactive dialogue with participants and for peer sharing amongst participants and their own social networks. The RYJ Facebook community was used to provide participants with deeper levels of engagement and support the behaviour change goals of the program. The Facebook community adds a different channel for participant feedback that provides a rich source of qualitative data for analysis.

With the nature of energy consumption being invisible, intangible and rarely discussed, the community adds a new dimension to the program which elevates the visibility of energy consumption amongst similar households and starts a discussion to help participants understand and learn more about energy.

To help participants engage with a deeper level of energy content beyond the RYJ app games, the social media community is used to provide Powerhacks and Energy Quests for participants to broaden and contextualise their learning and offer practical ways to put these learnings into action in the real world. The community directly ties into the game experience by providing notifications, reminders and direct links to game play as well as leaderboard style posts of participants' game achievements.

A core function of the social media community is to support the behaviour change approach by providing an element of social norming for participants. The community creates a shared experience for participants as they go through the program together with a similar group of people, working towards a shared goal to reduce their energy bills and earn the final reward.

The content and interactions help establish and reinforce social norms in a largely invisible and undiscussed area of behaviour, providing participants with an idea of what is normal when it comes to energy consumption and efficiency. With participants able to seek out information, opinions and support from peers in similar circumstances, the community promotes peer engagement through sharing and support. While RYJ content starts the conversation with participants, the ensuing conversation is mainly amongst participants and their peers, adding to the non-authoritarian feel of the program. The community also provided a channel for customer support, as participants asked questions and made enquiries. The data was used to help improve program communications as part of the agile marketing approach.

Challenges and quests

'Powerhacks' were used throughout the program to align with the game learnings, providing extra information and practical ways to trial behaviours. These gamified 'lifhack' style shortcuts/ cheats/ tips/ tricks gave participants easy to use tools which closed the loop of experiential learning, allowing them to put the new ideas and behaviours they had learned into practice. These fun and different ideas were designed to challenge old beliefs, myths or misconceptions and break down any real or

perceived barriers around the behaviours. Powerhacks presented smarter ways of doing things for participants in a non-preachy manner to help change old or engrained habits. They worked to build people's sense of control over their actions and normalize the behaviours as if they were the only/right/normal/preferred option – a new normal way of doing things. They also provided participants with broader, added benefits that were not always related to energy to give participants more reason to uptake them.

Several small challenges were built into each game/ area for behaviour change, designed to motivate participants to apply the right behaviours at home. These Energy Quests were delivered as social media posts as well as in the app as 'Energy Quest' pop up messages to motivate participants to perform the associated behavioural actions in their lives. For example, in Power Raid (switching off/standby power) participants could 'break up' with an energy guzzling appliance to win the 'Ultimate Break Up Pack' (including Tim Tams, Ryan Gosling photo, the Notebook DVD, Taylor Swift CD, tissues and chocolates).

As part of the gamified approach, the landlord engagement component of the program (research question 3) was themed as 'The Ultimate Energy Quest', designed to motivate participants to engage their landlord to take up one of the Energex Positive Payback offers to earn themselves a \$100 reward.

Rewards

Incentives and rewards were used throughout the program to promote interest, motivate action and shape behaviour by reinforcing positive outcomes. The rewards system was designed to provide participants with tangible benefits for completing program actions to inspire further action.

To pique interest and drive involvement in the program, rewards products were used during recruitment as incentives for participants to take action and register. Providing an extrinsic motivator in combination with elements of fun and entertainment gives participants a reason to participate in a program that may otherwise be considered of low interest.

Tangible products are used to reward participants for completing stages of the program. Rewards aligned with each game/ cluster of energy efficiency behaviours to further reinforce change. For example, by completing the stage focused on washing and drying behaviours, participants unlocked a Fully Loaded pack containing drying racks, pegs and basket to help them implement their learning and behaviours. Rewards were designed to progressively reinforce participants' achievements over time to build a sense of achievement to motivate progression through the program towards the final goal. Earning rewards helped participants improve their self-efficacy in relation to associated behaviours and feel empowered in their actions.

To create an element of surprise, the minor rewards packs were not communicated in advance so that when packs were received participants were delighted and rewarded for their efforts, to inspire further action and progression. Rewards products were accompanied by print materials which included a related Powerhack to further reinforce learning. Once installed and used, the rewards products served as in-situ prompts to remind participants of their achievement, learning and positive behaviours.

Whilst extrinsic motivators were used throughout the program, the core focus remained on creating an intrinsically motivating experience for participants to ensure they found their own internal reasons to take action and maintain the behaviour. Using the principles of gamification for these elements helped make the program experience fun and motivating for participants.

A reward fulfilment process was developed to administer and manage the rewards component of the program. The customer support resource used the CRM to manage reward fulfilment with external suppliers. With sizable final rewards on offer, the fulfilment of these major rewards was outsourced to

The Good Guys, who provided expertise in this area as one of Australia's largest suppliers of whitegoods. The Good Guys managed participants directly regarding their final rewards, ensuring expert advice was given in the administering of the like-for-like exchange of whitegoods for successful participants. Managing this process externally allowed RYJ resources to focus on core elements of the program and ensures a positive experience for participants.

Recruitment approach

Significant resources were devoted to creating a successful recruitment approach for the program, including CitySmart marketing resources and a dedicated QCOSS resource to work with community agencies.

Originally RYJ planned to run three separate 'waves' of the program intervention, with the initial wave serving as a pilot round, then the next round accommodating the majority of participants once any issues had been ironed out and improvements made. A third wave was a back up to allow for any additional participants to be recruited to meet the recruitment target of 1000 participants.

Having discrete waves of the program was conceived to put groups of participants through the program together to create a shared experience for participants whilst allowing for efficiencies in managing the program and delivering rewards.

Following the shortening of recruitment timeframes due to project delays, the recruitment period was compressed into two waves, with the initial phase targeting $n = 350$ and the second phase targeting $n = 650$ participants to reach the target of 1000 program participants. The shortening of recruitment timeframes added extra pressure to the recruitment approach that was compounded by the involvement of multiple unknown factors. As such, a well thought out, agile approach was essential to delivering large numbers of participants within the recruitment timeframe.

The recruitment phase of the project ran prior to each wave of the program intervention beginning, allowing potential participants to register to take part in the program. These two recruitment phases occurred while the project was infield; the first in April and May 2015 and the second, and final, from August to September 2015.

Wave 1 recruitment strategy

The recruitment strategy used a prioritised, multi-channel approach to recruit participants into the program. This approach was activated infield through agile and responsive planning and provided real-time data to test assumptions, monitor outcomes and make appropriate changes to recruitment activities.

CitySmart worked closely with QCOSS to gain insight into the community sector to understand how community service agencies and organisations could be engaged to act as recruitment partners for the program. Community service agencies were used to provide direct access to the target group through their own channels. These agencies were seen to provide access to the target group as a trusted face-to-face network where client relationships could be leveraged to provide personal referrals to find suitable participants to take part in the program. Their financial support, employment and housing programs and services were found to be most relevant to the life stage and mindset of potential participants, providing access to the 'Help me!' segment of ideal participants. Recruitment activities were aligned with these life-enhancing programs in order to target ideal participants to take part. Ideal participants for the program were identified as being more stable in their lifestyle (not in crisis) and be actively seeking positive improvements in their lives.

In addition to community agency partners, the recruitment strategy incorporated a number of different recruitment channels to not only minimise the risk but to test engagement between digital channels and traditional channels for the target group and provide multiple touchpoints of access.

Multiple touchpoints

It was essential to build multiple touchpoints with the target group during the recruitment phases to improve the likelihood of registration. The strategy employed multiple channels to provide touchpoints with potential participants that would convey and reinforce program messages, build

brand/program familiarity and engage the target group through different channels to register to take part.

Prioritised channel mix

Recruitment channels were prioritised based on:

- optimal access to target group
- anticipated conversion rate (registration volume)
- ability to control (increase or decrease) recruitment efforts in response to infield performance to achieve participant numbers for each wave
- cost (based on additional investment requirements to QCOSS consortium partnership).

Recruitment channels

Tier 1 Personal referrals

Direct, verbal recommendations from community service agency staff who work with the target group.

Tier 2 Database targeting

Different databases were used for direct mail or email communications. These databases were segmented where possible to meet target group criteria (low income, age group and location).

Tier 3 Advertising

Broadcast media channels both through community service agencies and media channels such as Google search engine advertising and Facebook.

Agility

As RYJ was a new and unique program, there were multiple unknown and untested factors which influenced the recruitment of participants, including the conversion and response rates of different channels for a program of this nature. To address the unknown and untested factors, it was vital the recruitment approach was agile and could respond quickly and easily while infield to meet targeted participant numbers.

Clear recruitment targets

Research conducted helped to predict and pre-empt as many factors as possible, including the response rate of participants registering for the program through different channels. This established clear recruitment targets for activities and response rates to be monitored and evaluated against. Weekly targets were established for registrations that would meet the desired number of registrations within the allocated period.

Built in flexibility to 'change direction' depending on response rates

Recruitment activities were planned and developed with flexibility – an ability to respond to infield performance and be 'turned on or off' depending on participant numbers. Scenario planning assisted the establishment of recruitment targets, including conversion rates and length of time for conversion. This was designed to trigger different responses plans aimed at increasing or decreasing recruitment activities to gain or slow participant registrations. For example:

If participant registrations were too low, new and additional channels would be activated to increase advertising reach and frequency to help increase sign-up numbers.

If participant registrations were too high, the ability to stop advertising and recruitment activities through channels and agencies was also built into recruitment planning.

KPIs were then monitored closely from day to day so that infield performance could be responded to in order to achieve the number of participants targeted.

Flexibility and continuous monitoring

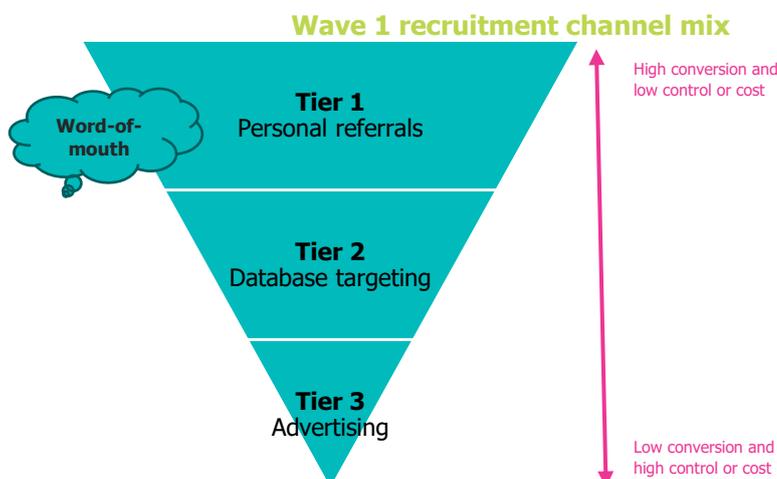
Activities with unknown response rates were 'tested and monitored' over short periods of time (2-7 days). This allowed the testing of different channels and activities with real time feedback that was analysed and responded to based on performance.

Real time feedback was critical, so analytics were built into each recruitment activity in the planning stage to allow for effective monitoring. Traditional methods of reporting such as verbal feedback were avoided in favour of digital analytics. This was essential given the short timeframes for recruitment into the program and provided unbiased, immediate feedback for analysis. The use of real time digital analytics allowed for quick response to infield conditions to meet KPIs.

The agile recruitment approach allowed for a quick response, when registration numbers slowed or dropped due to unsuccessful recruitment activities. The marketing team established contingency plans and additional recruitment activities for implementation based on infield registrations. Creating an agile approach from the outset allowed the team to be prepared and responsive at short notice to meet emerging conditions.

Recruitment plan - Wave 1

During the first period of recruitment, the use of different channels was prioritised (Tier 1 to 3) to create a variety of touchpoints with the target group, which was considered essential to improving the likelihood of registrations. The channel mix was prioritised based on the anticipated conversion rates of the touchpoints in each tier as well as their cost and ability to be monitored and controlled (i.e. turned on and off).



It was predicted that Tier 1 would be the main recruitment channel for the first wave and as such it was the main focus of recruitment activity. This was based on the understanding that direct referrals from community service agencies would hold more weight with potential participants and result in higher conversions, because of the strong, trusted relationship they have with each other.

Recruitment activities in Tier 2 were designed to supplement Tier 1 and included activities through community service agencies as well as other organisations, such as Australia Post.

Activities in Tier 3 would only be activated to increase registrations if recruitment targets weren't being met. Although this tier had touchpoints to a very large number of potential participants, low conversions were anticipated based on the broad and untargeted nature of the communication.

The first recruitment phase aimed to recruit 350 participants to the program with the remaining 650 to be recruited in the final phase.

A total of 34 community service agencies were engaged in recruitment activities for Wave 1. Each agency identified the recruitment channels that were best suited to their clients with many planning activities in both Tier 1 and 2. These planned activities would provide approximately 12,738 touchpoints with the target group and recruit the most participants for Wave 1.

Tier 1 and 2 activities planned for Wave 1 recruitment phase

Activity	No. agencies involved	Estimated reach	Anticipated conversion rate	Estimated sign-ups
Tier 1	18	3,605	15%	540
Events	6	1,427	15%	214
Meetings	12	2,178	15%	326
Tier 2	22	7,276	4%	310
Emails	5	408	4%	16
Mail outs	7	1,908	4%	96
Newsletters	10	4,960	4%	198
		10,881		850

Tier 3 activities included email campaigns through The Smith Family, Australia Post, Green Heart Life newsletter, EzyGreen database as well as flyers at Centrelink, Facebook advertising and Google AdWords. These activities aimed to provide an additional 118,791 touchpoints, which could be activated if recruitment targets weren't being met.

Tier 3 activities planned for Wave 1 recruitment phase

Activity	No. activities prepared	Estimated reach	Anticipated conversion rate	Estimated sign-ups
Tier 3	7	118,791	1%	1187
Email campaigns	4	82,591	1%	825
Events	1	200	1%	2
Facebook ads	1	34,000	1%	340
Google AdWords	1	2,000	1%	20

Planned recruitment activities were able to be monitored using:

- Feedback from community service agencies through QCOSS representative.
- SMS codes—provided on targeted DL flyer for selected agencies.
- Custom URLs—provided for email campaigns for selected agencies.
- Google Analytics—monitoring traffic to the RYJ website and goal conversions from different digital communications.

Throughout the recruitment phase, CitySmart monitored activities and response rates rigorously. Dates, times and the source of program registrations were monitored and assessed daily against the

recruitment targets. Recruitment targets for the first wave were based on the estimated conversion rate from the total number of touchpoints across all channels.

Established recruitment targets for Wave 1

Day 13	Day 16	Day 18	Day 21	Day 25
80	180	240	300	350

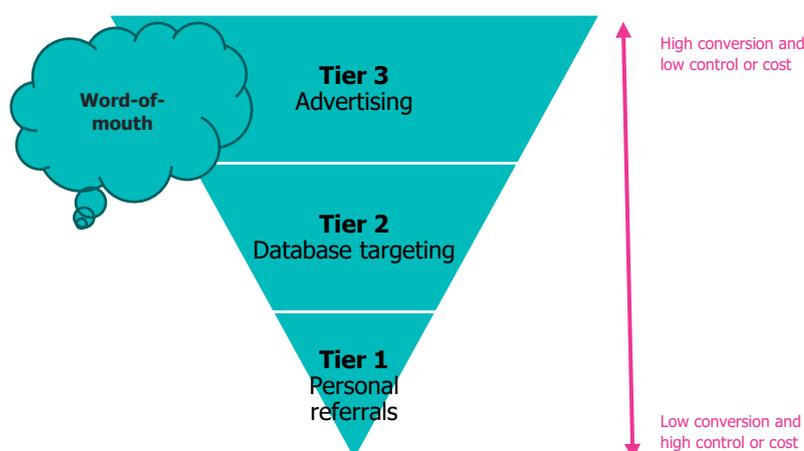
Note: The start of the pre-registration period is Day 1 of the Wave 1 recruitment phase.

A registration process was developed for those with and without Centrelink Reference Numbers (CRN) to verify their income eligibility to participate. In Wave 1, those with CRNs were able to enter their number into the registration form on the website. Those without CRNs contacted customer support and supplied additional information—ATO group certificate, pay slips or a letter of their job seeker agency—to prove their income.

Recruitment plan – Wave 2

As part of the agile approach to recruitment, the first recruitment period was closely monitored and evaluated whilst infield. Results were analysed and areas of improvement agreed for implementation during the second recruitment period. Based on the evaluation of the Wave 1 recruitment phase, the final recruitment phase re-prioritised recruitment activities from Tier 2 and Tier 3 with activities from Tier 1 supporting the channel mix and supplementing the recruitment targets.

Wave 2 recruitment channel mix



With a higher number of participants sought for Wave 2, the recruitment phase was extended from four weeks to seven weeks and ran from August to September. This allowed recruitment activities in the final round to be activated earlier and followed up with faster converting digital activities to drive a sense of urgency. The following key areas were re-prioritised in the Wave 2 recruitment approach:

- **Refined approach with agencies**

While promotion continued through relevant community agency programs and services, focus was placed on those providing financial support and family/parenting programs due to the high number of participants they provided in the first wave. A review of community service agencies identified the most appropriate agencies to engage for the second period of recruitment. Agencies whose resources were stretched were avoided so that planned activities had more chance of being delivered.

- **Word-of-mouth referrals**

Word-of-mouth was a relatively unknown and untested recruitment channel, however it was thought this channel could be a significant recruitment channel once Wave 1 participants received their rewards and began recommending the program to family and friends. The post program survey indicated 99% of participants had already mentioned the program to others and 96.7% would recommend it to friends and family. The survey also showed the majority of participants had spoken to between 1-4 people about the program, reinforcing the importance of word-of-mouth for this group. As word-of-mouth is considered a strong referral source for any product, program or service, a significant number of conversions were anticipated. To promote this referral method for Wave 2, a 'Refer a friend' competition was run through email and Facebook to incentivise participants to recruit family and friends for the final round.

- **Digital versus print**

The Wave 2 recruitment phase prioritised the use social media and digital communications (e.g. solus emails and e-newsletters) to recruit participants to the final round of the program. Mail out and events had a very low conversion rate in the first wave and won't be used for the final wave, unless required to boost numbers. Recruitment activities were targeted via relevant programs and services across each promotional channel. These program and services continue to be aligned to the interests and life stage of the ideal participant.

- **Psychographic targeting**

An evaluation of Wave 1 recruitment activities showed parenting/family support groups and financial programs were the most popular and successful at recruiting participants, so these activities were prioritised for the second recruitment period. As was the plan in Wave 1, additional recruitment channels were once again identified to assist in case of low recruitment numbers.

As the first recruitment phase exceeded its target of 350 to register 397 participants, the final recruitment phase aimed to recruit the remaining 603 participants.

A total of 27 community service agencies were engaged for this phase, seven less than Wave 1. This was due to some agencies being unable to participate, as well as the reprioritisation of others that were not as aligned with the target group's interests as previously thought (i.e. employment services and training providers).

Many community service agencies indicated they could promote through digital channels, which would reduce the impact of recruitment activities on agency staff and their general day-to-day business experienced in Wave 1.

Activities planned for Wave 2 recruitment phase

Activity	No. activities prepared	Estimated reach	Anticipated conversion rate*	Estimated sign-ups
Tier 3	14	198,900	1%	1,989
Email campaigns	6	96,200	1%	962
Facebook ads	7	32,700	1%	327
Newsletters	1	70,000	1%	700
Tier 2	13	4,428	4%	176
Emails	9	3,070	4%	122
Newsletters	4	1,358	4%	54
Tier 1	20	2,818	15%	422
Meetings	20	2,818	15%	422

	206,146		2,587
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*The anticipated conversion rate was based on the conversation rate with these activities in Wave 1.

Tier 3 activities included:

- Australia Post email
- Bubhub e-newsletter and Facebook
- Living in Brisbane newsletter (hard copy)
- Kids in the City Family Finance eGuide
- What's On 4 Australia solus email and Facebook post
- Green Heart Life newsletter
- Facebook advertising.

Planned recruitment activities were able to be monitored using:

- Google Analytics—monitoring traffic to the RYJ website and goal conversions from different digital communications.
- Custom URLs—provided for email campaigns for selected agencies.
- Statistics from Facebook Business Manager.
- Feedback from community service agencies through QCOSS representative.

As in Wave 1, activities and response rates were rigorously monitored and assessed daily against the recruitment targets.

Established recruitment targets for Wave 2

Day 7	Day 14	Day 21	Day 28	Day 35	Day 42	Day 49	Day 56
100	150	200	250	350	450	550	603

As in Wave 1, scenario planning was re-conducted to develop response plans aimed at increasing or decreasing recruitment activities to gain or slow participant sign-ups. If sign-ups were too low (i.e. recruitment targets not being met), additional Tier 3 activities would be activated to increase sign-ups. If sign-ups were too high or needed to be slowed, Facebook advertising would be stopped or the budget reduced and community service agencies would be stop their activities.

The Wave 2 registration process was modified for those without CRNs to streamline line the communication between the potential participant and customer support representative. The registration form was modified to allow registrations to be received without the CRN being input, and then once submitted participants would receive an email with instructions to provide an alternate form of income verification.

RESULTS

The following section provides an overview of the people who participated in the RYJ program, details RYJ participants' engagement with all elements of the program intervention and the resulting impact on behavioural and energy consumption variables. The results of the recruitment phases and the media and PR promotion of the program are also included in this section.

Summary

The results provide insight into the program's research questions:

1. Can a digital engagement learning program change energy consumption behaviours?

Results data from the trial supports the fact a digital engagement learning program (Reduce Your Juice) changed energy consumption behaviours.

2. What is the impact of communication and rewards on energy consumption behaviours of program participants?

Results data from the trial shows the impact of communication and rewards on energy consumption behaviours was significant in producing a 10.95% reduction in energy bills. However, results also show that there were not statistically significant difference between the four treatment groups suggesting an integrated digital communications and rewards approach delivered the result.

3. Does an incentive for participants a) generate contact with landlords to install energy efficient appliances and b) result in landlords implementing an energy efficient intervention to gain a rebate?

The trial shows participants significantly improved attitudes and could be incentivized to contact their landlords to install energy efficient appliances, however no landlords implemented the desired energy efficiency intervention.

A summary of the key results are summarized in the table below:

Summary Results Table	Interventions Group (RYJ participants)	Statistically Significant Difference?	Control group	Statistically Significant Difference?
Electricity bill savings (pre and post intervention period)	10.95% reduction	✓	5.87% reduction	✗
Habits	22.52% improvement	✓	9.73% improvement	✗
Attitudes	9.08% improvement	✓	1.29% improvement	✗
Intentions	15.56% improvement	✓	1.27% improvement	✗
Knowledge	5.02% improvement	✓	0.08% improvement	✗
Self-efficacy	10.42% improvement	✓	1.39% improvement	✗
Bill control	9.81% improvement	✓	0% change	✗
Giving up comfort	14.06% Improvement	✓	3.25% improvement	✗

The Summary Results table above allows us to determine if the changes in variables are due to the intervention or other occurrences in the environment. Both the control group and interventions group experience changes in the environment, but only the interventions group experienced the RYJ program. Therefore, if there are statistically significant changes in the interventions group and statistically non-significant or no change in the control group, then we conclude that the influence was due to the RYJ program.

A strong positive change is defined as a variable whose value changes in the right direction (for example, positive attitude increase) and achieves a statistically significant change as defined by a P value under the commonly used threshold of 0.05 (i.e. $p < 0.05$). Statistically significant means a result is unlikely due to random chance and due to the intervention. Even if the value changes in the right direction if the difference in change is not statistically significant (i.e. $p > 0.05$) then the change is said to have occurred just by chance and is not a meaningful change, or in other words the change is due to random noise, chance fluctuations, or happenstance. This explains why small changes can be seen in the control group even those they did not participate in the program; their changes are due to chance as they are not statistically significant.

Please note, for the purposes of summarising key outcomes the Summary Results table above only compares the intervention group with the control group. As described in the Research and Evaluation Approach section above, the interventions group was split into four distinct treatment groups to test research question 2 through difference testing based on the level of communication and type of

rewards received by participants. The results of treatment groups are discussed in the results section below.

Participants

The first section of results paints a picture of the typical RYJ participant – their basic demographics, their appliances and devices, energy habits, what they think about energy, and their energy knowledge.

The RYJ participant profile closely aligned with information from market research conducted earlier in the program, reinforcing this approach.

Following is a profile snapshot of all registrants who completed the first step of the program, the pre-program survey. Information was self-reported during the pre-program survey as participants completed their 'profile' online.

Sources:

- 1) Energy consumption data was collected via the energy network provider, Energex using participant's home address to correlate to their NMI.
- 2) Appliances and devices are compared to Brisbane averages using the Queensland Household Energy Survey 2014.
- 3) Smartphone and computer penetration is sourced from EY's Digital Australia: State of the Nation report 2015–16.
- 4) Queensland Competition Authority Report 2016.

Who they are

RYJ participants are most likely to be:

- Female aged 27-29 years old
- Most likely earning \$400-\$599 per week (\$20,800 to \$31,200 per annum)
- Studying or working part-time.

Where they live

- Rental house – 4 bed, 1 bath
- 3 or 4 people in the house
- Usually live with partner or partner and children.

Energy use

Participants were targeted who had high electricity bills. The average electricity bill for participants prior to the program was \$500.81 per quarter, around 6.4% - 9.6% of participants' income, showing the high proportional impact of energy on cost of living. Whilst, the \$54.80 per quarter saved by RYJ participants, representing a 10.94% reduction in electricity costs representing a material saving and benefit for low income households.

This can be compared to the average South East Queensland (SEQ) electricity bill of \$359.15 per quarter¹ (QCA, 2015). In a broader SEQ context the \$54.80 saved by participants represents a significantly higher 15.25% reduction in electricity costs.

¹ Queensland Competition Authority Report 2016. APPENDIX H: ASSUMPTIONS TO DETERMINE CUSTOMER IMPACTS FOR TYPICAL CUSTOMERS (Page 100)

Appliances and devices

Phones ²

- 98.7% had a smartphone (compared to 96% of 18-34 year olds and 81% of all Australians²)
 - 71.9% had two or more smartphones in their household
- 13.8% had one old mobile phone in their household
- 1.5% had no smartphone in their household

Entertainment

- 72.5% have a gaming console (compared to 76% in Brisbane)
 - 33.7% had two or more gaming consoles in their household
- 81.5% owned at least one laptop (compared to 76% in Brisbane and 73% of 18-34 year old Australians²)
 - 40% had two or more laptops in their household
- 73% had at least one tablet in their household (compared to 48% in Brisbane and 54% of 18-34 year old Australians²)
 - 36% had two or more tablets in their household
- 34.7% had a desktop computer in their household (compared to 63% in Brisbane and 52% of 18-34 year old Australians²).

Whitegoods

- 96.8% had one freezer in their household (95% in Brisbane)
- 77.6% had one Fridge (compared to 95% in Brisbane³) and 20.8% had two fridges (in Brisbane 33% have multiple fridges)
- 96.2% have one washing machine in the household (97% in Brisbane³)
- 54.4% have an electric clothes dryer in their household (compared to 57% in Brisbane³), 45% did not have a clothes dryer
- 43.8% a dishwasher (compared to 61% in Brisbane³) and 56.1% did not have a dishwasher.

Cooking

- 74% had electric cooktops (67% in Brisbane³)
- 26% had gas cooktops (27% in Brisbane³).

Cooling and heating systems

- 60.4% had cooling systems in their household (compared to 73% in Brisbane³)
- 43.4% had two or more portable fans, 31.3% did not have a portable fan
- 37.5% had split system air con (73% in Brisbane³)
- 11.6% have portable air conditioning (compared to 18.44% in Brisbane³)
- 14% had box air conditioning (12.4% in Brisbane³)
- 37% have reverse cycle air conditioning
- 25% had one or more electric fan heaters

² Smartphone and computer penetration is sourced from EY's Digital Australia: State of the Nation report 2015–16.

- 13.1% had an oil heater
- 10.4% have electric heaters (compared to 11% in Brisbane³)
- 11% had a bar heater.

Water heating

- 86.28% have electric water heating systems (58% in Brisbane³)
- 0% have gas (compared to 4% in Brisbane³)
- 4.89% have solar (compared to 16% in Brisbane³).

Habits

RYJ participants reported surprisingly medium to high levels of energy saving habits relating to the intervention. The least performed habit was turning switches of at the wall (only 51.1% self-reported performing this behaviour prior to program) and the most performed habit was closing the windows when using air conditioning (91.3% self-reported performing this behaviour prior to program).

Participants reported (prior to the intervention) high levels for performing cool, switch and wash behaviours with mean scores of agreement being 4.27/5 and above.

Cool

- 91.3% close windows when using air con
- 81.1% use a fan rather than air conditioning
- 76% close curtains or blinds to keep the house cool.
- 62.8% set the air conditioning to 24 degrees in summer

Switch

- 87.9% switch off lights when not in the room
- 51.1% switch off appliances at wall

Wash

- 86.8% wash full loads when washing
- 86.4% wash laundry in cold water
- 79.2% use a clothes line rather than dryer

Intentions

Participants showed strong intention to perform the behaviours targeted by the intervention, with high Switch (4.10 out of 5) and Wash behaviours (4.03 out of 5) and slightly lower behavioural intentions for the Cool behaviours (3.70 out of 5).

Cool

- High (4.13 mean out of 5) - Use a fan rather than air conditioner to cool the house
- Medium (3.70 out of 5) - Recommend to someone else to use a fan rather than the air conditioner to cool the house.

Switch

- High (4.27 mean out of 5) - Switch off lights and appliances when not in use

- High (4.10 mean out of 5) - Recommend to someone else to switch off lights and appliances when not in use.

Wash

- High (4.28 mean out of 5) - Use a clothes line or drying rack rather than a dryer to dry washing.
- High (4.03 out of 5) - Recommend to someone else to use a clothes line or drying rack rather than a dryer to dry washing.

Level of digital skill

Participants showed (prior to the intervention) a reasonably high level of familiarity with smartphones and gaming.

71.2% believed they were very skilled with using smartphones.

76.8% of participants reported some level of perceived gaming skills, with 45% reporting average skill levels and 31.8% saying they were skilled or very skilled.

23.2% reported low to no level of gaming skills.

What they think

Participants showed high levels of positive attitudes towards the energy habits targeted in the program intervention, with means of 4.08 and above.

- 4.61 out of 5 - Switch (Switching off lights and appliances)
- 4.50 out 5 - Wash (Using a clothes line or rack rather than the dryer)
- 4.08 out 5 - Cool (Using a fan rather than air conditioning).

Psychological factors were measured, with participants indicating:

- Moderate levels of needed Comfort by using air conditioners to keep the house cool (3.13 out of 5)
- Moderate to high levels of Price Concern for electricity (3.70 out of 5)
- Low levels of Bill Control for electricity bills (3.77 out of 5)
- Low levels of Social Norms (2.10 out of 5)
- Low levels of Self-Efficacy (2.73 out of 5).

Household expense factors were measured, with participants showing:

- 83% believe internet is a necessity item in the home.
- 75.4% reported they believed food was very important
- 53.5% reported they believed electricity was very important, followed by 37.7% believing it is important
- 47.4% believe mobiles and broadband are important to their household, followed by 39.0% believing it is very important
- 40.6% believed fuel was very important, followed by 34.6% believing it was important
- 37.9% believed home-entertainment is important whereas 34.0% believed it is unimportant
- 36.2% believed water was important to their household followed by 27.6% reporting it was important

- 31.8% reported they believed insurance was important, while 20.4% believed it to be important and 17.1% said it was unimportant.

What they know

The participant group through the pre-intervention survey showed a high level of knowledge (89.5%) around the areas for energy efficiency targeted by the program. The control group showed a similarly high level (86.8%) of energy knowledge around the targeted behaviours.

Program engagement results

The following outlines the results of the digital engagement with participants. Data is compiled from a number of sources including participant surveys, game analytics, communication analytics and customer support channels.

Overall

- 99.2% of participants said they liked the program
- 92.4% said it helped them monitor their energy use
- 60% of registered participants completed the RYJ program.
- 78% of starters (participants that completed the pre-program survey) successfully completed the program.

Program completion rate	 Registration accepted	 Pre-program survey completed	 Completed Game 1	 Completed Game 2	 Completed Game 3	 Completed program
Wave 1	390	297	229	218	214	214
Drop off rate		24%	17%	3%	1%	0%
Completion rate		76%	59%	56%	55%	55%
Wave 2	611	475	416	388	387	387
Drop off rate		22%	10%	5%	0%	0%
Completion rate		78%	68%	64%	63%	63%
TOTAL	1001	772	645	606	601	601
Drop off rate		23%	4%	1%	0%	0%
Completion rate		77%	64%	61%	60%	60%

The table above communicates the attrition throughout the program to demonstrate the outstanding engagement result the program produced with 78% of starters, or those people who completed the pre-program survey completed the 6 week program and the attrition that occurred at major steps of the program.

The largest attrition of participants occurred at the pre-program survey stage, which was the first mandatory step in the program. This was likely due to the program brand and nature of the program being an unknown offering for participants. Participants were dropped out of the program at this point if they did not complete the pre-program survey.

Following the pre-program survey stage, minimal attrition occurred during the core component of the program as participants played the three games for the required 10 minutes and progressed towards completing the post program survey.

Program completion rates improved marginally between the two program waves, likely due to program improvements made between waves.

Overall, just 7 participants unsubscribed from the program (0.006%), five in Wave 1 and two in Wave 2. While this statistic is hard to compare to other energy programs, it is much lower than marketing industry norms for unsubscribe rates in marketing campaigns which are considered good if they are less than 2%. In Wave 1, two people unsubscribed before the games opened, one during the first game, two in the second game. In the second wave, two people unsubscribed during the first game.

Survey engagement

Participants completed two mandatory surveys (pre and post program) and could choose to complete two additional, more in-depth surveys (QUT T1 and T2) for the chance to win an iPad Mini.

Survey engagement	Completion time	Used mobile device
Pre-program survey	41 mins 37 secs	70.0%
Post program survey	22 mins 25 secs	74.7%
QUT T1 survey	37 mins 12 secs	69.0%
QUT T2 survey	33 mins 27 secs	73.1%

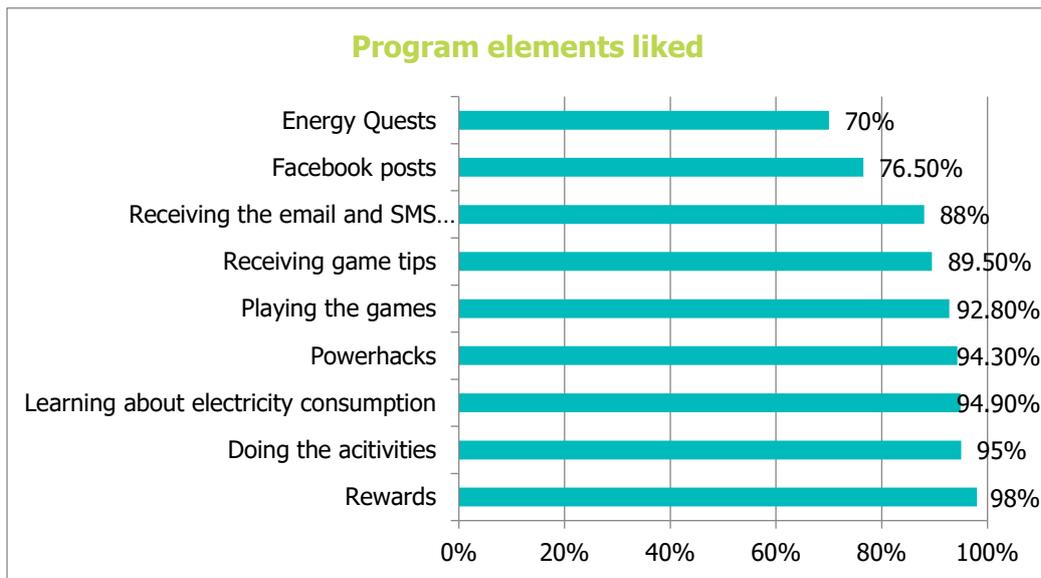
Participants on average took 41 minutes to complete the pre-program survey and only 22 minutes to complete the similar post program survey. The pre-program and T1 surveys generally took participants longer to complete than the post program and T2 surveys.

RYJ participants spent at least one hour completing the mandatory survey components of the program online (pre and post program surveys).

The majority to participants completed their surveys using a mobile device (smartphone or tablet).

Enjoyment of program elements

Participants were asked how they liked the different elements of the program in the post program survey. The following chart shows the percentage of participants who agreed or strongly agreed to like each element.

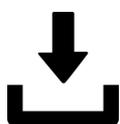


The rewards were the most popular program element with 98% of participants saying they liked this element. Aside from the tangible rewards, participants highly rated the learning elements of the program such as doing the activities, learning about electricity consumption and the Powerhacks.

Game engagement

App downloads

The RYJ app was downloaded and installed 2,366 times during 2015:



1,292 times from the Apple store

1,074 times from the Android Play store.

Overall, just over 90% of people downloaded the app to a smartphone and 10% used a tablet.



Apple: 88% iPhone, 12% iPad and iPod

Google Play: 93% Android mobile, 7% Android tablet.

Game play

The following analytics were collected from participant engagement with the app games. Multiple aspects of engagement with the games were measured to provide a data-rich picture of how participants engaged with the program games.

92.8% of participants indicated they enjoyed playing the RYJ games.

Sessions				Total program sessions
Total game sessions	15,365	20,109	27,548	63,022
Average sessions per player	22	31	44	97

Sessions are the count of times participants played from starting or resuming a game until ending or quitting the game.

Game play time

Participants were required to play a minimum of 10 minutes per game to stay in the program and earn rewards.

Game play time is calculated as the duration of game play time between starting or resuming a game and ending or quitting a game.

Total game play time (hours)				Total game play time
Total game play time	769 hours	461 hours	521 hours	1751 hours
Total game play time required	116 hours	110 hours	104 hours	330 hours

Participants played 5 times more than required



Game play per player

Participants were required to play each game for a minimum of 10 minutes per game in order to stay in the program and earn rewards.

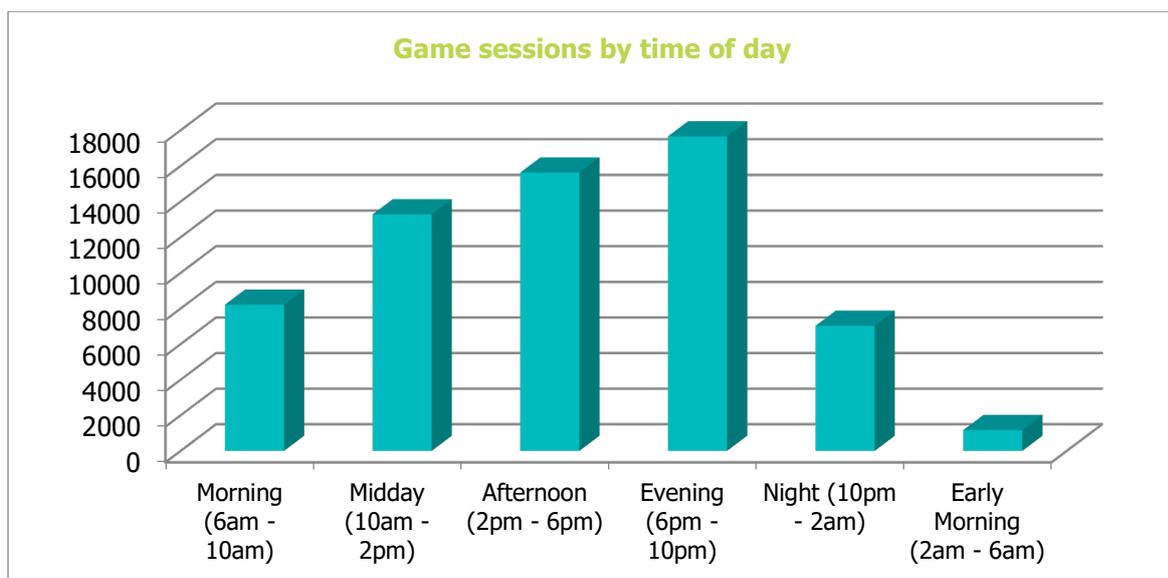
On average, participants played the RYJ games for:

- **158 minutes** over the program
- **1.7 minutes** per session

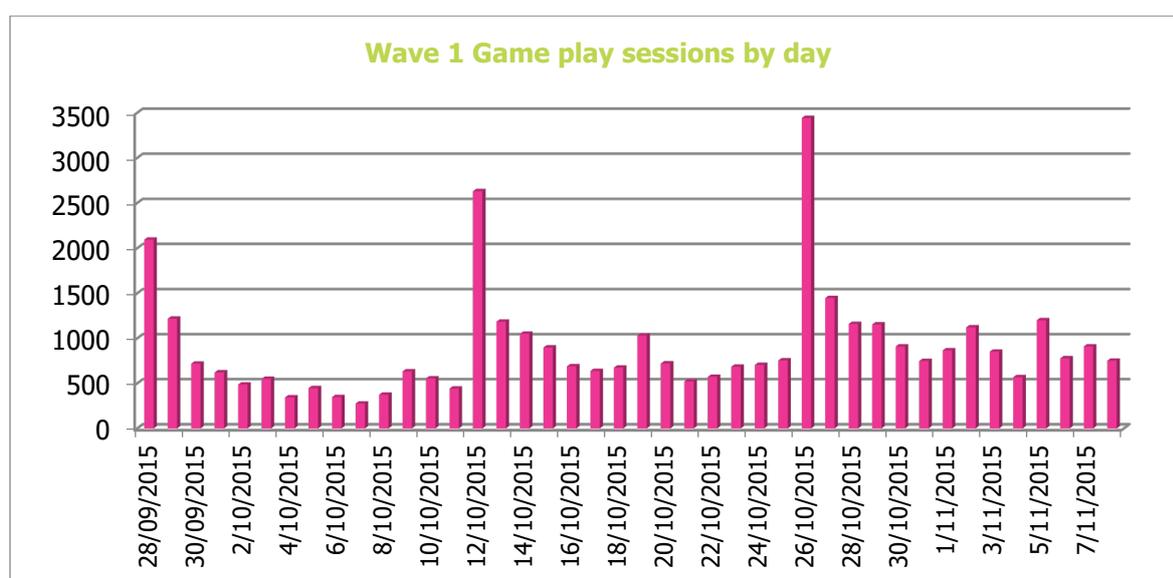
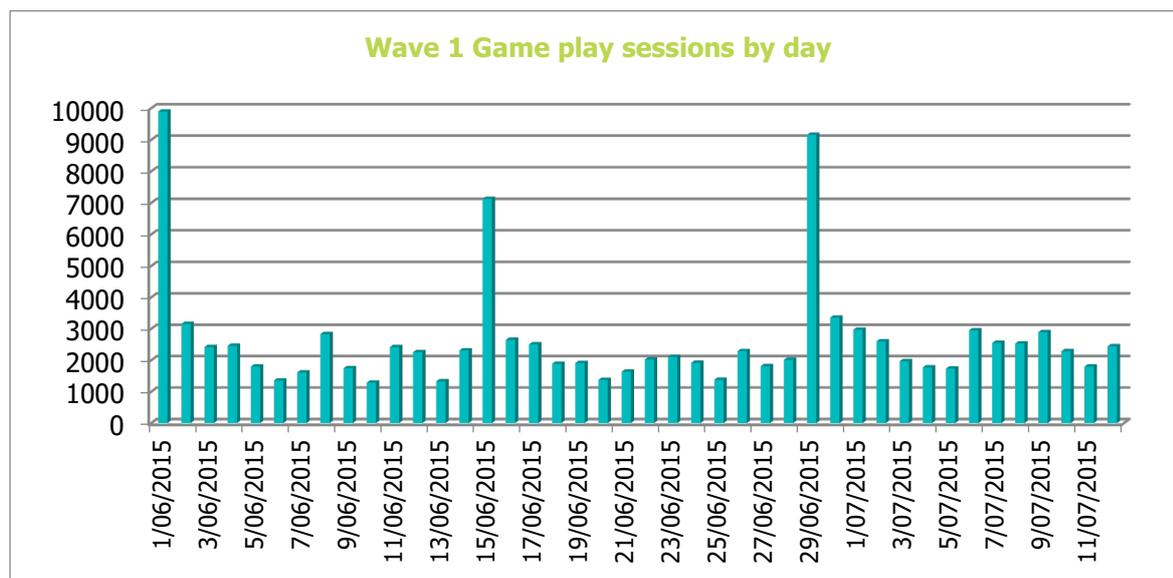
Average game play time per player (minutes)	TEMPERATURE DEFENDER	POWER RAID	FULLY LOADED	Average game play time
Average game play time per player	66 mins	42 mins	50 mins	158 mins
Average game play time per session	3.0 mins	1.4 mins	1.1 mins	1.7 mins

Game play sessions - time of day

Game play sessions were grouped into 6 time of day segments to show the main times participants engaged with the app games. The most popular time of day that participants played was during the evening (6pm-12pm), followed by the afternoon (2pm-6pm).



Game sessions over time



Game play sessions are shown over time for each wave above. The sessions peak on the first day each game was open for participants and drop away in the following two weeks for each game. During the two weeks for each game, a second peak in sessions usually occurred mid-way through when a reminder email was sent to those participants who hadn't played for long enough to earn rewards. In general, sessions are higher on days where communications (email, SMS and social media posts) were sent to participants, especially as many contained direct links to open the app. A small number of sessions were recorded following both waves, showing a small number of dedicated players still playing outside of the program.

Scaffolding messages

To help on board players, each game had a set of 15 tailored educational messages relating to the game learnings. Messages were cycled through in order, appearing prior to game play. Across the program, participants viewed 64,252 of these educational scaffold messages, averaging 98 per player. Examples are provided below:



During the post program survey, 89.5% of participants indicated they enjoyed receiving the game tips.

Educational messages viewed				Total scaffold messages viewed
Number of messages viewed	19,952	20,669	23,631	64,252
Average number of messages per player	29 per player	31 per player	38 per player	98 per player

Points

Each game used points to provide immediate feedback to players and reward positive actions related to the area of learning. Each game used different game play components and mechanics and so point scores varied markedly by game.

Points earned				Total points scored
Total points earned	128,267,150	237,783,100	46,424,725	412,474,975

<p>Average</p>  <p>player points</p>	<p>Average points per player</p>	620,090 points
	<p>Average points per session</p>	6,545 per session

Badges

Participants earned badges during the games for their game play related accomplishments, as well as non-skill related actions such as playing for the first time or making half way through each game. During wave 1 there were 6 badges in each game, while in the second wave two extra game play time related badges were added which participants unlocked for playing more than 10 minutes or 30 minutes in each game.

Participants showed high engagement with the game based badge rewards, with RYJ participants earning 12,392 badges out of a possible 14,388 badges available - 86% of the badges available. The percentage of badges earned increased across the three games, indicating a progressively more engaged group of participants.

<p>Badges earned</p>				 <p>Total badges earned</p>
<p>Percentage of available badges earned</p>	82%	86%	91%	86%
<p>Average number badges earned</p>	6.0 per player	6.2 per player	6.6 per player	18.8 per player

Status levels

When participants earned enough badges, they unlocked status levels of achievement. The levels were: Bronze = 3+ badges, Silver = 10+ badges, Gold = 18+ badges.

With the number of badges limited in each game, participants could at a maximum unlock one level per game. This was designed to encourage progressive engagement and accomplishment with the games over time.

<p>Status level attained</p>			
<p>Number of achievements</p>	105 Bronze	159 Silver	399 Gold

The majority of participants achieved Gold status in the games, earning more than 18 badges as they played the games.

Energy Quests

Energy Quests were designed to help participants change their behaviour by providing them action-oriented tasks to help them put their game play learnings into action at home. During each game, a related Energy Quest was displayed as a pop-up during game play, giving players an idea or message for them to trial at home. During the first week of each game, the Quest was displayed as a passive message, while in the second week the Quest was interactive with players able to respond 'Yes' or 'No' to a question asking if they had put the Quest into action at home.

Overall, **95%** of players responded positively to the Energy Quests.

Characters

In the RYJ game, players were given the option of picking one of six characters, including Mega Watt (Dad), Peta Watt (Mum), Micro Watt (boy), Milli Watt (Girl), Nano Watt (Baby) and Killa Watt (Pet). The avatars were presented in a fixed order in the app for the first round of participants: Mega, Peta, Micro, Milli, Nano, Killa Watt. During the second round, characters were randomly presented to participants for selection.



Avatar selection	Mega Watt	Peta Watt	Micro Watt	Milli Watt	Nano Watt	Killa Watt
Wave 1	488	221	86	107	144	177
Wave 2	193	321	169	279	292	356
Total	681	542	255	386	436	533

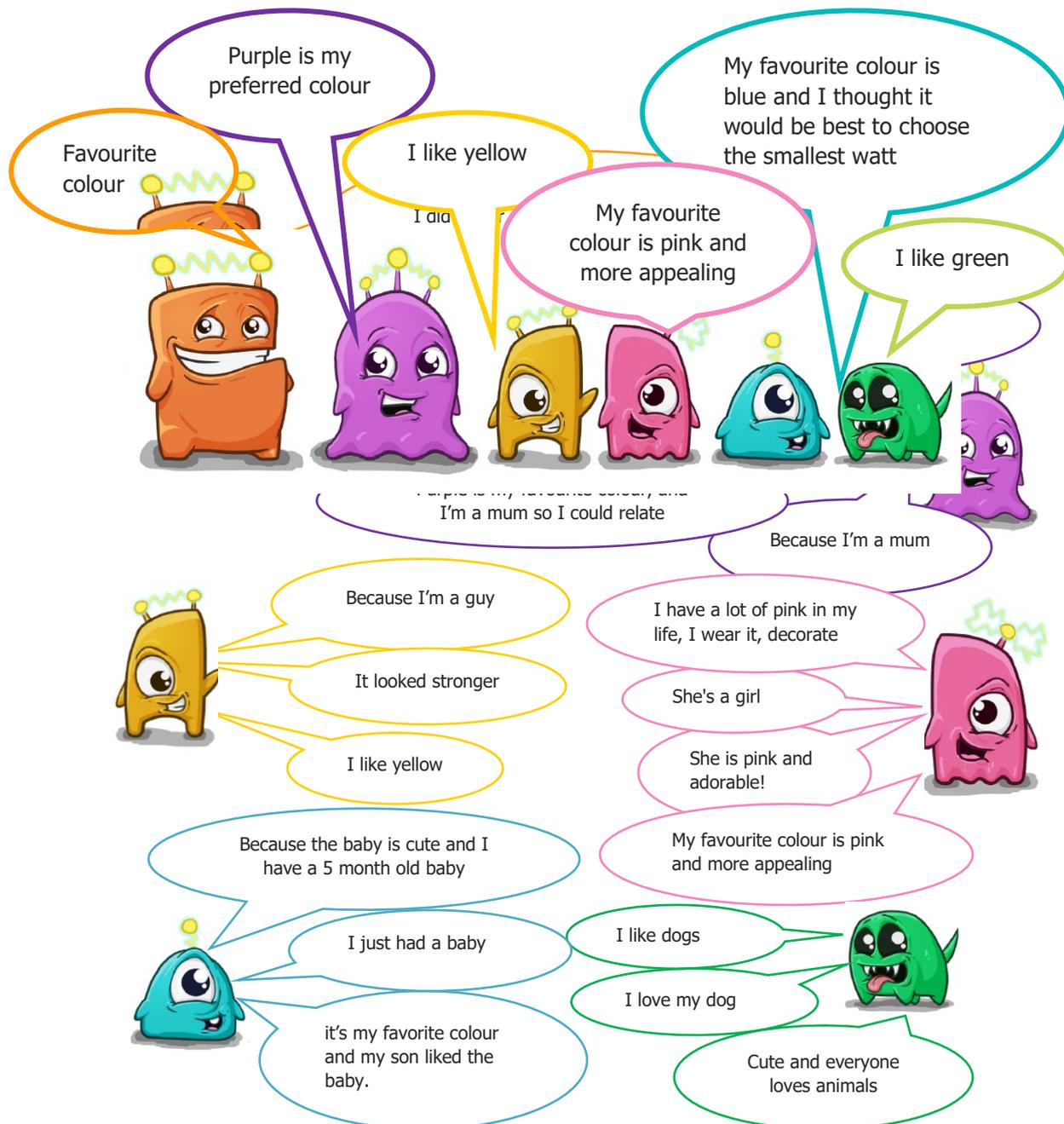
Mega Watt was the most popular character choice across both cohorts. This could be attributed to the first wave of RYJ players, whereby the character Mega Watt was the first selectable character in the game. Participants also provided insight, by stating they picked "the first character that was offered".

In the second wave, characters were rotated in random order to avoid the first character selection bias. In comparing character selection by wave, Mega Watt was favourite in the first wave, whereas Killa Watt was favourite in the second wave. Peta Watt was consistently the second most popular choice of avatar.

Reasons for selecting characters

In the T2 survey, participants were asked to provide insight as to why they chose their particular character. Interestingly, it appeared colour and the household role the characters represented were the most popular reasons for RYJ participants to pick their characters.

The first evident theme was to why participants picked their characters was colour. The majority of participants who answered the T2 survey and the question regarding why they picked their particular character was because the colours were their "favourites", "preferred", "liked" or because it was the "most appealing".



Analysing participant's responses by individual Watt character showed a link between character colour and household role as the main basis for character selection. This was particularly evident in participants who selected Peta Watt, they discussed the reasoning behind their selection was not only due to the colour purple but also because they were mums.

Game feedback

As shown in the Favourite game table, feedback from participants about their favourite games was reasonably evenly distributed, with Power Raid being the most popular game:

Favourite game	Percentage of respondents
Power Raid	37.5%
Fully Loaded	32.5%
Temperature Defender	30.0%

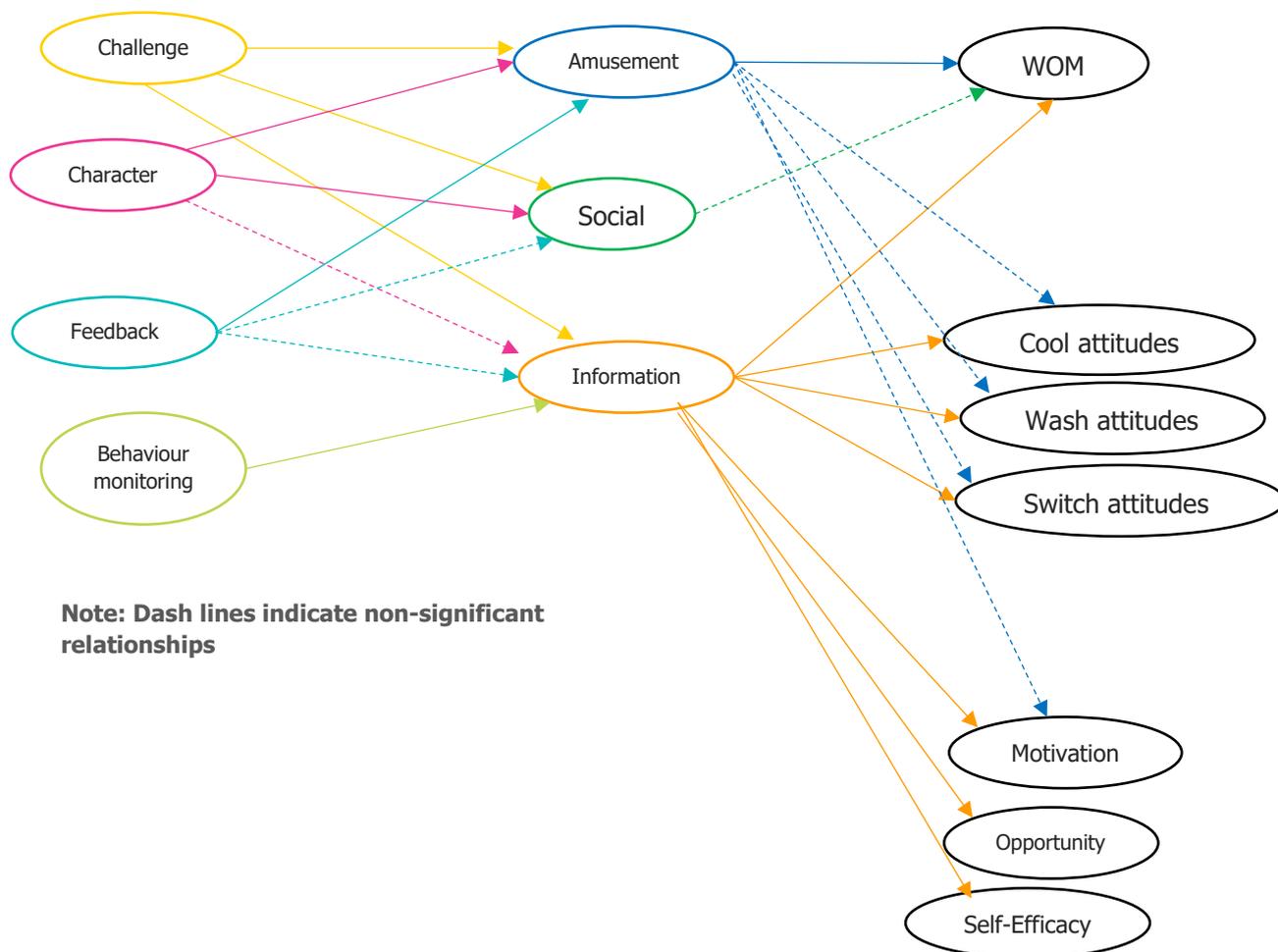
Overall 92.8% of participants said they enjoyed playing the games.

When asked who played the games the most, 85% said only they played, while 9.8% said the kids played the most.

Game experience

Using the foundation of evaluating social marketing m-games conducted by Dr. Rory Mulcahy, the RYJ game was analysed to assess the game’s ability to create a valuable experience for players, which influenced their thoughts and feelings to electricity saving. This was done by assessing the game attributes of challenge, character, feedback and behaviour monitoring, and the value dimensions of amusement value (the amount of fun in using the game), social value (the connection the game provides with others) and information value (the amount of knowledge the game provides the player about the targeted behaviour of the game).

Analysis was conducted to investigate whether the RYJ game experience influenced the desired outcomes of the program such as word-of-mouth (WOM) for electricity saving behaviours including Cool, Wash and Switch; attitudes to Cool, Wash and Switch behaviours; motivation to save electricity; opportunity to save electricity; and self-efficacy to save electricity.



Generating a valuable gaming experience for participants

The first component of the model assessed which game attributes in the RYJ game influenced the value perceived by RYJ players in using the game. This was broken down by assessing how game attributes of character, challenge, feedback and behaviour monitoring influenced the creation of an amusing experience, a social experience and informative experience.

Generating a valuable gaming experience for participants	
Creating an amusing game	From the results of the structural equation model analysis, it is evident the game attributes of challenge, character and feedback are significantly important.
Creating a social experience	According to the results, the game attributes of challenge and character significantly influenced the social value players experienced from using the RYJ game.
Creating informative gaming experience	The results demonstrate the game attributes which significantly and positively influenced the creation of an informative experience were challenge and behaviour monitoring.
Valuable gaming experience and desired RYJ outcomes	The second component of the model assesses the influence the gaming experience had upon desired outcomes for RYJ participants, including word-of-mouth for saving electricity; attitudes to switch; wash and cool; as well as motivation to save electricity, opportunity to save electricity and self-efficacy to save electricity.
Influencing WOM for saving electricity	The RYJ game positively and significantly influenced RYJ participants WOM for saving electricity by creating an amusing and informative experience whilst using the RYJ game.
Influencing attitudes to Cool, Switch, and Wash	The results demonstrate the RYJ game was able to significantly influence the attitudes of RYJ participants regarding Switch, Cool and Wash by providing an experience which was informative.
Influencing motivation	The RYJ game influenced and increased motivation to save electricity by creating an informative experience.
Influencing opportunity	RYJ participants perceived opportunity to save electricity was also significantly and positively influenced by creating an informative experience with the game.
Influencing self-efficacy	The RYJ game increased self-efficacy for saving electricity by its provision of an informative gaming experience about saving electricity.

Communication engagement

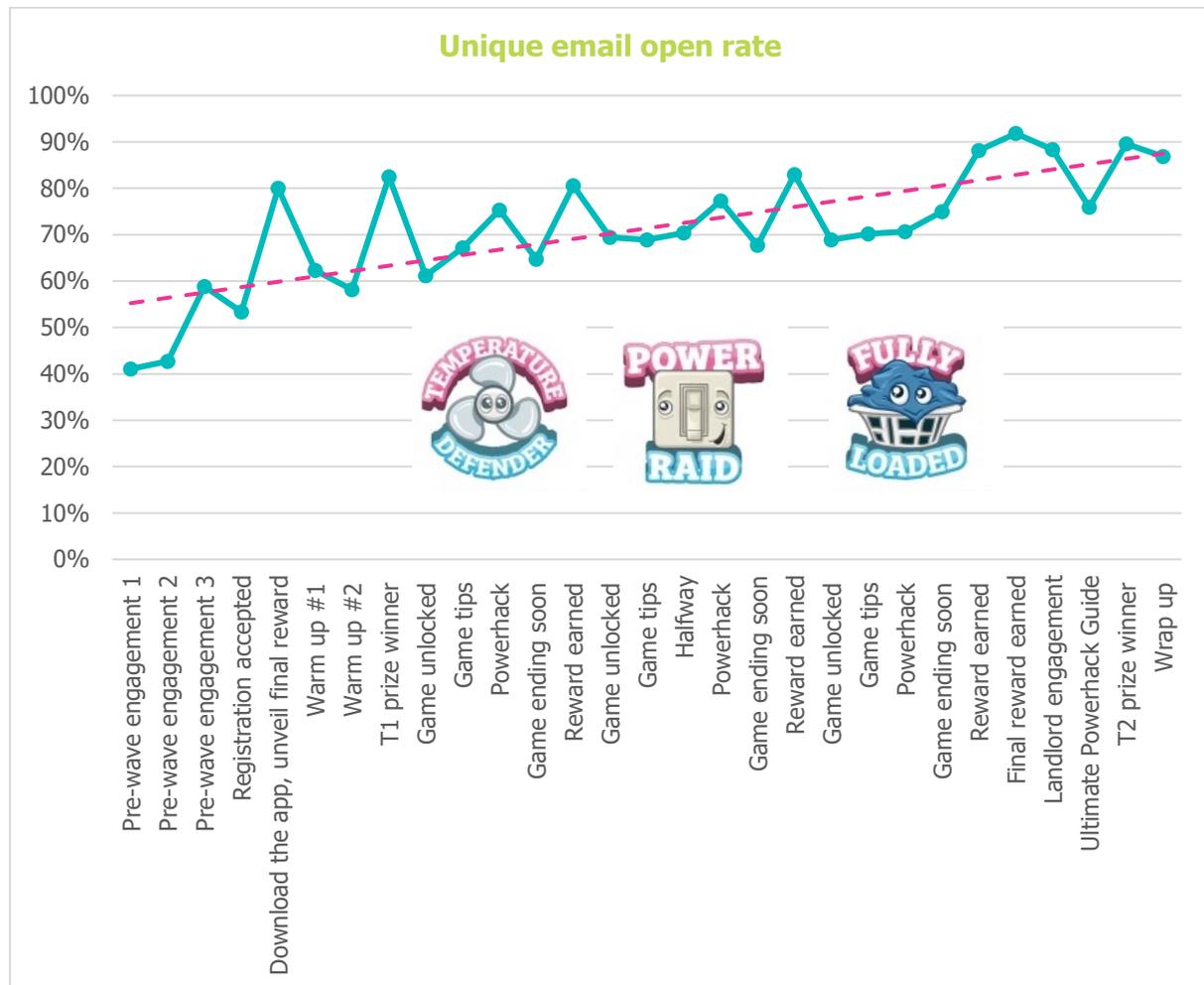
Communications were a key element of the digital engagement with participants and were measured via commonly used analytics and benchmarks.

Email

Emails were used to communicate with participants about the games, Powerhacks, Energy Quests, surveys and rewards. 88% of participants agreed or strongly agreed to enjoying receiving the program email and SMS communications.

Participants who hadn't played for the required amount of time were sent email reminders urging them to play more and providing direct links to play the app games. These reminders have been excluded from the analysis as they were not sent to all participants and so do not present a clear

picture of engagement. Confirmations for participants who dropped out of the program have also been excluded as they are not core to the program engagement and were only sent to a small number of participants. Invitation emails sent to participants to take part in program surveys were distributed using a survey system where email engagement was not measured and as such are not included in the following results.



Unique open rates climbed steadily over the program, showing participants’ increasing levels of engagement with the program. As participants dropped out at the end of each game and the pre and post program surveys, the remaining participant group was proportionately more engaged. The average unique email open rate for the program was 70%, which is well above industry averages of between 20-30%.

The majority of links clicked in emails were direct links to play the app games or links to the Facebook community. Not all emails contained clickable links, so the average click through rate only includes emails sent which contained links. Across the program, the average click through rate was 11% which is well above industry averages of between 2-4%. A detailed summary of results for program emails is shown following.

SMS

Reminders were sent via SMS to encourage participants to complete key actions within program timeframes. Analytics for SMS tracking is limited, with the communications system only logging the

time messages were sent. Clickable links were used in the SMS messages and analytics tracking for participant's interactions with these links is assessed in the following section.

Integration

To integrate different communication channels with the app games, links were used that would directly open the RYJ app from participant's mobile devices. These links were used mainly in reminder messages delivered to participants through email, SMS, and Facebook, to make it easy for participants to be directed straight to the app. Across the program, these links received 772 clicks from participants to open the app, which showed a relatively strong need for direct access to the app via other digital channels.

Email name	Subject line	Purpose	Versions	Unique email open rate	Unique click rate
Pre-wave engagement 1	While you are waiting...	Engagement for early sign ups to Wave 2	Wave 2 only	41%	NA
Pre-wave engagement 2	The 10 thirstiest appliances in your home	Engagement for early sign ups to Wave 2	Wave 2 only	43%	38%
Pre-wave engagement 3	Not long to go!	Engagement for early sign ups to Wave 2	Wave 2 only	59%	NA
Registration accepted	Congrats! You've been accepted!	Confirm acceptance into program (meet criteria).	All active participants.	53%	1%
Download the app, unveil final reward	Fridge, washing machine or BBQ?	Encourage participants to download the app by revealing their final reward.	Energy efficiency and Lifestyle rewards	80%	NA
Warm up #1	Hey %First Name%, ever wondered what's wasting your watts?	Pre-engagement email showing the highest energy consuming appliances.	Extra Communications treatment groups only	62%	12%
Warm up #2	What is a normal sized electricity bill anyway?	Pre-engagement email including a video talking about 'average' bill sizes.	All active participants.	58%	17%
T1 prize winner	Did you score an iPad mini?	Prize winner announcement for QUT T1 survey.	All T1 participants.	82%	12%
Game unlocked	It's time to play %%First Name%%! Your first game is unlocked now.	Temperature Defender is unlocked, aim of the game, link to play game.	All active participants.	61%	15%
Game tips	Top tips for Temperature Defender	Game tips aligned to behaviours/ learning.	All active participants.	67%	5%
Powerhack	Here's how to hack your power %First Name%	Powerhack aligned to behaviour.	Extra Communications treatment groups only. Summer/ winter version	75%	13%
Game ending soon	Temperature Defender ends soon...	Reminder the game will close in 3 days, link to play game.	Extra Communications treatment groups only	65%	13%
Reward earned	Congrats %First Name%, you earned a reward	Temperature Defender reward earned.	Energy efficiency and Lifestyle rewards	81%	NA
Game unlocked	Hey %First Name%, Power Raid is now unlocked!	Power Raid is unlocked, aim of the game, link to play game.	All active participants.	69%	4%
Game tips	Top tips for Power Raid	Game tips aligned to behaviours/ learning.	All active participants.	69%	2%

Email name	Subject line	Purpose	Versions	Unique email open rate	Unique click rate
Halfway	Congrats, you've made it halfway!	Congratulate participants for making it halfway through the program.	All active participants.	70%	8%
Powerhack	Here's how to hack your power %First Name%	Powerhack aligned to behaviour.	Extra Communications treatment groups only	77%	10%
Game ending soon	Power Raid ends soon...	Reminder the game will close in 3 days, link to play game.	Extra Communications treatment groups only	68%	6%
Reward earned	Congrats, you earned a reward %First Name%	Power Raid reward earned.	Energy efficiency and Lifestyle rewards	83%	NA
Game unlocked	Fully Loaded is now unlocked to play %First Name%!	Fully Loaded is unlocked, aim of the game, link to play game.	All active participants.	69%	2%
Game tips	Top tips for Fully Loaded	Game tips aligned to behaviours/ learning.	All active participants.	70%	2%
Powerhack	Here's how to hack your power %First Name%	Powerhack aligned to behaviour.	Extra Communications treatment groups only	71%	10%
Game ending soon	Fully Loaded ends soon...	Reminder the game will close in 3 days, link to play game.	Extra Communications treatment groups only	75%	6%
Reward earned	Congrats, you earned a reward %First Name%	Fully Loaded reward earned.	Energy efficiency and Lifestyle rewards	88%	NA
Final reward earned	Woohoo! You earned your final reward	Program completed, final reward earned.	Energy efficiency and Lifestyle rewards	92%	NA
Landlord engagement	Hey %First Name%, here's a bright scheme from Energex	Landlord engagement offers from Energex.	All active participants.	88%	31%
Ultimate Powerhack Guide	99 ways to hack your power	Provide additional Powerhacks (beyond core behaviours).	All active participants.	76%	34%
T2 prize winner	Did you score an iPad mini?	Prize winner announcement for QUT T2 survey.	All T1 and T2 participants.	90%	NA
Wrap up	Thanks for being a part of Reduce Your Juice	Wrap up, thank you, refer a friend competition.	Wave 1 only	87%	28%
Total program				72%	11%

Note: Where NA is denoted under Unique click through rate, there were no clickable links within the email.

Social media

The RYJ Facebook page was used as a voluntary community for participants to follow during the program. The Facebook figures below also include results from the recruitment activity conducted on Facebook.

The RYJ Facebook page had over 1200 Likes, which meant the page posts may have been seen within the newsfeeds of these people, subject to the impact of the Facebook algorithm.

Not all participants followed the RYJ Facebook page and this was an optional component of the program. It is difficult to gauge the proportion of these followers that were RYJ participants as the Facebook identifier is different to the RYJ unique identifier.

In the post program survey, 76.5% of participants indicated they liked the RYJ Facebook posts.

RYJ Facebook

Was seen **1.8 million** times

Reached **1.3 million** people

Engaged **16,175** people

Received **1,258** Likes

Content received **21,849** clicks

Facebook jargon deciphered

A Facebook **status or post** is an update feature which allows users and brands to update their followers with their thoughts, whereabouts, or information about their followers or friends.

Likes is the number of participants who click 'like' a post or page. This allows them to see posts from the RYJ page in their newsfeed.

When someone **comments** on a post, it registers as a form of engagement.

Shares is the number of times your Page's posts are shared with other people's followers.

A **tag** links a person, Page or place to something that is posted, such as a status update or a photo. For example, you can tag a photo to say who's in the photo or post a status update and say who you're with.

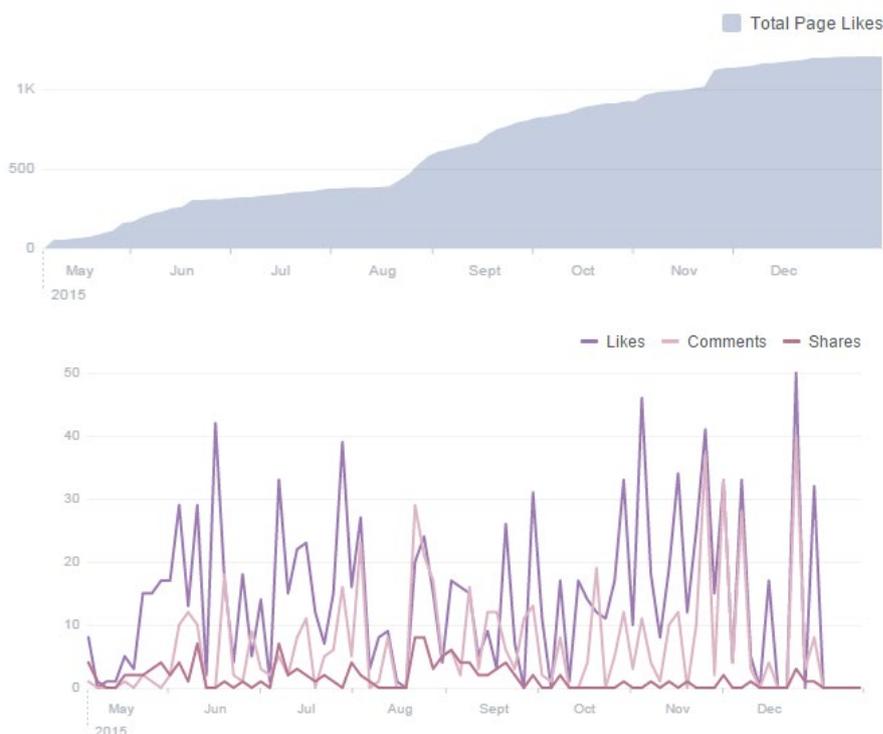
Engagement is the total number of actions (likes, comments and shares) related to an ad/post.

Clicks is the total number of time people click on an ad or post. This may include external clicks to websites, liking a page, posting a comment, or app installs.

Reach is the number of people the ad/post was shown to reach on Facebook (the number of people who received impressions – people can see multiple impressions).

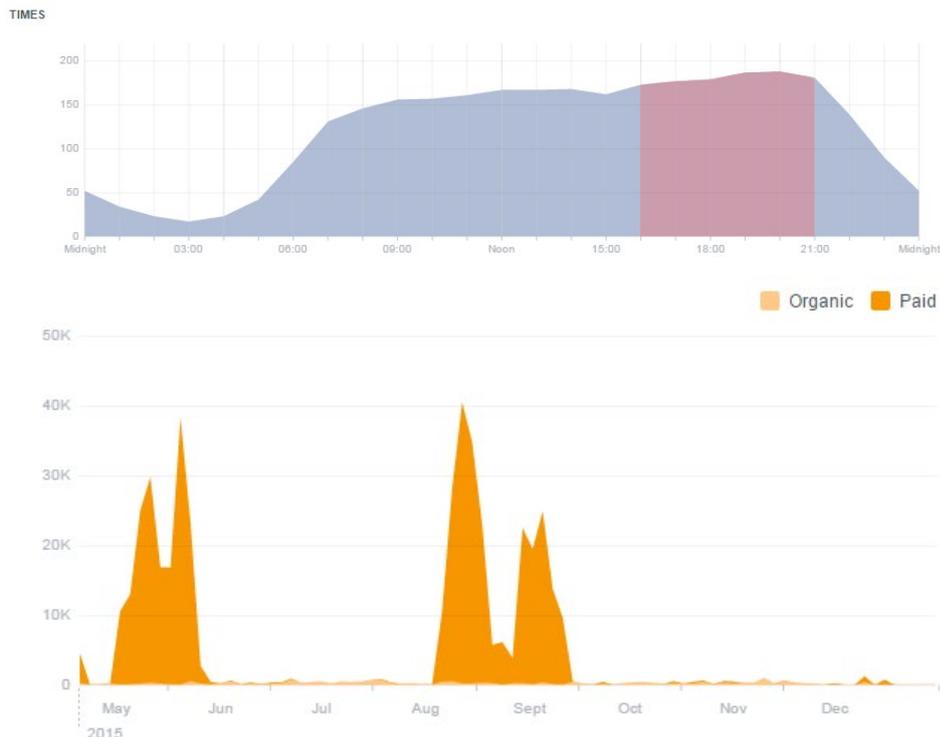
Impressions refers to the number of times the ad/post entered the screen and is displayed, despite whether or not it is clicked.

Boosting a post adds advertising spend to a post to reach more people. It is usually called an ad or a paid post.



Page likes consistently increased throughout the program.

Engagement was steady throughout the whole program.



In general users were most engaged between 6:00 and 9:30pm.

Posts had the maximum reach during recruitment periods where budget was spent to target a wider audience (whilst in-program only participants were targeted).

Content posts

Facebook content primarily covered the following types of posts: Powerhacks, game reminders and results, and Energy Quest promotional posts. The Powerhacks and Energy Quests were aligned to each game/ area for behaviour change as it was open to participants.

For the RYJ program, the top ten posts with the highest engagement were:

1. **Final stages** – This post highlighted that the final survey was open which would earn participants their final reward. Participants were naturally excited and asked questions and posted positive program feedback.
2. **Wrap up survey** - This post was made in response to participants asking about their final reward deliveries, to inform them about how they would be contacted with delivery options. The majority of the engagement was likes (showing excitement to be finished with the program and receive their rewards), as well as participants asking questions regarding delivery.
3. **Wrap up survey (keep calm)** - Similar to the

Published	Post	Type	Targeting	Reach	Engagement
09/11/2015 14:00	Hey juice-reducers! The final step of Reduce Your Juice is no	📄	🌐	1.7K	227 141
10/11/2015 14:24	Attention all over achieving juice-reducers! It looks like you hav	📄	🌐	1.7K	311 104
17/11/2015 11:00	Keep calm and Reduce Your Juice! The Good Guys will be cal	📄	🌐	917	177 93
11/11/2015 11:00	It's time for juice-reducing bragging rights - congrats to our top	📄	🌐	1K	171 57
02/11/2015 11:00	Energy Quest: Shower Ballad. It's time to 'come clean' on your f	📄	🌐	797	126 49
23/11/2015 13:00	Don't miss your chance to win a iPad mini! Have you complet	📄	🌐	515	38 44
30/11/2015 14:00	Congratulations to our juice-reducing Powerhack winners! Ou	📄	🌐	553	148 40
29/10/2015 14:00	Fully Loaded Energy Quest time! Thought about bringing your	📄	🌐	898	55 39
08/11/2015 17:00	Final final call. Make sure you've nabbed your Cold Turkey ba	📄	🌐	760	88 38
01/12/2015 11:30	QUT survey prize winner announcement. Drumroll please... T	📄	🌐	530	35 36

previous post, this message was designed to keep participants updated about receiving their calls from The Good Guys, as there were a lot of questions at this stage. This was an impromptu post that was not boosted by advertising budget.

4. **Leaderboard** – The highest scorers for each game were posted which prompted the community to talk to each other and compare scores. Game related achievements such as scores, badges and trophies were popular conversation on social media, with questions consistently asked about the badges throughout the program.
5. **Shower ballad Energy Quest** – The Energy Quest competition posts had high engagement, with participants sharing their 4 minute shower songs in this post.
6. **T2 reminder** – This reminder to take part in an optional survey with the chance to win an iPad Mini received questions regarding the delivery/wrap up of the program, as well as questions about when the T2 survey invitation was sent (not all participants received the invite, only those who participated in the T1 survey).
7. **Powerhack winners** – This post shared the winners of the Ultimate Powerhack competition and received many "thank you" comments and questions about the wrap up of the program.
8. **Fully Loaded Energy Quest** – This post about washing full loads received questions and feedback about the cost of washing in full loads and regarding participants' washing routines.
9. Final call - A reminder to get participants to play the final game Fully Loaded to be eligible for their rewards - mostly questions around the program and unlocking badges.
10. QUT survey prize winner - Engagement on this post is mostly congratulations to the winner and some questions about the wrap up stage of the program.

The top three posts were from the wrap up stages of the final wave of participants. With the higher number of participants, engagement was high in these final stages.

Posts about Quests and competition winners generated excitement amongst the community, resulting in high engagement with this content.

Game related achievements such as the game score leaderboard were also popular amongst participants, bringing together a community around the app games.

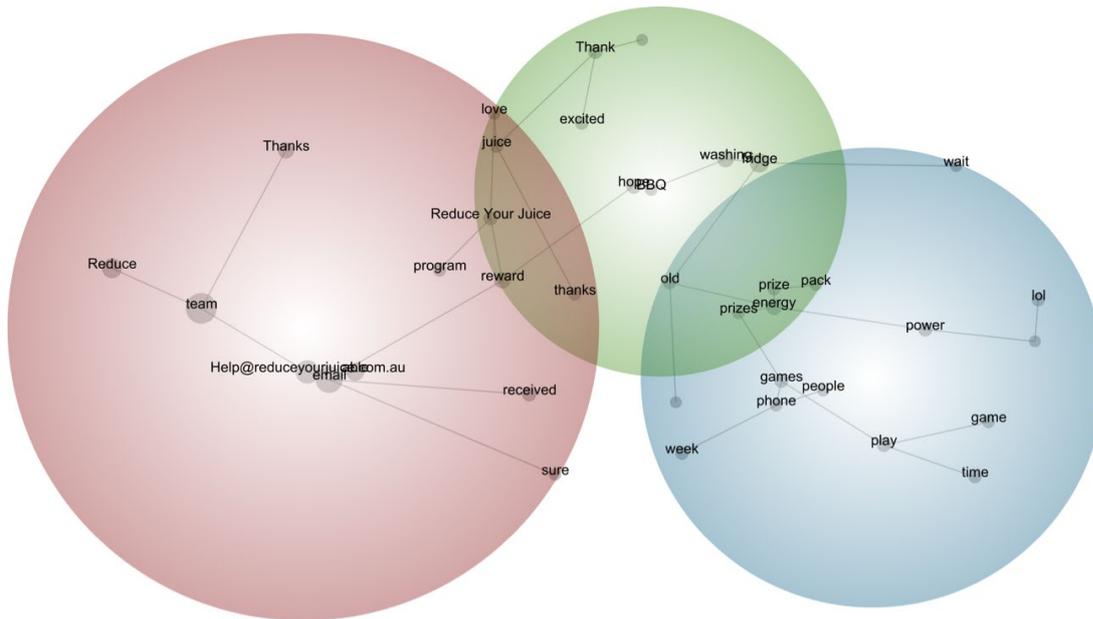
Other popular posts included posts surrounding popular events such as Halloween, Ekka Day holiday, Star Wars Day and State of Origin.

Participant comments

To analyse the comments from the RYJ Facebook page, an exploratory approach was taken to identify the most popular themes of comments. Analysis was conducted using Leximancer, a qualitative content analysis program which allows data to be manually coded and connected through the use of algorithms. Similar words and phrases were coded to allow the key topics to be determined by the dominant words and phrases posted.

The analysis of the data revealed the top three key themes of discussion on the RYJ Facebook page:

- 1) **Team support**
- 2) **Fridge**
- 3) **Play**



Team Support

The first key theme was team support, which had a total of 154 mentions on the RYJ Facebook page. Team support represents comments and posts made mostly by RYJ team members directing participants to customer support. Related words to Team Support included: email, help, help@reduceyourjuice.com.au and thanks. Comments included:

- Hit the link above and register and message the page if you have any problems. The reduce your juice team are super helpful :-)
- If you are having difficulty hun just message the reduce your juice team on their page and they will help you. They were really helpful when I was having problems. Also in your phone application store there is a free app for reduce your juice which you will need xx
- Thanks for your help :)
- Contact the team on their page hunni and they will assist you. They can most likely send you the email again or help you set up your account so you can get your first lot of goodies ;-)

Fridge

The second key theme on the RYJ Facebook page comments was Fridge, which had 84 mentions. Comments regarding fridges varied from people expressing their excitement of the arrival of their new fridge, comparisons of the fridge to other prizes such as the BBQ or questions regarding the delivery of the fridge. Related terms to Fridge included energy, hope, thank, old and excited. Comments included:

- Does everyone get different prizes? I got my first today!
- And at the end, I had the choice of a replacement fridge or washing machine. Very cool.
- Excited for my brand new fridge! Thank you so much!
- soooooo stoked that i can finally replace my fridge ... thought i would never be able to
- I'm getting a new fridge, super happy because mine sounds like a helicopter and it's bugged lol Thanks Reduce Your Juice i have got all my eligible friends to sign up

Play

The third key theme of comments on the RYJ page was play, which had a total of 35 mentions. The theme play relates to the RYJ game with participants discussing problems or questions they had regarding the games as well as their experiences with the game. Related terms to Play including, games, time and lol (laugh out loud). Comments included:

- About 1500 so far... it's not as easy as the last games!
- I loved the switch level. I got 240000 on it. Was good those nights when the kids were restless it'd play the game lol
- I dont know but am very curious... want to get it (trophy)! Haha...been playing all day trying...They are totally addictive lol

Energy Quests

Three Energy Quests were held during each wave to align to the behaviours targeted in the program and encourage participants to put their learning into action to save money. Energy Quest competitions aimed to get participants to take on an additional challenge designed to prompt real-life actions at home. Each Energy Quest was incentivised with the chance to win a small prize pack. 95% of participants said they enjoyed doing the activities, and specifically 70.1% enjoyed the Energy Quests.

Temperature Defender Energy Quests

These competitions incentivised participants to take a Winter or Summer Energy Quest for the chance to win an 'ultimate winter warmer pack' or 'ultimate hello Summer pack'.

The Winter and Summer Energy Quest competitions and Facebook posts achieved the following results:

- 265 entries
- 446 visits to the competition
- 3,613 people reached
- 82 likes
- 23 comments
- 4 shares
- 616 clicks.



The most popular quest participants chose to undertake are listed in the table below.

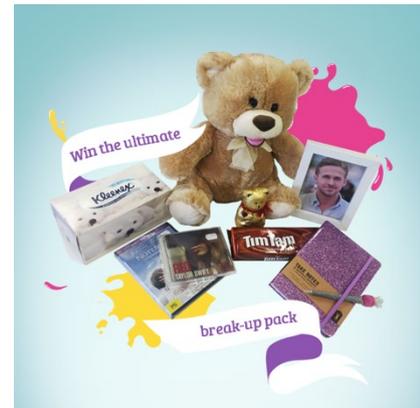
Wave 1 - winter	Quest results	Wave 2 - summer	Quest results
1. Blankie buddie: Find a blanket or rug to get under before you reach for the heater. Snuggling under the covers is free but blasting your heater will cost you big bucks.	44%	1. Alfresco: Eat outside! You'll soak up some of the sun's rays and use Mother Nature's natural aircon – a breeze. Too easy!	25%
2. Mind the gaps: Use door snakes or towels to make sure all the warm and fuzzy heat stays inside and keep the cold outside where it belongs.	14.3%	2. Make a splash: Use your local swimming pool to cool down and splash around, or get a paddle pool instead (great for pets!).	21%
3. Extreme accessories: you lose heat faster through your extremities, so grab a beanie and wooly socks to keep your body's heat close to home.	18%	3. Polar bare: Have a cold shower! It will not only cool you right down, but it will be friendly to your power bill as well.	22%
4. Hello sunshine: Open your blinds first thing in the morning and let the sun shine in. When it sets, close up the house to keep all that toasty warmth in one room... yours. Easy peasy.	17%	4. Sprinkle, sprinkle little star: Water your garden and run through the sprinklers at the same time for a 2-in-1 cooling effect.	14%
5. Knittin' mittens: Get your grandma to knit you a scarf or mittens.	6.7%	5. Mystify: Recycle an old spray bottle, fill it with water and use it to cool down on a hot and humid day.	18%

Power Raid Energy Quest

Participants had to choose to 'break up' with their biggest juice-user, an appliance responsible for increasing their energy consumption at home. Participants had the chance to win an ultimate break up pack which included various 'break up' themed items such as a Taylor Swift CD, tissues and *The Notebook* DVD.

The Power Raid Energy Quest competition and Facebook posts achieved the following results:

- 150 entries
- 306 visits to the competition
- 1,767 people reached
- 144 likes
- 74 comments
- 2 shares
- 420 clicks.



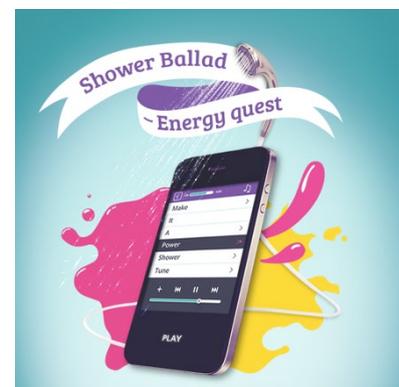
The most popular items participants chose to 'break up' with included microwaves, laptops, dryers and gaming consoles. A selection of participant comments from the Quest:

- "I would have to say. Dryer ! The love of my life doing me wrong. He's convenient and being a full time worker owning our own business and two sons aswell time is of the essence. But every quarter I kick myself for using him when I read that bloody power bill. From today I'm officially separated from 'Dryer' and formally seeing 'Clothes Line'. After the first load of washing hung today I already feel better. Good bye dryer it's been fun."
- "I love lamps and put mine on at night even when I don't need them on so my lamps! I love the atmosphere of dim light."
- "My laptop. Only going to use my iPad instead of having laptop on all the time also And get outside more often."
- "I broke up with my hair dryer. It always left my hair frizzy, which of course meant I had to use the straightener, which used even more energy. Now I just wash, towel dry, let it dry naturally and make the most of my curls. A great excuse to spend a few minutes sitting in the sun too!"
- "This year I broke up with my heater. Last year our electricity bill was \$600 dearer in winter so this year we bought cheap doona's for the couch and thermal clothing and big thick work socks, gloves and beanies to keep us all warm. As well as a large renovator rug from Bunnings to cover our tiles and all for less than a quarter of our winter bill last year."

Fully Loaded Energy Quest

The Shower ballad Energy Quest encouraged participants to submit their favourite 4 minute shower boogie for the chance to win one of two Bluetooth waterproof shower speakers. Participants also shared their shower songs on the Facebook community. The Shower ballad Energy Quest competition and Facebook posts achieved the following results:

- 104 entries
- 161 visits to the competition
- 2,208 people reached
- 45 likes
- 51 comments
- 1 share
- 342 clicks.



Refer a Friend competition

At the end of the first wave, participants were incentivised to refer a friend to the program, with the chance to win an iPad Mini. In addition to an email sent to participants, two competition posts were advertised on Facebook.

This competition saw high levels of engagement and was an effective recruitment source for the second wave, achieving the following results:

- 172 entries
- 233 visits to the competition
- 7,988 people reached
- 55 likes
- 80 comments
- 12 shares
- 277 clicks.



Powerhacks

The Powerhacks were a popular element of the program, with 94.3% of participants saying they enjoyed them. Powerhacks provided participants with easy ways of adopting money-saving energy efficiency ideas at home. Powerhacks were mainly delivered via the Facebook community, as well as via email communications. Powerhacks were aligned to each game to provide participants with extra information surrounding the core behaviours being targeted.

At the end of each wave, the 'Ultimate Powerhack Guide' was released to participants via email and social media post, giving them even more Powerhacks to use around the house. The email had the second highest unique click through rate of all emails over the program, showing high engagement and interest even though participants had earned their final reward by this stage.

The Guide, which was hosted as a page on the RYJ website, received 191 unique views over the program and showed above average engagement of 5 minutes 57 seconds spent on the page compared to the website average of just over 2 minutes.

Ultimate Powerhack Guide competition

The Ultimate Powerhack Guide email included a link to a competition where participants could win one of 10 energy saving powerboards by submitting their own Powerhacks. 136 Powerhack entries were received, with participants picking up on the style and language used in the Powerhacks throughout the program. Participants showed they had given the Powerhacks some thought, submitting a range of content not covered in the program. Getting participants to submit their own content gave them even more involvement in the subject matter.

The Ultimate Powerhack competition and Facebook posts achieved the following results:

- 136 entries
- 185 visits to the competition
- 1,245 people reached
- 50 likes
- 15 comments
- 1 share
- 247 clicks.

The following outlines a selection of participant Powerhack submissions:

- Smart Charging: Charge your mobile or tablet in the car when you are out and about, saves on electricity at home.
- Sleeping Tablet Time: Turn off your tablet or iPad when not using it to conserve its battery power and charging it less frequently.



- Feeling the heat in summer? Get a spray bottle and fill with tap water (add a mint leaf for added freshness). Find a nice spot to stand/sit outside in the shade and spray the water above your head and let it rain down on you. Even if there is just a little breeze, you will feel refreshed, calmed and best of all, nice and cool.
- Invest in remote control power points you can turn off your washing machine TV microwave all from your bed :)
- Flirty Fluctuations: If your laptop is connected to power take it off charge (and turn off the charger at the wall) when the battery is at 100%. Recharge your battery once it falls into the 20% range, this will not only help conserve power but also help extend your laptop's battery life by maintaining good charge cycles.
- I keep my slippers and dressing gown next to my bed to put on as soon as I get up so I don't notice the cold.
- I cook hot meals through winter so the oven warms the house while its cooking and then we keep warm with the warm food., instead of using the heater.
- In winter instead of using heaters I use hot water bottles. Saves lots on power bills.
- Cuddle a cat instead of using the heater! The sound of purring has been shown to lower blood pressure and reduce stress.
- Put boiled water into thermo bottle so we don't need to keep re-boil water
- When using the oven turn it off 10 to 15 minutes before it's finished. There will be enough heat to finish cooking without keeping the power on until the very end.
- Before going away in Holidays turn all power off, including emptying fridge to save money and electricity.
- Staying in wet swimmers through summer and splashing in a paddle pool with my daughter.
- Instead of watching tv I read a book or walk the dog.
- Reading, instead of watching tv or playing a board game with your family
- put the solar charger in the car and charge your phone when you need to. So don't need to use electricity
- Turn off my mobile phone while in the car. Reduces battery use and keeps my family safe so my phone goes unanswered whilst driving
- put out all frozen foods you want to cook for dinner in the afternoon so you don't need to defrost using microwave
- use lounge room for all my kids to study so only switch one light on instead of all rooms' light
- open the blind during daytime so we don't need to turn on the light
- I turn everything (except the fridge) off at the power points when not in use - including the microwave!
- I peg a sheet across the close line for shade for water play in summer
- Once a week nominate a day that you use candles and play family games rather than use the lights and television
- Keep the blinds closed during summer to keep the sunlight out and use your fan or air con less!
- Choose TV show or movie that whole family can watch rather than each family member turns on each TV in their own room
- I've strung a line up in my garage, so the kids uniforms and baby clothes dry overnight, and we don't use the dreaded dryer!

Video

A video was created as part of the warm up for the program, to help participants understand the cost of a 'normal' sized electricity bill, based on the number of people in a household in Brisbane. The video was hosted on YouTube and was linked to via email and Facebook messages to participants.

The video engagement results showed:

- 436 minutes watched
- 325 views
- 1 min 23 seconds average view duration
- 68% average duration viewed
- 12 likes
- 5 shares

YouTube analytics provided the ability to see audience retention analytics for the video. Usually retention naturally declines over the video as people stop viewing, however interestingly at the point where the video spoke about 'what's a normal bill' retention actually went up slightly, showing that people have replayed the content. These digital analytics show that people were interested, particularly in the bill size information, and that the audience engaged with the video's key messages.



YouTube also offers the ability to show your video's retention relative to all YouTube videos of similar length. The graph indicates the RYJ video showed above average ability to retain viewers during playback, especially during the content showing average bill sizes for different sized households, reinforcing viewer's interest in this content.

Landlord engagement

The landlord engagement component sought to find out if an incentive for participants would generate contact with landlords and result in landlords installing the energy efficiency intervention to gain a rebate. There were no cases of participants successfully engaging their landlords to take up the Energex Positive Payback Scheme rebates. Engagement with the email and social media post that communicated the offer to participants was high and one participant indicated they had forwarded it on to their landlord. The Facebook posts received 8 likes in the first wave and 24 likes in the second wave, with two comments on each post. One participant commented "I think if I sent this to the real estate they wouldn't forward it on", indicating a barrier to taking action.

The landlord engagement offer email received high engagement from participants, with 88% unique open rate and 31% unique click throughs to read more information about the offers. Specifically, the following offers were clicked on by participants:

- Hot Water offer: 115
- Air Conditioning offer: 52
- Pool pumps offer: 8.

Customer support

Customer support channel	Cases	%
Email	514	81.2%
Social media	97	15.3%
Phone	17	2.7%
Other	4	0.6%
SMS	1	0.2%

The customer support function for the program was delivered largely online, with the majority of participants using email and social media to engage ask questions or comment about the program. On average 4 enquiries were received each day and 633 cases were logged over the two waves of the program.

The majority of enquiries received were regarding rewards products, including delivery timing or queries about the final reward products. The graph below shows the two spikes in customer enquiries which coincided with participants earning their

final rewards in each round.

Registration was also a common type of enquiry, with participants asking about the sign up process including how to apply without a CRN.

More than 80 enquiries were received of participants updating phone numbers and address, showing the transience of the target group.

27 participants contacted RYJ to provide positive feedback and compliments about the program, including having reduced their energy bills.

12 enquiries were received querying or requesting for the program to be available to a broader range of participants (by age, location or income).

The overwhelming majority of sentiment from customers was positive, with lots of positive emails received. A selection of responses follows.

"All set to pick up the bbq on sunday 22nd. Got family coming in the evening for a BBQ to celebrate. Thanks so much for all your help and let me know if I can give any further feedback about the program that would be of any use. I am so grateful to have participated. Have a wonderful holiday season."

"Thanks so much for the speedy reply, and the wonderful news! That would be fantastic. I appreciate your help! All the best"

"Thank you so much for you help and assistance. Its greatly appreciated. Keep up the good work."

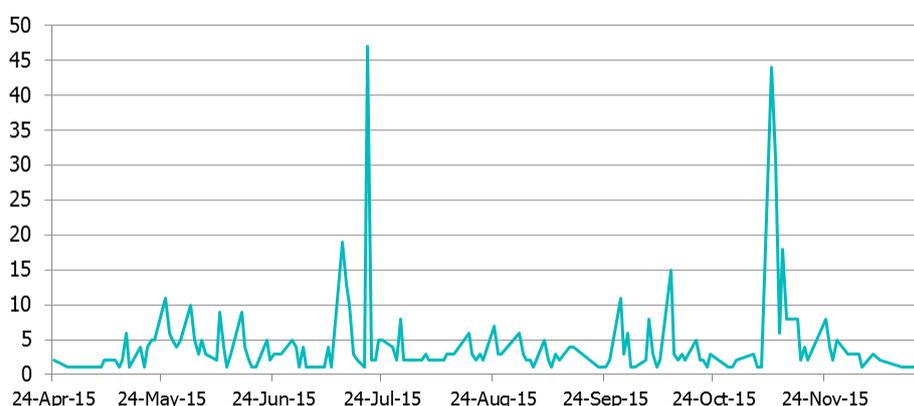
"Thank you so much forgetting back to me - it is very much appreciated! I am very pleased that you have been able to assist. I will be sure to play it very safe with the game time from now on - now that life is getting

relatively back to normal again!
Thanks again"

"You are awesome! It was the Capitol R for my email! I'm writing a Uni assignment right now and I can't even make an app log in. Oh my goodness!!!! Thank you :-)"

Case type	Cases
Reward	261
Registration	87
Update contact details	83
Survey	65
Technical difficulty	56
Games	43
Compliment	27
Other	8
Communications	1
Customer experience	1
Delivery issue	1
Total	633

Number of customer cases



Rewards

The program rewards were very popular with participants with 98% of participants indicating they liked the RYJ rewards. Participants were progressively rewarded with:

- A welcome pack for completing the pre-program survey.
- A Temperature Defender pack for playing more than 10 minutes of Temperature Defender.
- A Power Raid pack for playing more than 10 minutes of Power Raid.
- A Fully Loaded pack for playing more than 10 minutes of Fully Loaded.
- A final reward (fridge/washing machines/BBQ pack) for completing the post program survey.

Participants received either Energy Efficient or Lifestyle themed rewards packs, and a consistent welcome pack was earned by participants completing the pre-program survey.

Participants showed high engagement with the reward packs with 89.5% saying they were motivated to save more electricity knowing they were going to receive rewards in the program. While the rewards helped motivate participants to save more electricity, 57.9% of respondents said they would still participate in the program if there were no (tangible) rewards.

Participants found the rewards packs to be useful and of high value with 99.1% of respondents saying they used the rewards they received in the program and 79.3% saying the rewards and prizes they received had high value.

63.6% of respondents indicated it was highly likely they would receive the rewards and prizes in the program, with 21.8% unsure and 14.7% indicating the negative. This shows an element of uncertainty over receiving the rewards for completing actions. Anecdotal feedback from a recruitment event showed disbelief at receiving such a substantial reward for completing the program, with many comments of the program being "too good to be true".

Rewards distributed

The RYJ program saw 601 participants earn the major reward by completing the program. The number of rewards distributed was:

Fridge – 246

BBQ – 207

Washing machine – 148

Outcomes of whitegood capital upgrade

The average fridge substitute was a 469Ltr Fridge. The average fridge replaced had an energy consumption before intervention of 481 kWh per annum, which equates to 11% of the total average SEQ household electricity consumption.

The Fridge exchange resulted in a 25.17% improvement in energy efficiency for this appliance. This saved on average 121kWh per year or \$26.97 per annum.

The average new washing machine installed was a 6.5kg washing machine with 4 star WELLS rating. Washing machines were delivered by a third-party contractor who did not report the detail of washing machines being exchanged.

Other benefits

- 19.2t of scrap metal collected
- 900kgs of cardboard recycled
- 246kgs of polystyrene recycled
- 92kg of plastic recycled.

Feedback on rewards

A lot of positive feedback was received via email through the customer support:

- I just wanted to send an incredibly big THANK YOU! I recently received a pedestal fan and also a power board and solar mobile phone charger! I can not tell you how incredibly grateful and thankful I am I did not expect these at all, and truly appreciate your generosity, I am completely blown away! Thank you for the opportunity to be apart of Reduce Your Juice it truly is fantastic and motivating at well. Thank you with all my heart.
- Hi! I really don't know how to thank you for this I had no idea we actually received a white good at the end of the games I thought we went into a draw. My family are very blown away & grateful for all the very helpful gifts you have sent us.
- Hi there, Firstly I just want to say another incredibly, huge and heartfelt thank you to Reduce Your Juice, this opportunity to be apart of not only a wonderful community but also receive such incredibly generous rewards along the way and fantastic information and advice and motivation has left me truly taken back and lost for words. I am incredibly grateful and thankful and want to let you know what a great difference the wonderful rewards have made in my life and helping me to save electricity where I hadn't before thank you! :) I have also just received an email about a final reward (again I had no idea this was happening and feeling gobsmacked! I thought it was a competition that only one person would win!) ... Again I honestly can not say thank you enough and express my gratitude, THANK YOU, THIS IS INCREDIBLE! :)

RYJ customer support received many messages from participants showing excitement and gratitude for the rewards:

- Woopwoop!!!! Unlocked all of the badges - thanks RYJ it has been really fun and I have learnt a few new things ... thank you for all of the goodies, it was great getting the packages in the mail - might sound a bit sad but it's been a highlight to open the parcels and see what I get lol (apparently I'm too old for Xmas and birthday presents now so it was really neat to receive these very useful items from you guys) Now I can be super excited for the final reward - what an awesome Xmas prezzy for me, I certainly won't forget it!!!! Thank you again, I'm sure all participants are as grateful as I am.
- Omg RYJ THANK YOU SOOOO MUCH!!!! I'm so grateful for the fridge, absolutely amazed by this initiative. I won't be throwing out frozen lettuce now and can stock up on fresh fruit and veges that will last more than 2 days in the new fridge. Not only making a difference on my power bill for the better but just making life that bit better for my family to stock up on fresh food and down to one trip to the supermarket a week and able to have medications on the top shelf out of my daughters reach for peace of mind ðŸ˜Š forever grateful, still can't believe it!!!!
- Thank you!!! I picked up one on Monday, so I didn't realise there was another one, oops. Thank you so much for these amazing goodies!!! They are so great. :) I adore the 'break-up' prize - I love how funny and cute that parcel is. And the solar charger and power board are fantastic. I had considered saving up for a solar charger but now I can start harnessing the sun straight away!

Program touchpoints

The average program experience for a typical RYJ participant consisted of a range of integrated touchpoints, delivered in small bite-sized interactions. Participants interacted with the program through multiple channels.

A typical RYJ participant experienced around 339 touchpoints delivered through more than 10 different channels. This is markedly more than in traditional engagement techniques such as interviews or face-to-face consultations and supports the behaviour change approach of continuous learning.

Typical user experience	
Program touchpoint	Number
Recruitment source	1
Registration page	1
Game educational messages	98
Game play sessions	97
Badges and status earned	22
Push notifications	6
Emails	41
SMS	6
Social media posts	60
Reward packs	5
Surveys	4
Total	339

Participant feedback

Feedback was collected from participants at various stages during and after the program. Overall, feedback from participants about RYJ was overwhelmingly positive. Participants emailed and sent compliments via Facebook saying how much they enjoyed the program and rewards and saved on their energy bills.

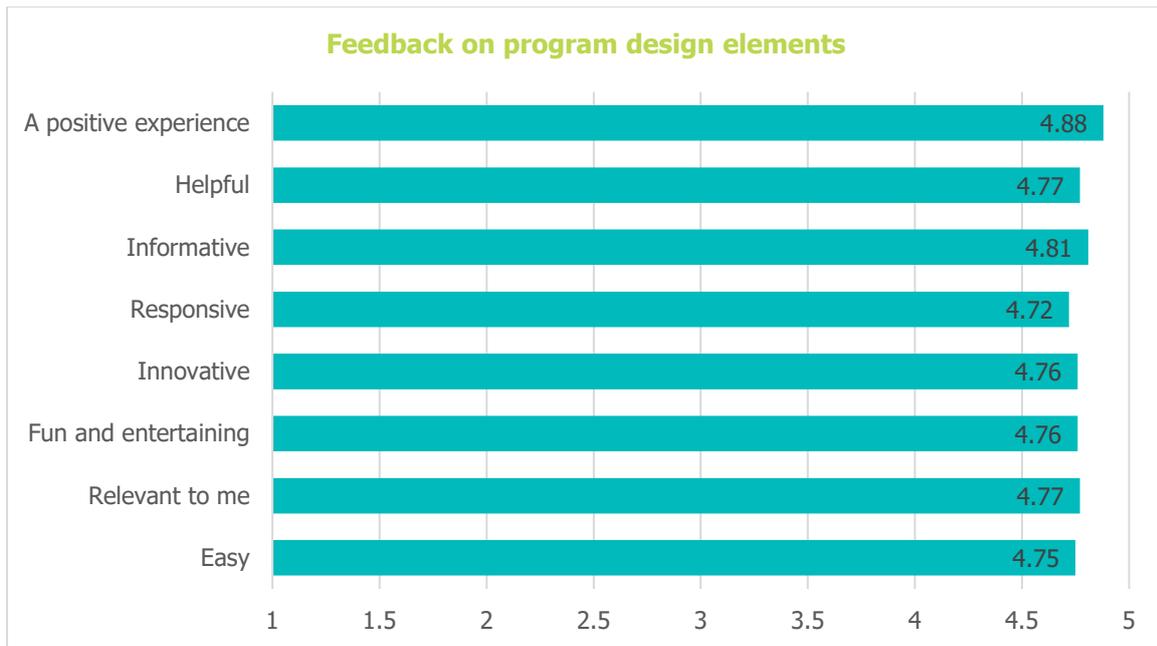
97.2% of participants said they would recommend the program to friends or family.

46.2% of participants said they told 1-4 people about the program and 52.8% told 5+ people.

Only 1% of participants didn't tell anyone about the program.

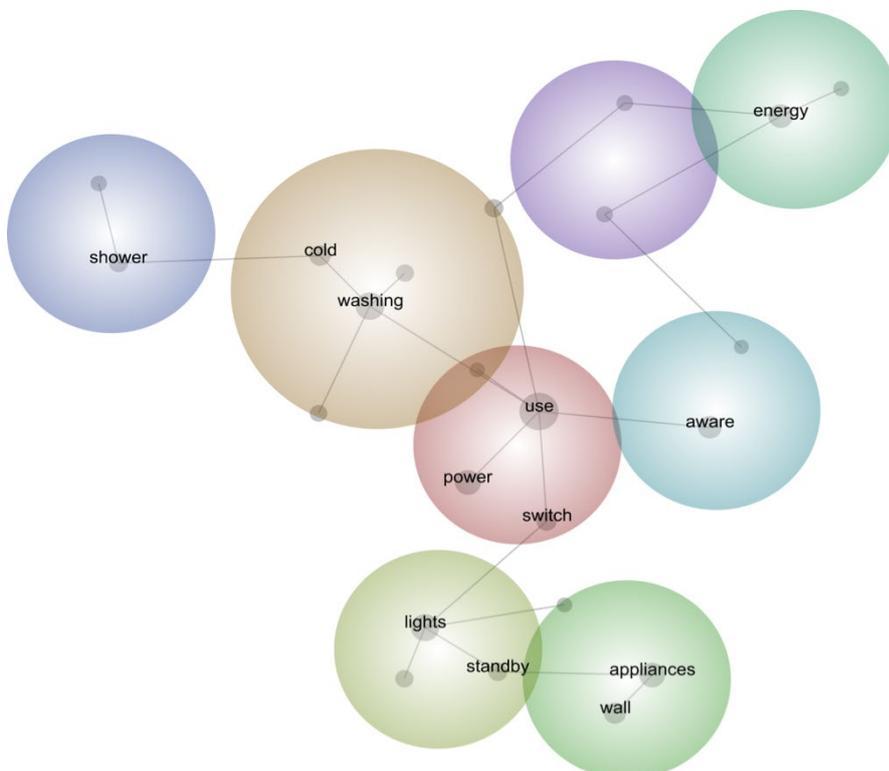
Program design elements

To measure the success of the program in delivering on the design principles set out, participants were asked to agree or disagree with statements about the program during the post program survey. 8 program design elements were measured on a 1 to 5 scale, with 5 representing Strongly Agree and 1 representing Strongly Disagree. Participants were asked if they thought the program was: easy, relevant to me, fun and entertaining, innovative, responsive, informative, helpful, and a positive experience. Participants overwhelmingly agreed with all statements about the program, showing the success of the program in achieving the desired style of engagement with participants.



Monitoring energy use

During the post program survey, participants who agreed with the statement Reduce Your Juice helped me monitor my own energy use were asked to provide an example of how the program achieved this. Participants then provided open ended responses which were analysed using Leximancer. The Leximancer analysis found eight key themes discussed by RYJ participants: 1) use 2) washing 3) lights 4) appliances 5) energy 6) aware 7) shower 8) helped.



Use

The theme Use is characterised by participants becoming more attentive to the energy being used within their household. Participants discussed how this could provide a challenge from them to reduce their electricity:

“The challenge to try and not **use** the juice really makes you concentrate more when executing it in real life circumstances”

Participants also discussed how they found other objects or appliances to use that were more energy conservative:

“Rugged up and **used** blankets instead of the heater”

“Turning off power and **using** a fan”

Washing

The theme washing refers to participants laundry behaviours. Participants discussed how they were more mindful when doing the washing to use cold water or wait for a full load. This can be seen in the following participant’s answers:

“I didn’t know **cold laundry** was just as effective as hot water washing”

“Washing **full loads** only now”

Lights

The third theme participants discussed in regards to how the RYJ program assisted them was lights. In this theme participants discussed how participating in the program made them more likely to switch lights off which were not being used.

“I **switch off lights** before bed” “I am now more conscience of **turning off unused lights**”

Appliances

Participants discussed how participating in the RYJ program encouraged them to switch appliances off which were not in use:

“Just in the little things - I made the conscious decision to turn **more standby appliances off**”

“I am now **switching stuff off at the wall**”

Energy

Energy was the fifth common theme discussed by participants. Participants discussed energy broadly in regards to aspects such as getting lower bills, receiving helpful hints to save electricity and teaching others how to save electricity.

“I followed the powerhacks! And got a very **low electricity bill!**”

“...Was fun teaching my 5 year old about **saving energy**”

Aware

Participants also discussed how the RYJ program made them more aware of the energy and electricity being used in their household at an individual and household level.

“Made me **more aware** of costs of energy consumption”

“It has made the **whole family aware** of what happens if they don’t pay attention to the things that suck too much power”

Shower

The seventh most discussed theme was shower. In this theme participants discussed how the program had encouraged them to have shorter showers.

"4 minute showers to a good song"

"The timer for the shower **made me realise how long I was actually in the shower for**. It then allowed me to adjust to try have shorter showers"

Helped

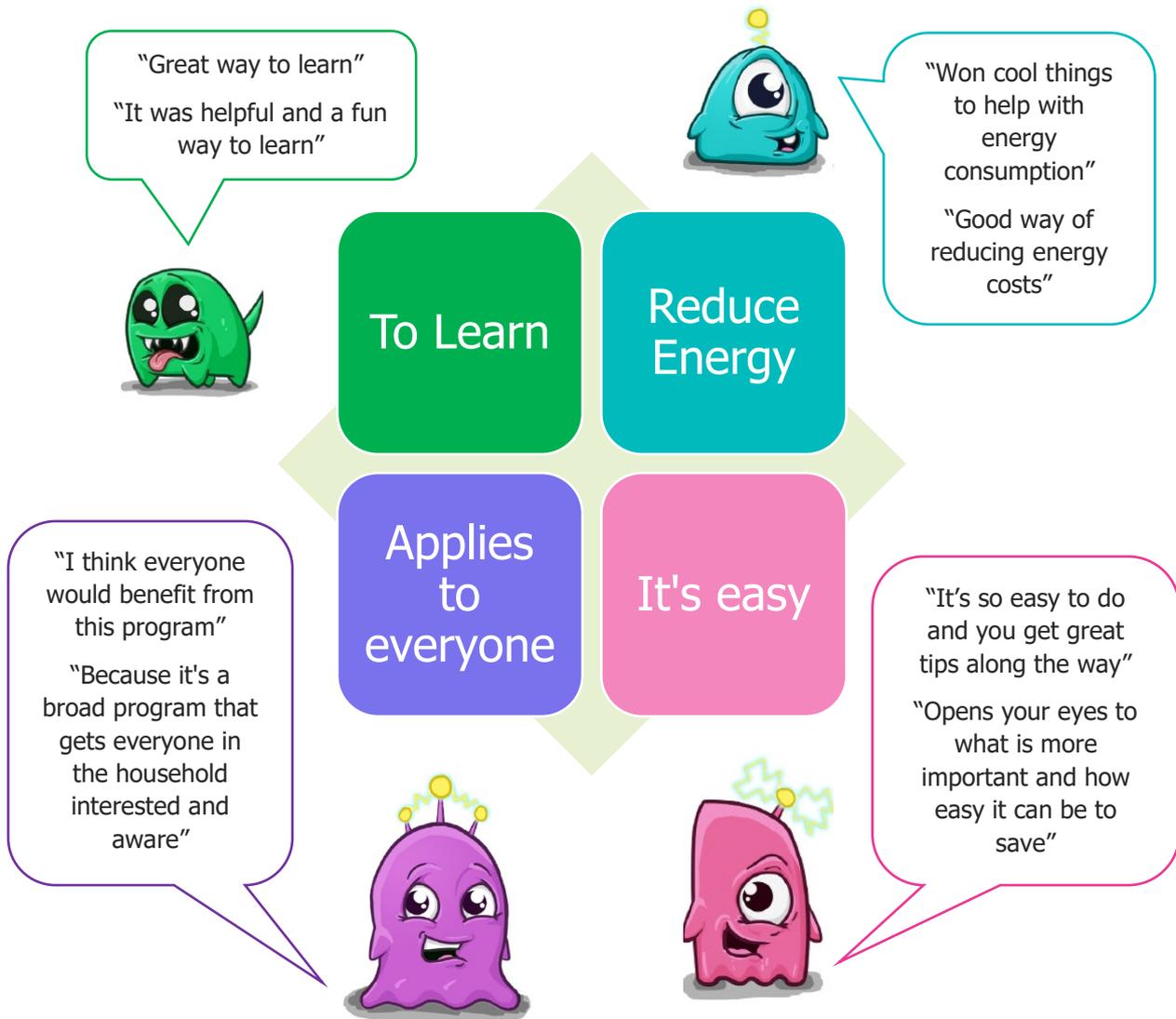
The final theme discussed by participants was helped. Participants of RYJ discussed how the program had overall helped in assisting them reducing their electricity and energy consumption around their home. Interestingly, participants also discussed how the program had helped them engage their household into saving electricity.

"It has **helped** me realise how much energy I waste"

"The games especially the switch game (explained it too them (children) and let them played) **helped my children turn off appliances in there room.**"

Recommending the program to friends and family

During the post program survey, participants were asked if they would recommend the RYJ program to friends or family and why. Leximancer was used to show the key themes participants discussed in this question, with four main reasons why they would recommend the program to friends and family shown.

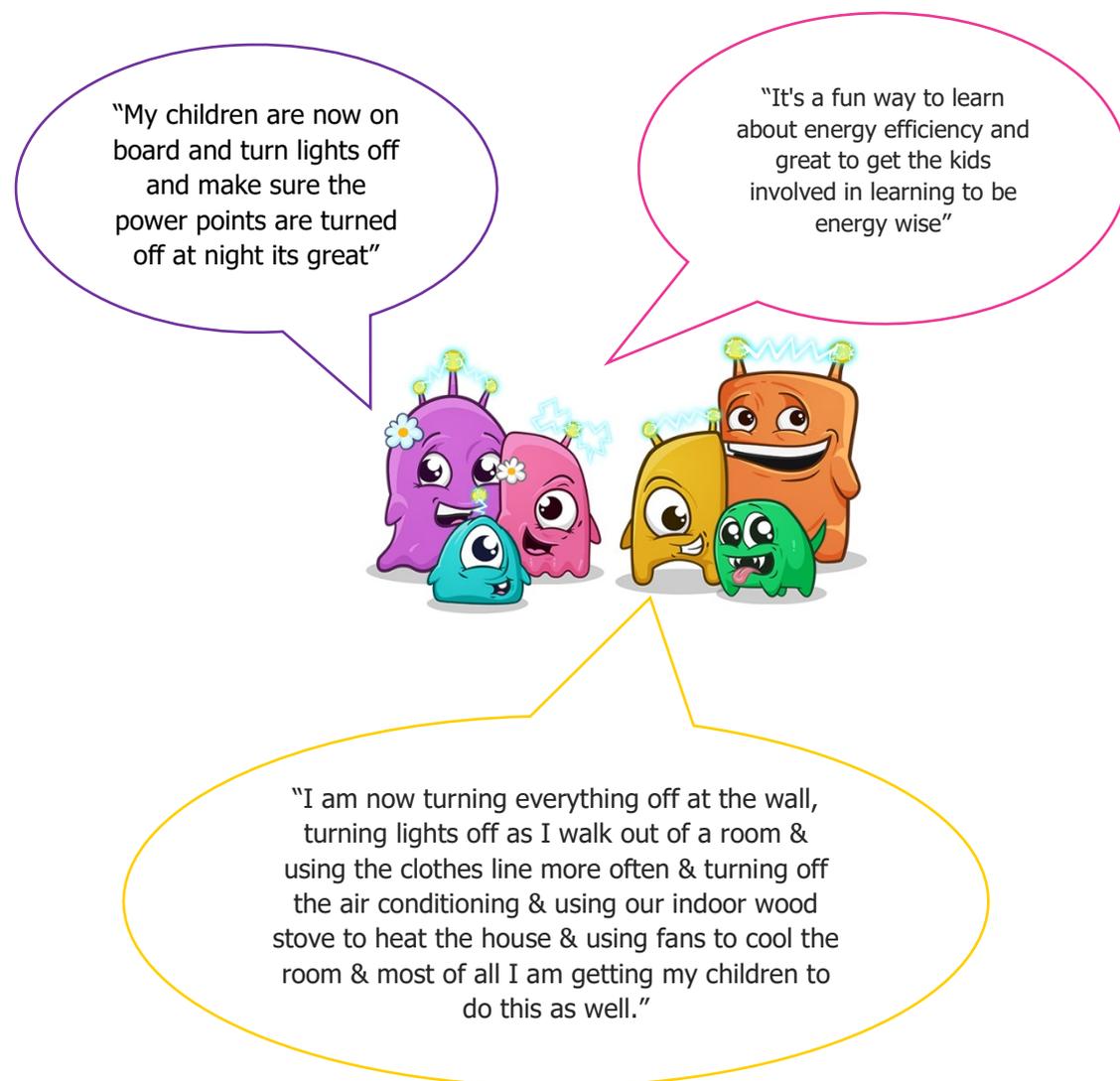


Engaging the household

A qualitative analysis was conducted looking at participant's responses to how they thought the program helped them save electricity. Interestingly, although the RYJ program primarily targeted the individual who signed up, the program had a flow on effect and engaged the whole household in attempting to reduce their electricity consumption.

As one participant pointed out, the ability of an individual to reduce household electricity is limited and the whole household must be engaged in order to a reduction to be achieved: "...having only one person educated doesn't work. Everybody has to be involved and aware and willing to go to a little bit of extra effort to save power".

Household engagement to save electricity appeared to be the most common in family households whereby parents used the games and other tools in the RYJ program to encourage their children to assist in saving.



Thank you

RJY received many unprompted votes of thanks from participants both through the customer support email and on the Facebook community. A selection of comments is below.

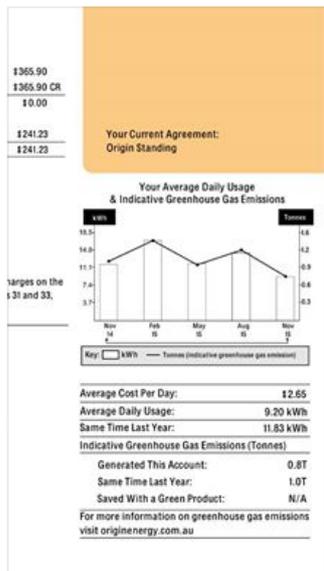
- Hey just wanted to say thanks. We more then halved our energy usage and recently had the smallest energy bill we have ever had. The new fridge is excellent, fresh food lasts heaps longer so we are saving even more money. I can not express my gratitude enough for this program. Everyone should do this.
- Hi I just wanted to provide some feedback about the reduce your juice experience. I felt as though the tips, emails, messages and games made me more consistently aware of trying to make changes to my energy use but didn't feel that I was particularly successful at putting the changes I wanted to make into effect. However when I got my most recent bill I found that it had gone from \$884 down to \$720. Considering that I felt my effort and success in implementing changes was minimal this was fantastic and leaves me feeling much more optimistic about my ability to continue to keep the bill under control. As a single Mum on a pension this has been very helpful. The rewards were also a fantastic incentive.
- I just had to let you know that our latest bill was down again to \$510, \$450 if paid early. That's another \$160 drop and I haven't had a bill that low in years. I cannot believe that I had resigned myself to \$800 plus bills. Amazing what a bit of information, incentive and intention can accomplish. Thanks again.
- All set to pick up the bbq on sunday 22nd. Got family coming in the evening for a BBQ to celebrate... I am so grateful to have participated. Have a wonderful holiday season.
- I would like to say thank you very much for the opportunity to play such fun games and be a part of this program. I don't think I can thank you enough, as I have never owned a BBQ and have always wanted to own a Weber. I can't wait to get grilling :)
- Good evening reduce your juice team :) I am so happy that I have earned my final reward. On a personal note, I loved the program and found the games really entertaining (addictive) haha #secretaddict



Anita [redacted] ▸ Reduce Your Juice

11 mins · 🌐

Got my first electricity bill since starting my RYJ "diet" and I am very impressed!!! We saved \$124.67!!! And watt's better (pardon the pun) is this is for 2 people, not one person like it was this time last year! We did put a rotary clothes line in from Masters that was \$80, but even with this cost in mind - we still came out well on top!!! Thank you RJY!!! Opening my electricity bill was like Christmas this morning!!! Who'd have thought that saving electricity would be so exciting!!!



1 Like



Chloe [redacted]
Today at 16:04 🌐

Just had my first power bill since completing reduce your juice and have more then halved our energy usage! Woohoo! Thanks to this program.



Leshanicka [redacted]

23 October 08:28

Hey I just wanted to let the reduce your juice team know that we are really becoming power conscious when it comes to our electricity bills. We now get monthly bills and are really happy to say that the last 2 months our monthly electric bill has been only \$40 and that's for a family of 5. Using reduce your juice to help teach our kids how to save power has been an awesome help in showing them how to save power and money. And they see that the money we save can be used on family outings to the beach and bbqs.

Energy habits and explanatory factors

The program intervention targeted behaviour change in three core sets of behaviours represented in the program mini-games and email and social media content. Specifically:

- Temperature Defender targeted cooling and heating habits
- Power Raid targeted switching off lights and appliances
- Fully Loaded targeted efficient washing and drying laundry habits.

The Before and After intervention graphs denotes the program participants before and after the program intervention and the Before and After Control graphs denote the control group results taken in parallel timing to the program 6 weeks apart.

Further analysis of the data was undertaken to determine if an increase in the number of positive habits led to positive change in electricity usage. Using the pre and post habit answers from participants 3 groups were made; 1) those who increased the number of positive habits adopted over the intervention, 2) participants whose habits did not change, 3) and participants who abandoned some habits and thus lowered the number of positive habits they selected to adopt. The sample was split into these 3 groups and a paired t-test was used to examine the change in electricity usage before and after the intervention. Those who abandoned positive habits increased their kilowatt usage by 32.16% while, those who adopted more positive habits only increased their bill by 3.30%, those with no change in habits increase 13.45%. Although the changes were not statistically significant a clear trend can be seen with those participants adopting more positive habits lowering the percentage increase in their kilowatt usage.

Groups	Kilowatt (before)	Kilowatt (after)	% Change	Statistical Significance
Adopted more	1443.13	1490.72	+3.30%	.516
No change	1350.65	1532.27	+13.45%	.132
Abandoned some	1401.80	1852.60	+32.16%	.065

Energy-saving habits

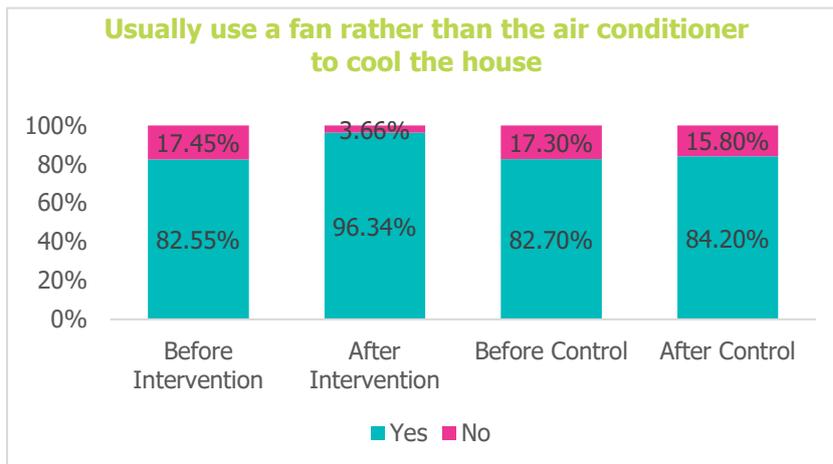
Habits evaluated were positive energy saving behaviours. An increase in the number of Yes responses at post-program indicates an improvement. To test if there was a significant improvement from Time 1 to Time 2 a McNemar's test statistic was used. All habits improved significantly in the intervention group. Within the control group on Habit 2 "Usually use cold water to do the laundry" improved significantly.

All habits targeted by the RYJ program intervention showed a statistically significant improvement for the participant group. On average, participants showed a 22.52% improvement in habits over the program intervention period.

Temperature Defender

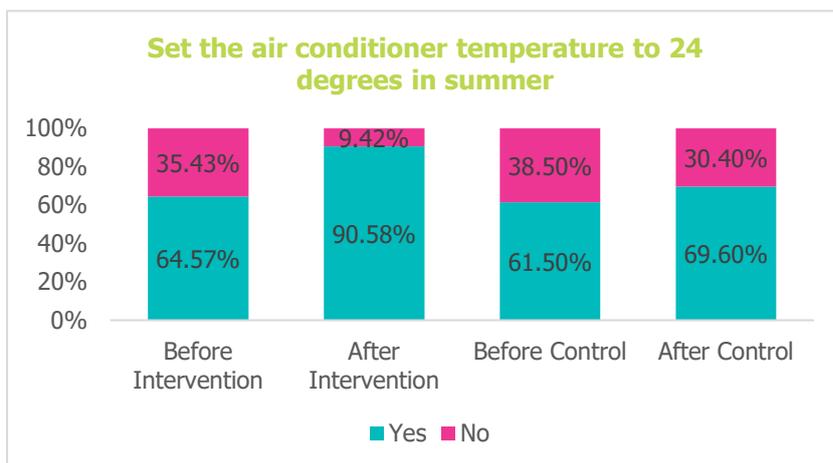
The two core behaviours targeted by the Temperature Defender game and digital program content were setting the air conditioner to 24 degrees in summer and using a fan rather than the air conditioner. The Temperature Defender game involved players using a fan to blow away hot suns and keep their room at 24 degrees by not letting the suns through. The suns heated up the room and when reaching 30 degrees, the 'Scare Conditioner' would appear and use a substantial amount of juice from the juice bar. When all the juice was used the game would end.

Using a fan rather than the air conditioner to cool the house



Program participants showed a statistically significant improvement (16.07%) for the habit of using a fan rather than the air conditioner to cool their homes ($p < .001$). The control group change was no statistically significant.

Setting the air conditioner temperature to 24 degrees in summer

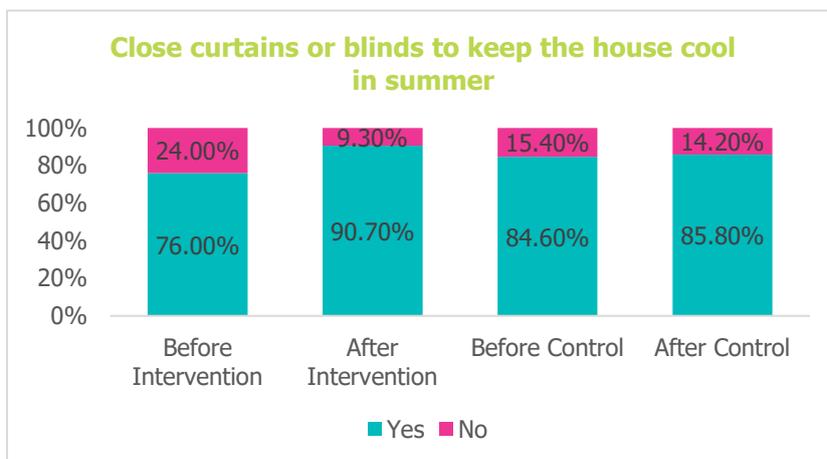


There was statistically significant improvement (40.28%) in participants saying they set the air conditioning to 24 degrees after the program ($p < .001$).

After the intervention 90.58% of participants indicating they perform this behaviour after the program while the control group remained constant with a

non-significant change in behaviour. Both groups demonstrated a similarly low starting point for this habit, indicating uncertainty around the correct temperature to set the air conditioner.

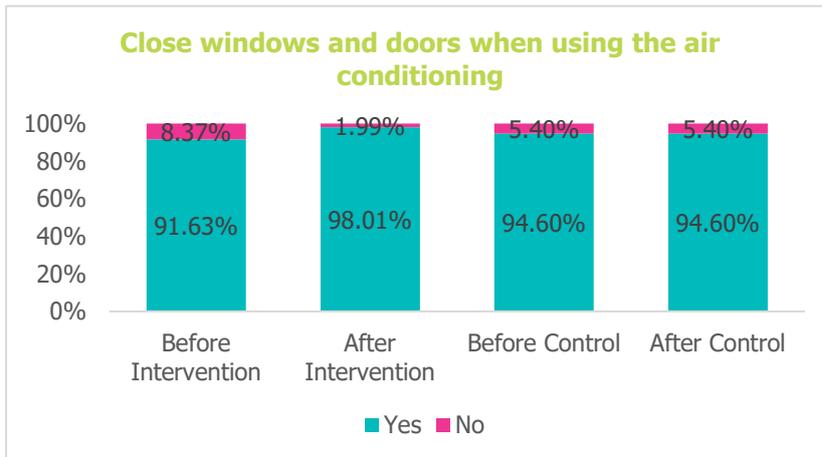
Closing curtains or blinds to keep the house cool in summer



This habit was not directly included in game play, however was include in broader program content on social media and in emails. Participant's change in closing curtains or blinds to keep the house cool was statistically significant ($p < .001$) at 23.61%, increasing to 90.7% agreement with the habit after the intervention.

The control group change was not statistically significant.

Closing windows and doors when using the air conditioning

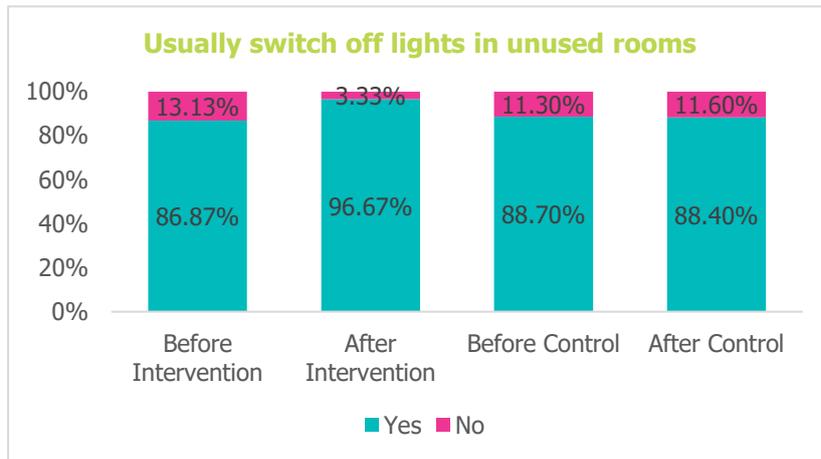


This habit was not directly targeted in the app games, although was included in broader program content. This habit showed a statistically significant improvement (6.96%) in the participant group ($p < .001$), while the control group change was not statistically significant with no movement over time.

Power Raid

The Power Raid game targeted the core behaviours of switching off lights and appliances around the house, with players continuously tapping different switches and standby lights to turn them off.

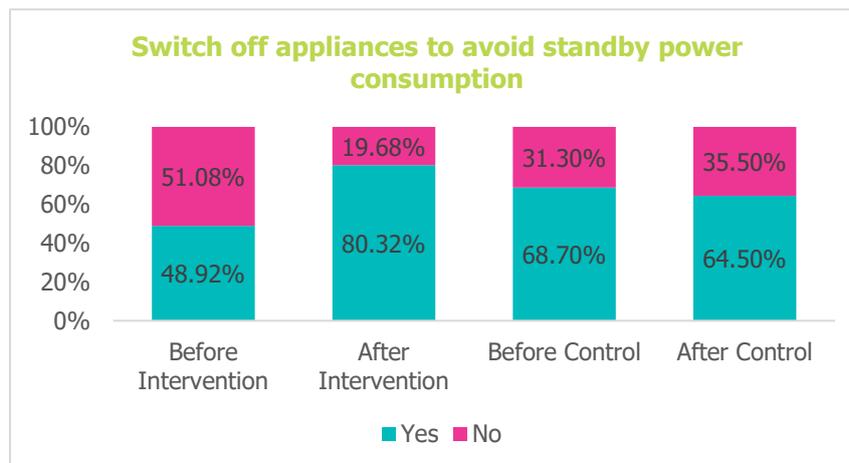
Switching off lights in unused rooms



A high percentage of people in both the control and participant groups indicated they already perform this habit, however participants showed a statistically significant ($p < .001$) improvement (11.29%) in switching off lights in unused rooms after the program intervention.

The change in the control group was not statistically significant.

Switching off appliances to avoid standby power



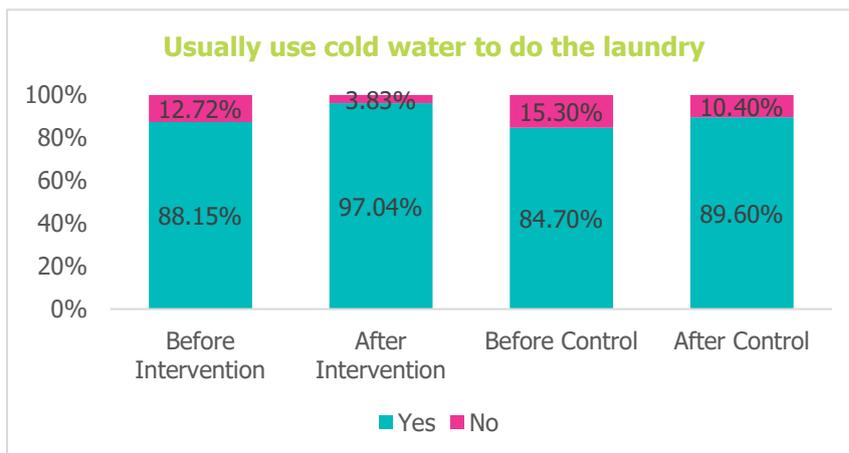
This habit showed the largest improvement for participants, with a statistically significant change ($p < .001$) of 64.21%.

The change in the control group between time periods was not statistically significant.

Fully Loaded

In the Fully Loaded game, players picked up blue cold wash items and avoided the red hot water items which used up more juice. Players could reduce the amount juice they used by grabbing the clothes line to hang out their washing. Bonus points were given to building up items for a full load before hitting the washing machine. Hitting Darth Dyer was instant game over.

Using cold water to do the laundry



Participant's agreement with this habit improved significantly (10.08%) over the intervention time period ($p < .001$).

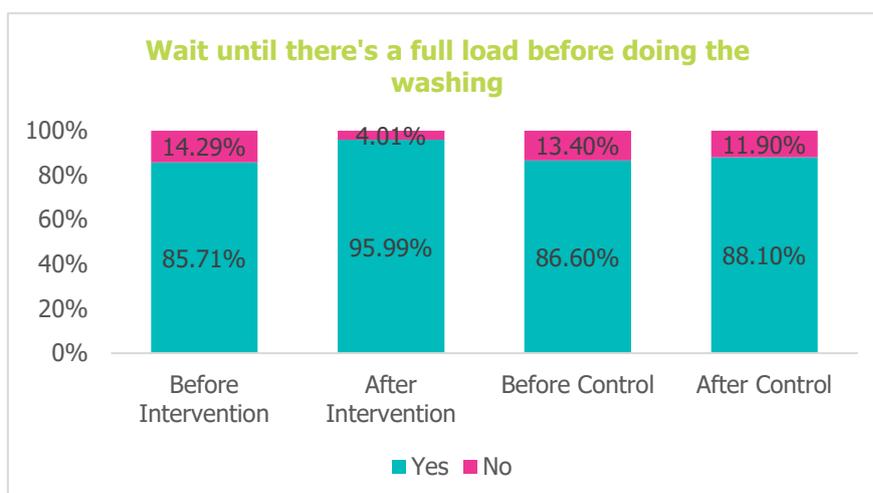
Both groups showed relatively high incidence of this habit to start with, although the program participants showed a higher rate of improvement than the control group after the intervention.

Using a clothes line rather than the dryer to dry washing



Participants showed a statistically significant improvement (17.54%) in this habit after the program intervention ($p < .001$) while the change in the control group was not statistically significant.

Washing full loads of laundry



Participants showed a statistically significant improvement (11.99%) in this habit over the program intervention period ($p < .001$) while the change in the control group between time periods was not statistically significant.

Psychological factors

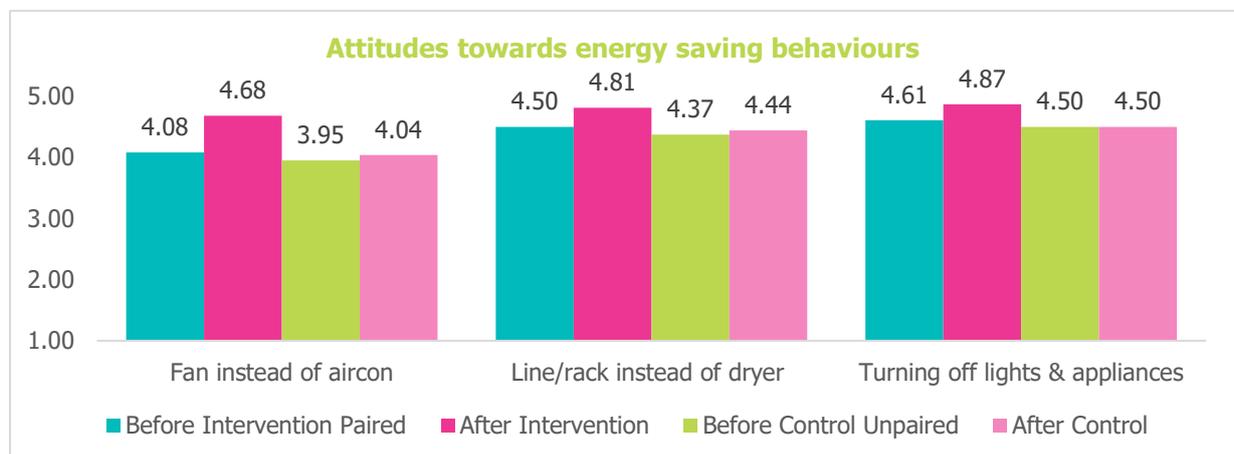
Attitudes towards energy behaviours and a range of psychological factors were analysed to gain a greater insight to why or why not participants were performing electricity saving behaviours. Factors were measured on a scale of 1 to 5, Strongly Disagree to Strongly Agree.

Results are denoted below where M is the Mean, SD is the Standard Deviation. The t-value shows the size of the difference relative to the variation and the P value shows the significance of the result (significant if below 0.05).

Attitudes towards energy

Participant's attitudes towards the core behaviours targeted by the intervention were measured before and after the program intervention. Participant's attitudes were all positively influenced by the program. Using a paired t-test, significant differences were found for all intervention variables, showing positive attitudes increased towards:

- using a fan rather than the air conditioner to cool the house.
- using a drying rack or clothes line rather than the dryer to dry washing.
- switching off lights and appliances when not in use.



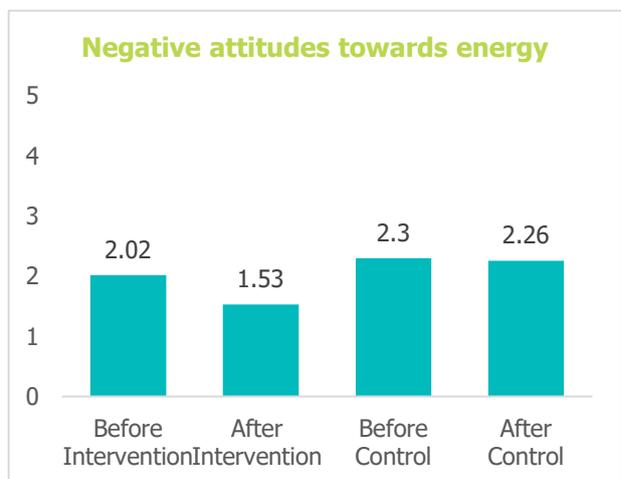
No significant difference was found for the control group in regards to positive attitudes towards using a drying rack instead of a dryer and turning off lights and appliances, however there was a significant difference for positive attitudes towards using fan instead of air conditioning in the control group.

Negative attitudes

Negative attitudes towards energy were measured before and after the program intervention for the participant group and control group. The graph shows a summary of the CSIRO questions on negative attitudes towards energy that were measured across all the LIEEP projects.

The participant group's negative attitudes towards energy dropped substantially, while the control group attitudes remained constant.

For the participant group, there was a statistically significant decrease in Negative



attitudes towards saving electricity scores from Time 1 (M = 2.02, SD = 0.84) to time 2 (M = 1.53, SD = 0.62), $t(595) = 15.70$, $p = 0.000$.

The control group showed there was not a statistically significant change in Negative attitudes towards saving electricity scores from Time 1 (M = 2.3, SD = 0.95) to time 2 (M = 2.26, SD = 0.88), $t(349) = .986$, $p = 0.325$.

Motivation, Opportunity and Ability

Motivation and Ability constructs measured in Wave 1 and Wave 2 were found to not be valid or reliable, so items were selected from each construct to test differences between before and after intervention.

Motivation

Significant items selected to measure Motivation were:

- For Motivation (Wave 1), people's agreement with the statement "I have more control over my electricity usage than I did at this time last year" was used.
- For Motivation (Wave 2), people's agreement with the statement "I think it is important to save electricity" was used.

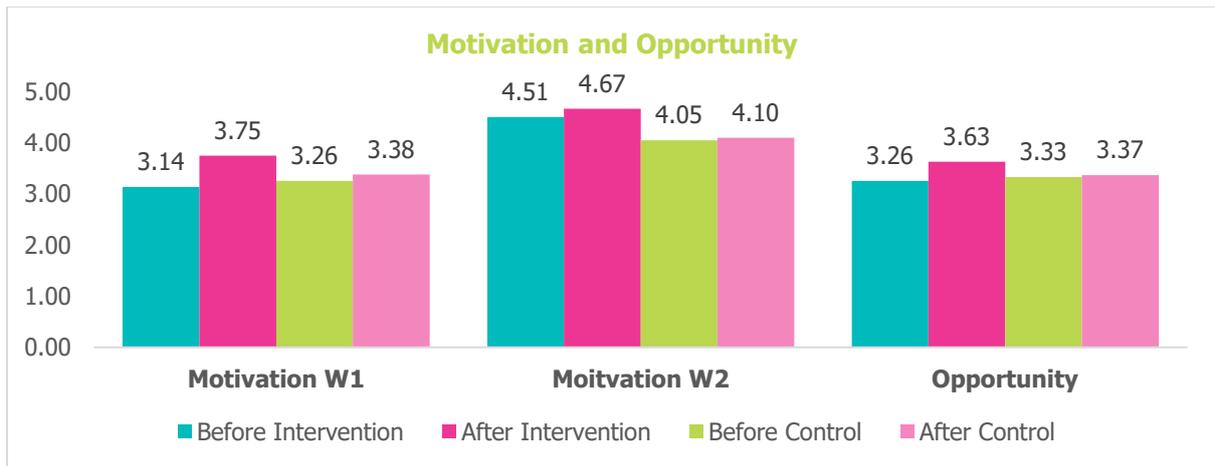
While the participant group showed larger increases in motivation than the control group, the increases across both the participant group and the control group were shown to be significant. Results showed:

- There was a statistically significant increase in Motivation Item (Wave 1) for the participant group from Time 1 (M = 3.14, SD = 1.17) to time 2 (M = 3.75, SD = 1.08), $t(115) = -4.98$, $p = 0.000$.
- There was a statistically significant increase in Motivation (Wave 1) scores for the control from Time 1 (M = 3.26, SD = 1.04) to time 2 (M = 3.38, SD = 0.98), $t(141) = -2.2$, $p = 0.03$.
- There was a statistically significant increase in Motivation Item (Wave 2) for the participant group from Time 1 (M = 4.51, SD = 1.17) to time 2 (M = 4.51, SD = 1.08), $t(211) = -2.57$, $p = 0.011$.
- There was not a statistically significant increase in Motivation for the control (Wave 2) scores from Time 1 (M = 4.05, SD = 0.8) to time 2 (M = 4.1, SD = 0.81), $t(195) = 0$, $p = 1.000$

Opportunity

Opportunity to save electricity increased significantly for the participant group between the before and after program surveys, while the slight control group increase was not statistically significant. This demonstrates the impact of the program in changing participants' perception of the environment as they saw more opportunity to save electricity after the intervention. Results showed:

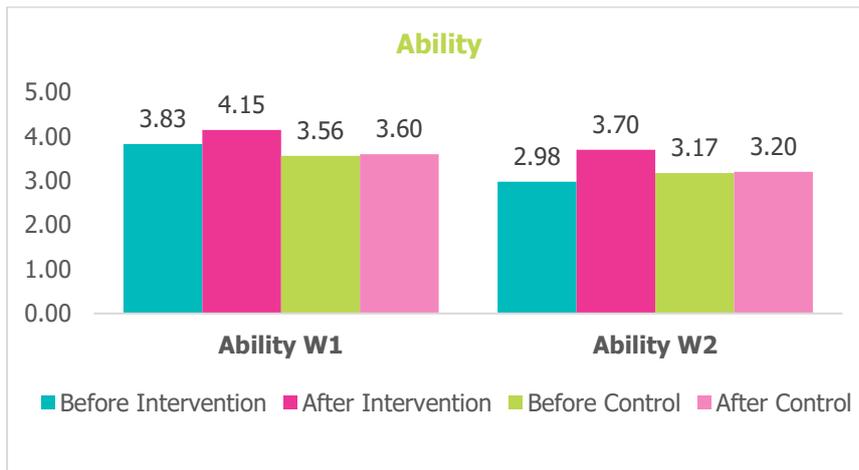
- There was a statistically significant increase in Opportunity scores for the participant group from Time 1 (M = 3.26, SD = 0.64) to time 2 (M = 3.63, SD = 0.58), $t(310) = -11.8$, $p = 0.000$.
- There was not a statistically significant increase in Opportunity scores for the control from Time 1 (M = 3.33, SD = 0.58) to time 2 (M = 3.37, SD = 0.6), $t(337) = -0.02$, $p = 0.987$.



Ability

Significant items selected to measure Ability were:

- For Ability (Wave 1), people's agreement with the statement "It is important for my household to have a coordinated plan to save electricity".
- For Ability (Wave 2), people's agreement with the statement "My household has a plan for saving electricity".



There was a significant improvement in participant's perception of Ability using the items above, while the control group change was not significant.

Results showed:

- There was a statistically significant increase in Ability Item (Wave 1) for the participant group from Time 1 (M = 3.83, SD = 0.82) to time 2 (M = 4.15, SD = 0.65), $t(115) = -4.61$, $p = 0.000$.
- There was not a statistically significant increase in Ability (Wave 1) scores for the control from Time 1 (M = 3.56, SD = 0.91) to time 2 (M = 3.6, SD = 0.93), $t(141) = -0.98$, $p = 0.331$.
- There was a statistically significant increase in Ability Item (Wave 2) for the participant group from Time 1 (M = 2.98, SD = 0.82) to time 2 (M = 3.70, SD = 0.65), $t(211) = -8.94$, $p = 0.000$.
- There was not a statistically significant increase in Ability (Wave 2) scores for the control from Time 1 (M = 3.17, SD = 1.15) to time 2 (M = 3.2, SD = 1.15), $t(195) = -0.68$, $p = 0.495$.

Behavioural intentions

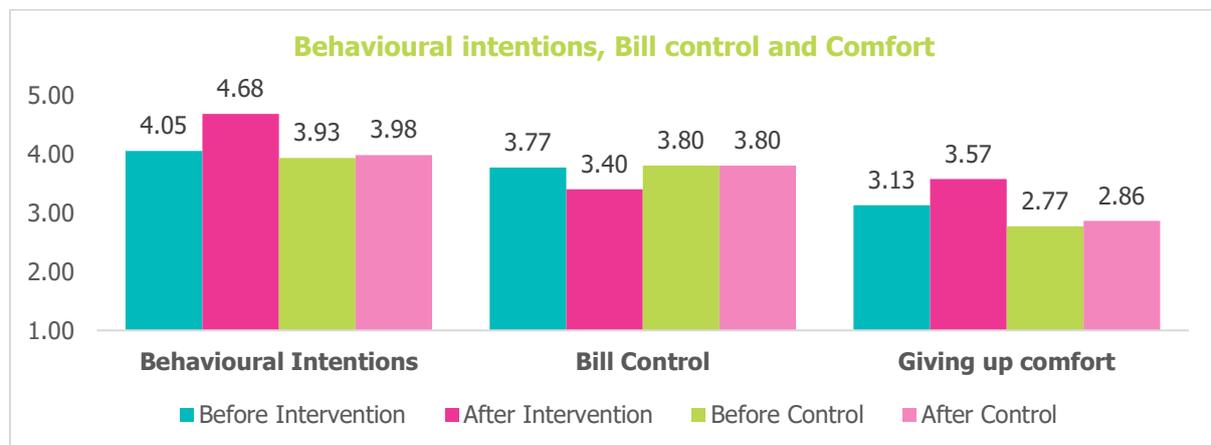
There was a statistically significant improvement in participant's intentions to perform the energy saving behaviours targeted by the program intervention after the program, while the control group showed no significant change.

Bill control

Bill control showed participant's perception of how much the electricity company was in control of their bill versus their own control. Participants showed a significant improvement in their perceived control of their bill over energy companies after the program, while the control group showed no significant change over the same period.

Willingness to give up comfort

The participant group showed a significant increase in their willingness to give up comfort after the program intervention, while the control group showed no significant change.



Results showed:

- There was a statistically significant increase in Behavioural Intentions scores for the participant group from Time 1 (M = 4.05, SD = 0.83) to time 2 (M = 4.68, SD = 0.49), $t(585) = -20.66$, $p = 0.000$.
- There was not a statistically significant increase in Behavioural Intentions scores for the control from Time 1 (M = 3.93, SD = 0.83) to time 2 (M = 3.98, SD = 0.82), $t(329) = -1.68$, $p = .093$.
- There was a statistically significant decrease in Bill Control scores for the participant group from Time 1 (M = 3.77, SD = 1.07) to time 2 (M = 3.4, SD = 0.78), $t(334) = 7.5$, $p = 0.000$.
- There was not a statistically significant increase in Bill Control scores for the control from Time 1 (M = 3.8, SD = 1.16) to time 2 (M = 3.8, SD = 1.17), $t(340) = -0.82$, $p = 0.411$.
- There was a statistically significant increase in Willingness to give up comfort scores for the participant group from Time 1 (M = 3.13, SD = 0.83) to time 2 (M = 3.57, SD = 0.78), $t(189) = -9.61$, $p = 0.000$.
- There was not a statistically significant increase in Willingness to give up comfort for the control scores from Time 1 (M = 2.77, SD = 0.62) to time 2 (M = 2.86, SD = 0.62), $t(228) = -1.85$, $p = 0.066$.

Concern about electricity savings

Bill or price concern was used to measure concern for effort or bother involved in conserving energy as well as the individual's concern to pay for their energy needs. The participant group showed a significant increase in effort and being bothered to save electricity and concern to pay for their

energy needs after the intervention, compared to the control group change which was not statistically significant.

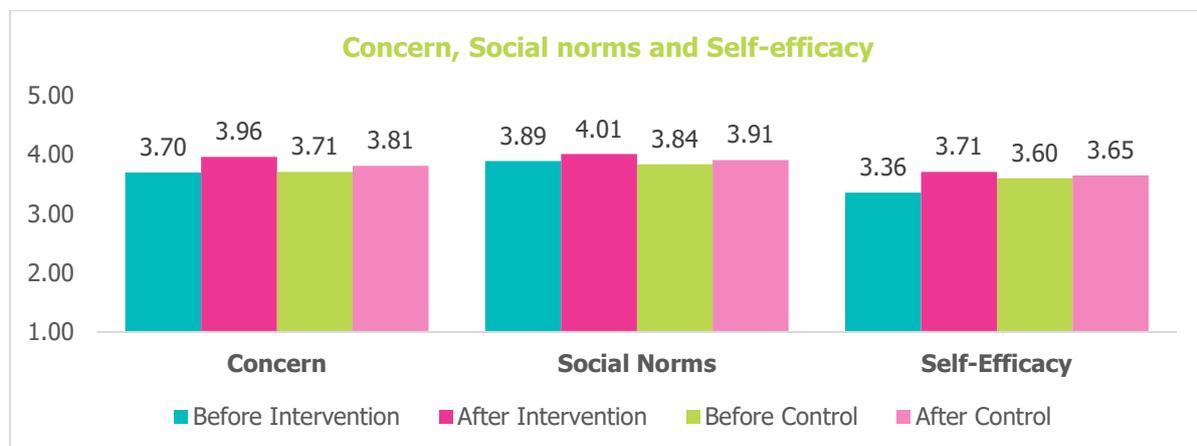
Social norms about saving electricity

The social norms construct comprised of subjective norms of what other people think (the amount of pressure that people perceive they are under from significant others to perform or not to perform a behaviour) and moral norms around whether it's the right thing to do (an individual's internalised moral rules which reflects the perception that engaging in a behaviour would cause self-approval and involve an ascription of self-responsibility to act).

The participant group showed a significant increase in social norms after the program intervention, while the control showed no significant change.

Self-efficacy

The participant group showed a significant improvement in self-efficacy after the program intervention while the control group showed no statistically significant change.



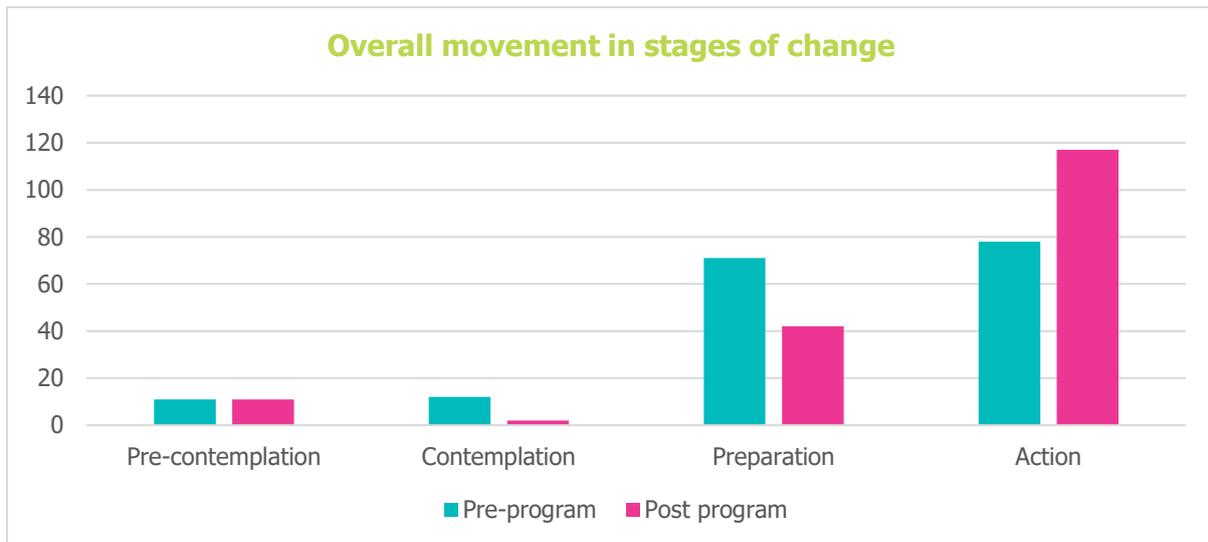
Results showed:

- There was a statistically significant increase in Price concern scores for the participant group from Time 1 (M = 3.7, SD = 0.78) to time 2 (M = 3.96, SD = 0.77), $t(327) = -5.46, p = 0.000$.
- There was not a statistically significant increase in Price concern scores for the control from Time 1 (M = 3.71, SD = 0.96) to time 2 (M = 3.81, SD = 0.94), $t(337) = -1.44, p = 0.152$.
- There was a statistically significant increase in Social Norms scores for the participant group from Time 1 (M = 3.89, SD = 0.47) to time 2 (M = 4.01, SD = 0.5), $t(320) = -4.09, p = 0.000$.
- There was not a statistically significant increase in Social Norms scores for the control from Time 1 (M = 3.6, SD = 0.57) to time 2 (M = 3.65, SD = 0.59), $t(335) = -1.59, p = 0.112$.
- There was a statistically significant increase in Self-Efficacy scores for the participant group from Time 1 (M = 3.36, SD = 0.74) to time 2 (M = 3.71, SD = 0.7), $t(326) = -12.03, p < 0.000$.
- There was not a statistically significant increase in Self-Efficacy scores for the control from Time 1 (M = 3.84, SD = 0.63) to time 2 (M = 3.91, SD = 0.67), $t(334) = -1.36, p = 0.176$.

Stages of change

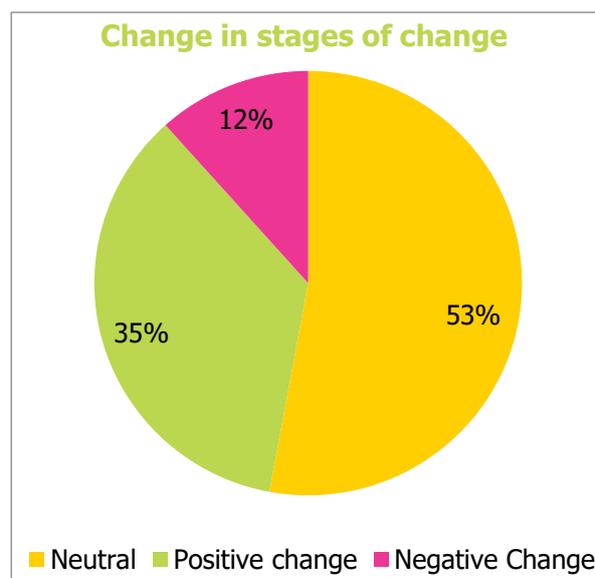
A sample of participants was evaluated to monitor any movement through a Stages of Change model where pre-contemplation shows people who have not yet acknowledged the problem, contemplation shows people who acknowledge the problem but are not ready or willing to make a change, preparation shows those getting ready to make a change, action shows those who are changing their behaviour, and maintenance shows people maintaining the behaviour change. The fifth stage of maintenance has been excluded from this analysis as the wording in the measure was found to be unreliable. As such, the analysis focuses on participants' movement through the first four stages from pre-contemplation through to action.

The bar chart below shows the overall change in the number of respondents in each stage, with the action stage showing the largest overall increase in number between the pre-program and post program stage.



While there is a large increase in the overall number of people in the action stage at the time of the post program survey, the results should be analysed at participant level to show whether individuals moved upwards or downwards through the stages. The Change in stages of change pie chart shows the percentage of positive, neutral or negative movement through the stages. 53% of respondents were neutral in that they did not change, while 35% showed a positive movement upwards through the stages of change. Only 12% regressed backwards through the stages of change.

Of the 53% who did not change, 71% of them were at the highest stage (Action), 24% remained at the stage below that (Preparation), and 4.4% stayed in the pre-contemplation stage. The 71% who were in already in the Action stage were at the highest possible stage and so could not progress any more through the stages even if they found the program to be extremely helpful and implemented the changes.



The table below highlights the movement through the stages of individual participants from Pre-program to Post program. The orange shaded diagonal line of results shows participants who

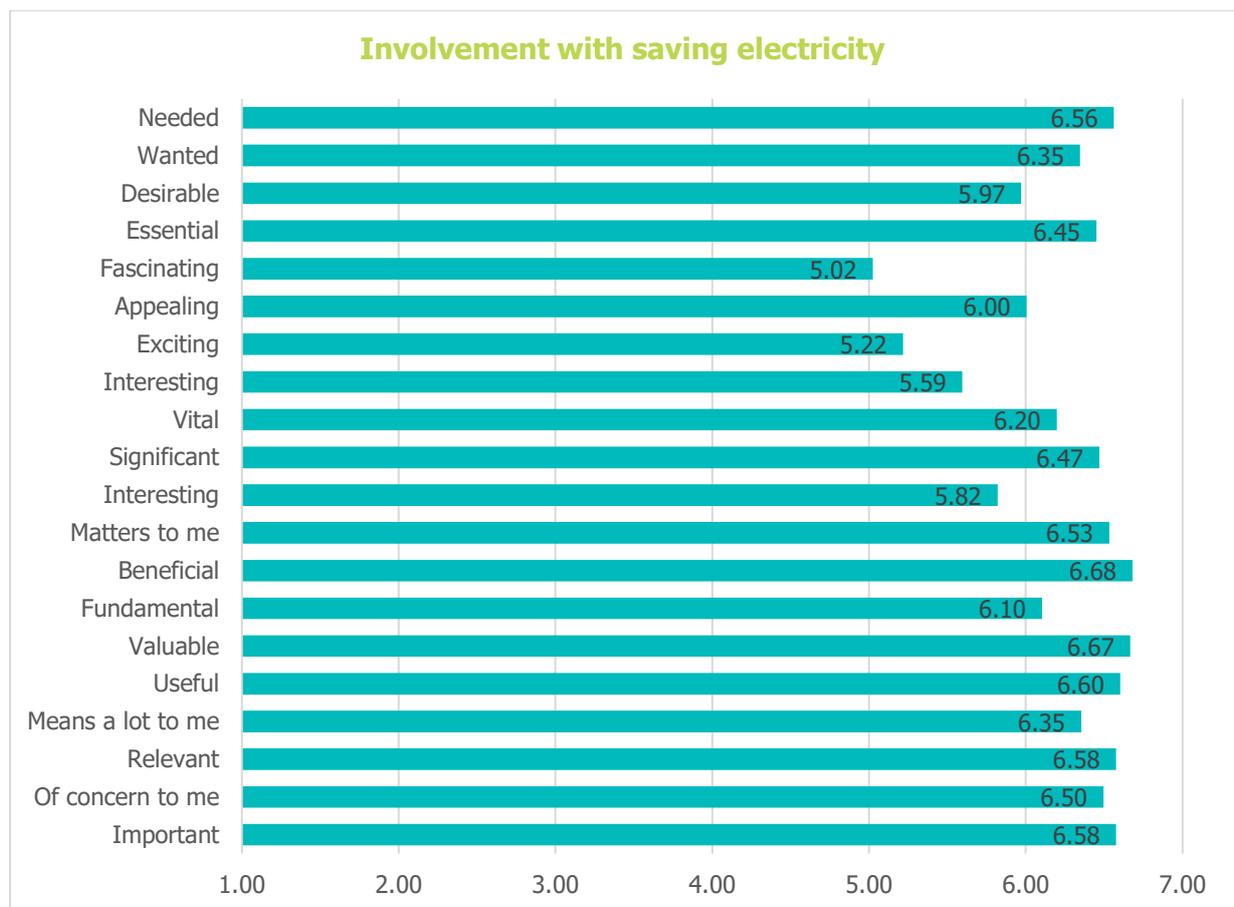
remained neutral in that they remained at the same stage both before and after the intervention. Below the line shaded green is the participants who moved upwards through the stages, while the pink shaded results show the 12% of participants who regressed.

Movement in stages of change

		Pre-program position				Total Post Program
		Pre-contemplation	Contemplation	Preparation	Action	
Post program position	Pre-contemplation	4	3	3	1	11
	Contemplation	1	0	1	0	2
	Preparation	2	6	22	12	42
	Action	4	3	45	65	117
Total Pre-program		11	12	71	78	172

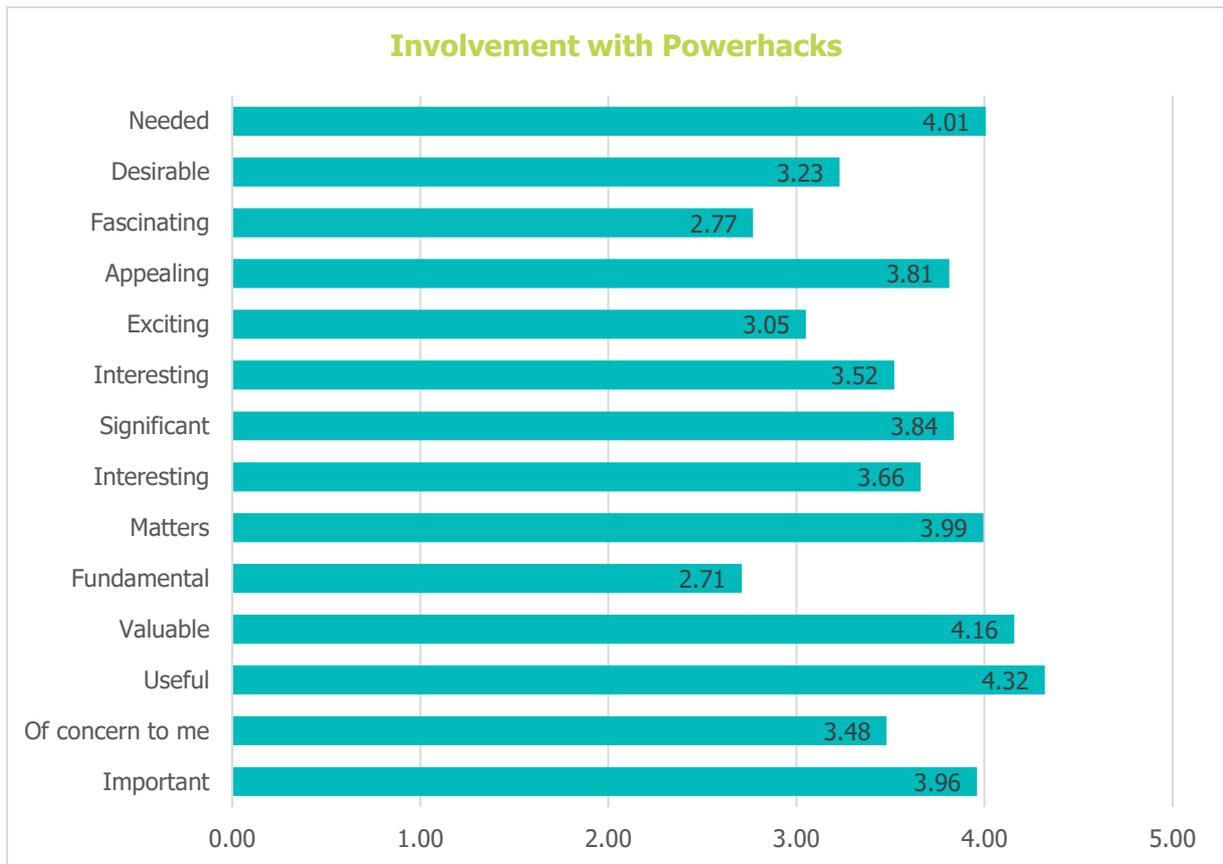
Involvement

Participant's involvement with saving electricity was measured to show their involvement with different rational and emotional aspects of saving electricity after the program. A scale of 1 to 7 was used, with 7 indicating more agreement with each aspect, making 4.0 the midpoint. The Involvement with saving electricity graph shows the results, which indicate participant's high involvement with saving electricity after the program intervention.



Participant's involvement with the Powerhacks was also measured after the program intervention to show how they related to this element of the program. A scale of -5 to 5 was used, making 0.0 the

midpoint. The Involvement with Powerhacks graph below shows respondent's high involvement with the Powerhacks, with elements of 'useful' and 'valuable' rating highest.



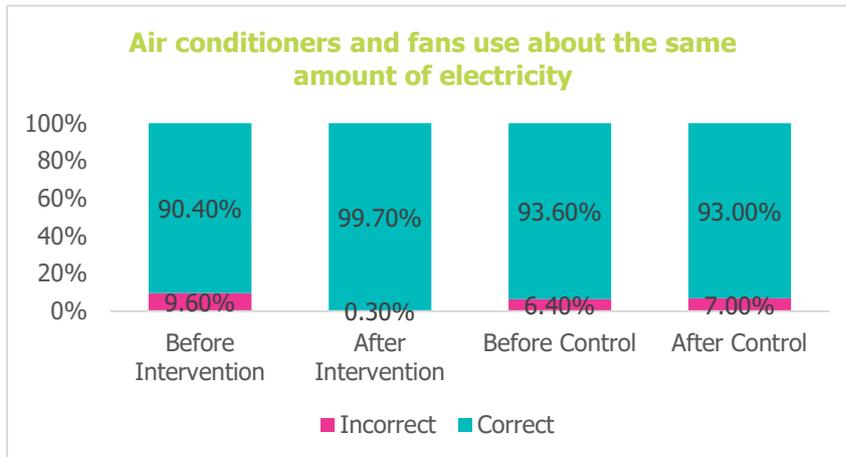
Energy knowledge

Energy knowledge was measured using True or False questions asking participants about various energy savings behaviours related to the intervention. To test if there was a significant improvement from Time 1 to Time 2 a McNemar's test statistic was used. An improvement means there was an increased in the amount of correct answers at Time 2.

Overall knowledge in both the participant and control groups was quite high, however the participant group showed significant improvement in 7 out of 10 questions after completing the intervention while the control group showed no significant change in knowledge for any of the questions over the same time.

Temperature Defender

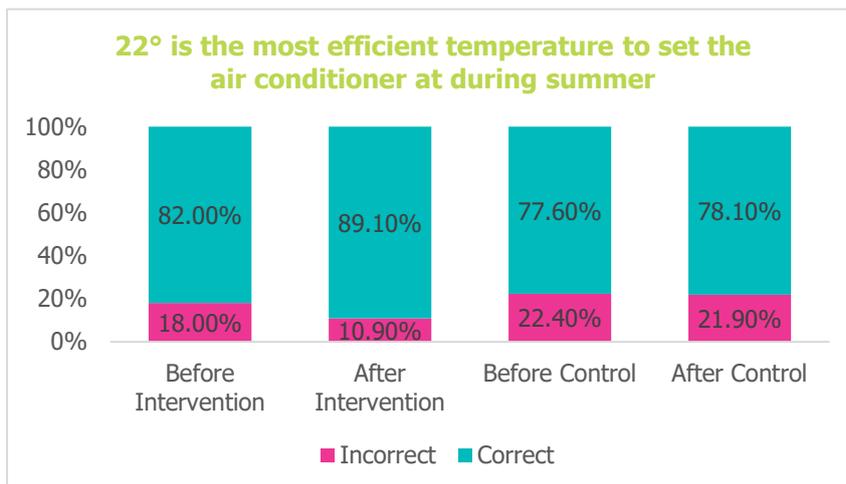
Air conditioners versus fans



Most participants correctly answered this question as false, knowing that air conditioning uses more electricity than fans.

The change in knowledge for the program intervention group showed a significant change at 9.3% while the control group showed no significant change over time.

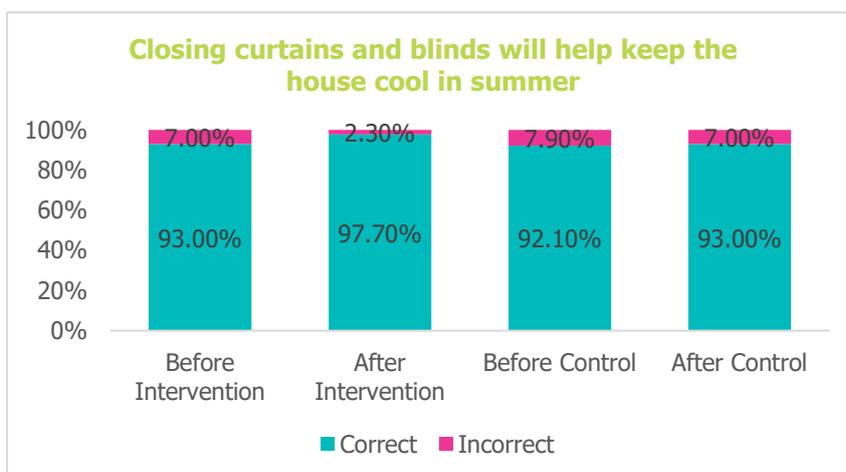
Efficient air conditioning temperature in summer



Most people correctly answered this question as false (24 degrees is the most efficient temperature for air conditioning during summer).

The program intervention group change in knowledge was significant at 7.1% while the control group change over time was not significant.

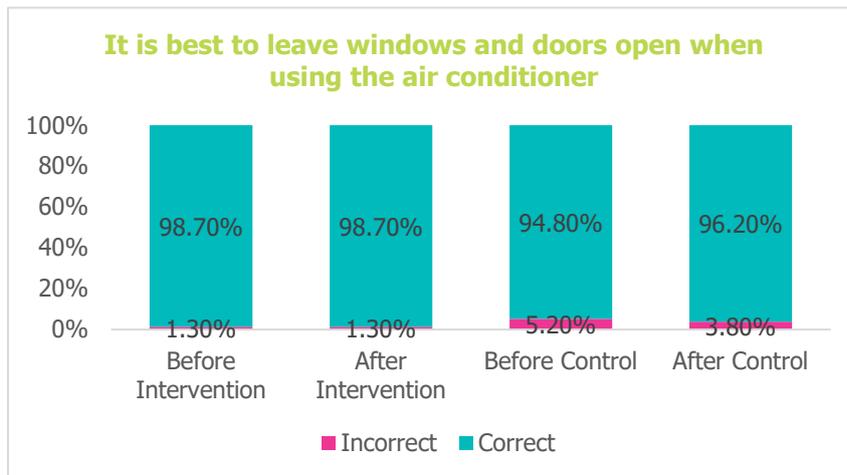
Closing curtains and blinds



Most people answered this question correctly as true that closing curtains and blinds will help keep the house cool in summer.

For the intervention group, there was a significant change in knowledge from prior to post intervention, while the control group change over the same time was not significant.

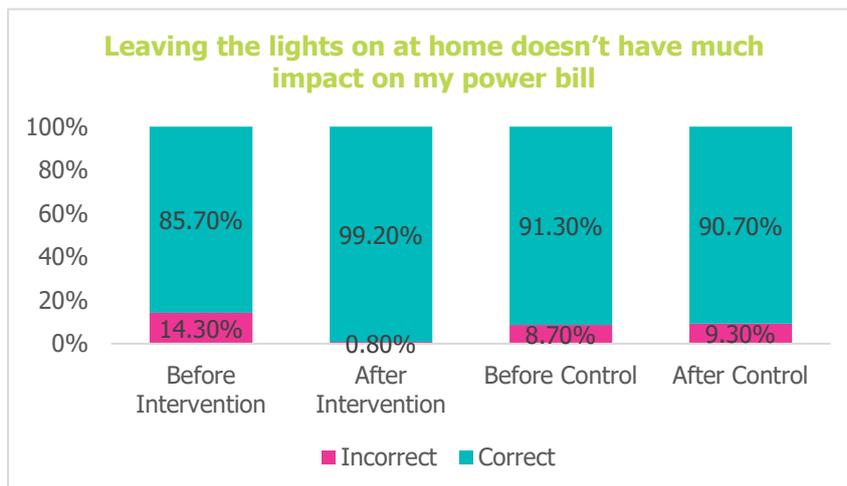
Having windows and doors open when using the air conditioner



Nearly all people correctly answered this question as false that leaving windows and doors open when using the air conditioning is best. There was no significant change in either the intervention or the control group over time for this question. Only 8 people in the intervention group answered incorrectly (1.3%).

Power Raid

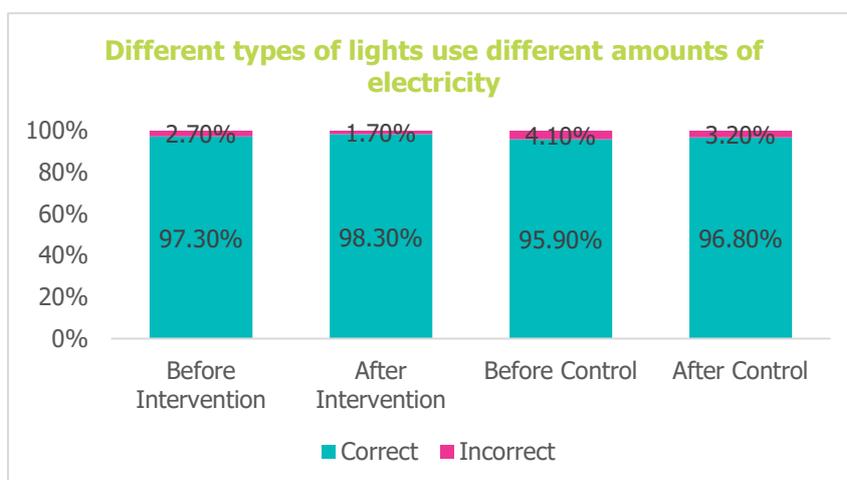
Leaving the lights on



Most people correctly answered this question as false that leaving the lights on will not impact their power bill.

The change in knowledge for the intervention group was a significant improvement of 13.5%, while the control group showed no significant improvement over time.

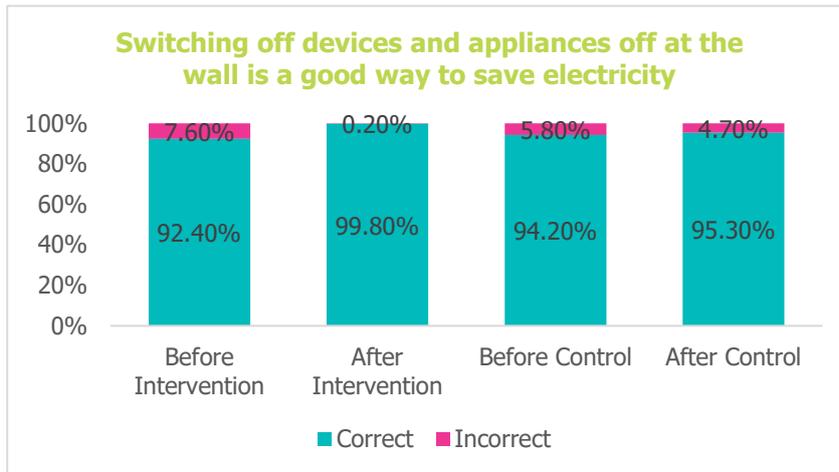
Different types of lighting



Nearly all people correctly answered this question as true, knowing that different types of lights use different amounts of energy.

There was no significant change in knowledge in either the participant intervention or the control group over time.

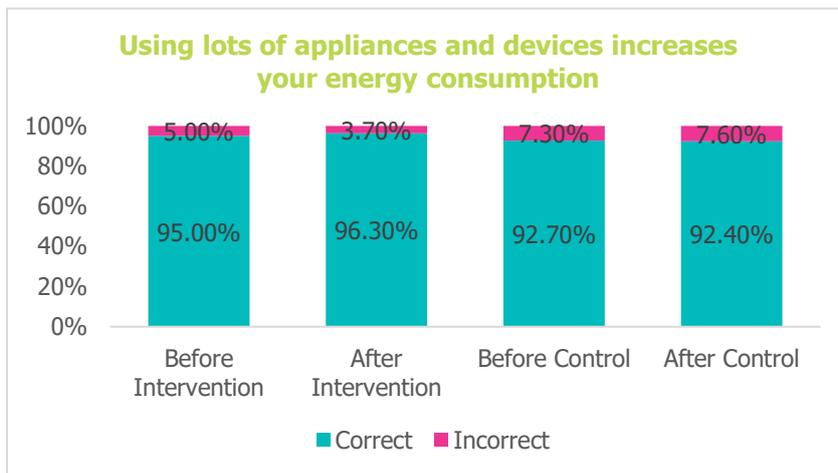
Switching off devices and appliances off at the wall



The majority of people correctly answered this question as true, knowing that switching off appliances and devices at the wall will save them electricity.

The program intervention group's improvement in knowledge over time was significant, while the control group change was not significant.

Using lots of appliances and devices

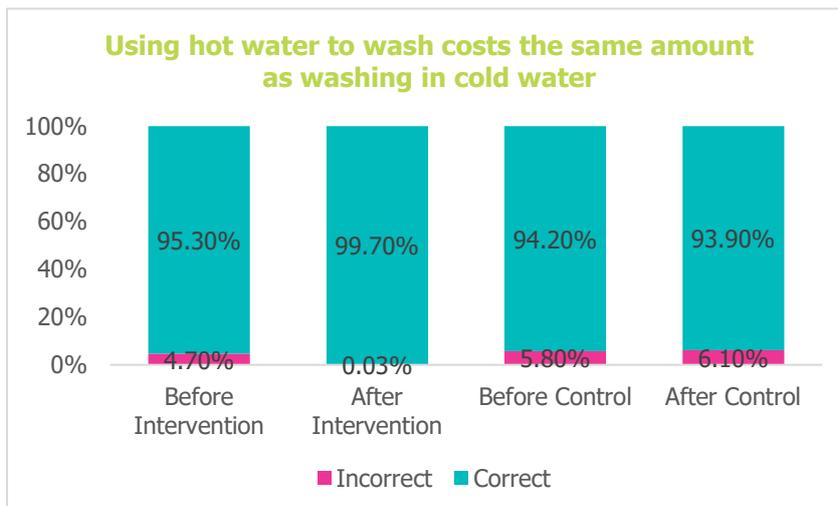


Most people correctly answered this question as true, knowing that using lots of appliances and devices will increase their energy consumption.

Change in knowledge over time for the participant group and the control group was not significant.

Fully Loaded

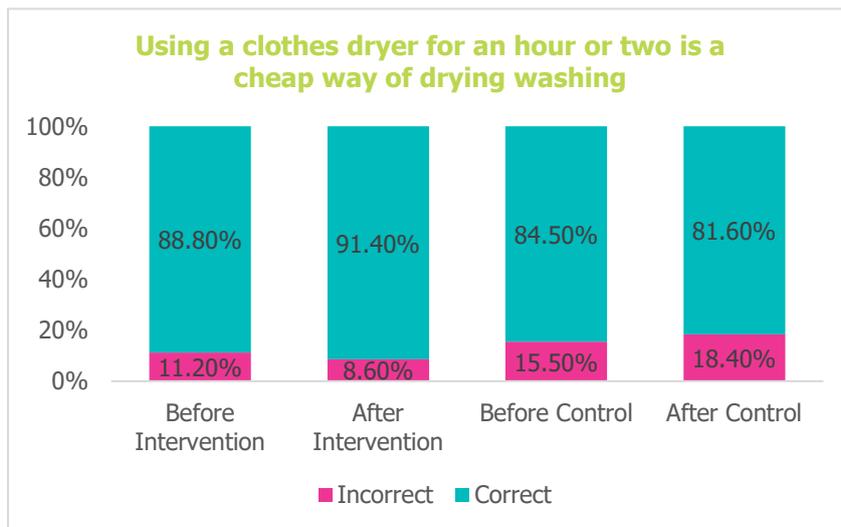
The cost of using hot water to wash



Most people correctly answered this question as false, knowing that hot water costs more to use for washing than cold water.

The improvement in knowledge for the intervention group over time was significant, with most participants correctly answering the question after the intervention. The control group's change was not significant.

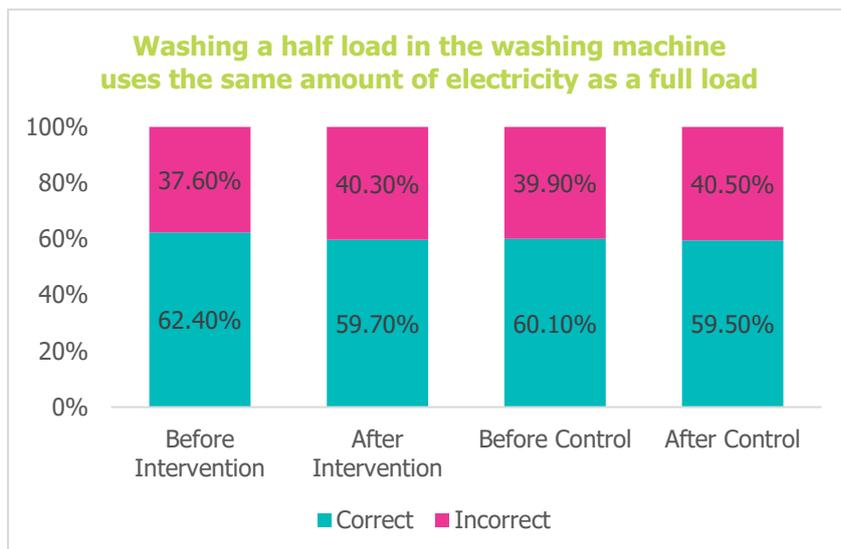
Using a clothes dryer



A high percentage of people answered this question correctly as false, knowing that clothes dryers are not a cheap way of drying washing.

While the intervention group improved knowledge over time, the change was not significant. The control group improvement was also not significant.

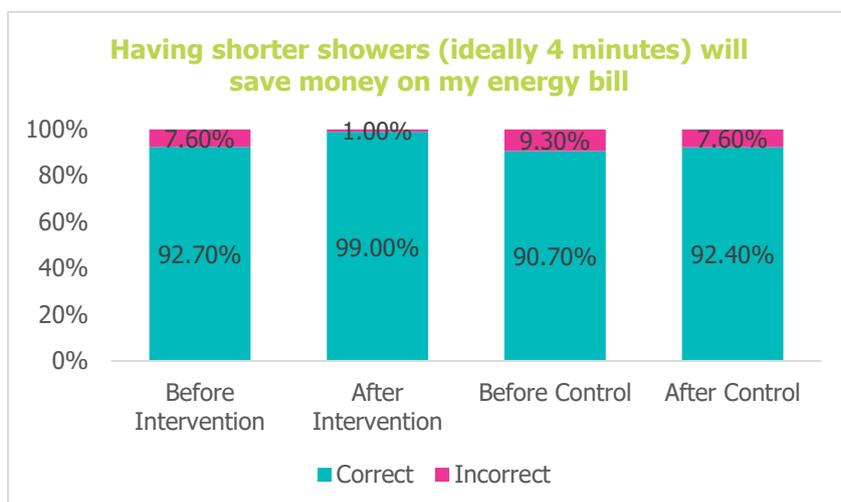
Washing a half loads



This question about the energy use of washing a full load versus a half loads showed the biggest knowledge gap for both the participant and control groups. While the answer is true, over a third of people answered incorrectly. The question wording may have been confusing for respondents.

Neither participants nor the control group showed any significant change in knowledge for this question.

Having shorter showers



Most people correctly answered this question as true, knowing that shorter showers will save them money on their energy bill.

The participant group showed a significant improvement in knowledge over time, however the control group change was not significant.

Energy savings

Introduction

The evaluation of participant energy data was a complex process which required analytical thinking to be applied by the joint evaluation team of CitySmart, Energex and QUT. A significant body of work was created to evaluate participant energy data to ensure a rigorous outcome. There are a number of factors to take into consideration when discussing the findings.

- RYJ was conducted in cohorts, with the first cohort undertaking the program between 4 May 2015 – 5 August 2015 and a second cohort between 31 August – 2 December 2015. This provided an opportunity to test the program’s effectiveness over different seasons or climatic conditions – the first wave in warmer conditions the second in cooler conditions.
- The source data for energy savings evaluation comes from two primary sources including data supplied by participants in pre and post intervention surveys from their household electricity bills and energy consumption data that was sourced directly from Energex (the energy distributor in South East Queensland). The project team compared self-reported electricity bill data with actual consumption data (kWh) to ensure there was a high level of confidence in energy outcomes reported.
- In South East Queensland, residential households have Type 6 meters installed that are manually read (The QLD Electricity Connection and Metering Manual describes these as single phase direct connected kilowatt-hour meters) on a quarterly basis or 12-16 week cycle. The timing of the energy data collection creates a challenge in establishing baseline energy consumption for participants because a meter read does not occur on day one of the program. This was taken into consideration whilst undertaking the analysis by removing records where a physical meter read did not occur within the month of the intervention commenced.
- The energy cost savings reported by participants (\$54.82) reflect behavioural change outcomes only. The post intervention survey was completed prior to the delivery of white goods. Furthermore, quarterly energy consumption data analysed does not reflected the full benefits of the whitegoods because the deliveries of white goods to households that graduated the program took upto seven weeks to from the end of the intervention for each wave. Further reductions in household energy consumption is expected to occur due to energy efficient white goods (fridges and washing machines). We have taken a conservative approach to reporting this outcome by not including this additional energy saving in the headline results. This should also provide a stronger level of confidence that the \$54.82 would be at least maintained by households engaged. We have undertaken an analysis of the products replaced to calculate the following estimated cost saving. This has been included in the cost benefit analysis modelling.
 - 246 participants saved on average 121kWh per year or an estimated \$26.97 per annum for the life of product being 10 years.
 - 147 participants saved on average 114kWh per year or or an estimated \$25.41 per annum for the life of product being 10 years.
- RYJ targets ‘young adult renters’ who are more likely to move dwelling on a frequent basis, there is difficulty in accurately measuring the energy consumptions for this audience. In the context of assessing energy consumption for a household, we excluded participants who

moved house or had not lived in their home for 12 months to allow for a standardised comparison with the previous year's energy data.

- This target group can tend to change household composition, which directly impacts the energy consumption for the comparison period. Whilst data was collected pre and post intervention, we were not able to collect data on the household composition during the comparison period. Those households that changed composition during the intervention period were removed from the analysis.
- Whilst most consumers report only consuming energy, some participants put energy back into the grid via solar panels, so the energy generation for these participants was deducted from the energy use they took from the grid to produce their net energy usage for use in evaluation.

The project team took a great deal of care and consideration in the detailed methodology applied to the evaluation of the energy consumption. A large data set was collected and washed before the statistical analysis was undertaken by the team to ensure a rigorous evaluation.

Household electricity bill

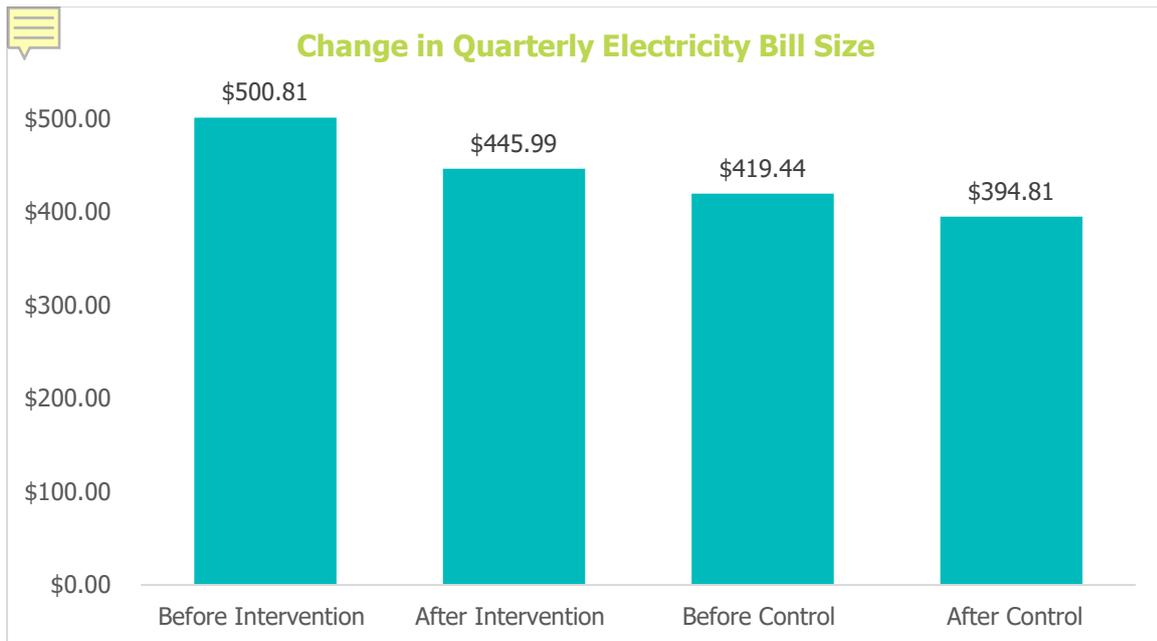
Both the participant and control groups were asked to self-report their electricity bill size prior to and after the program intervention. Correlation analysis was conducted on the bill amount and kilowatt usage to identify consistency. The results showed a high level of correlation which provides confidence in the accuracy of the electricity bill amount provided by participants. The correlation could not be an exact amount as the price per kilowatt varies based on service provider, time of day and solar systems. A Pearson's correlation was run to determine the relationship between the bill amount and kilowatt values. There was a strong, statistically significant, and positive correlation between the bill amount and kilowatt usage before the intervention ($r = .69$, $n=201$, $p < .000$). The post intervention values also revealed a strong, statistically significant, positive correlation between the bill amount and kilowatt usage ($r = .58$, $n=85$, $p < .000$).

Using a paired T-test showed the program intervention group's drop in bill size to be statistically significant ($p < .000$), whilst the control group was not statistically significant ($p > 0.05$).

The participant group **significantly decreased their bill size by \$54.82** (10.95%) while the control group showed a non-significant decrease of \$24.63 (5.87%) over the same time.

It should be noted that due to the 6 week timeframe of the intervention, not all participants would have received an updated quarterly bill over this period. This result does not include the set and forget energy efficiency improvement delivered by whitegoods as discussed above.

The largest reduction in a participant's quarterly electricity bill recorded was \$580.00.

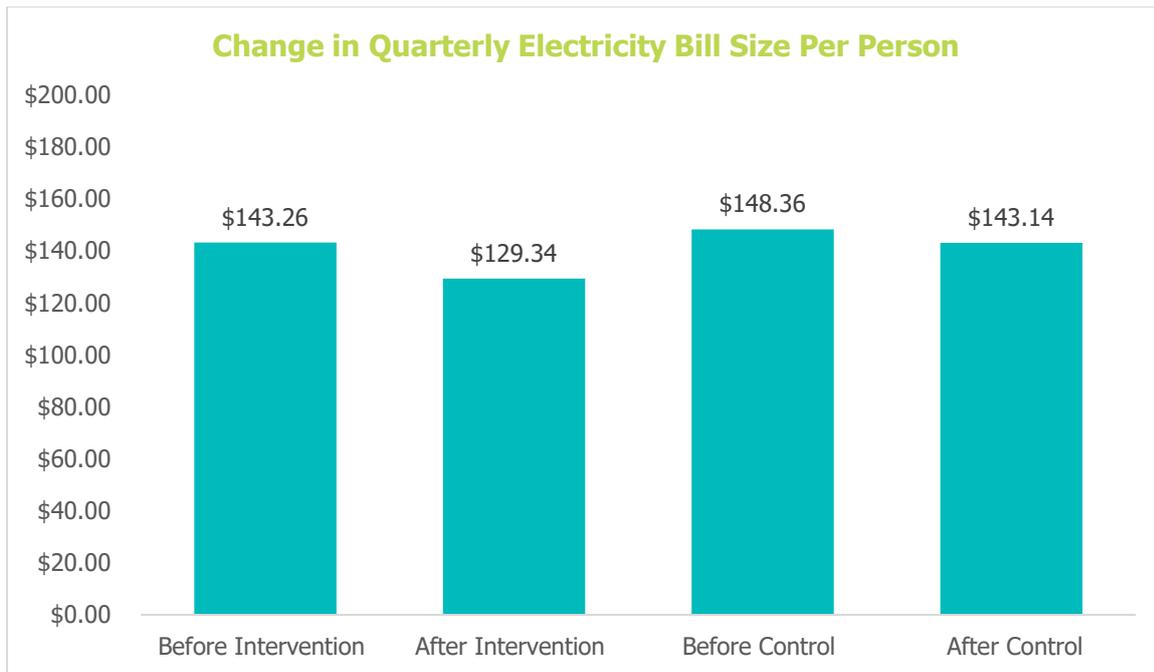


An analysis of electricity bill size per person in the household was conducted to assess the relative bill size per person. The household electricity bill was divided by the number of people in the household to work out the bill amount per person for both the intervention and control groups.

Results showed there was a statistically significant decrease in bill amount per person for the intervention group. From Time 1 ($M = \$143.26$, $SD = \$77.62$) to Time 2 ($M = \129.32, $SD = \$72.36$), $t(401) = 4.6$, $p = .000$.

There was not a statistically significant decrease in bill amount per person for the control group. From Time 1 ($M = \$148.36$, $SD = \$144.01$) to Time 2 ($M = \143.14, $SD = \$151.63$), $t(312) = .75$, $p = .453$.

Looking at this at an individual level, the participant group significantly decreased their bill size per person \$13.94 (9.72%) while the control group showed a non-significant decrease per person of \$5.22 (3.52%) over the same time.



Electricity consumption data

In addition to self-reported bill information, electricity consumption data for intervention participants was sourced via Energex. This allows for self-reported electricity bill data to be compared with actual consumption data (kWh).

Data was supplied for participants home addresses for the 12 months prior to the intervention as well as for the following 12 months after the intervention.

For the purposes of evaluation, data for Wave 1 and Wave 2 participants has been analysed using a paired-samples t-test. Participants were removed from the analysis if they did not have both meter data and survey data, had moved residence within the intervention timeframe or had lived in their home for less than 12 months (which renders their comparative data unusable). See Energy data evaluation process table following for full details on the evaluation process.

Wave 1 electricity consumption

Energy data on program participants was collected (sourced from distributor Energex) for the year the intervention took place (2015) and the year before (2014). This allowed the researchers to compare year on year results to determine what energy changes took place when the participants joined the program.

The results showed that in the 2014, when the intervention was not running, there was a 18.93% increase in energy use. Over the same time frame a year later, when the intervention was running, an increase of only 2.25% occurred. Whilst the energy usage did go down after the program occurred, it did reduce the rate of increase dramatically, from 18.93% in 2014 to 2.25% in 2015.

Wave 1 participant sample	Time 1 (Before)	Time 2 (After)	Significant difference	Percentage change
2014 (no intervention)	1494.29	1777.18	$p = 0.001$	18.93% increase
2015 (intervention)	1685.58	1723.58	$p = 0.569$	2.25% increase

When the intervention was not occurring in 2014, there was a statistically significant increase in energy usage from Time 1 (M = 1494.29, SD = 918.88) to Time 2 (M = 1777.18, SD = 1116.74) conditions; $t(126) = -3.483$, $p = 0.001$. The increase in 2014 was 18.93%.

When the intervention was occurring in 2015, there was no statistically significant increase in energy usage from Time 1 (M = 1685.58, SD = 933.43) to Time 2 (M = 1723.58, SD = 941.27); $t(126) = -0.571$, $p = 0.569$. The increase in 2015 was only 2.25%.

Wave 2 energy data

The mean scores shown below show that during 2014 there was a non-significant decrease in energy consumption while during 2015 there was a larger, statistically significant decrease in energy consumption from before to after the intervention. This indicates the impact of the intervention in creating a significant reduction in energy consumption.

Wave 2 participant sample	Time 1 (Before)	Time 2 (After)	Significant difference	Percentage change
2014 (no intervention)	1688.06	1628.14	$p = 0.337$	-3.55% decrease
2015 (intervention)	1684.56	1525.14	$p = 0.001$	-9.46% decrease

When the intervention was not occurring in 2014, there was no significant change in energy usage for from Time 1 (M = 1688.06, SD = 880.98) to Time 2 (M = 1628.14, SD = 864.83), $t(68) = 0.96$, $p = 0.337$.

When the intervention was occurring in 2015, there was a significant reduction from Time 1 (M = 1684.56, SD = 832.78) to Time 2 (M = 1525.14, SD = 742.01), $t(70) = 3.59$, $p = 0.001$.

Change in electricity consumption

When analysing the total sample of Wave 1 and Wave 2 participant energy data, during 2014 when there was no intervention there was a significant increase in energy consumption of 10.33%, while in 2015 when the intervention occurred there was a non-significant decrease in energy consumption of -1.99%.

Overall participant sample	Time 1 (Before)	Time 2 (After)	Significant difference	Percentage change
2014 (no intervention)	1564.98	1726.70	$p = 0.006$	10.33% increase
2015 (intervention)	1685.37	1651.77	$p = 0.468$	-1.99% decrease

Overall when the intervention was not occurring in 2014, there was a statistically significant increase in energy usage from Time 1 (M = 1564.98, SD = 909.88) to Time 2 (M = 1726.7, SD = 1037.53), $t(194) = -2.771$, $p = 0.006$.

In 2015, when the intervention was occurring, there was no statistically significant increase in energy usage from Time 1 (M = 1685.37, SD = 898.77) to Time 2 (M = 1651.77, SD = 880.48), $t(196) = 0.728$, $p = 0.468$.

This shows the impact the RYJ program had in changing the trajectory of participant's energy consumption, indicating a **12.32% improvement from the previous year**.

Self-efficacy

To further analyse participant's electricity consumption data, results were sorted into those who increased versus those who decreased energy consumption to find any differences between the groups. Repeated/ Mixed ANOVA was used for the two groups with different constructs to highlight any differences between the groups.

The only construct that was significantly different between the group that decreased their energy and the group that increased energy use was self-efficacy.

The group that reduced its electricity usage has a lower self-efficacy at the beginning of the program but had a higher score after the intervention than the group that increased their energy usage.

The results show that the change in Self-efficacy was significantly affected by the type of electricity usage change, $F(1, 1) = 4.1, p = .049$.

The impact of communication and rewards

RYJ measured the impact of communications and rewards during the trial, with four treatment groups receiving variations of Energy Efficient or Lifestyle rewards, and Standard or Additional Communications. Data from the four different treatment groups was compared against each other whilst taking into account the factor of time, which represents the scores for variables at time 1 (before the intervention) and time 2 (after the intervention). This was done to determine if the type of communication and reward type would influence any of outcome variables and to what degree.

To do this, a mixed ANOVA was used, which compares the mean differences between groups that have been split on two "factors" (known as independent variables), where one factor is a "within-subjects" factor (time measured at before and after the intervention) and the other factor is a "between-subjects" factor (the four treatment groups). A statistically significant result would indicate that there was a difference between the groups, and further post hoc analyses can reveal which group was significant compared to the remaining groups.

Results from the four treatment groups pre and post intervention were evaluated against variables including bill size, bill amount per person, habits, attitudes (negative attitudes and attitudes towards behaviours), behavioural intentions, bill control, bill concern, willingness to give up comfort, social norms, self-efficacy, and opportunity to save electricity. No significant differences were found to occur for any group.

Both the level of communication and the different types of rewards used in the intervention had no impact on different variables for participants, including attitudes, habits, intentions, energy use, bill size, engagement, and various psychological factors.

Put into perspective, the level of difference between the communications treatment groups was likely not significant enough to show any impact. The Additional communications group only received 9 extra communications compared to the Basic communications group, which when put into the context of the program's 339 touchpoints may not have been significant enough to notice the difference.

The type of rewards people received, either energy efficient or lifestyle related, was shown to not influence key participant variables. Participants found high value in both types of rewards, with substantial and comparable value between the groups. This is demonstrated by participant responses regarding the rewards, with 79.3% perceiving the rewards to have high value and 99.1% saying they used the rewards they received. Based on anecdotal feedback, the major reward component could have been made more meaningful by allowing participants to choose the items they needed most. Some participants had recently purchased either a fridge or washing machine or already had a barbecue, so allowing them to choose an alternative would have provided them with a more meaningful goal/reward to work towards.

Engagement score

Given engagement with the program was across a number of different elements, a method was developed to show an overall engagement score for each participant. The engagement score has

been calculated to show participant’s engagement with key elements of the program including the app games, Facebook community, email communications and surveys.

This allowed an additional means of classifying participants into low, medium and high engagement groups, which was then used to provide an extra level of analysis across the different variables relating to behaviour change.

After the engagement scores were calculated, scores were divided into three groups using a median split. This process created tertiles that showed Low, Medium and High levels of engagement as set out below.

Engagement score grouping	Number of participants	Percentage
Low	337	33.5
Medium	339	33.7
High	329	32.7

Comparison tests

These three groups of engagement levels were used to examine if differences exist between them amongst a range of variables. The statistical test used for this part of the analysis was Mixed ANOVA.

Comparison tests were run with:

- Attitudes
- Bill concern
- Opportunity
- Self-efficacy
- Social norms
- Bill size.

Other results discussed earlier in this report demonstrated a significant improvement overall in terms of participants’ attitude and behaviour towards energy. However, results across the range of constructs and variables have shown there is no significant difference based on the level of engagement. This suggests that being engaged in the program changed attitudes and behaviours, however the level of engagement – that is, low, medium or high, didn’t have an influence on this change.

A one-way ANOVA was also used to examine engagement scores across the four treatment groups. Results showed there was no significant difference between treatment groups for the High, Medium, and Low engagement score groups.

Development process

The following method was developed and applied to create the engagement score:

Engagement score process	
1.	Identify the activities that shows the participant engaged with the program: Did they do pre and post, and T1 and T2 surveys? How did they engage with the games? Did they engage with content on Facebook? Did they open and click through email communications?
2.	Identify the data sources to measure engagement: a. Survey analytics b. Game analytics

	<ul style="list-style-type: none"> c. Facebook analytics d. Email communication analytics
3.	<p>Identify a scoring mechanism for each engagement point:</p> <ul style="list-style-type: none"> e. Surveys – 1 point for each survey completed. f. Game data: <ul style="list-style-type: none"> i. Game 1, 2, 3 durations / session numbers / points / Energy Quest views – below average range (1 point); average range (2 points); above average range (3 points) ii. Energy Quest positive response for Game 1, 2, 3 = 1 point. iii. Badges = 1 point for each badge earned iv. Status level trophies = Bronze (1 point), Silver (2 points), Gold (3 points) g. Facebook – 1 point for each comment h. Email communication – 1 point for each open and click-through
4.	<p>Extract the data from the different systems and sort actions for each participant.</p>
5.	<p>Calculate points based on actions per participant and determine the Engagement Score per participant.</p>

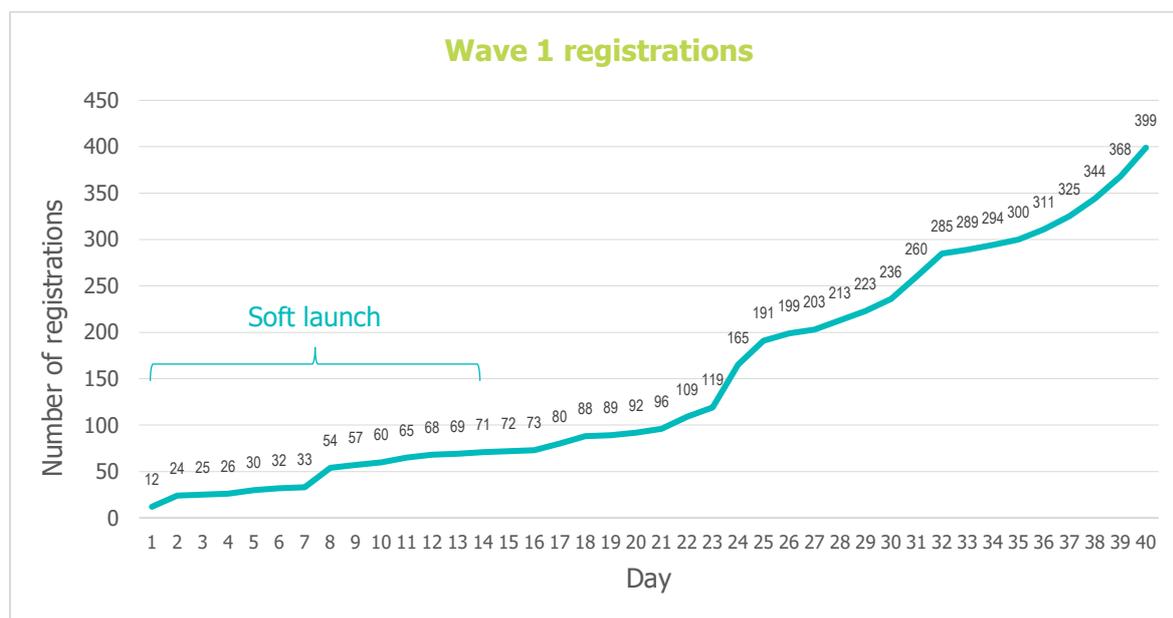
Recruitment

The following section outlines the recruitment results for the program. The recruitment periods occurred prior to each wave commencing: 20th April – 29th May 2015 and 13th July – 20th September 2015. At the beginning of the first recruitment period for Wave 1, there was two weeks of a 'soft launch' for recruitment activity which allowed for recruitment agencies to set up and prepare for activities starting more broadly on 4th May.

The analysis is broken down into two separate periods of recruitment prior to Wave 1 and Wave 2. As part of the agile marketing approach, recruitment activities were trialled, measured and evaluated for improvement both in real time and more discretely between waves.

Wave 1

Wave 1 registrations

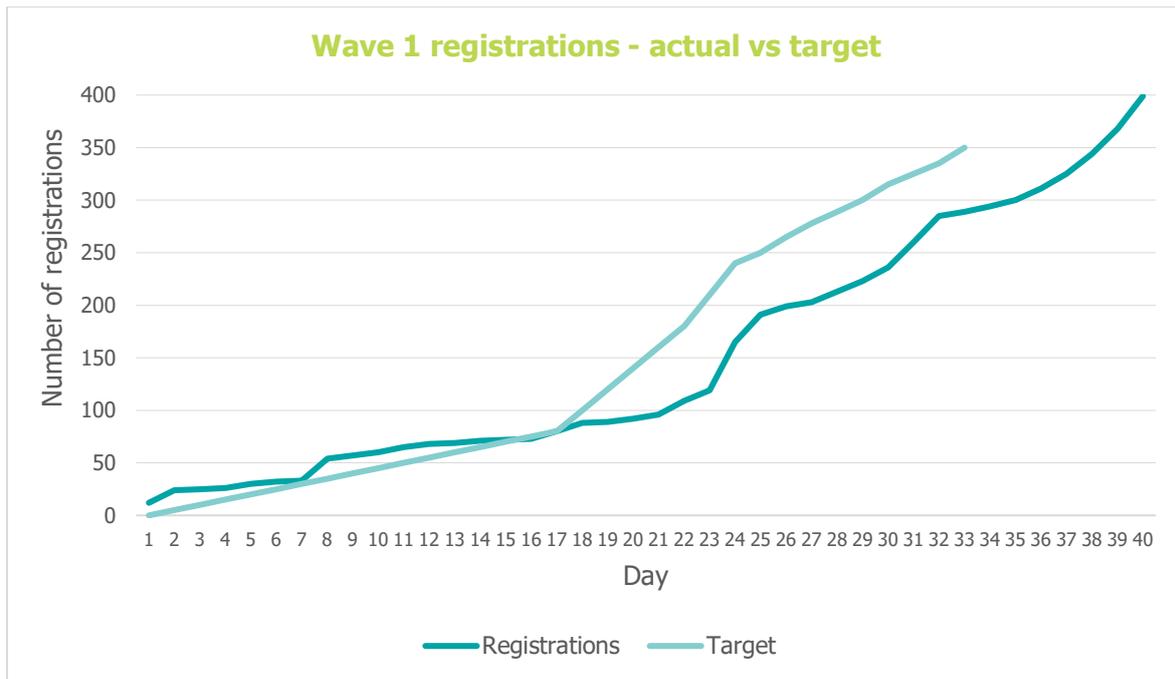


During the soft launch, recruiter kits and promotional materials were delivered to agencies during this time to allow staff to become familiar with the program and begin displaying promotional materials. Registrations were sluggish with 69 participants registering during this pre-registration period and agencies slow to engage with marketing the program to potential participants.

After the soft launch, at the start of the active recruitment period from 4th May recruitment activities were launched across all community service agencies and registrations picked up slightly. Due to the slow initial uptake, additional recruitment activity was activated with small amounts of Facebook advertising and Google AdWords being trialled. After the first week of the active recruitment period, response rates were relatively low and registrations slow, falling short of the first recruitment target.

Continuous monitoring of activities over the next week showed the conversion rate drop significantly. It appeared the response from community service agencies had slowed as external issues and challenges began to impact their involvement and ability to recruit participants.

The Wave 1 registrations – actual vs target graph outlines the rate of participant registrations compared to the recruitment targets set during the Wave 1 recruitment phase.



Registrations in the second week were critically below recruitment targets (less than half) and to increase the number of registrations, activities in Tier 2 and Tier 3 were quickly activated to increase and drive program registrations on Day 19. This included Facebook advertising and targeted email campaigns to Smith Family clients, CitySmart EzyGreen subscribers and the Australia Post Lifestyle Survey. The activation of these channels proved successful and registrations increased significantly within a short period. The activities engaged the target group and conversions rates were much higher than anticipated. The momentum of these activities continued and the recruitment phase was extended for another week to ensure 350 participants would be recruited. This week was a buffer at the end of the recruitment period that was originally set aside to ensure enough time for participants to register and complete their pre-program survey.

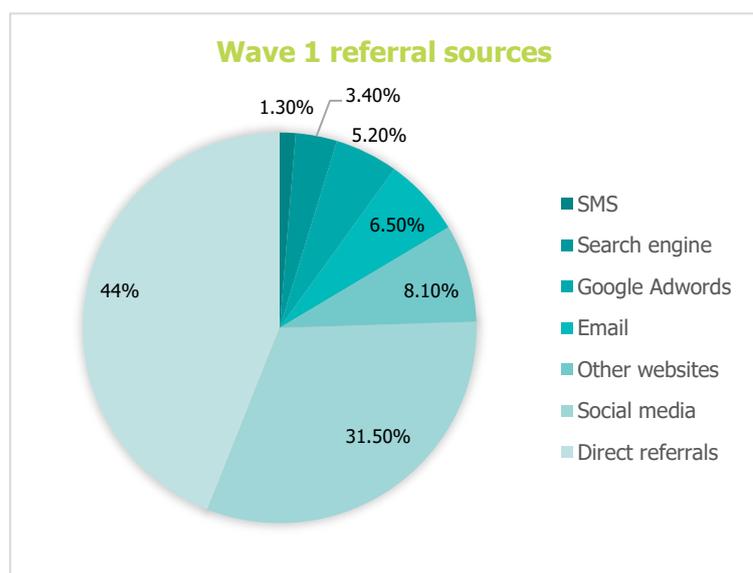
Across this first recruitment period, a total of 566 registrations were received of which 399 met the eligibility criteria and were accepted to participate in the program. Of those accepted to take part, 7 participants who registered close to or on the cut-off date were moved to Wave 2 while another two opted out prior to completing the pre-program survey. The first recruitment phase closed on 29 May 2015 with 398 participants registering for Wave 1.

Wave 1 referral sources

The Wave 1 referral sources chart shows the referral sources that engaged the target group and drove the most traffic to the registration website, tracked using Google analytics.

Social media and direct referrals show the largest number of referrals to the website. Direct referrals include people who either directly entered the website URL into their browser or had their privacy settings set to disable tracking.

SMS referrals came from targeted DL



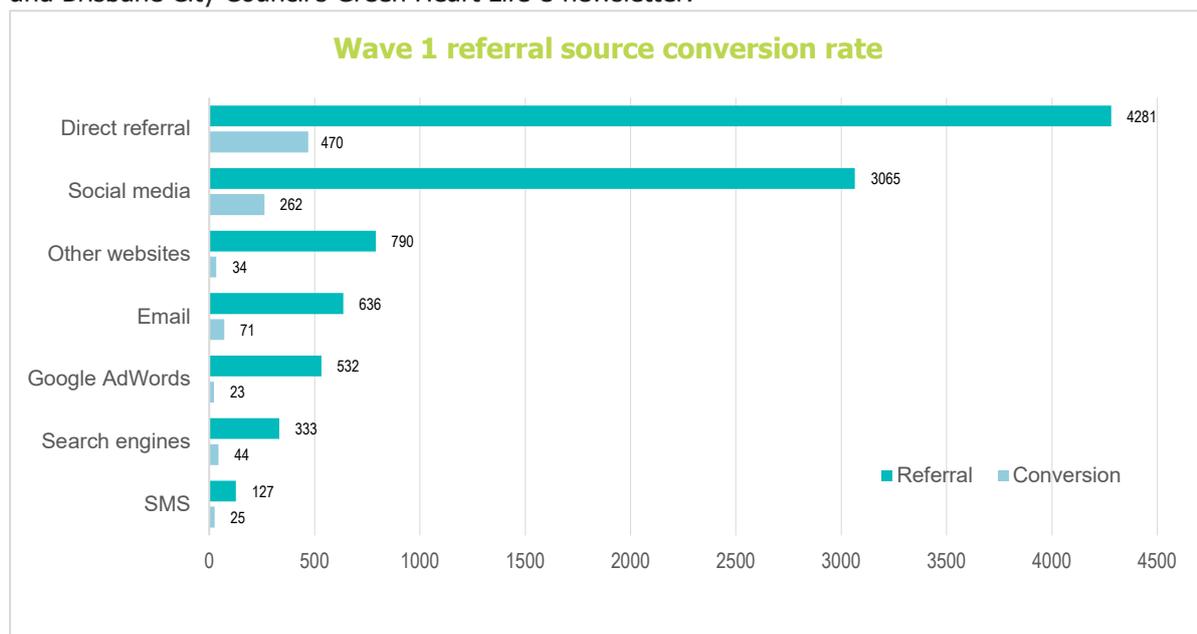
flyers distributed through community service agencies either via personal referrals, mail outs or being displayed in public facing areas. The flyers displayed unique codes (one for each agency) which potential participants could message to the RYJ mobile number. A return SMS was then sent to the person with a link to the RYJ website.

Google AdWords campaigns were trialled during Wave 1 recruitment, with the following search terms proving successful in bringing traffic to the registration website:

- Centrelink login
- rent assistance
- energy efficiency
- affordable housing
- Centrelink online
- Centrelink payments
- how to save money
- saving money
- save money
- help with rent.

Conversion rates were used to show the effectiveness of recruitment channels in referring participants to the registration website. Conversions are recorded once a participant completes the registration form on the RYJ website. The Wave 1 referral source conversion rate chart shows the conversion rate of referral sources for Wave 1. Although direct referral and social media had the highest rate referral rate, the highest conversation rate was from search engines (66%), SMS (19%) and email (11.1%).

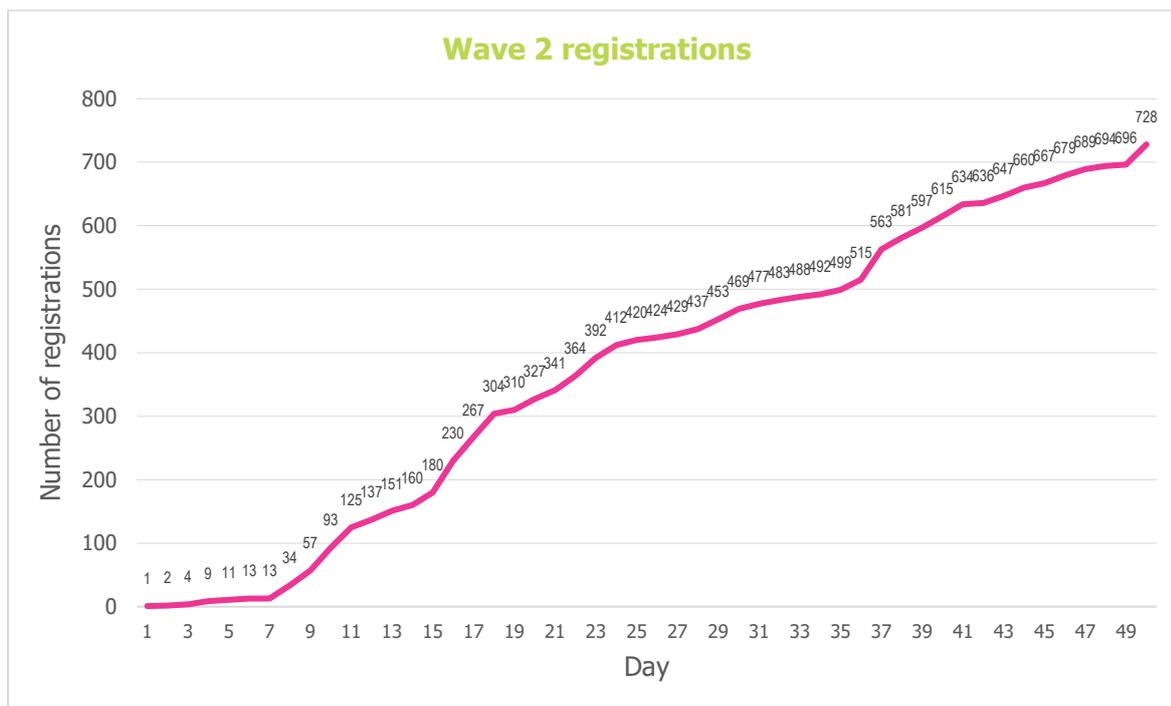
Referrals from search engines are believed to be secondary as participants had heard of the program earlier and went looking for it using an internet search engine. It is unclear where the primary referral source came from in this case as it cannot be tracked. SMS referrals came from targeted DL flyers distributed through community service agencies. Email referrals included broadcast media channels (Tier 3) and community service agencies (Tier 2) with community service agencies having a stronger conversion between the two. Broadcast media channels included Australia Post Lifestyle Database and Brisbane City Council’s Green Heart Life e-newsletter.



Wave 1 referral source conversions	SMS	Search engines	Google AdWords	Email	Other websites	Social media	Direct referral
Conversion rate	19%	66%	3.1%	11.1%	4.3%	8.5%	10.9%

Wave 2

Wave 2 registrations



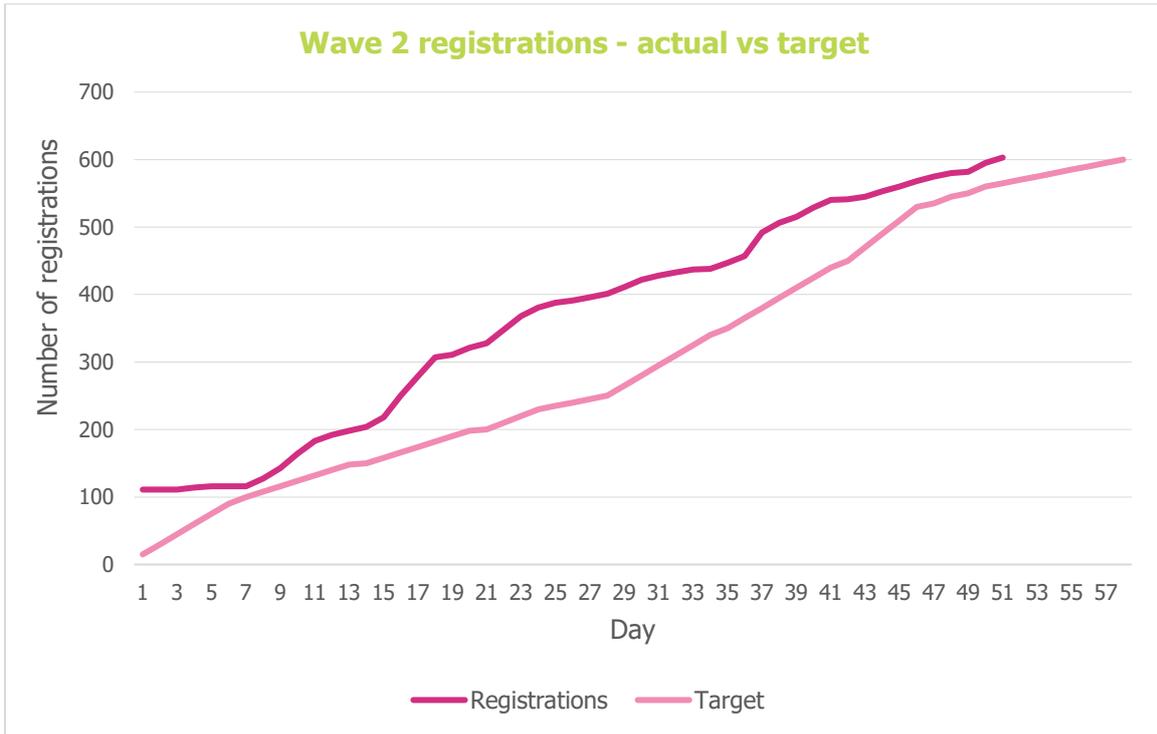
The Wave 2 registrations graph illustrates the rate of participant registrations during the Wave 2 recruitment phase. Registrations increased more rapidly in Wave 2, with social media and word-of-mouth campaigns the key activities driving registrations in this phase.

The Wave 2 registrations – actual vs target graph compares the rate of participant registrations against the recruitment targets during the Wave 2 recruitment phase and shows that unlike Wave 1, registrations significantly exceed recruitment targets.

Social media recruitment campaigns started on day 8, prompting an instantaneous increase in participant registrations. The Refer a friend competition was activated on day 10 which added to the improved registration rate.

With projections showing the target would be met earlier than anticipated, these campaigns were turned off on day 25. The following 10 days saw a slowing of registrations so the campaigns were reactivated on day 36.

A jump in registrations was experienced following the reactivation of Facebook advertising. These activities proved successful and the target of 600 participants was met on day 51 of recruitment, so recruitment was closed six days early. This can be seen on the graph with the registration line stopping before the target line. Community agencies were advised to cease recruitment activities two weeks earlier than originally anticipated.



Wave 2 referral sources

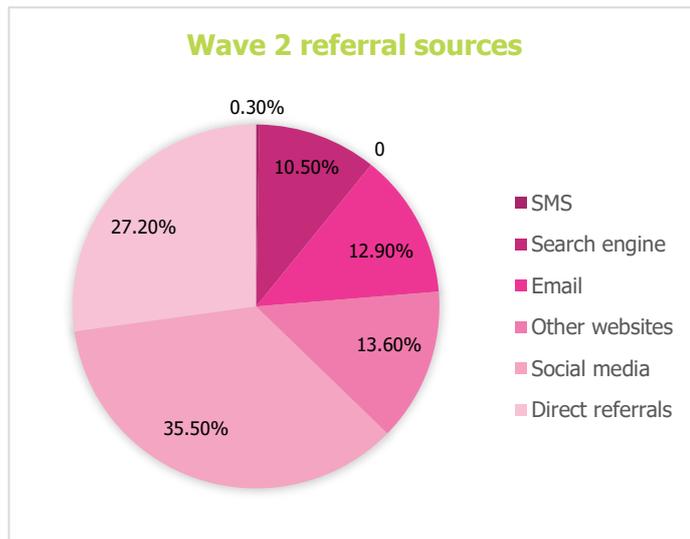
The referral source chart for Wave 2 shows an increase amongst all referral sources compared to Wave 1.

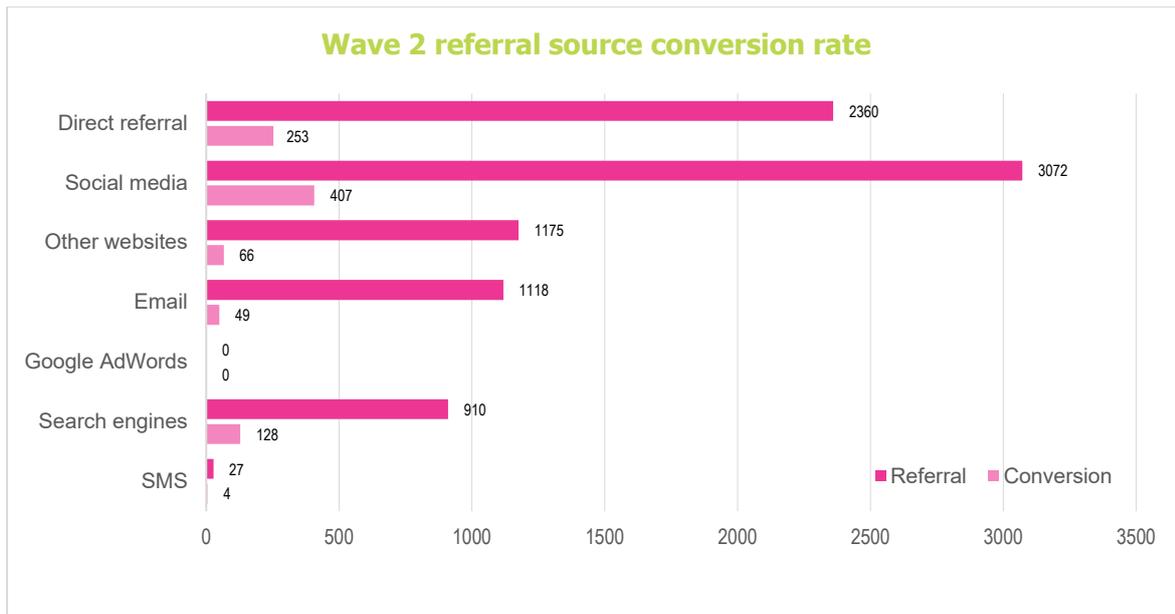
Note: Google AdWords were not activated during the Wave 2 recruitment phase as other recruitment activities were deemed more efficient in successfully bringing in registrations.

The Wave 2 referral source chart below shows the conversion rate of referral sources for Wave 2 and once again, the highest converters were SMS (14.8%) and search engines (14%).

As mentioned previously referrals from search engines are believed to be secondary as participants had heard of the program earlier and went looking for it again through an internet search engine.

Although targeted DL flyers were not actively distributed in Wave 2, SMS still provided some conversion for those that had received a flyer earlier.





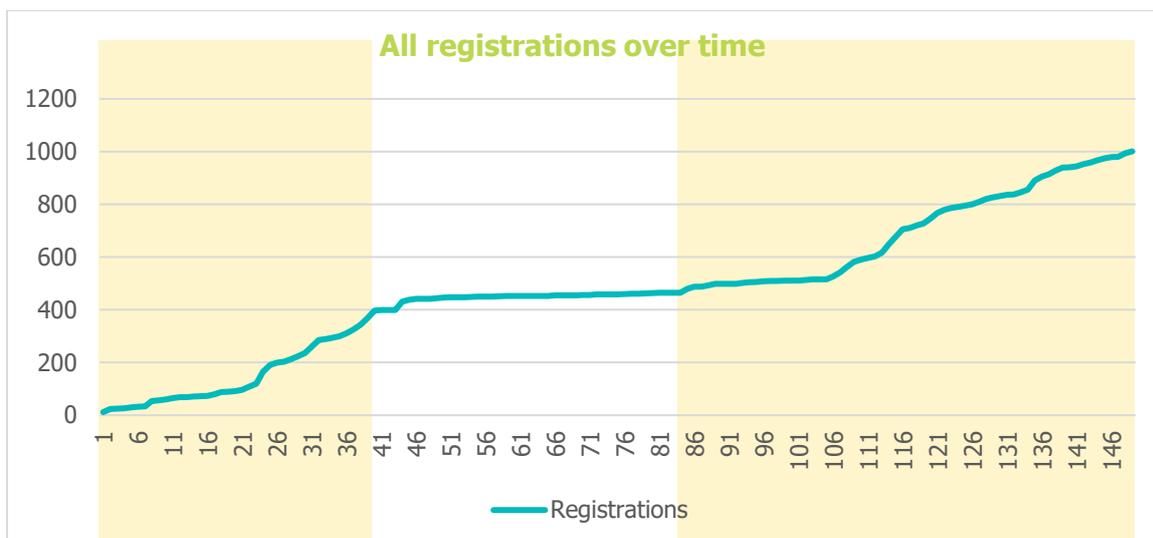
Wave 2 referral source conversions	SMS	Search engines	Google AdWords	Email	Other websites	Social media	Direct referral
Conversion rate	14.8%	14%	-	4.3%	4.3%	5.6%	10.7%

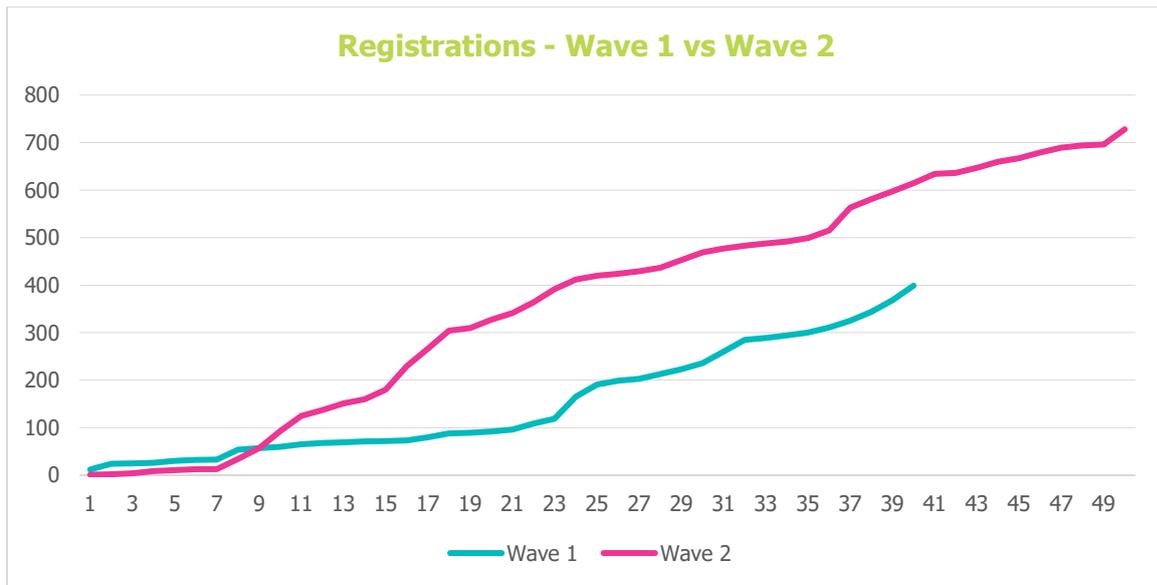
Overall recruitment results

Overall registrations

The graph below shows the rate of registration from the start of the first recruitment phase, continuing through Wave 1 of the program and finishing at the end of the second recruitment phase. The active recruitment phases are shaded in yellow.

Although active recruitment stopped at the end of the first recruitment phase, registrations were still received and accepted for Wave 2—a total of 93 registrations were received and 82 of these were accepted prior to the second recruitment phase beginning. These registrations were attributed to a delayed response to the initial recruitment activities.





Despite the higher recruitment target and longer recruitment phase for Wave 2, there was a considerable increase in the rate of registrations between Wave 1 and Wave 2.

This was attributed to:

- Word-of-mouth – generally considered a strong form of referral for any product, program or service, however it was significant for RYJ given the nature of the rewards and the Refer a friend competition run through email and Facebook during the second recruitment phase.
- Social media advertising – prioritised in the second recruitment phase based on the learnings and high conversion rates from Wave 1 and its ability to be ‘turned on and off’.

Registration breakdown

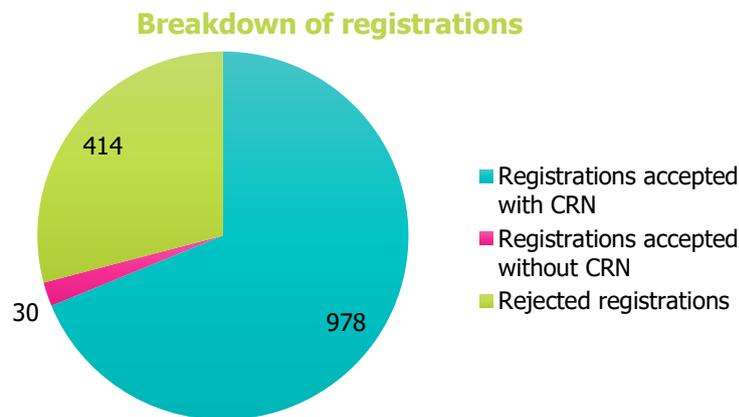
During recruitment planning, it was predicted that having the required CRN would be a barrier for many potential participants due to the low percentage (an incidence of less than 4% of the population) of CRN-holders within the target geographical recruitment areas and the tight timeline (4-6 weeks) to recruit the required number of participants to meet our milestone obligations. Our concern was that whilst the majority of people accessing community service agencies (our primary recruitment source) would have CRNs, these channels may not be able to deliver the volume of participants required within the timeline. The planned digital recruitment activity to support agency recruitment through Facebook ads and Google AdWords may struggle with conversion because they were not able to target people based on income and instead focused on targeting people who fit characteristics of the ideal participant. Because this approach was untested for this specific audience, it was difficult to obtain a high level of confidence around the expected conversion from recruitment activity – therefore we needed to have a flexible and nimble approach.

CitySmart also developed a process to verify a person’s low income status without having a CRN. This involved the potential participant providing proof of income such as a notice of assessment from the previous financial year, plus a copy of the candidates’ most recent payslip that showed a total year to date amount of income earned, or an unexpired Health Care Card (it is possible for someone to hold a health care card, but to also be marked as not eligible for benefits from Centrelink) or their JobSeeker ID and/or confirmation from their JobSeeker agency that they are a low income earner. . Once received, they were verified as low income and accepted into the program.

Registrations were measured across the program to determine the number of registrations received, number accepted to participate and the number of people who applied with or without a CRN as verification of their income status. Having a CRN did not turn out to be a barrier as predicted—not

even with participants who were recruited through activities outside community agencies like Facebook—and 978 of 1,008 participants accepted into the program had a CRN.

Most registrations were verified using a CRN to substantiate income level, although 3% of successful applications were accepted using alternate income verification methods as people asked to participate who were low income earners but were not receiving Centrelink benefits and did not have a current



CRN.

Of the 1,422 registrations received, 414 (29.1%) were rejected as they did not meet the eligibility criteria to participate for a variety of reasons:

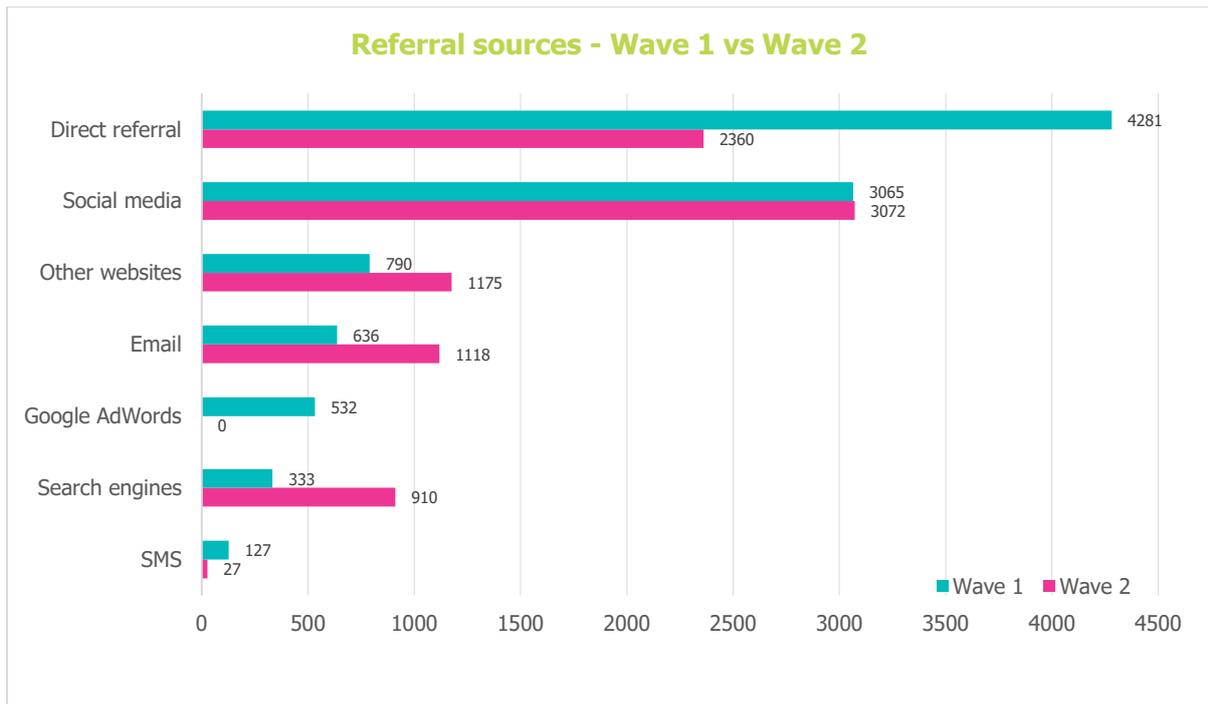
- Over 35 years old
- Live outside of Brisbane, Redlands, Logan or Moreton Bay council areas
- Own their home or paying a mortgage
- Were in state government housing
- Earn more than \$41,500 annually.

The main reason for rejection was that applicants did not have current concessions when checked using the CCeS system (despite having a CRN). Participants were offered alternate means of providing proof of their low income status, however the uptake of this was low. A number of registrants also attempted to register multiple participants at the same address, however due to program rules surrounding rewards this was not allowed and multiple applications were rejected.

Note: 1008 registrations were accepted, however 7 people from the first wave were moved to the second wave which accounts for the difference to the final number of 1001 participants.

Overall comparison of referral sources

The chart below compares the referral sources used in each recruitment phase.



While direct referrals (people typing the URL in directly or having privacy settings to not track activity) was highest for Wave 1 recruitment, they significantly dropped in the second wave. With digital channels emphasized for the second recruitment period, increases are shown above in website, email and search engine referrals between the waves.

Social media was the stand out performer across both waves, delivering consistently high referrals to the registration website.

Self-attributed referral sources

As well as sources tracked using digital analytics, participants were also asked to attribute their referral during the pre-program survey. The chart below shows the referrals of Wave 1 compared to Wave 2. Some similar sources have been grouped for ease of interpretation.

Results show word-of-mouth more than tripling between the waves, while social media showed a 62.5% increase. Referrals from community agencies dropped between the waves by 25% as recruitment activity was de-emphasised in favour of digital and peer channels.



Rate of referrals

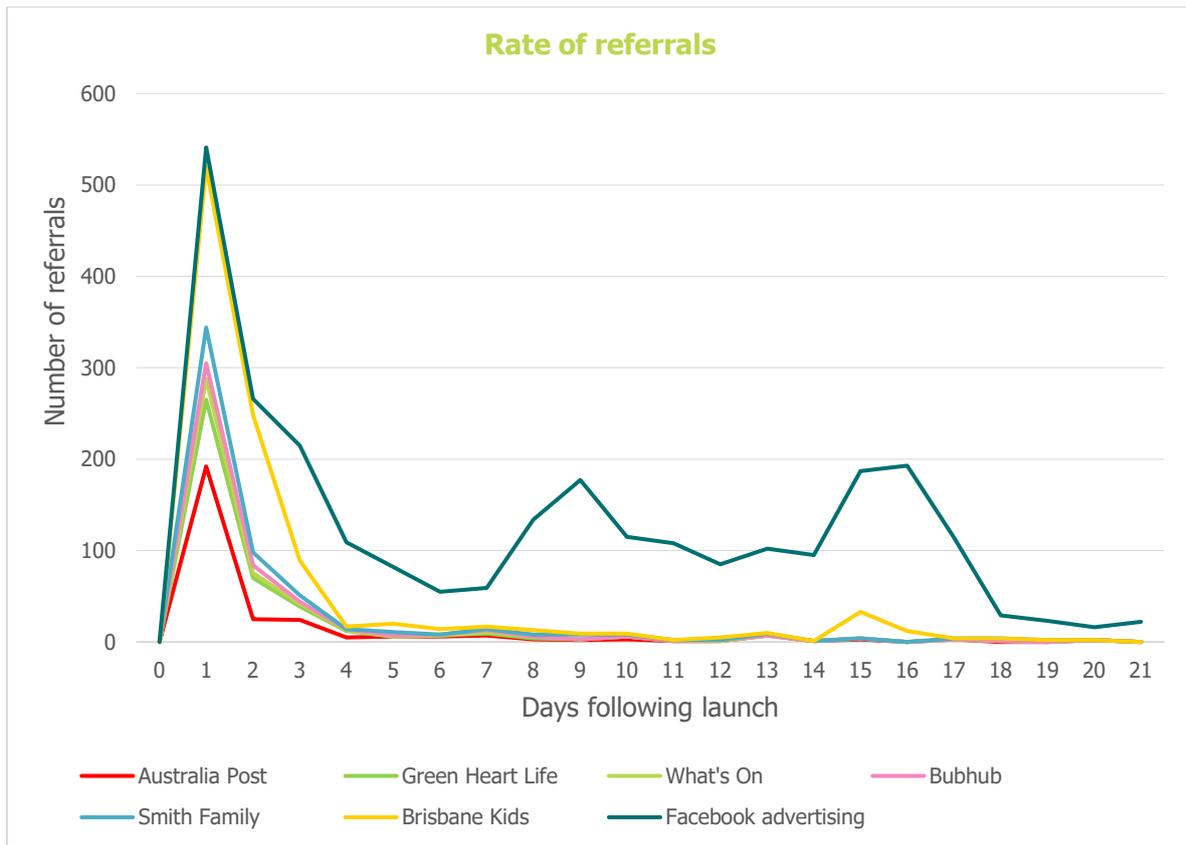
An analysis was undertaken to compare the rate of different channels in delivering referrals. The graph illustrates the rate of referral from the top 7 recruitment activities during the 3 week period following their activation in market. Each of these activities was digital, therefore able to be tracked through the use of custom URLs. The rate of activity is the number of referrals they generated to the website. The activities included:

- Australia Post Lifestyle and Movers database (email)
- Green Heart Life (e-newsletter)
- What's On (email)
- Bubhub (Facebook)
- Smith Family (email)
- Brisbane Kids (Facebook)
- Facebook advertising (Facebook)

Note: These activities may not have occurred in the same recruitment phase (a mix of Wave 1 and Wave 2), however the comparative effectiveness of these activities was measured over a 3 week time period.

Facebook shows high amounts of activity over time and was the most active digital source over the 21-day period.

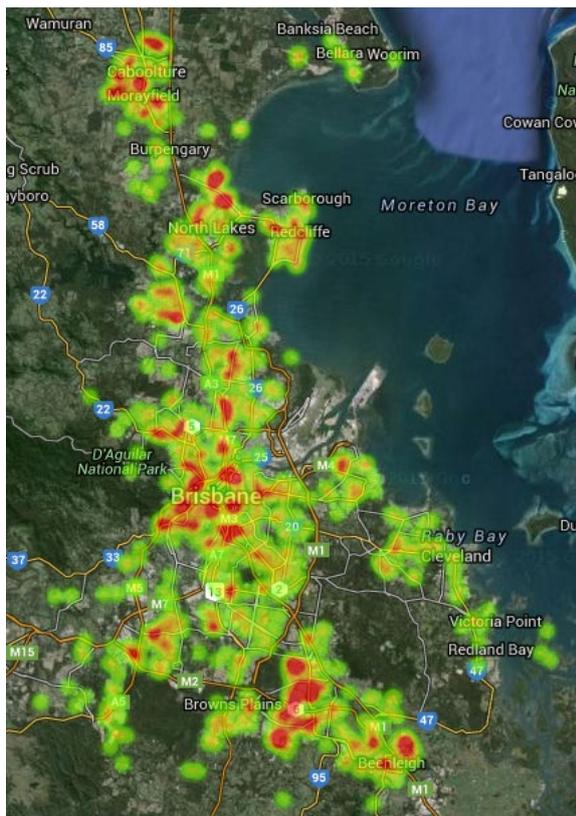
All activities showed an initial peak in delivery, with Brisbane Kids Facebook advertising matching Facebook's overall peak. In contrast to Facebook, other activities did not peak as strongly and did not deliver consistently over time after their activation. The activity that they generated slowed or dropped off after four days at most.



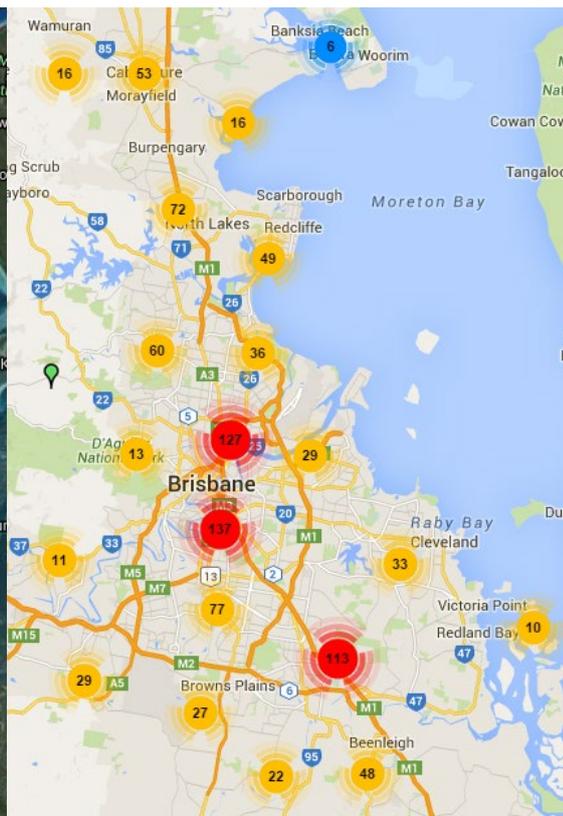
Distribution of participants

The following maps were compiled to show where participants live across Brisbane. The heat mapping following (left) shows orange and red areas of higher density and the cluster map (right) groups participants into key clusters, with the largest clusters appearing in the Inner North and South of Brisbane and further south in the Logan area.

Heat map



Cluster map



Key recruitment learnings

The agile approach was critical to the success of the recruitment strategy as it ensured activities could be boosted or slowed depending on the response rate. The review of activities between waves allowed for improvements to be made to the recruitment approach, including re-prioritisation of channels and materials.

The fun aspect of the program was well received, with the vibrant art direction overcoming negative perceptions of government program communication (which are traditionally more conservative in their creative execution) and providing cut-through with the target group which helped stimulate involvement.

Multiple touchpoints are required for conversion, preferably a mix of both online and other real life mediums. Having a closing date created a sense of urgency to sign up and increased traffic to the website and in social activity.

Recruitment channels required enough time to convert people to register, with targeted digital communication and social media promotions quick to activate and receiving the highest response while agencies took longer to roll out materials and activate recruitment activities. Social media and digital campaigns showed more instant results and were easier and faster to track than more 'direct' channels. Facebook conversions took between 1–4 days while email campaigns converted over 3 weeks

The activation of additional digital advertising channels and recruitment activities provided more control than those activated by external partners and were successful in dramatically increasing promotion of the program and ensured recruitment targets were reached and exceeded.

Social media activities focused on sponsored ads, promoting the program to people with the same characteristics as the ideal participant, and 'shout outs' on family and parenting pages. As a result,

the website received a high volume of referrals from social media which resulted in a high number of overall conversions.

Email communications that included a personal recommendation or were targeted towards those fitting the program's eligibility criteria worked best. For example, an email from the Smith Family which included a personal recommendation to clients about the program had a 33% conversion rate. This was most likely due to the fact that community service agencies act as a trusted source with the target group, with little intrusion on the recipient's time or consultation.

Promotional events gained a lot of interest from people however produced limited on-the-spot conversions. However, events provided a great opportunity to gain feedback directly from the target group, which helped improve messaging and recruitment materials. While the program attracted prime time news coverage infield to a large number of viewers/listeners, however this only yielded a few registrations.

Community agencies were stretched with resources and time, with activity slow to materialise in market. Issues such as merger/re-structures, storm damage, funding pressures and tender applications during the recruitment period reduced or ceased the participation of some agencies. Overall engagement from agencies was difficult to manage and harder to track than digital channels. Agencies were not actively involved in digital communications and many were not able to promote through this channel often due to a lack of appropriately skilled resources. There was also some perception from agencies that clients didn't have mobile phones or internet access. A lack of appropriate client information made the use of targeted email campaigns through agencies more difficult.

In some cases, agencies didn't understand the program as a whole and its objectives, likely due to its innovative and different structure and approach. This was a similar story infield with the brand being new and unknown and generating some scepticism and lack of trust, with many people wanting to know 'why' the program was being run and rewards were involved. The focus on providing ample recruitment materials and guidance on how to use them was appreciated by agencies, although not many materials were viewed or downloaded from the website provided to participating agencies. In general, agencies where someone championed the cause (usually engagement officers) showed higher engagement and recruitment numbers.

Media and PR promotion

CitySmart engaged a Public Relations agency to support efforts to build awareness and maximise media exposure for RYJ. The program achieved over \$246,600 in advertising and PR media value through its promotion in a number of channels.

The primary goals were to establish awareness of the program as a new and innovative energy saving initiative, promote its benefits amongst target audiences, maximise media exposure for program partners and supporters, and enhance recognition and brand awareness of CitySmart and its work in the community.

Key audience groups were identified as business, trade (including sustainability, marketing and communications) and the broader community.

In the initial stages of the brief in May 2015, media was leveraged from a staged launch event that initiated interest and subsequent media enquiry. In November 2015, CitySmart was announced as the recipient of the coveted National Energy Efficiency Awards for Best Residential Energy Efficiency Project, which represented an opportunity to renew media interest for the program, in lieu of trial results being published in the first quarter of 2016.

The RYJ media approach comprised of two key stages:

1. Program launch
2. National Energy Efficiency Awards Announcement

Program launch

The launch of the Reduce Your Juice program centred on a media launch event attended by The Hon. Ian Macfarlane MP, Minister for Industry and Science, Brisbane City Council Lord Mayor Cr Graham Quirk, CitySmart CEO Megan Houghton, Queensland Council of Social Services (QCOSS) CEO Mark Henley and QUT Professor Rebekah Russell-Bennett (Social Marketing). The event was hosted at The Cube, Science and Engineering Centre.

A targeted media list was prepared and media information developed for distribution both in the lead-up to the event (media alert/invitation) and following the official announcement (media release and support materials).

All media information and media briefings were crafted to key messages that supported CitySmart's overarching communications objectives of:

- Supporting our community
- Innovative marketing and communications – digital and social
- Driving sustainability outcomes

All attending media were issued with a media kit, including media release and accompanying imagery/video footage. This was following by a broad distribution of the announcement media release, which was tailored to appeal to different media outlets.

Awards announcement

In November 2015, Reduce Your Juice was announced as the recipient of the National Energy Efficiency Awards for Best Residential Energy Efficiency Project. This represented an opportunity to renew media interest in the program, and media release material was prepared according to the campaign objectives and messaging.

The opportunity was pitched exclusively to Channel Seven to ensure maximum coverage, which attracted interest from Today Tonight. A trial participant and key spokespeople were identified and briefed according to the program goals.

A 'media callout' was staged at the trial participant's residence. The story was supported by an interview with the Lord Mayor and CitySmart CEO, together with the provision of app footage and background information. Once television exposure was secured, key environmental media was targeted for coverage.

Media outcomes and achievements

Through close liaison with media and the community, the RYJ program achieved significant coverage across a broad range of media. In lieu of hard data, the visual nature of the program primarily attracted television interest, which impacted on press coverage the following day. A summary of coverage is below, with estimated media value following.

Media outcomes

Stage	Outputs	Outcomes
ONE	20 May 2015: MEDIA ALERT <i>Australian-first energy saving program launch</i> 20 May 2015: MEDIA RELEASE <i>Australian-first energy saving program to help low income households</i> 01 Jun 2015: MEDIA RELEASE <i>First week of 'game-play' kicks off in Brisbane to curb rising cost of living</i> 22 Jul 2015: MEDIA RELEASE- <i>'Game-play' rewards on-route thanks to CPL's Milestones Printing</i> 21 Sept 2015: MEDIA RELEASE <i>First week of energy saving kicks off in Jamboree</i>	20 May 2015: 4mins 04secs <i>4BC Afternoon Program</i> 20 May 2015: 1min 29secs <i>Seven News Brisbane</i> 20 May 2015 <i>Brisbane Kids</i> 21 May 2015 <i>Digital Brisbane</i> 25 May 2015 <i>WME</i> 29 May 2015 <i>Sustainability Matters</i> 7 September 2015: 1min 50secs <i>Nine News Brisbane</i>
TWO	20 Nov 2015: MEDIA RELEASE <i>Brisbane's power saving idea sparks nationwide buzz</i>	8 November 2015 <i>Sustainability Matters</i> 4 December 2015 <i>Channel Seven News</i> 24 Dec 2015: 2.25min <i>Channel Seven Today Tonight</i> 3 December 2015 <i>The Fifth Estate</i> 10 December 2015 <i>Ecogeneration</i> 22 December 2015 <i>Community Door</i> 22 December 2015 <i>QUT News</i>



Date	Media Outlet	Program/Section	Headline	Size (cm ²)	Duration	Circulation	Advert Value ³	PR Value ⁴
20/05	4BC	Afternoons	Afternoon Program	N/A	4.04mins	20,000	\$1,750	\$5,250
20/05	Seven News Brisbane	Broadcast Clip	General News	N/A	1.29mins	217,973	\$12,600	\$37,800
20/05	Brisbane Kids (online)	Local News	CitySmart: Reduce Your Juice Program	N/A	N/A	200,000	\$150	\$450
21/05	Digital Brisbane (online)	General News	Reduce Your Juice	N/A	N/A	N/A	\$0	\$0
25/05	WME (online)	General News	Brisbane given help to reduce its juice	N/A	N/A	N/A	\$4,500	\$13,500
29/05	Sustainability Matters (online)	General News	Saving Energy isn't a game...or is it?	N/A	N/A	5301	\$4,800	\$14,400
07/09	Nine News Brisbane	Broadcast Clip	Nine Afternoon News	N/A	1.50mins	99,413	\$6,000	\$18,000
24/12	Channel Seven	Broadcast Clip	Today Tonight	N/A	2.29mins	117,736	\$21,000	\$63,000
19/11	Sustainability Matters (online)	General News	National Energy Efficiency Conference Highlights	N/A	N/A	4248	\$4,800	\$14,400

³ Advert value is the estimated cost of running an equivalent advert in that channel

⁴ PR Value represents the estimated value of reach generated by the activity (approximately 3 times the advert value)

03/12	The Fifth Estate (online)	General News	New energy app helps reduce power bills by 18 per cent	N/A	N/A	39,000 per month	\$3,000	\$9,000
10/12	Ecogeneration (online)	Other	Award-winning Reduce Your Juice app guides energy saving behaviour	N/A	N/A	27,000	\$3,050	\$9,150

Date	Media Outlet	Program/Section	Headline	Size (cm ²)	Duration	Circulation	Advert Value	PR Value
22/12	QUT News (online)	General News	QUT and CitySmart win national energy efficiency award for Reduce Your Juice	N/A	N/A	N/A	N/A	N/A
03/12	The Fifth Estate (Facebook)	Social Media	New energy app helps reduce power bills by 18 per cent	N/A	N/A	653 likes	N/A	N/A
01/05	Live 4 Less (Facebook)	Social Media	Shared post from Reduce Your Juice page	N/A	N/A	194 likes	N/A	N/A
21/05	Study Brisbane (Facebook)	Social Media	Energy bill draining your wallet?	N/A	N/A	158, 494 likes	N/A	N/A
07/10	ZED Electrical Bundaberg, Rockhampton (Facebook)	Social Media	Reduce Your Juice	N/A	N/A	158 likes	N/A	N/A
19/01	Your Energy Savings (Twitter)	Social Media	Your Energy Savings	N/A	N/A	3,009 followers	N/A	N/A
29/12	ASBEC (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	935 followers	N/A	N/A
27/12	ASBEC (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	935 followers	N/A	N/A
31/08	QCOSS (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	1,174 followers	N/A	N/A

16/06	Team Quirk (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	4,106 followers	N/A	N/A
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Date	Media Outlet	Program/ Section	Headline	Size (cm ²)	Duration	Circulation	Advert Value	PR Value
04/06	QUT Business School (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	837 followers	N/A	N/A
21/05	QCOSS (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	1,174 followers	N/A	N/A
19/05	QCOSS (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	1,174 followers	N/A	N/A
14/05	QCOSS (Twitter)	Social Media	Reduce Your Juice	N/A	N/A	1,174 followers	N/A	
	@cassandra_lee (Instagram)	Social Media	Reduce Your Juice related post	N/A	N/A	424 followers	N/A	N/A
	@cutekaz (Instagram)	Social Media	Reduce Your Juice related post	N/A	N/A	385 followers	N/A	N/A
	@chicmus (Instagram)	Social Media	Reduce Your Juice related post	N/A	N/A	2,184 followers	N/A	N/A
	@greenharvard (Instagram)	Social Media	Reduce Your Juice related post	N/A	N/A	3,120 followers	N/A	N/A
	@lovefunandhappiness (Instagram)	Social Media	Reduce Your Juice related post	N/A	N/A	515 followers	N/A	N/A
ADVERT: \$61,650							PR: \$184,950	

Media clips – Stage 1

20 May 2015 *4BC Afternoon Program*

broadcast clip

Station :	4BC	Program :	Afternoons
Location :	Brisbane	Producer :	Ms Joanne Lyon
Aired On :	20/05/2015 12:23:41 PM	Duration :	4 mins 04 secs
Compere :	Clare Blake	Summary ID :	W00061784847
Demographics :	Male 16+ 9000	Female 16+ 11000	
Interviewees :	Stephanie McDonald, Reporter, 4BC		

Interview with Stephanie McDonald, Reporter, 4BC, who has been at the launch of Reduce Your Juice this morning, an energy saving app created by City Smart, part of Brisbane City Council. She confirms it is funded by the Federal Government and has been launched at Queensland University of Technology. A group of 1,000 people renting on low incomes between 18 and 35 years will test the app on their phones or iPads and participate in six weeks of game playing to save on energy bills.

20 May 2015 *Seven News Brisbane*

broadcast clip

Station :	Channel 7	Program :	Seven News
Location :	Brisbane	Producer :	Mr Warren Evans
Aired On :	20/05/2015 6:50:30 PM	Duration :	1 mins 29 secs
Compere :	Sharyn Ghidella and Bill McDonald	Summary ID :	M00061790692
Demographics :	Male 16+ 85494	Female 16+ 132479	
Interviewees :	Graham Quirk, Brisbane Lord Mayor		
Interviewees :	Mark Henley, QCOSS		
Interviewees :	Dan Hayes, City Smart		

Low income earners are wanted to trial a new app that could save 20 per cent from their power bill. Reduce Your Juice shows Australians the best way to reduce their electricity usage. It's a \$5m federal program being run by City Hall's City Smart agency.

CITYSMART: REDUCE YOUR JUICE PROGRAM



Electricity prices seem to be continuously on the rise these days, resulting in increasing electricity bills for families. For young, low income earners, these increased expenses can be even more challenging; particularly when juggling with things such as rent, car expenses and other day to day living costs.

As a way of reducing some of the costs associated with energy bills for low income households, CitySmart is launching their Reduce Your Juice program from 1 June 2015.

WHO IS CITYSMART?

Reduce Your Juice is a pilot research program being run by CitySmart, who are a subsidiary of Brisbane City Council. The program is funded under the Australian Government's Low Income Energy Efficiency Program grants, through the Department of Industry and Science. You can learn more about CitySmart [here](#).



WHAT IS THE REDUCE YOUR JUICE PROGRAM?

The Reduce Your Juice program is aimed at assisting low-income, young adult renters to reduce their energy consumption and save money on their energy bills. The eligible participants will progress through an eight (8) week program, which involves playing games and completing actions and surveys that will earn them rewards and increase their knowledge of energy usage.

And that's not all. Upon successful completion of the program, participants will earn themselves either a new BBQ, or a replacement fridge or washing machine, thanks to the support of the program partners that include QUT, Queensland Council of Social Services, Energex, The Good Guys, and Brisbane City Council. There are also plenty of other rewards up for grabs for successful participants who complete all the requirements.

WHEN DOES THE PROGRAM START?

Reduce Your Juice is running in two rounds in 2015, with the first commencing on 1 June and the second in September, with a limit of 500 participant in each round.

WHO IS ELIGIBLE FOR REDUCE YOUR JUICE?

To be eligible to take part in this program, participants need to be:

- aged 18–35 years
- low income (<\$41,500 for individuals or \$50,700 for households)
- able to provide a Centrelink Reference Number
- renting in Brisbane, Logan, Moreton Bay or Redlands local government areas
- have a compatible smartphone or tablet

HOW DO I REGISTER?

Participants can register at www.reduceyourjuice.com.au. Be sure to sign up ASAP as the limited places will fill quickly and registration is required before the 1 June kick off date.

For further assistance, please contact: help@reduceyourjuice.com.au

Reduce Your Juice

PUBLISHED: 21/05/2015



CitySmart's Low Income Energy Efficiency Program, Reduce Your Juice, takes a new and innovative approach to energy efficiency, combining a range of insights into a leading-edge digital solution.

Funded by the Department of Industry and Science as part of the Low Income Energy Efficiency Program (LIEEP) grants, Reduce Your Juice is a trial program designed to engage 1000 participants aged 18-35 and renting a home in the Brisbane, Logan, Moreton Bay or Redlands areas to save energy. Reduce Your Juice trials an innovative and interactive approach to energy efficiency, transforming a traditionally low interest and involvement area using elements of fun and entertainment.

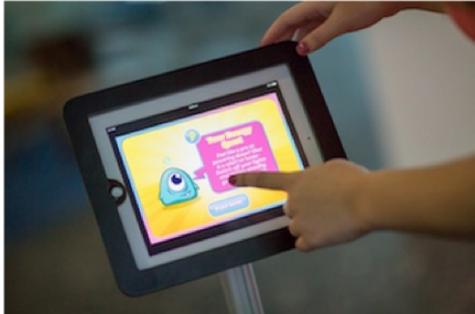
Using a mobile app, digital communications and a stealthy learning approach, Reduce Your Juice helps participants make better decisions about their energy use and reduce their household electricity bills.

To find out more about the Reduce Your Juice program, visit the [CitySmart website](#).

Brisbane given help to reduce its juice

Monday, 25 May 2015 - 0 Comments

A new energy saving trial - Reduce Your Juice - has been launched in Brisbane to help lower the cost of living for the city's low-income renters. The program promises to help residents save up to \$285 or 19% of their annual electricity bill.



Created by Brisbane City Council's sustainability agency CitySmart and funded by the Australian government, the program combines digital and social marketing research to motivate and improve energy efficiency decision-making behaviours in the household.

A Reduce Your Juice app is available for download on Apple and Android devices, comprising a series of games aimed at helping residents learn about energy use at home and the impact of their behaviour on energy consumption.

Reduce Your Juice aims to help participants reduce their cost of living by up to 19%.

These games include Power Raid (switching off lights and appliances), Temperature Defender (efficient home heating and cooling) and Fully Loaded (efficient washing and drying) and they are supported by a range of integrated digital communications such as email, SMS and social media.

The Reduce Your Juice trial program involves two rounds of 500 participants aged between 18 and 35 years old and renting in Brisbane, Logan, Moreton Bay and Redlands council areas.

The trial program was designed in collaboration with Queensland University of Technology (QUT) and social marketing professor Rebekah Russell-Bennett said not only was game-playing an innovative approach to tackling energy usage in the home, but the methodology behind the whole program to change energy use behaviour was an international first.

"Most traditional energy efficiency programs use an information deficient approach – basically they assume people lack the knowledge of how to reduce their energy," Russell-Bennett said.

"Reduce Your Juice has adopted a best practice framework using leading theory, that recognises that energy efficiency in the home is a low involvement act and that people often don't care or think about electricity until the bill arrives.

"Through the use of social marketing based game playing, participants aren't asked to change their values around energy use, rather through clever game play engagement, they gain increased knowledge that results in positive behavioural changes."

To help cement positive behavioural changes as common practice in the home, a rewards program has been designed where participants are encouraged to put their learnings from the 'virtual world' into action through tips and tricks delivered via digital messages called 'Powerhacks'.

Participants who play the games for 10 minutes each week over the six-week program, and complete relevant surveys to monitor the program's success, will be rewarded for their progress, including the chance to earn either a replacement energy efficient fridge or washing machine, or a Weber BBQ.

The first round of participants will commence the program on June 1.

Build on your knowledge and develop opportunities with **Construction Industry News**.



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Saving energy isn't a game... or is it?

By Sustainability Matters Staff

Friday, 29 May, 2015

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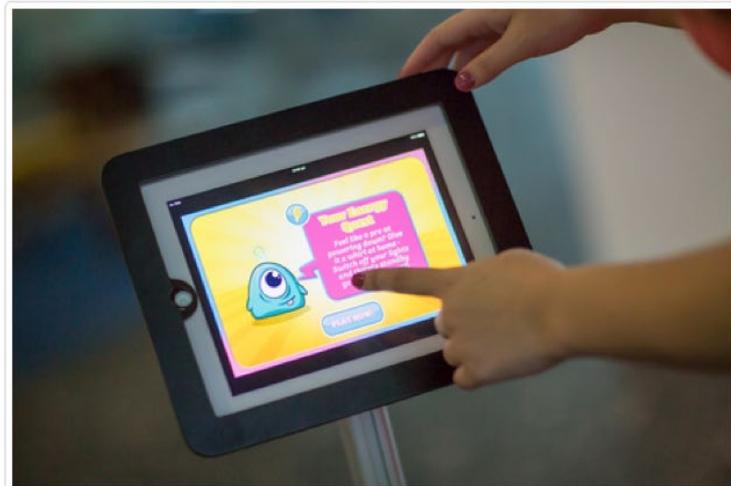
Brisbane's new energy-saving program 'Reduce Your Juice' has been launched to help lower the cost of living for Brisbane's low-income renters, with program participants having the opportunity to save up to 19% off their average annual electricity bill.

Created by [Brisbane City Council](#) sustainability agency [CitySmart](#) in collaboration with [Queensland University of Technology](#) (QUT) and funded by the Australian

Government, the trial program combines best-practice digital and social marketing research to motivate and improve energy-efficiency decision-making behaviours. The program involves two rounds of 500 participants aged between 18-35 years, renting in Brisbane, Logan, Moreton Bay and Redlands council areas, staged across two six-week periods this year.

The first round of participants will commence the program on 1 June with the download of the Reduce Your Juice app. The app delivers three mini-games - Power Raid, Temperature Defender and Fully Loaded - that aim to virtually engage players to help them learn about energy use in the home, the impact of their behaviour on energy consumption and their ability to make real-life behavioural changes.

Participants will be encouraged to put their learnings from the 'virtual world' into action through tips and tricks delivered via digital messages called 'Powerhacks'. Additionally, those who play the games for 10 minutes each week, and complete relevant surveys to monitor the program's success, will be rewarded for their progress, including the chance to earn either a replacement energy-efficient fridge or washing machine, or a Weber BBQ.



7 September 2015 *Nine News Brisbane*

broadcast clip

Station :	Channel 9	Program :	Nine Afternoon News
Location :	Brisbane	Producer :	
Aired On :	7/09/2015 4:54:15 PM	Duration :	1 mins 50 secs
Compere :	Eva Milic	Summary ID :	M00063116082
Demographics :	Male 16+ 39416	Female 16+ 59997	
Interviewees :	Graham Quirk, Brisbane Lord Mayor		
Interviewees :	Kirsty Lamont, Mozo		
Interviewees :	Christine Da Costa, Participant		
Interviewees :	Prof Rebekah Russell-Bennett, QUT		
Visuals :	AGL		
Visuals :	Dodo		
Visuals :	Energy Australia		
Visuals :	Origin		
Visuals :	Red Energy		

Queensland power prices have risen 50% in the last 3 years. A new, free program designed by Brisbane City Council and Queensland University of Technology is helping low income earners cut back on their energy bills. Results of the trial has been successful with some participants saving 10% off their bills. Kirsty Lamont, Mozo says it is really important for people to shop around when choosing a power provider.

Media clips – Stage 2

24 Dec 2015: Channel Seven *Today Tonight*

broadcast clip

Station :	Channel 7	Program :	Today Tonight (SA)
Location :	Adelaide	Producer :	Mr Graham Archer
Aired On :	24/12/2015 6:52:58 PM	Duration :	2 mins 29 secs
Compere :	Compere	Summary ID :	M00064383872
Demographics :	Male 16+ 46708	Female 16+ 71028	
Interviewees :	Anita Martin, Trialist		
Interviewees :	Neil Horrocks, CitySmart		

A new app, Reduce Your Juice, is helping people save money on their power bills. TVs, computers, PlayStations, air conditioning and music players are often blamed for high energy consumption. The new app is aimed at teaching kids and adults how to save energy. Neil Horrocks, CitySmart, developed the app for Brisbane. He says the idea is to give instant feedback on what can help reduce someone's power bill. So far, testing has proven lessons learned in the game can pay off in real life for kids and adults. Anita Martin, trialist, says she saved \$127 in one quarter alone.

National Energy Efficiency Conference highlights

By Sustainability Matters Staff
Thursday, 19 November, 2015

The National Energy Efficiency Conference, held this week in Melbourne by the **Energy Efficiency Council** (EEC), enabled over 300 efficiency leaders, innovators, energy users and policymakers to come together to hear, debate and analyse the latest Australian and global thinking about maximising productivity by saving energy.

National Energy Efficiency Industry Awards

The conference saw the presentation of the National Energy Efficiency Industry Awards, delivered to a diverse range of businesses and governments for outstanding achievements in energy efficiency in commercial buildings, industry, SME, residential and demand response projects.

Award winners included:

- Best SME Energy Efficiency Project 2015: **Ryan Meat Company** and **Minus40**
- Best Residential Energy Efficiency Project 2015: **CitySmart**, for Reduce Your Juice
- Best Energy Savings Program 2015: **Moreland Energy Foundation**, for achievements from 2000–2015
- Best Demand Response Project 2015: Australian Textile Mills and **EnerNOC**, for Technology-Enabled Critical Peak Demand Response
- Best Industrial Energy Efficiency Project 2015: **Tri-Tech Chemical** and Genesis Now
- Best Commercial Building Energy Efficiency Project 2015: **Mirvac Property Trust**, for Sirius
- Leading Energy User 2015: **Charter Hall Group**, for energy efficiency in the Charter Hall Office Trust
- Energy Efficiency Champion 2015: Stuart Nesbitt, climate change technical officer at **Moreland City Council**



“Tonight’s winners represent the best efficiency projects in Australia and, importantly, the outstanding efficiency providers and the visionary clients who make them happen,” said EEC CEO Luke Menzel. “Their expertise, skill and commitment are helping Australia reduce its energy use across the board.”

Retrofit survey results

Conference attendees also heard the results of the Melbourne Retrofit Survey 2015, which collects data from building owners, building managers and facilities managers on retrofit activity undertaken in commercial buildings. The survey found that 37% of commercial buildings in central Melbourne have retrofitted to improve their environmental performance in the last five years.

Key findings from the survey include:

- 37%, or 541 commercial buildings in the municipality, have retrofitted since 2010.
- 21%, or 315 buildings, intend to retrofit within the next five years.
- 12% of buildings spent over \$1 million.
- 92% of retrofits included a lighting upgrade, 49% involved a chiller upgrade and 20% included an upgrade to the building management system.
- Retrofit activity is on the rise, with 11% of buildings in 2015 'currently' being retrofitted (compared to 7% in 2011 and 5% in 2013).

Environment Portfolio Chair Councillor Arron Wood said retrofitting to improve a building’s performance “makes economic sense”, since more efficient buildings “cost less to run and are more likely to attract and retain tenants”.

“There is a clear business case for these retrofits in terms of improved air quality, temperature quality and staff attraction and retention,” he said.

The survey results can be downloaded from the [City of Melbourne website](#).

A new pathway for mid-tier commercial office buildings

Finally, the [Green Building Council of Australia](#) (GBCA) launched a new document to tackle the energy productivity of up to 80,000 buildings mid-tier commercial office buildings around Australia.

The report 'Mid-tier commercial office buildings in Australia: a national pathway to improving energy productivity' takes a snapshot of the nation’s mid-tier office building sector, outlines key stakeholders and identifies barriers and the opportunities to improve energy efficiency. Mid-tier buildings are commonly defined as B-, C- and D-grade buildings, usually found in capital city CBDs and fringe areas, suburban centres and some regional towns.

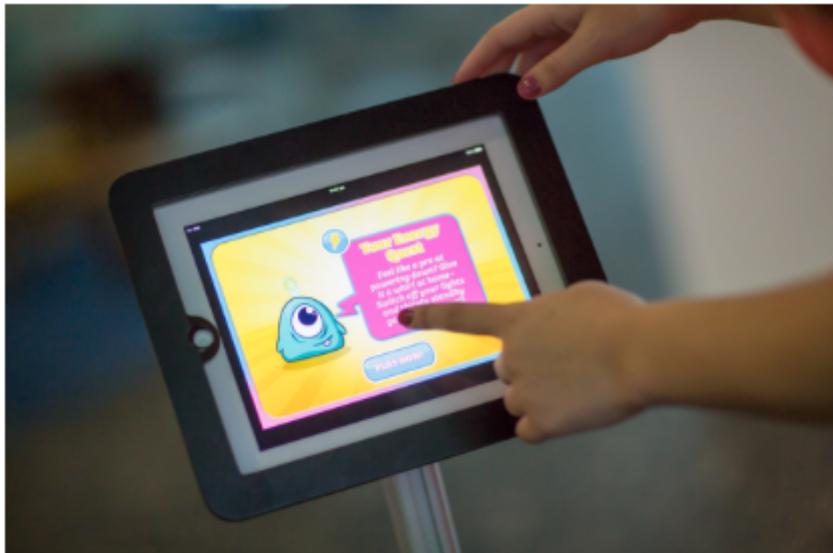
The pathway document includes the following actions:

- A Building Retrofit Toolkit, which will establish best practice in retrofits and tune-ups in mid-tier buildings.
- Reviewing the scope of the current Commercial Buildings Disclosure program to encompass smaller office buildings.
- Building a business case for energy-efficiency upgrades.
- Conducting further research to better understand the sector and its stakeholders.
- Establishing a sector network to increase collaboration, innovation and exchange.

“The mid-tier office sector presents huge opportunities,” said GBCA Director of Advocacy Katy Dean, “and our industry can be an exemplar for energy efficiency and greenhouse gas emissions reduction around the world.”

The report can be downloaded from the [GBCA website](#).

New energy app helps reduce power bills by 18 per cent



Annie Kane | 3 December 2015

Brisbane City Council's sustainability agency CitySmart has announced that its trial of a new interactive app has helped low-income residents reduce their power bills by more than 18 per cent.

The [Reduce Your Juice](#) program uses an interactive mobile gaming app in conjunction with a social media community, email and SMS to effect behaviour change.

It is thought to be the first time this type of learning method has been trialled in Australia for energy-saving purposes.

App details

Funded by the Department of Industry and Science as part of the now-scrapped Low Income Energy Efficiency Program, the app (available for download on Apple and Android devices) delivers a series of mini-games that aim to help players learn about energy use in the home, the impact of their behaviour on energy consumption, and their ability to make real-life behavioural changes to become more efficient and to save money.

It comprises three games: one that requires users to turn off lights and appliances, one that seeks to boost efficient home heating and cooling, and one that focuses on efficient washing and drying practices.

The app also includes "powerhacks" – tips that help reduce energy consumption. For example, one "powerhack" states that residents can save energy by charging mobile devices while they get ready for work rather than overnight, while another suggests that showers should be restricted to the playing time of a song.



A trial of the program commenced in June and asked 1000 young-adult renters (aged between 18 and 35) on low incomes to play the app for five minutes a week over a period of six weeks.

Preliminary results have shown that not only did the app help reduce energy bills by up to 18 per cent, participants also played the app six times over what was required.

It has since won the National Energy Efficiency Awards for Best Residential Energy Efficiency Project.

Energy Efficiency Council chief executive Luke Menzel said that the program was recognised for "the behavioural change achieved in some of Queensland's most marginalised communities" and for its efforts in connecting with a group that is "notoriously difficult to engage with".

Mr Menzel added: "Reduce Your Juice is a cutting-edge program that shows how we can promote sustainability outcomes using the tools of the 21st century. Brisbane is leading the way on this one, and it deserves to be emulated around Australia."

CitySmart chief executive Neil Horrocks commented: "The implications of this award are significant. It is a national tick of approval for our work and acknowledgement that we are doing something incredibly special here in Brisbane that could potentially assist many households across Australia.

"We're very encouraged by the preliminary findings which show a substantial impact on household power usage in our target market and, while there is still some way to go before the trials and results are finalised, I think the early signs suggest we have taken the correct approach, using the latest behavioural research to create an unconventional and inventive approach to tackle a costly issue for householders in today's digital generation."

The full report detailing the results of the trial will be released in February 2016.

Award-winning Reduce Your Juice app guides energy saving behaviour

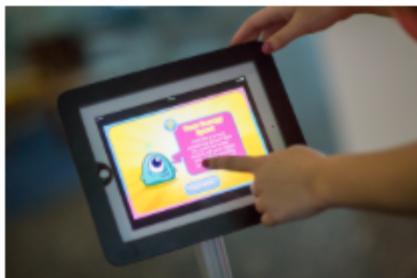
Thu 10 December 2015



A Brisbane digital initiative 'Reduce Your Juice' could enable households to reduce their power bills by up to 20 per cent.

Reduce Your Juice, which was the brainchild of Brisbane City Council's sustainable agency CitySmart, uses an interactive mobile gaming app in conjunction with social media, email and SMS to guide energy saving behaviour.

The first trial involved over 1,000 young adult renters on low income, who can on average spend around 10 per cent of their weekly income on power bills.



Reduce Your Juice uses an interactive mobile gaming app to promote sustainability among Queensland's most marginalised communities.



Initial results from the trials conducted showed power bill savings of more than 18 per cent.

"We're very encouraged by the preliminary findings that show a substantial impact on household power usage in our target market and while there is still some way to go before the trials and results are finalised, I think the early signs suggest we have taken the correct approach – using the latest behavioural research to create an unconventional and incentive approach to tackle a costly issue for householders in today's digital generation," CitySmart Chief Executive Neil Horrocks said.

The initiative won the Best Residential Energy Efficiency Project award at the [National Energy Efficiency Awards](#).

Energy Efficiency Council Chief Executive Luke Menzel applauded the initiative and its ability to overcome the challenge of researching young adult renters.

"This group is notoriously hard to engage with. The judges were extremely impressed by the behavioural change achieved in some of Queensland's most marginalised communities," Mr Menzel said.

"Reduce Your Juice is a cutting-edge program that shows how we can promote sustainability outcomes using the tools of the 21st century. Brisbane is leading the way on this one, and it deserves to be emulated around Australia," he added.

Trials of the program have now been completed, with an initial set of results expected to be released in December and the full report due in February 2016.

Reduce Your Juice received funding from the Department of Industry and Science as part of the [Low-Income Energy Efficiency Program](#), which trials different approaches to energy efficiency for low-income households. The data collected as part of the program will help inform future energy policy and improve household social health, welfare and livelihood.

The first two rounds of Reduce Your Juice officially commenced on 1 June 2015. Each round involves six weeks of app engagement and energy efficiency activity for up to 500 low-income renters aged between 18 and 35 years old in Brisbane, Logan, Moreton Bay and Redlands council areas.

Home > News >

Reduce Your Juice wins national award

Post date: Tuesday, 22 December 2015 - 12:24pm



Reduce Your Juice is an Australian-first program helping low-income households save money on their energy bills. It transforms the traditional approach to energy efficiency into a fun, interactive experience that helps change household energy habits.

Led by CitySmart in conjunction with Queensland Council of Social Service (QCOSS), Energex, The Good Guys, Brisbane City Council and QUT, the program received funding from the Australian Government to trial new and innovative approaches to energy saving to inform future policy.

This innovative approach was acknowledged when Reduce Your Juice won the National award for Best

Residential Energy Efficiency Project at the National Energy Efficiency Awards. The awards recognise national excellence in innovative projects by the peak body in Australia for energy efficiency, cogeneration and demand management – the Energy Efficiency Council.

Preliminary results from the program reveal that:

- Over 600 people participated in the program
- Average saving on their first power bill was \$58
- Participants played five times more than required
- 97% of participants would recommend to friends or family.

For more results visit the [Reduce Your Juice website](#).

News

QUT and CitySmart win national energy efficiency award for Reduce Your Juice

22 December 2015

A project designed to reduce energy consumption among low income renters involving QUT researchers from both Design and Business, has received national recognition for its innovative approach to changing household habits.

The [Reduce Your Juice](#) program was designed as a fun way to become super energy-smart and save money on electricity bills through the use of mobile games and a digital engagement platform.

It won **Best Residential Energy Efficiency Project** at the National Energy Efficiency Awards, which recognised national excellence in innovative projects by the Energy Efficiency Council.

QUT and the Brisbane's sustainability agency [CitySmart](#) ran a successful trial this year involving 1,000 low-income renters aged between 18 and 35 in the Brisbane, Logan, Moreton Bay and Redlands council areas.

The program combined mobile games, personalised digital communication tools and energy efficiency rewards to engage participants in order to reduce their energy consumption. This collaboration with CitySmart involved academics and students from urban informatics, interaction design, social marketing, and games.

Led by Professor Marcus Foth and Professor Rebekah Russell-Bennett, the project included contributions from Associate Professor Daniel Johnson and Research Assistant Ella Horton, as well as PhD students Rory Mulcahy, Heather Hill, Heather McKinnon and Alireza Rezaeian.

It was funded by the [Department of Industry and Science](#) as part of the [Low Income Energy Efficiency Program](#) (LIEEP).



The Reduce Your Juice program has been named Best Residential Energy Efficiency Project

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GPO Box 2434
Brisbane QLD 4001

Facebook

Study Brisbane added 2 new photos. Like Page
 21 May 2015 ·

Energy bill draining your wallet?

Sign up to **Reduce Your Juice** – a fun program to use less electricity, play games and earn a new fridge, washing machine or BBQ. If you live in Brisbane and are an 18-35 year old renter who doesn't earn a big bucket of cash, this could be for you! #reduceyourjuice

Registrations close 29 May and places are filling up fast. Register now at <http://bit.ly/1Bd2prD>



6 Likes

The Fifth Estate Like Page
 3 December 2015 ·

Brisbane City Council's sustainability agency CitySmart has announced that its trial of a new interactive app on energy has helped young, low-income residents reduce their power bills by more than 18 per cent #reduceyourjuice <http://ow.ly/VpFGO>



The Fifth Estate | New energy app helps reduce power bills by 18 per cent

Green buildings and sustainable cities – news and views

THEFIFTHSTATE.COM.AU

ZED Electrical Bundaberg, Rockhampton and Surrounds Like Page
 7 October 2015 ·

It's definitely warming up. But instead of turning on the Air-Cond just yet, switch the fan on & see what a difference it makes to the temperature - and your electricity bill!! **Reduce Your Juice**

And Did You Know, that to generate a cool air-flow, you will need to switch your fans back to Summer mode (Counter-Clockwise).

#ReduceYourJuice #DidYouKnow #ZEDElect



1 Like 1 Share

Twitter

QCOSS @QCOSS_ · 19 May 2015
#reduceyourjuice launched today by the Hon @IanMacfarlaneMP Minister for Industry and Science ow.ly/NaGgl



← ↻ ♡ 1 ⋮

QCOSS @QCOSS_ · 14 May 2015
Do you have clients who are 18-35 & low-income renters in SEQ?
#reduceyourjuice can help save money & earn rewards ow.ly/MYngX



Reduce Your Juice

Reduce Your Juice can help you save money on your electricity bill. Use less power and score sweet rewards.
reduceyourjuice.com.au

← ↻ ♡ ⋮

QCOSS @QCOSS_ · 31 Aug 2015
Do you have low-income clients 18-35yrs renting in SEQ? They can save money & earn rewards with #reduceyourjuice smarturl.it/Ryj-QCOSS



Reduce Your Juice

Reduce Your Juice can help you save money on your electricity bill. Use less power and score sweet rewards.
reduceyourjuice.com.au

← ↻ ♡ 2 ⋮



Team Quirk @Team_Quirk · 16 Jun 2015
LM talks about innovative @iluvBNE #reduceyourjuice program in his #BCCBudget2015 speech - helping residents reduce their energy use

← ↻ ♡ 1 ⋮



QUT Business School @QUTBusiness · 4 Jun 2015
#innovation is ... #gamification to change behaviour positively e.g energy saving
#reduceyourjuice @LEADX15

← ↻ ♡ 6 ⋮



QCOSS @QCOSS_ · 21 May 2015
Registrations close Sunday for #reduceyourjuice! Know someone 18-35, renting in SEQ, who wants cheaper energy bills? ow.ly/NgKrM

← ↻ ♡ 1 ⋮ [View summary](#)



Your Energy Savings @YES2Savings · Jan 19
Check out the new energy & money saving app info update via @ASBEC1
#saveenergy & #Reduceyourjuice

ASBEC @ASBEC1

Results show engaging new app makes energy use fun and saves you money! #Reduceyourjuice app from @iluvBNE
reduceyourjuice.citysmart.com.au

← ↻ ♡ 1 ⋮



ASBEC @ASBEC1 · 29 Dec 2015
Results show engaging new app makes energy use fun and saves you money!
#Reduceyourjuice app from @iluvBNE reduceyourjuice.citysmart.com.au

← ↻ ♡ 1 ⋮



ASBEC @ASBEC1 · 27 Dec 2015
Impressive results so far from the #CitySmarts #ReduceYourJuice App trial
@iluvBNE reduceyourjuice.citysmart.com.au

← ↻ ♡ ⋮

Instagram



 @cassandra_lee

I won a brand new Weber BBQ thanks to Reduce Your Juice!!! I am so lucky thank you so much for such a great program! 😊😊 Make sure you check out their web page and sign up for awesome power saving tips and your chance to participate next year and win amazing prizes too! #powersaving#reduceyourjuice 🌍🌍

1 15



 @cutekaz

#reduceyourjuice#savingpower#savingtips
All things to help me cut back on power to save money.

0 7



 @cutekaz

#fan#handfan#reduceyourjuice#lights#lightbulb

0 7



 @chicamus

It was an absolute pleasure to be a guest speaker at QUT's E-marketing Strategies class today and share a bit about our insights and digital strategy on Reduce Your Juice!

#reduceyourjuice#marketing#brisbane#qut

2 40



 @greenharvard

#Harvard Housing's #Sustainability team hosted the #ReduceYourJuice Juice Bar event for the second year on Monday at the Graduate Commons Welcome Event. Grad students and their families enjoyed fresh juice while the team brought #energy saving strategies and #lighting and #power saving devices at reduced prices to the tenants. Awesome event!

#greenharvard



 @chicamus

Meet the Watt family! Find out more at reduceyourjuice.com.au

#reduceyourjuice#qut#brisbane#australia

Queensland University of... 0 25



 @lovefunandhappiness

#Prizes#Won#SoooHappy#OnARoll#Friday

4 9



 @greenharvard

Morris Hall @harvardhbs takes a break from studying to celebrate their recent #energy challenge victory.

#reduceyourjuice#greenharvard#harvard

0 16

Awards

RYJ has received the following recognition and awards:

National Energy Efficiency Awards 2015
Best Residential Energy Efficiency Project.



BADC Awards (Brisbane Advertising and Design) industry 2015
Silver: Mobile Content Advertising – Games Online and Social
Bronze: Digital – Innovative use of Digital
Bronze: Digital – Visual Design.



Reduce Your Juice was an Honoree at 2016 Webby Awards. The US-based awards are known within the industry as the internet's highest honour, with Reduce Your Juice acknowledged as an outstanding entry. Reduce Your Juice was selected against 13,000 entries from 65 countries.

Conferences and events

RYJ has been presented at the following conferences and events:

- ISPIM Brisbane December 2015
- iSMA USA September 2015
- NILS conference Brisbane September 2015
- PwC Digital Economy August 2015.

DISCUSSION

Reducing the juice

RYJ's creative, innovative approach to energy efficiency achieved stronger than anticipated results and benefits for participants. In addition to bottom line electricity bill savings for participants, the program provided an array of benefits for participants and proved the legitimacy of using an evidence-based approach.

The new and innovative digital approach involved an element of risk, however the acknowledgement of conflicting unknown factors from the outset and the development of an agile mindset helped allay these fears and produce a meaningful outcome for RYJ participants.

As the program was developed and implemented many barriers and commonly held views and opinions arose that had the potential to negatively impact the program outcomes. The results of the RYJ program are discussed in detail in the following section and various myths are debunked surrounding the RYJ participants, their engagement with the digital program, and the measurement and evaluation of program results. The research will dispel many misconceptions about this demographic in the wider community and reveal an interesting picture of digitally connected low income earners who readily engage with digital and showed an ability to learn and change.

The modern, low income renter

During the early stages of research and development, several myths arose surrounding the target group for the program – young (18-35 year-old) low income renters in greater Brisbane. RYJ uncovered a picture of young low income earners which breaks the stereotypical views of the past. Finding showed RYJ participants were different to the traditional, stereotypical picture of someone who was 'poor', uneducated, and experiencing access barriers. Instead participants had an average middle-class profile of appliances and devices, were highly connected, and demonstrated an ability to learn and change.

Having the goods

Views of the past paint a picture of low income earners who are less likely to own materialistic goods due to lower disposable incomes. Low income earners are often perceived as not purchasing, using and consuming non-essential goods and services. Interestingly in RYJ, participants were shown to have similar if not higher amounts of certain non-essential goods compared to the Brisbane average.

Echoing the results of the initial market research conducted, RYJ participants showed technology device rates on par with Brisbane averages and in some cases higher than average, dispelling the perception that being in a lower income bracket means you are less likely to own entertainment devices and other appliances. This includes high cost discretionary appliances such as gaming consoles, laptops and tablets, showing the importance of these entertainment items to this group. These energy intensive devices such as game consoles, computers and TVs often contribute to higher energy bills, with devices often left on continuously or in 'screen saver' or standby modes.

The market research also indicated the importance of entertainment and social connections (largely through digital media channels) for the target group which was echoed in the program findings. The findings of RYJ were consistent with the market research findings, revealing a different picture of this low income group who despite not having high discretionary income, still have all the same goods as an average household.

While the target group's appliance profile was similar to Brisbane averages, they had higher incidence of electric cooking and water heating than average, which would further increase the cost impact of electricity for this group. This is reflected in a higher than average bill size for participants, who

showed significantly higher energy bills than the control group. The ongoing energy cost impact of appliances and devices is often not considered when purchasing these goods.

Participants with large electricity bills were actively sought to participate in the program through the recruitment marketing, as there was a higher likelihood of the program providing a meaningful cost benefit for these participants. The recruitment approach was successful in that RYJ participant's recruited showed much larger bills than the control group's bills which were 16.3% smaller. This proved to be a successful strategy, with RYJ reducing the proportion of income participants spent on electricity. Average bill size dropped by 10.95% for participants, and electricity as a proportion of income for an average participant dropped from between 6.4% and 9.6% before the intervention to between 5.7% and 8.5% after the intervention, showing a cost of living improvement for participants.

One possible explanation as to why low income earners have such high ownership of these goods in comparison to their disposable income is their aspirations to be seen or perceived as belonging to a higher socioeconomic group. This is often coined aspirational consumption or conspicuous consumption (O'cass & McEwen, 2004). Past research on low income earners has shown their willingness to go into debt to buy materialistic goods as they believe more goods bring admiration, happiness and pleasure (Ponchio & Aranha, 2008). In the context of RYJ, it appears low income earners use the ownership of technological goods to be seen and perceived as belonging to the average middle class population. The rapid price reduction of consumer entertainment goods and availability of financing options such as Rent-Try-Buy and no upfront contracts is likely to have contributed to the increased ownership. Therefore, in contrary to previously held views of low income earners, they can and may own a large amount of goods which are often believed to be only attainable for higher income groups.

Highly digitally connected

Research from the program showed the marked impact that technology is having on the younger generations of today, despite lower levels of income. The impact of technology is changing not only the way younger low income earners consume energy but also the way they save energy through programs like RYJ.

Participants had high levels of communication devices, especially smartphones, which provide the group access to the internet. Smartphones, tablets and computers provide access to a range of services, entertainment and resources through the internet, acting as an equaliser and connector for the target group. This technology provides visible lifestyle indicators which help the group view themselves as part of the average middle class, breaking down access barriers encountered by past generations of low income earners.

RYJ showed that digital is the new norm for this target group, demonstrated by their level of appliance and device ownership as well as their propensity to connect and engage online. This is further shown by the importance of the internet, with 83.3% of the target group considering the internet as a necessity. Participant's familiarity with digital devices allowed them to readily engage with all aspects of the digital intervention, naturally interfacing with the various digital elements including app games, email, SMS and social media with minimal problems encountered. This digital affinity is likely to have added to participant's energy hardship though, with the number of appliances and devices increasing their energy consumption. Unsurprisingly, the habit of switching off appliances to avoid standby power had the largest significant improvement in behaviour change for the group, showing 64.21% improvement after the program. This is illustrative of an 'always on' generation who live amongst an increasing number of devices with little thought given to the cost of maintaining a digital lifestyle.

Fast learners

Barriers such as low literacy levels that were raised early on in program development were dispelled during the program, with 30.3% of participants having completed High School Year 12 education and

40.5% undertaking higher education including university and TAFE. Literacy concerns were allayed as participants demonstrated their capability to absorb and learn new information correctly. The simple and visual approach taken by the program is likely to have assisted learning, along with the fun nature of the program which was designed to be intrinsically motivating for participants. Delivering a programmatic approach gave participants the opportunity to continuously learn small snippets of information to then apply and change their behaviour through fun, easy, practical ideas such as Powerhacks and Energy Quests.

Although levels of energy related knowledge significantly improved following the program, participants showed relatively high levels of energy knowledge to start with prior to the program, indicating that knowledge and behaviour are not causally related.

Helping people change

Segmentation a key

As part of its customer-centred approach, RYJ put considerable effort into segmenting the market and targeting the intervention to work best for those that could benefit most from saving electricity. By understanding the target group and finding the segments most interested and likely to change through a segmentation strategy, RYJ was able to recruit 'ideal' participants to take part and ensured efforts were focused on the best prospects. In addition to finding the right participants, RYJ employed CBSM techniques to find the right behaviours to base the intervention on, ensuring the program would be easy and impactful for participants.

The initial RYJ target group was defined during the funding stage based on demographics (age, income, geographic location, living status), however the use of segmentation to identify psychographic commonalities and CBSM techniques to focus the program by behavioural factors provided more meaningful descriptors than demographics. This is especially important given the impact of lifestyle and behavioural factors on energy consumption. With energy consumption defined by more than demographic factors, lifestyle differentiators such as families with children, or those who spend more time at home due to unemployment and underemployment may offer opportunities for targeted interventions in the future.

As part of the segmentation approach, RYJ did not target participants who may be in a state of crisis as they would likely have more pressing life issues to prioritise over energy efficiency. RYJ looked to find a set of low income earners experiencing proportionately large cost of living pressures due to the combined impact of their low income and large electricity bills, who were in more stable conditions seeking to improve their circumstances. Using a motivational hierarchy such as Maslow's hierarchy of needs, it can be said that the program avoided people at either end of the spectrum of needs, avoiding those trying to meet the most basic physiological needs as well as self-actualisers who sit at the other end of the spectrum and are unlikely to benefit from the aims of the program. The program appealed to the mid-range of people actively looking to improve their home and financial circumstances and fulfil psychological needs such as self-confidence and being part of a community. When reviewing this targeted strategy, concern was raised from community agencies who were sensitive to not excluding participants who may already be marginalised. This highlighted a difference in philosophical approach between marketing and community service techniques. RYJ's approach attempted to focus efforts where the most impact could be gained, rather than exclude people from the process.

A non-traditional approach

Following market research to create customer insights and desktop research into the successes of a variety of traditional behaviour change programs which had varying outcomes, it became apparent that traditional communications campaigns and education are not the best way to change behaviour.

RYJ built a behaviour change approach using the application and adaptation of relevant theories to create the underlying working basis for the program to follow to achieve real change for participants. The customer-centric model is designed to create an intrinsically motivating experience for the program's participants to help them change their behaviour.

Traditional failings

Traditionally campaigns that focus on behaviour change use one-way communication that place emphasis on guilt, fear, or shame to drive action. These approach is largely ineffective as negative appeals are more likely to invoke self-protection and inaction rather than an active response such as volunteering to comply (Brennan and Binney 2010). Other studies find that the degree of guilt evoked by an advertisement campaign can lead to anger and negative attitudes towards sponsors (Coulter and Pinto, 1995 and Cotte et al., 2005). RYJ takes a more positive approach to change through the use of fun to drive intrinsic motivation, an increasingly preferred approach with social marketing practitioners. RYJ provides evidence that empowering people to learn for themselves is a successful way of developing a behaviour change intervention for a low involvement situation. RYJ's approach successfully employed evidence and theory to create a new, practical recipe to tackle the situation at hand.

The majority of traditional behaviour change campaigns are focused on social advertising, information heavy websites and brochures. The RYJ approach provides stark contrast to traditional engagement, helping participants to learn for themselves rather than educating them as such. While social communications campaigns often involve one-way, authoritative style communication, RYJ evolves this communication to become more interactive, using two-way channels such as Facebook and games to provide interactive feedback through simulated behaviours.

Evidence based design principles

The program design principles that underpinned RYJ were developed with the customer in mind and were based on research of the successes and shortcomings a range of other programs. Setting out these guiding principles for all aspects of the program was essential in building multiple aspects of the experience together as a seamless experience for participants. The design principles were an effective tool that was used to help brief agencies in the development of the creative execution for the program, helping them gain a good understanding of the desired solution. The design principles were measured during the post program survey to assess their correlation to the actual program experience. Results showed the program was successful in achieving all design elements, with participants rating all elements over 4.7 out of a possible score of 5. This includes the program being seen as a positive experience, being helpful, informative, responsive, innovative, fun and entertaining, relevant and easy. Performing thorough research prior to development proved to be an effective tactic, with the market research customer insights and behaviour change research largely proven by the program results.

Stealthy learning

The behaviour change model developed for the program was created via collaboration between CitySmart's marketing manager and QUT's research and evaluation team's social marketing Professor, bringing together multi-disciplinary experts to create a unique, fit-for-purpose solution. In contrast with traditional one-way communication campaigns, the RYJ's customer-centric approach engages participants in a more authentic, collaborative style for fun learning using mechanisms such as peer-to-peer engagement to avoid the one-way authoritarian style preaching to people what they should be doing. Using an experiential learning model views the learning process as continuous rather than shifting people through discrete stages of contemplation and change, with the digital approach complementing this iterative change through short bursts of frequent communication.

Using behavioural theory and CBSM techniques to select the right behaviours, the RYJ behaviour change model was used to engage participants primarily in a set of core energy behaviours that were prevalent across the group, would be relatively easy to perform and have a noticeable impact on the cost of participant's energy bills. The effectiveness of the RYJ behavioural approach was demonstrated by the significant change in all habits targeted by the intervention after the program, with an average 22.5% change across the habits. This is high in comparison to industry benchmarks for behaviour change programs, which in the health industry show on average of 5% change in behaviour (Snyder, 2014).

The RYJ program helped participants change the way they think towards energy, both decreasing negative attitudes and showing a significant improvement in attitudes towards the key behaviours targeted. In addition to attitude and habit change and improvement in multiple psychological factors, the program's effectiveness was also measured in the reduction in participant's electricity bills, which was a meaningful indicator for participants and provides proof of the effectiveness of the approach. RYJ participants reported 10.95% decrease in electricity bill size after the intervention, while a comparative study of gamified energy efficiency programs indicated savings of between 3-6% among a sizable number of participants, and savings of more than 10% in narrowly targeted interventions. (Grossberg et al, 2015).

Beyond an information deficit

Behaviour change campaigns are often based on the assumption that there is an information deficit and that filling a knowledge gap will make people to act (Think-Feel-Learn). However, RYJ showed that most participants already had a high knowledge of the correct behaviours and yet still had high electricity bills. 89.5% of participants correctly answered questions around the core energy behaviours targeted by the program before the program intervention, showing a high existing level of knowledge already present in the target group. While the level of knowledge did significantly increase after the intervention to over 94%, in comparison to no significant change in the control group, the high starting point indicates that knowledge may not be a good predictor of behaviour in this area. People already 'know' what they should be doing but in many cases need to be reminded or re-engaged or motivated to act. Factors of control, motivation, and self-efficacy were evidently more important in building confidence and empowering participants to alter their habits. There is often a focus on creating awareness and educating participants, however in this case it can be seen that knowledge does not equate to behaviour change.

While energy knowledge was high for participants, there was a knowledge gap around what constitutes a normal sized electricity bill. This market research finding was reflected during the program as participant's showed high interest with program content around 'what is a normal bill anyway?' Digital analytics showed people replayed the section of the video that outlined average sized bills for different sized households. While this specific lack of knowledge was addressed by program content, it was compounded by a participant's perceived lack of control and confidence so it was important to help participants overcome feelings of acceptance or disempowerment to effectively tackle their energy use.

Continuous learning

RYJ trialled different levels of communication to evaluate any impact between the treatment groups. Interestingly, the different communications treatment groups showed no significant impact on key indicators such as habit and attitude change, program completion rate or bill savings. Perhaps the level of communication between the groups was not marked enough to effect noticeable change, however given the variance in engagement scores of participants receiving different levels of communication, it can be speculated that participants self-served from the available information to take what they need for their own purposes.

The number of touchpoints participants experienced in the program is also well in excess of traditional engagement program techniques such as interviews or in-home consultations. The overall difference between the communications treatment groups was only 9 communications, which is relatively minor in perspective to the 339 average program touchpoints participants experienced as part of the RYJ intervention. These small bite-sized digital interactions also had the advantage over traditional communication techniques of easily fitting in with participants' busy digital lifestyle, allowing participants to consume small snippets of information in easy to digest portions. This helped participants continuously build and improve their learning over time. With many digital users feeling distracted and overwhelmed by the amount of information online (Ernst & Young, 2016), this approach has further importance in cutting through to end-users.

Measurable results

RYJ's digital approach provided the opportunity to build in multiple digital measures to assess its effectiveness in engaging participants to change. While traditional approaches often focus on limited measures such as awareness, RYJ used built in digital analytics in combination with surveys to effectively track response. The use of digital channels provided the ability to rigorously measure the effectiveness and efficiency of different channels without interfering with the customer journey, something which is not easily implemented in traditional communication campaigns. Using a range of digital media allowed for comprehensive analytics to be built into the program intervention to assess the levels of engagement and change in different areas. By building in analytics to multiple parts of the intervention, as well as measuring the baseline to post program change, the evidence-based approach could be proven to be effective using multiple measures of success. The mostly real-time feedback also provides the flexibility to use agile marketing techniques to test, assess and improve different elements to respond to the changing needs of participants and market conditions rather being set in a structured process of planning and executing a campaign and assessing the results afterwards.

People don't have to care to change

High involvement, cognitive approaches to behaviour change rely on providing people information to think about in the hope that stimulating these thought processes will affect their behaviour. Having researched the way the target group interact with energy as low involvement, RYJ employed a contrasting behavioural approach (Do-Feel-Learn learning hierarchy) to affect change for this low involvement scenario.

Care factor: low

Research showed that people were not highly motivated to change – they did not want to put a large amount of effort or thought into changing their energy behaviour, despite wanting to save money on their energy bills. RYJ's approach recognises the low role of energy in the target group's life and doesn't set out to raise its importance for the target group or make them feel overly concerned or interested in energy.

The program addresses the low care factor by using fun and entertainment to engage participants in a targeted way, focusing on high impact areas that will have a bottom line result for participants and making the behaviours more appealing to engage in. RYJ uses the things participants do care about (social connection and entertainment) to engage them in key behaviours in a relevant way. This is contrary to other social marketing approaches which often use fear, guilt or shame with minimal impact, often having the opposite effect of turning people off altogether.

Making it fun works

Fun was key to the RYJ program intervention. Making the program content fun doesn't pretend to try and elevate the importance of energy saving for participants. Taking a light-hearted or irreverent

approach to the subject helped engage participants in an otherwise boring topic, which previously only featured on their agenda at the time of the bill arriving and needing to be paid. By engaging participants in a fun manner they were able to realise the benefits, ease and value of the program for themselves, rather than being preached to or educated as such.

Fun is instrumental for participants to be intrinsically motivated to learn and change. While gamification techniques were used to engrain the fun into the program, it should be noted that gamification was always used to serve a programmatic purpose such as facilitating feedback, reward or progression. For example, gamified rewards (both tangible and intangible) were employed to help shape participant's behaviours by rewarding positive actions.

RYJ was successful in helping participants learn to save energy, with 94% saying they enjoyed learning about electricity consumption after the program. Many participants voiced this in the post program feedback, saying RYJ was "helpful and a fun way to learn". While RYJ did not set out to make the target group care about energy savings, the group showed high levels of emotional and cognitive involvement with saving electricity after the program.

A practical approach

Even though RYJ didn't set out to highly involve participants in energy reduction, it did provide the opportunity for participants to tackle their high electricity bills, with the opportunity construct showing a significant increase compared to the control group. RYJ participants improved their perception of having more opportunity to save electricity after the intervention.

The RYJ behaviour change model set out to ensure participants had the opportunity to trial the targeted behaviours at home through elements such as the Powerhacks and Energy Quests. This was an important aspect in the learning approach which helped transfer the online learning into a practical, real-world scenario. Involvement with the Powerhacks was measured after the intervention and shown to be high, especially in being useful and valuable to participants. Experimentation with new behaviours is likely to help participants improve their self-efficacy as they put their learning into action in an easy way that shows results, with RYJ participants showing a significant improvement in self-efficacy in comparison to the control group.

Participants also felt more in control of their bills (over energy companies) after the program intervention, and showed much higher concern for saving energy than the control group. Participants showed a marked improvement in behavioural intentions in comparison to the control group, demonstrating a willingness to put their learning into action after the program. RYJ participants also demonstrated a positive movement through the stages of change, indicating an improvement in their readiness to take action following the program. Market research had shown that the target group was not highly involved with saving electricity, although after the intervention participants were shown to be highly involved with saving energy. It is likely that improved confidence and control helped participants become more involved in saving energy. This may be attributed to the fun approach which is directed to engaging participants personally, focusing on them rather than trying to make them care, which is more of an external feeling.

Motivation is about more than tangible rewards

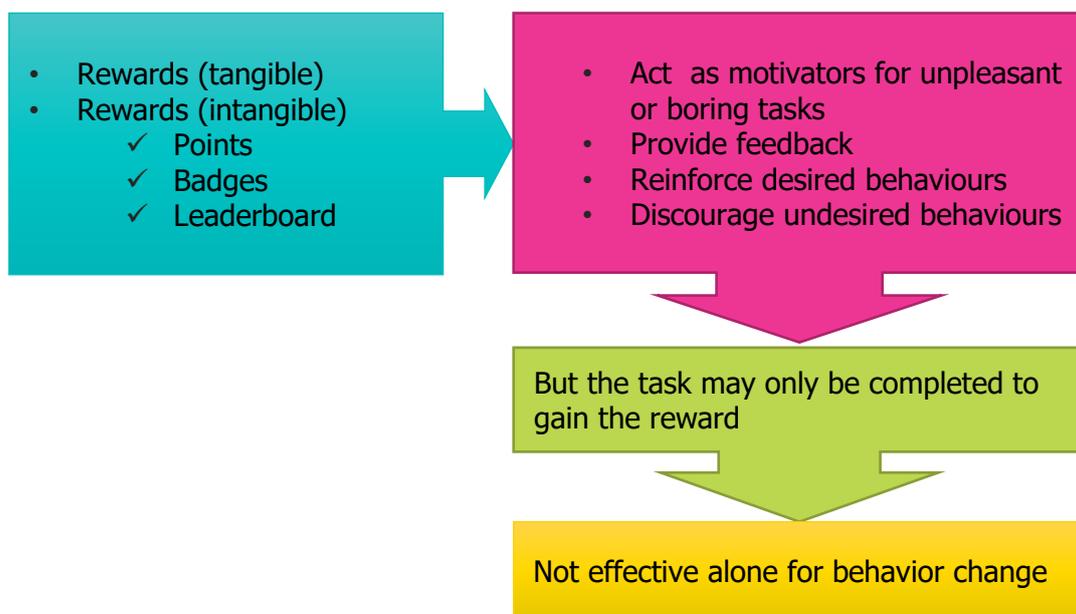
The engagement of participants during RYJ was higher than expected, with 60% of all registrants completing the whole six week program. Many of the anticipated online barriers to participant engagement proved not to be issues for this digitally inclined target group who clocked up more than 5 times the minimum amount of game play time required; completed surveys online; actively participated on social media; and engaged with email communications at rates well above industry standards.

What role do tangible rewards play and why?

External rewards were a useful way to entice participants to engage in a task for which there was no internal motivation. The market research undertaken clearly told us that the target group was not highly involved with their energy consumption that is they accepted high energy bills as a way of life and expressed low sense of control around being able to reduce their bills. The role of external or tangible rewards was to create initial interest in energy consumption through this incentive to overcome perceptions of control and start the process of attitudinal change.

A literature review undertaken during program design also found evidence that low income households traditionally have older, more energy intensive white goods. This provided the logical solution to both challenges – providing initial incentives for change and providing set-and-forget energy efficiency that is portable for tenants.

Conversely, Kohn (1999) presents countless examples of how incentives actually reduce performance, once the incentive has been removed or is no longer available to incentivize positive behaviours. There is a sufficient body of evidence suggesting that providing rewards by themselves do not deliver long term behaviour change. Reduce Your Juice demonstrates the effective use of both intrinsic and extrinsic motivators to engage and inspire the group, through a digital engagement approach aimed at changing a number of key energy behaviours.



The program's final reward products served as sizable incentives for participants to complete the program, an interesting observation of the qualitative data collected through Social media and discussion with participants during installation was that many participants did not realise they would in fact earn the final reward by completing the program. There was a perception amongst these participants that the rewards were a 'prize pool' that they had the 'chance to win' by completing the program, with multiple participants voicing their surprise when they were told they earned their final reward product. This is likely due to the graphical representation of the rewards in program materials. As participants could not be guaranteed to receive a certain type of reward, a selection of different rewards was shown together in a graphic visually akin to a prize pool. This demonstrates the strength of a visual approach in communicating with the target group and also provides evidence that participants would be incentivised by the chance to win prizes rather than earning them as such.

Similar feedback was received during recruitment events too, as potential participants commented that the program sounded 'too good to be true', showing disbelief that they would be rewarded with products for completing the program. This was also the case for the minor rewards packs that participants received for completing each game - the rewards packs were not specifically advertised to participants in advance so were not highly anticipated or expected. This created an element of excitement which delighted and surprised participants, piquing their interest and motivating further action once in the program. Many participants voiced their gratitude and surprise for these rewards through social media or via email messages to customer support.

The program intervention tested different types of reward products (energy efficient and lifestyle related) with different treatment groups. Interestingly the different types of rewards products did not have any discernible impact on participant's engagement, motivation or energy reduction, with no significant differences found between the treatment groups. In general participants were happy with the minor rewards packs, with no negative feedback received around any of these rewards apart from a small number of products being exchanged due to malfunctions. The fulfilment process for the final rewards products generated a high amount of enquiries to customer support with participants finalising product selection and delivery instructions.

Our recommendation is that if future program funding allowed for the inclusion of rewards products, the ideal scenario would be to offer participants a choice of high value products that provide a level of set-and-forget energy efficiency. The use of tangible rewards such as energy efficient products provides immediate value to participants over cash based rewards such as gift cards. Where funding doesn't allow for the provision of this level of rewards, the chance to win a sizable reward would likely motivate participants sufficiently.  

Intangible rewards

While the rewards products were expected to act as incentives for participants to complete the various actions of the program, the intangible rewards component of the program proved to be unexpectedly important to participants. The program design incorporated extrinsic motivators (rewards products) in careful combination with intrinsic motivators to ensure that participant's motivation for change was not purely linked to the rewards products and would be more likely to be sustained in the longer term. An element of fun was used throughout the program, designed to intrinsically motivate participants to engage and change for their own reasons. The combination of extrinsic rewards and intrinsic motivators provided participants with tangible reward for their efforts as well as feelings of mastery and control, self-efficacy and achievement.

Game play based rewards such as points, badges and achievement levels (Bronze, Silver, Gold) were evidently important to participants with a large number of comments received about them on social media and through customer support. This became clear when the first Halfway Hero badges failed to unlock on the correct day of the program. The technical glitch sparked multiple comments and enquiries from participants who wanted to ensure could collect all the badges, despite the fact the badges were not linked to any form of extrinsic reward. The game badges provided an important element of feedback for participants and were a popular element in the program, giving participants feedback and recognition for a job well done. This feedback was vital in building intrinsic motivation for participants to stay engaged and progress through the program as there was a sense of anticipation, motivation and reward for achievement. Players unlocked 86% of all potential badges in the program, with the majority of players achieving Gold trophy status in the app. This showed the importance of achieving accomplishments for participants rather than merely receiving products.

A progressive journey

In addition to the smaller engagement loops in game play, larger progression loops were fundamental in moving participants through the program towards their final goal. The structure of the program was important in helping participants stay motivated to progress towards the final goal, with the

program broken down into smaller, achievable stages that participants could complete and be rewarded for their accomplishments. With each stage rewarded by tangible reward products as well as intangible rewards such as the unlocking of games and achievement of status levels, there were a range of reasons and types of motivations for participants to take part and progress through the program in addition to the learning component.

Community

Community was another important element which helped to provide participants with feedback and support as they progressed through the program. Participants received positive messages of congratulations and support through Facebook which were designed to make them feel good about their accomplishments to motivate further action. Participants readily shared their game related achievements, taking screen shots of their high scores and posting them on the RYJ Facebook community page and asking other participants about their scores, prompting large discussions.

Value

In addition to earning rewards, RYJ provided value for participants through learning which focused on real life outcomes such as cost savings and lifestyle improvements, affording participants meaningful benefits beyond material items. For example, the Powerhacks gave participants smarter ways of implementing their learning and often included extra benefits not directly related to saving energy to improve the overall value. This includes health benefits in the form of mental health improvements from increased sense of control and confidence, improved diet as a result of fresh fruit and vegetables, and improved thermal comfort. This is discussed in more detail in the cost benefit analysis below.

While the final rewards products provided participants with a high monetary value item, they also provided broader benefits with participants commenting about the improvement in their lifestyle, especially due to the fridge and barbecue. Things like being able to have family over for a barbecue or being able to buy more food and store food properly in the fridge was collected through qualitative data sources such as social media, surveys and feedback received once final rewards were dispatched.

To further enhance the finding relating to the importance of tangible reward products for participants to engage and change their behaviour, supplementary research is being conducted with another group of participants who will only play the games but will not receive any tangible reward products or program communications. The group will undertake the pre-program and post program surveys, and game analytics will be gathered to assess the impact of the game component of the intervention without the rewards and communications components in the hope of isolating results.

Change goes beyond the individual

Behaviour change approaches often target individuals for change, frequently undervaluing the role of the household and broader community in changing behaviour. As RYJ included the provision of reward products it was necessary to recruit individuals to register for the intervention. In addition to distributing rewards, the difficulty in verifying a whole household as low income earners and in evaluating beyond an individual bill holder meant the program had to recruit and engage individual participants. However, as the program unfolded the role of the household and community in creating change became more apparent.

Shared experience

Electricity bills are influenced at a household level so it is hard to ignore the impact other members of the household have on electricity bills. The use of games as part of the intervention was an effective mechanism for bringing the household together through a shared experience. Research undertaken by QUT Honours Student Alpha Yam regarding the use of the RYJ games (see Appendix) suggests the

RYJ games influenced household decision making by creating a shared experience which created new household norms for making decisions by stimulating conversation and discussion around energy. The importance of energy efficiency values among household members was increased which motivated and persuaded members to monitor their energy use, encouraging households to work as a team to reduce energy use. The energy roles that people took on in the household were also influenced by the RYJ games, with people more likely to share the role of 'Energy Champion' (an active role initiating, maintaining and enforcing behaviours) within the household after playing the games.

This research showed the game was more effective for households that have a democratic power structure and less so for households that have less shared values about energy use, which was echoed by program results for change in electricity bill size, with people living with their parents, alone, or with a partner and children showing the largest improvements in electricity bill size. This shows the dynamics of the household to be an important factor in saving energy. It can be argued that for uninteresting behaviours such as turning off the lights (Sweeney et al, 2014) the main reason people perform these actions is due to the behaviours being prompted, modelled or valued by significant others to whom they feel or want to feel attached or related (Ryan & Deci, 2000). This shows the importance of the rest of the household in providing feedback to each other, as well as how people may be more receptive to changing these behaviours if they feel connected to those changing their behaviour.

Anecdotal feedback of the household sharing in the program reward products was received on social media, with participants commenting about their excitement in receiving and using the rewards in their household. In this way the rewards products provided a visible reminder of energy in the home and created a shared benefit for the household. For future developments of the program, the synergy of the household can be better harnessed by building in more explicit elements to involve the rest of the household, especially children where they are present. A household incentive scheme can be structured so that participants can get the rest of their household on board to save electricity, creating their own shared goal for cost savings and then sharing in the cost saving reward by using the money for an alternate purpose.

Community

The RYJ Facebook community helped demonstrate that change was larger than the individual, highlighting the importance of creating a shared experience for participants. The community helped make energy efficiency more tangible and visible for participants as they could discuss their problems and experiences in the program and around energy with similar people going through a common experience. The shared experience connected participants to the program and each other, creating community bonds and providing a more authentic opportunity for learning by overcoming common barriers to energy efficiency. By seeing other participants engage with the program, an element of openness and trust was created for the program through the community. Instead of pushing content to followers, ideas were often seeded on social media for participants to engage with and discuss amongst themselves, adding to the believability of content.

The sense of community which unfolded is demonstrated in the way participants picked up on the program communication style, sharing the common program language. For example, participants re-used descriptors such 'juice-reducers' and ran with themes used in the Energy Quests such as breaking up with their appliances, in one case referring to their dryer as the love of their life. Appliances were personified and brought to life by participants in line with the theme of the program: "I broke up with my air-conditioner. Cause over a 3 month period she stole over \$500 from me." The shared program themes and language helped participants feel part of the community and become more involved in the subject matter to make sense of the content in terms of their own life. With energy generally not high on the target group's agenda, having a Facebook community worked well as gave the opportunity for interactive communication within a relevant environment that was already engrained in participants' lifestyle and used to stay connected.

While participation was voluntary, participants readily engaged with the program on Facebook. Customer support featured as the most prominent theme of comments, demonstrating participants' natural disposition for engaging in social media to answer questions and gain support.

Collaboration was an important element of the community, with participants often helping and supporting each other, and responding to others' queries about the program. One participant even responding to another participant's query by cutting and pasting a portion of the FAQ's from the website as a response. Participants engaged with each other, happy to share their opinions and stories with each other and often discussing queries about the games and sharing their game experiences with their fellow participants. Friendly competition was inspired by posts showing a leaderboard of high scores, with participants asking each other about their game scores and sharing differences and struggles in skill levels made apparent by the shared scores. While this extended the competition of the games beyond the app, it largely inspired a collective sense of purpose for participants.

Posts where participants commented often stimulated a snowball of responses from other participants, with people seemingly more likely to comment once someone else had started the conversation. Facebook posts that received the highest engagement often focused around achieving different stages of the program or games and earning rewards, as well as around Energy Quest competitions, showing the popularity of creating a shared experience amongst participants. The Facebook community was representative of the program's high participation rate of females, who seemed more likely to participate, often assuming the Energy Champion role online.

Social norms

The impact of social norms was measured over the program intervention including subjective norms (the amount of pressure people perceive they are under from significant others to perform or not to perform a behaviour) and moral norms (an individual's internalised moral rules), to show the perception that engaging in a behaviour would cause self-approval and ascription of self-responsibility to act. RYJ participants showed a significant increase in social norms after the program, while the control group did not change significantly, indicating the role of the program in creating an increased perception of social pressure for energy efficiency.

The community helped participants see what other people are doing in the program and feel more confident about their own actions as they can see change happening more broadly around them in the community. As with visibility at the household level, seeing positive change more broadly in the community helped participants feel more confident in creating change at home.

Digital: the new normal

Digital engagement

Taking part in a digital program for energy efficiency is likely to be uncharted waters for most people, however RYJ participants engaged naturally with the program online. Despite the program's unique combination of games, rewards, community and communications, engagement was high with 78% of all participants who completed the initial survey going on to complete the entire program.

With more social marketing efforts now trialling new media and digital tools, the RYJ trial opens the door to more development in this area, including for low income earners. While the program breaks new ground in its combination of digital elements for behaviour change, participant's engagement with the program appeared to be second nature. With participant's spending so much time online, and the nature of energy efficiency being quite low involvement, it makes sense to incorporate the digital intervention into channels where participants spend their time as they will not go out of their way to find the program. Developing the program to easily fit in with their lifestyle and be consumed in many small interactions was an effective way of reaching participants and helping them change.

RYJ helps prove the logical link between using digital channels to change low involvement behaviour such as energy efficiency.

During the development stages of the project, stakeholders expressed reservations about the effectiveness of the digital approach due to its perceived impersonal and removed nature. This proved unfounded, with the digital program intervention shown to be highly effective in changing energy efficiency attitudes, habits and intentions. The strong level of behaviour change reported in the program of 22.5% across the targeted habits adds substantial weight to the effectiveness of a digital intervention for behaviour change.

This is not to say that the mere use of digital channels will always be effective in changing behaviours. The RYJ program was created using appropriate theoretical frameworks and used an evidence-based approach to creating change. The program's digital execution was highly relevant to the target group of participants and the nature of the behaviours being targeted. The combination of digital channels provided participants with an easy way to engage with the program during their normal everyday activities.

RYJ takes several traditional strategies and best practice approaches and executes them through digital channels. For example, breaking down the engagement into small, achievable steps and rewarding participants both immediately and progressively over time was a strategy used to help participants effectively progress through the program over time. Customer journey mapping techniques were used to map out key stages of the program in detail, highlighting potential barriers and pain points for participants as well as points for feedback, recognition and reward of achievement.

Participant's natural preference for digital channels was demonstrated in their use of the customer support function, with 96.5% of enquiries received via email and social media, making the need for a phone line almost extinct. Administering customer support via digital channels improved cost and time efficiencies in delivering this service. This channel provided another source of participant feedback which was monitored and evaluated to provide important program improvements, especially around communications messaging to help ensure participants had a clear understanding of the program. The overwhelming majority of feedback received through this channel was positive, with participants showing appreciative sentiment about the program. Participants also interacted with each other to answer queries about the program, showing the evolution of the customer support function through a more social channel.

RYJ's integrated digital channels provided a level of flexibility for the program intervention, supporting the agile marketing approach by providing a rich source of feedback and analytics which allowed for continual analysis and iterative improvements to be implemented to enhance the customer experience. Participant's interactions with different elements such as social media, game analytics, communications and customer support were closely monitored by the CitySmart team with a mindset of continuous improvement to the customer experience. The RYJ Facebook community was another key source of qualitative feedback about the program, with over 16,000 engaged users (likes, comments and shares) providing real-time feedback about the program experience. The Facebook community was used to trial different types of content with participants to understand what worked best for this group. For example, as content that tied into current events and popular sentiment proved popular, likely due to elements of borrowed interest and shared experience, more posts were developed in this style to help make the content more appealing.

Although engagement with program elements was relatively high across most participants, when breaking down engagement into high, medium and low groups it appears that higher levels of engagement does not translate to more change in variables such as attitudes, bill control and size, and self-efficacy. This can be attributed to the nature of the RYJ program, in that engagement took place as an integrated experience across many different channels, with a high number of touchpoints

experienced as short bursts of engagement over time. This allows participants to pick and choose how they will engage with the program as they have time or find interest in different components.

Retaining participants online

Overall retention of participants during the program was considered high, although it is difficult to find directly comparable programs to benchmark against. RYJ's largest drop off of participants occurred during the initial stage of the program, with over 20% of registered participants failing to complete the first step (the pre-program survey). While this figure is significant, it should be noted that the pre-program baseline survey was considered a substantial barrier to participation. The team managed this barrier by developing the survey using an interactive, mobile-first approach which kept the experience as light and simple as possible. This approach proved effective with the average participant spending 64 minutes completing the pre and post program surveys and around 70% of participants completing the surveys using mobile devices.

Gaining feedback from participants who dropped off at this point proved difficult with few completing the feedback survey sent to them. Anecdotally there seemed to be some confusion over exactly what the program entailed and who could take part during the recruitment stage. This drop off rate was fairly similar between the waves, improving only slightly in the second wave. Acknowledging and understanding this limitation allows for additional participants to be recruited upfront to account for attrition in future programs.

During the communication of the program to participants prior to this initial stage, there was a large amount of information to convey regarding participation restrictions (age, income, location, renting), timings for the program, limitations on available places, detail of what the program involved, and the potential different rewards on offer. This added to the complexity of communications during recruitment, a problem that would be overcome in future iterations of the program where stringent research requirements would not be present and communications could be simplified. This would create a much smoother experience for recruiting participants which may help reduce the initial rate of attrition.

As participants engaged with the core elements of the program intervention (playing games, receiving communications and doing activities), the drop off rate was minimal with 8 out of 10 participants who started playing the games completing the full program requirements.

A fun approach to change

The RYJ program sought to create a fun experience for participants where mundane subject matter could be effectively communicated and participants could interactively engage with content to provide intrinsic motivation to improve the likelihood of change. As a core design principle, fun was incorporated across the program, namely through the use of games and gamification. This approach was effective with 95% of participants saying they liked doing the activities and 94.9% liked learning about electricity consumption.

The potential of serious games and gamification is beginning to be explored across a wide range of contexts, including tackling problematic behaviours such as adolescent binge drinking (Rundle-Thiele, et al. 2015), diabetes (Theng, et al. 2015) and energy use (Peham, et al. 2014; Reeves, et al. 2015). RYJ was a unique behaviour change program in that serious games and gamification were integrated throughout the entire program. The program utilised a reward-based gamification system (Nicholson, S. 2015) whereby communication, quests, rewards, achievements and badges were interconnected by game play in the RYJ app with actions taken outside the app in the 'real world' of participant's homes. Utilising both serious games and gamification leverages the advantages they offer, especially their common goal of shaping human behaviour by providing a motivating experience. RYJ has provided interesting insights into the use of serious games and gamification for behaviour change.

Serious Games

The application of games has moved beyond the purposes of entertainment to now being used as a tool for education, training and facilitation of behaviour. Recognising this, RYJ investigated how serious games could be successfully applied to target low income earners to reduce household electricity use. The results for RYJ overwhelmingly support the ability of serious games to help this group become more motivated and take steps towards saving electricity in their homes. These findings add to the growing support for the use of games in achieving outcomes and impacts such as knowledge acquisition, positive affective states and increased motivation (Connolly, et al. 2012).

A unique finding to this program was the potential for a serious game to not only influence individual behaviour but to influence group behaviour. In the RYJ program, the game provided a tool for an individual to engage others towards a common behavioural goal, in this case household electricity saving. A common example of this in RYJ was the use of the games by parents to teach and motivate their children to save electricity. Such findings broaden the potential for serious games to move beyond individual behaviours such as adolescent drinking to tackling more group focused behaviours. Future research would benefit the investigation of how these findings can translate to other behaviours.

Gamification

Gamification is a relatively new term both in practice and for academic study, with discrepancy often occurring between its popular usage and empirical research based evidence to support its effectiveness (Harwood & Garry, 2015). This has led to gamification often being termed a 'buzz word' rather than a valid approach that can be implemented to develop strategies and tactics. Despite this, preliminary investigation into gamification shows individuals can achieve better outcomes and increase levels of motivation in educational settings when gamification is present (Domínguez, et al. 2013). Similar results have been found in RYJ, where the use of a gamification approach has seen higher levels of motivation to save electricity, opportunity to save electricity, ability to save electricity and self-efficacy to save electricity. This adds to the growing evidence and discussion of using gamification to tackle social issues.

Findings from the RYJ program indicate that for mundane and boring behaviours such as saving electricity, gamification is a useful approach as it piques the interest of both the individual and the household. Similar to the serious game findings, it appears the gamification approach unifies a group towards a common goal or challenge, in the case of RYJ, reducing the amount of electricity consumed. An example of this in the RYJ program was where participants shared 4-minute shower songs through an Energy Quest challenge in an attempt to reduce their individual shower times. Gamification appears to provide a common, shared experience and unites participants in a challenge experience to achieve a collective goal. Further, this unified challenge and experience can make performing undesirable behaviours more appealing and rewarding to carry out.

The role of fun as a key component of gamification should not be underestimated, with intrinsic motivation an essential factor in successfully carrying out a gamified approach for behaviour change. Fun infiltrated most elements of the program, designed to involve participants in an intrinsically motivating experience which brought the subject matter to life in a light-hearted yet interactive way. As part of the gamified approach, RYJ used characters to provide a personal, relatable connection for participants to the program, giving them choices and control in the intervention.

Gamification techniques were also used to motivate and progress participants through the program journey. The program used both micro engagement loops for immediate feedback and reward as well as macro progression loops to progress players through the broader customer journey. The gamified approach was successful in changing the perception of variable such as control and comfort for participants, using fun to engage them in an experience to change their mindset rather than preaching one-way authoritarian messages in the hope of change. Gamification allowed for the employment of different social marketing and behaviour change techniques in a fun way that resonated with the target group. Rather than focusing on one particular type of behavioural

technique, a mix of gamified elements helps create a variable experience that is more likely to appeal to a broader set of participants.

While the application of gamification techniques was considered useful for the RYJ intervention, it is important to note that specific gamification strategies were only applied following research undertaken into the issue, the target group, the behaviours being targeted, and the customer journey (motivation and progression) requirements for participants. Gamification tools were then strategically applied to help achieve behaviour change.

Comparing RYJ to marketplace serious games and apps

A game changer

The overall research findings of RYJ provide evidence that serious games and gamification can be useful for behaviour change, offering the potential of a better experience for individuals and groups. The findings of RYJ demonstrate serious games and gamification can positively improve psychological factors such as attitudes, control, knowledge and self-efficacy related to saving electricity as well as the opportunity to perform such behaviours.

The use of games and gamification played different roles in the behaviour change approach for RYJ, with the games providing simulated behavioural experience, feedback, knowledge and reward for participants, while gamified communications and activities gave participants the opportunity to reflect and analyse these behaviours, and then conceptualise them and apply them in their own environment. The gamified use of activities (Energy Quests and Powerhacks) and rewards was an important component of the behaviour change approach, with activities prompting participants to apply and trial the behaviours, while gamified rewards were used to incentivise and reinforce action.

Taking these findings forward, several key areas for future investigation emerge. Firstly, there is a need for more empirical research. Given the infancy of both serious games and gamification, more research is needed to investigate the behaviours and contexts for which these approaches are best suited. Another unknown factor is whether serious games or gamification are applicable or useful for different age cohorts or socio-economic groups. It will also be important for future research to investigate the effectiveness of serious games and gamification over a longer time frame.

Customer value provided by games

In undertaking research to understand the effectiveness of RYJ, CitySmart were able to benchmark it against other similar serious games using the framework of customer value (Mulcahy, 2015). Comparisons of the RYJ game were made with other serious games in the marketplace, namely:

- The My Quit Buddy m-game focuses on encouraging smoking cessation by providing users with distracting tasks, as well as tracking and providing feedback on their smoking behaviour.
- Dumb Ways to Die is an m-game which has 18 mini-games, with a small selection focused on train safety scenarios.
- Quit for You Quit for Two focuses on encouraging pregnant (or planning to be) women to quit smoking by providing games and activities to distract them from their cigarette cravings.
- CityGT is a driving m-game which focuses on demonstrating the dangers of using a mobile phone whilst driving.

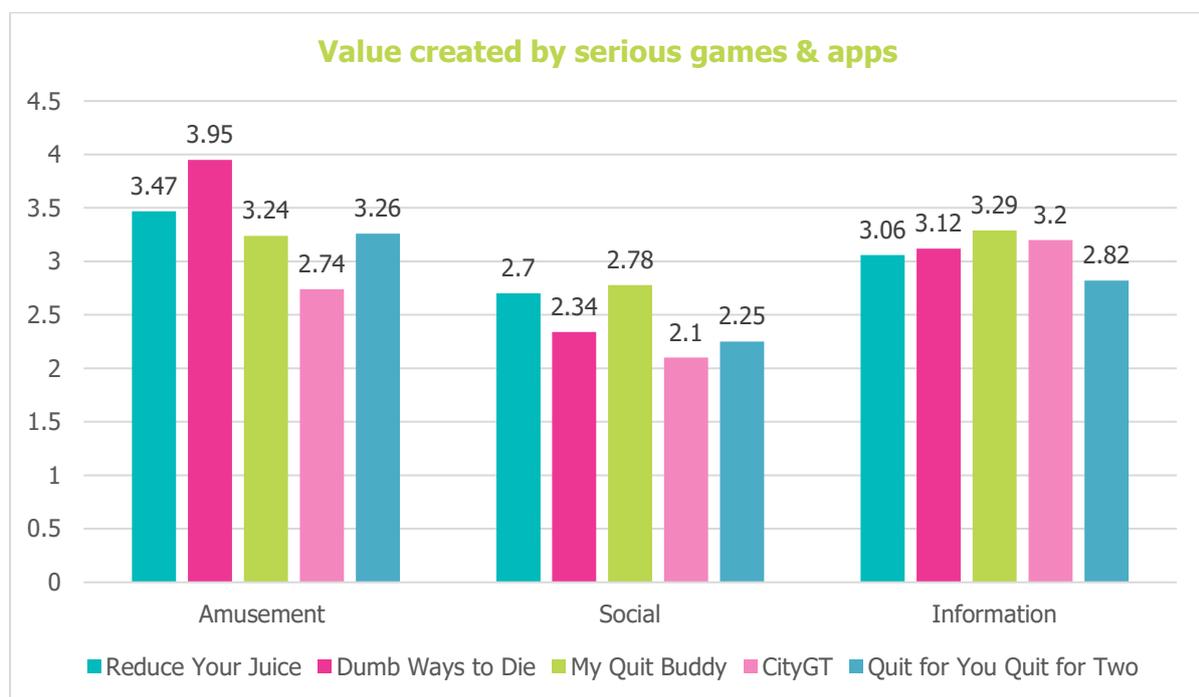
The components of customer value used to evaluate the games were amusement value (the amount of fun in using the game), social value (the connection the game provides with others) and information value (the amount of knowledge the game provides the player about the targeted behaviour of the game).

The RYJ games fair well compared to other games in the marketplace, with the second highest cumulative score for customer value (9.24) just .23 below the highest Dumb Ways to Die (9.41). Overall, the RYJ game by itself performed well in regards to customer value with high levels of

Amusement (3.47 out of 5) and Information value (3.07 out of 5) and medium levels of Social value (2.7 out of 5). These results provide important insights to potential improvements for the RYJ game, in particular social value. Future improvements of the RYJ game could focus upon designing social aspects within the game in an attempt to improve the levels of social value generated.

Game	Amusement*	Social*	Information*	Cumulative score	Placing
Reduce Your Juice	3.47	2.7	3.07	9.24	2 nd
Dumb Ways to Die	3.95	2.34	3.12	9.41	1 st
My Quit Buddy	3.24	2.78	3.29	9.31	3 rd
CityGT	2.74	2.1	3.2	8.04	5 th
Quit for You Quit for Two	3.26	2.25	2.82	8.33	4 th

*Scores are out of a total of 5.



Game attribute preferences

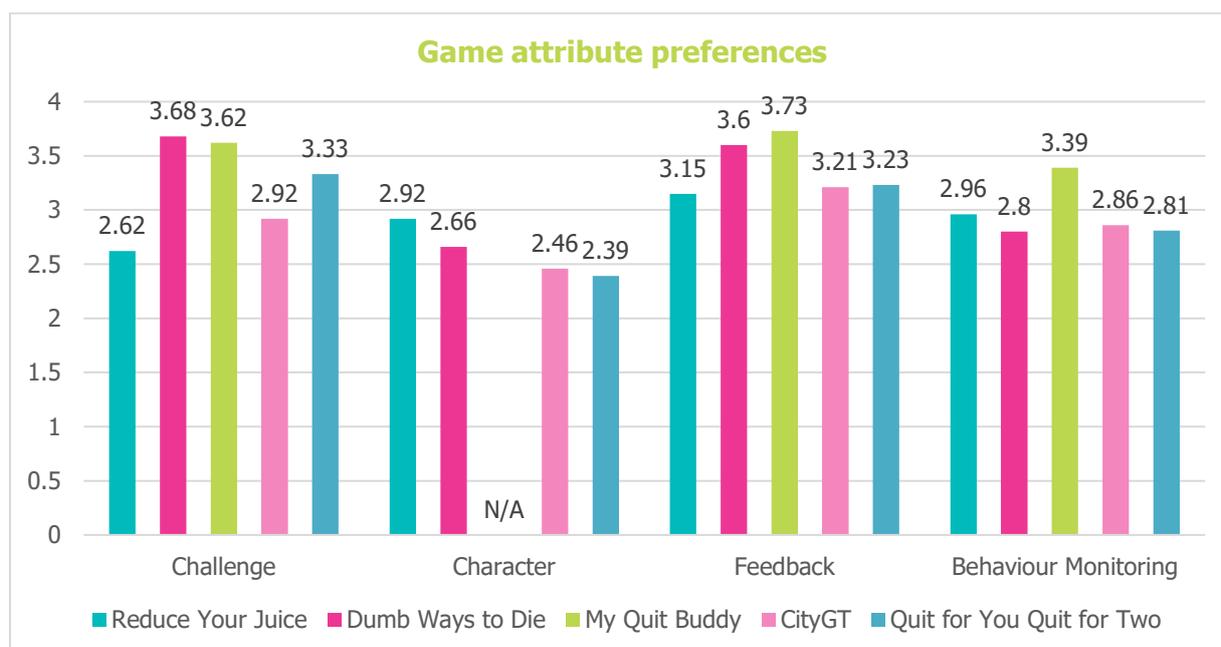
Using a selection of game attributes common to serious games used in social marketing (Mulcahy, 2015) the RYJ game was compared to Dumb Ways to Die, My Quit Buddy and Quit for You Quit for Two. By comparing these preferences for game attributes, improvements can be made benchmarking off other games in the market. For example:

1. Challenge (levels of difficulty in performing tasks): Dumb Ways to Die had the highest level of preferred challenge (3.68), whereas RYJ had the lowest level at 2.62. It therefore appears currently the RYJ game is not providing players an optimal level of challenge for players, which could then be improved upon for future editions of the game.
2. Character (likability for character): For character, RYJ characters have the highest level of preference in comparison to all other games in the market. Therefore, from these results it could be determined RYJ is a market leader in regards to character design for serious games in comparison to Dumb Ways to Die, Quit for You Quit for Two and CityGT.
3. Feedback (rewards such as points and punishments such as loss of points for performing behaviours in and out of the game): My Quit Buddy scored the highest for Feedback (3.73), whereas RYJ scored the lowest in this game attribute (3.15). Again, for the redesign or

redevelopment of the RYJ game greater emphasis can be placed upon improving this game attribute in the game.

- Behaviour Monitoring (the level of usefulness the game has with helping players monitor their behaviour): My Quit Buddy scored the highest for Behaviour monitoring (3.39), followed by RYJ (2.96). Again, using these evaluation results improvements to the RYJ game can be made using design comparisons with other games in the marketplace.

Game	Challenge	Character	Feedback	Behaviour Monitoring
Reduce Your Juice	2.62	2.92	3.15	2.96
Dumb Ways to Die	3.68	2.66	3.6	2.8
My Quit Buddy	3.62	N/A	3.73	3.39
CityGT	2.92	2.46	3.21	2.86
Quit for You Quit for Two	3.33	2.39	3.23	2.81



Non-traditional recruitment

Participant's use of digital channels became apparent early on, with clear preferences for digital and social channels emerging during the infield recruitment phase. The ability to track digital channels in close to real-time proved to be an advantage within the short recruitment timeframes infield.

The initial recruitment strategy prioritised the use of direct personal referrals through the formal networks of participating community agencies to recruit the right people to participate in the program. The soft launch period for recruitment where agencies had the opportunity to pre-register their clients showed slow uptake and response from agencies and did not materialise into participant registrations. Conflicting priorities and low resourcing made the agency channel difficult to affect whilst infield. The focus on face-to-face direct personal referrals through agencies proved problematic as it was slow to activate and difficult to affect, even with the dedicated QCOSS resource on the

ground who had built relationships with participating agencies. In developing the recruitment strategy, these formal networks of participating agencies were viewed as providing access to the hard-to-reach target group, however in reality having these channels added to the distance from potential clients, making it slower and more difficult to administer the approach and gain feedback and insight from the target group.

Agile response

The recruitment approach for RYJ included a number of integrated unknown elements which had the potential to unfold in very different ways. As such, the agile marketing approach proved an effective way to manage and respond to these factors in the field, with digital analytics allowing for channel effectiveness to be gauged quickly. As part of the agile marketing approach to recruitment, a range of activities were implemented to respond to the slow initial number of registrations. During the first recruitment period this involved trialling and evaluating a number of different activities including digital communications (email, social media) and recruitment events. Metrics were built into channels where possible to effectively measure each channel's ability to convert interest into action (registrations). The CitySmart marketing team closely monitored and evaluated the different channels to understand their effectiveness and adjust the recruitment approach to take advantage of the highest performing channels.

Digital recruitment

Digital channels emerged as early winners in gaining registrations, showing more immediate response and conversions and providing more control and flexibility in reaching the target group. Digital channels such as email and social media involved markedly less effort to activate than the more traditional offline channels and provided the benefit of real-time, measurable results, while traditional channels including print materials and community agencies were more difficult to track and had less immediate response from participants.

Social media channels (Facebook) showed an almost instant response, with both advertising and content based marketing resulting in participant registrations through the website. The ability to track these referrals in real-time and to view and optimise their conversion rate to website registrations proved the most effective way of recruiting participants to take part in the program. Facebook targeted advertising proved an effective way to monitor and assess the response of different demographic and psychographic groups to the program. For example, targeting mothers through family focused channels was effective in increasing registrations and referrals and so was prioritised for the second recruitment period.

Facebook was likely convenient for the target group to engage with the program due to the high existing usage by this group. In addition to being an easy, low effort channel to reach the target group, Facebook was seen as a credible source of information for the target group and the preferred way of engaging. While the original recruitment approach was built on using an established network of trusted partners, it is fair to say the target group treat Facebook as a trusted medium. This led to the prioritisation of social media in the recruitment approach for the second wave and provided even higher levels of administration and cost efficiency, and effectiveness in recruiting participants once the learnings and improvements were applied. Facebook advertising had the added benefit of reaching and converting participant registrations over a longer period of time than any other medium, providing the best value for money. In addition to the ability to effectively target groups of participants online, Facebook provided effective measurement of conversions to registrations using a tracking pixel and was highly controllable, with advertising able to be turned on and off which resulted in direct changes to registrations.

Email campaigns to segmented participant databases were another effective digital channel for reaching the target group, especially those which came from trusted sources or used personalised recommendations from agencies. Privacy issues made it more difficult to administer email marketing through agencies as there was less visibility over emails being sent out and timing was difficult to

control, however measurability was built in using unique url's for tracking provided to each agency. Where agency resources were committed to actively administering this type of email direct marketing it was highly effective.

Word-of-mouth

One of the biggest unknowns during planning was the potential impact of word-of-mouth on recruitment. Results showed this channel to be of significant importance in the recruitment of participants into the program, with word-of-mouth referrals tripling between the first and second recruitment period. This can be partially attributed to a word-of-mouth campaign created to incentivise wave 1 participants to refer their friends to register for the second wave program. Social media was also effective in prompting participants to share the program with their friends. The credibility and importance of peer information and channels was highlighted in RYJ's recruitment activities.

Targeting

During the recruitment planning stages, digital channels were highlighted as having the potential to bring in untargeted registrations which would then need to be rejected and the potential negative feedback managed to avoid backlash. While a small number of enquiries were received from people outside of the target group asking to participate, the majority (over 70%) of registrations received were accepted to take part in the program. 'Ideal' participants with high bills were in fact recruited for the program, showing the ability of digital channels to successfully target communications.

Verification

The participant registration form used on the RYJ website included an element of pre-verification, with website form fields used to assess age and post code before registration forms were submitted to then be verified using the CCeS system. Having a stringent, government agency aligned process for participant verification provided a strong front gate into the program. The majority of rejected applications were due to invalid or inactive CRN's used to apply. During the first recruitment period, a small number of people enquired about accessing the program without a CRN so the non-CRN approval process was made more obvious on the website during the second recruitment period to make it more available and easily accessed by applicants. Although it was only for a small percentage of participants, the alternate means of verification provided an opportunity for a broader group of people who didn't have a CRN (such as child care workers and nurses) to participate.

Adding digital to the mix

While trusted social service agencies were still part of the recruitment mix, the use of digital recruitment channels actually helped ease the burden of recruitment for agencies and provided an opportunity for more efficiency in reaching their clients. CitySmart shared its digital learnings from the recruitment approach with interested community agencies, holding a workshop where learnings were shared and tips and advice given in how to practically use these digital tools to reach clients. These digital channels provide community agencies with a new way of communicating with clients that doesn't replace their client relationships or interactions but enhances their efficiency in relevant circumstances. Following the workshop, CitySmart was also invited to present at a NILS Conference, helping to improve the knowledge of participating agencies in the digital space.

Overall the importance of digital and social in successfully recruiting the required number of participants within short timeframes cannot be overlooked. The ability to monitor and improve these channels and the diligence and responsiveness of the team in implementing the agile approach was crucial in successfully recruiting the required 1000 participants.

Landlord engagement: A bridge too far.

RYJ participants were incentivized to interact with their landlord to get them to install energy saving initiatives in their rentals, which would in turn allow the landlord to receive a rebate through the

Energex Positive Payback Scheme. An email was sent to all participants themed as the 'Ultimate Energy Quest' and a corresponding post was delivered to the Facebook community at the end of the program after participants had earned their final rewards by completing the final survey. The email and social media communications received high engagement from participants, however there has been no uptake of the Positive Payback Scheme offer by participant's landlords. The Ultimate Energy Quest email open rate was among the highest of the program and the Facebook community posts received a number of comments, however none of these interactions have resulted in landlords implementing the available offers.

Participant barriers

Despite the larger long term cost benefit the offers provide and the immediate cost incentive on offer, the barriers to engagement were substantial for participants. The cost-benefit value proposition for participants to perform this action was not as simple or valuable for participants as other elements of the program. The interaction with their landlord would be more of a high involvement task and may have been viewed negatively by participants, despite the digital tools provided to assist with the task. Landlords are likely viewed as authoritative figures by the target group which adds a barrier to interaction through an element of risk and scepticism.

The nature of this landlord engagement component of the program was in stark contrast to the relative ease and fun of the rest of the program, involving multiple difficult steps for participants with the likelihood of no immediate feedback or payoff for their actions. Whereas the rest of the program had inspired participants to take action themselves within their homes, this part of the intervention required participants to interact with an external party who they may not know and who may not respond.

While the landlord engagement component was positioned at the end of the intervention to take advantage of an anticipated improvement in self-efficacy, the difficulty of the steps involved and lack of control over the outcomes add to the unlikelihood of this incentivized offer being successful. With control identified as a key barrier for participants in general, the influencing of an authoritative figure to take action is likely outside of the locus of control for participants.

Barriers for landlords

The barriers for landlords to implement the offers should also be acknowledged, with investment required in time and effort as well as financially. Landlords would need to purchase and install a new appliance, schedule and pay electricians or plumbers, or contact the energy provider to change tariffs and then complete the required paperwork. The cost-benefit proposition for landlords may not have been compelling enough to drive action, especially if the rental property is an investment and minimal capital investment is preferred. The payoff is likely to not be immediate enough for most landlords unless the improvement was already required due to an appliance breakdown.

While materials were provided for participants to easily forward to their landlords, landlords would not have been familiar with the RYJ brand which may have been confusing. The Australian Government brand or Energex brand may have served as a better headline for the communications content being forwarded to landlord as there is pre-existing trust with these brands.

Improvements

Landlord engagement may be more effective if delivered via face-to-face advice or consultation, with a deeper level of help for participants to help them overcome the barriers involved. Alternatively, landlords could be targeted directly via alternate means than through their tenants. Further investigation could be made into avenues for direct communication with landlords, as well as tax or other benefits the offers may provide for landlords to further incentivize action for landlords and make the cost benefit proposition more palatable.

The benefits of a digital delivery

The digital delivery approach of RYJ provided many benefits in efficiency and effectiveness. In contrast to traditional approaches which rely on people or printed collateral to deliver a consultation or face-to-face intervention, RYJ's digital delivery approach allowed a relationship to be developed with participants over time where messages were delivered in short bursts through a mix of digital channels they regularly use. The variety of fun, visual messages delivered to participants through Facebook, games, email and SMS are likely to have resonated more with participants, fitting into their lifestyle easily and less likely to be seen as a chore. An average participant was likely to experience over 300 touchpoints adding up to around 4 hours over approximately 8 weeks, which allowed participants to take part without sacrificing a major amount of time or effort. These short interactions are likely to be more beneficial in providing continuous learning opportunities for participants that were easy to digest and understand, and built on their previous experiences logically and iteratively.

Analytics

By building in digital analytics to all key areas of the intervention, the RYJ team could continuously monitor, evaluate and improve the experience for participants. The range of digital analytics help form a more accurate, impartial, and immediate picture of participant engagement and feedback and also allows for an agile response.

The RYJ encountered the difficulty that even with a large amount of digital analytics available there was a lack of existing, relevant benchmarks to base KPIs and decisions on from similar programs. A mix of other industry benchmarks and best guesses were often used for decision making and evaluation such as marketing campaign indicators. This was a valid strategy to use, as despite the multiple unknown factors of the program digital analytics allowed for progress to be tracked daily and the agile approach meant elements of the program could be adjusted and improved accordingly in response to insights and trends.

Continuous improvement

Having multiple elements to the intervention provided the benefit of giving participants a variety of ways to engage with program and keep interactions fresh and interesting. The variety of measurable elements allowed the RYJ team to test and evaluate elements that resonate best with participants. For example, social media content was continually tweaked and refined based on participant engagement and response to different types of content. In this way, even if the data was not showing great results it was valuable to the team, who could use it to evaluate the interactions and form insights that would allow for improvements to the experience to help achieve behaviour change.

Personalised experience

Using digital channels allowed for an element of choice and personalisation in the customer experience, where participants could choose when and how deeply to engage with the program within the parameters provided. System automation worked to make the customer experience more meaningful, as only those who didn't engage for the required time were sent reminders to participate through email, SMS and app push notifications. In future without the complexity of the treatment groups, communications could be further personalised to be more relevant to participant's household and lifestyle factors.

Community

The effectiveness of an online community was relatively unknown prior to the program, however the use of Facebook as a delivery vehicle allowed the marketing team to closely monitor and evaluate the effectiveness of the community component through digital analytics and feedback. The existing Facebook analytics for clicks, comments, likes and shares gave the team a richer picture of participant engagement with content that that sourced from other program elements. Listening to, seeding and responding to conversation on Facebook was a vital avenue for quantitative and qualitative, real-time feedback for the marketing team. Facebook gave the team an easy to administer, immediate way of

communicating with participants which was valuable to both participants and the delivery team as an interactive communication channel.

While digital channels are often held as lacking trust with end users, the RYJ program participants readily engaged on Facebook, demonstrating engagement and trust with the brand online. The community provided an open, two-way dialogue with participants which helped the program be seen as more authentic and trusted with the target group. Many participants became visible brand advocates in the Facebook community, interacting with the brand and their fellow participants, using brand language, stimulating conversations and even answering other participant's queries.

The online community provided visibility for the program in a social context which helped influence social norms for participants. RYJ content was also shared more broadly beyond the participant group, for example a post about switching ceiling fans over for winter was shared more than 20 times by electricians to their own followers. The measurability of 'sharing' and 'reach' on Facebook helps show the spread of content more broadly to other audiences.

Word-of-mouth

The use of digital channels also helped track the effect of word-of-mouth online, a wild-card element that had the potential to impact the program in many ways. Participants were asked if they were referred by people they knew during the surveys, as well as how many people they told about the program to get an idea of how the program was being talked about. The Refer a Friend competition and Facebook conversation provided more evidence of the importance of word-of-mouth for the program, with many participants tagging friends in posts and referring them to register for the program. Word-of-mouth is a notoriously difficult to measure and manage component that was made easier through the use of digital channels and analytics.

Meaningful evaluation in the digital environment

Engaging with participants in a digital environment has the benefit of providing data at an individual participant level. The depth and breadth of this data allowed the team to monitor and make decisions at both an individual and an aggregate level during the program, and provided the capacity for a richer post-program analysis.

Breadth of data

RYJ integrated a number of digital channels, so building in the right analytics was crucial to being able to evaluate its success and explain its effectiveness. While baseline and post intervention participant surveys were used to evaluate change in participant's attitudes, habits and intentions, a range of other measures were integrated in the program to more broadly measure participants' engagement with various aspects of the intervention. RYJ used multiple metrics from different sources so that data can be compared or triangulated between sources to strengthen the quality of results. A mix of quantitative and qualitative data was used to create richer stories.

The program's data collection approach shared the program design principles in providing a simple but not simplistic customer experience that was easy, fun and entertaining. The pre and post program surveys were built to take advantage of mobile optimised elements the interactive survey software offered to make the customer experience easy and interactive without compromising the integrity of data being collected. This helped create a high completion rates for surveys (around 80%), to overcome a potential barrier to participation. Conducting the surveys online provided efficiencies to data collection, with the survey software providing real-time data results and easy ability to export data and integrate with the CRM system.

While the program surveys were used to overtly collect data from participants, analytics were built into all aspects of the program to collect data in a non-intrusive manner designed to preserve the customer experience whilst gaining important information about the participant engagement with the

intervention. These data sources were used to help overcome the effects of social desirability bias often encountered in the self-reported measurement of behaviour change.

Beyond the basics

Many campaigns and programs use only basic metrics for success such as awareness, downloads or views, however RYJ sought to provide a richer picture of participant's engagement with the multiple program elements, as well as providing insight into their motivations and reasons for interacting. When reviewing literature and working with industry stakeholders to build analytics into elements of the program, the RYJ team found that other programs and games use limited metrics to measure and evaluate success and often failing to fully explain the effectiveness of the program. The standard game analytics available to measure player engagement were limited and mainly designed to achieve objectives not relevant or well suited to the RYJ intervention such as monthly engaged players. In looking beyond the basic metrics of views and downloads, it became apparent that a more bespoke evaluation solution would need to be developed. As such, the RYJ team worked to incorporate non-standard measures into the app games to better understand participant's interactions with this element of the program. Game play analytics such as session frequency and duration, badges earned and avatars selected provided visibility of how participants engaged with the games during the program. Findings showing interactions to be short, frequent game play sessions helps endorse the program approach of fracturing elements into small, simple interactions to fit into participants' lifestyles.

Energy data

The collection of energy data through participants' energy meters was incorporated into the program to strengthen the self-reported behaviour change measures. Permission was required to obtain this data from a participant's meter via their National Meter Identifier (NMI). Through a relationship with the energy network supplier, the collection of this data was made somewhat less intrusive for participants as permission was built into the program's terms and conditions and data was sourced by matching participant's addresses with their NMI outside of the program experience for participants.

While this simplified the customer experience, the complexity of energy data caused difficulties for evaluation. The lack of smart meters in Queensland meant that participant data was only available on a quarterly, rolling basis. Only a third of the participants' meters were read in any given month, which made pre and post evaluation problematic to compare consistently. Participants who had moved house in this time were removed from the dataset, to ensure the longitudinal data related to the same households.

In the end, longitudinal evaluation was used to compare the pre and post reads with previous year's consumption in order to take into account seasonal differences. Energy data results showed variances between the waves of participants due to seasonal effects which highlights the impact of timing for the intervention between seasons.

CitySmart's bespoke system for reading and reporting NEM13 files received from the energy network provider turned out to be an asset, despite some complications. While it was required to undertake some manual cleansing of solar and duplicate data, the system allowed us to make sense of the data in a meaningful manner through the ability to output the data against different criteria and participant' data.

A rigorous approach

The overwhelming majority of measures used to evaluate the intervention proved to be reliable, endorsing the partnership approach with QUT as the research and evaluation partner. Working with an expert research and evaluation partner helped to provide rigour and reliability to the evaluation approach for the program. Using the expertise of QUT provided invaluable advice and direction in creating the evaluation framework. It also meant the measures used in the baseline and post intervention surveys underwent testing before being used to ensure their reliability. The resulting

quality of data, measures and the evaluation approach allowed sound conclusions to be drawn with statistically significant results across almost all variables measured.

The only exception was the reliability and validity of questions for the MOA (motivation, opportunity and ability) constructs. A framework was used with a number of survey items (questions) not meeting the required thresholds for reliability (such as item-to-total correlation and Cronbach Alpha scores) and validity (factor loadings). In order to overcome these issues with MOA, rigorous reliability and validity tests were carried out and items (questions) were excluded until the thresholds were met. By carrying out reliability and validity tests and modifying the measurement of MOA to ensure thresholds were met, this allowed for analyses techniques such as t-tests, ANOVA, Regression and SEM to be conducted. However, if thresholds of reliability and validity were not met, questions were tested separately to examine differences between RYJ participant's pre and post as well as comparisons between RYJ participants and the control group. Both approaches allowed for greater insight into the impacts of RYJ without excluding valuable data.

The use of a control group provided a valid way of comparing results with a demographically comparable group of people who did not receive the program intervention at the same points in time. With 60% of participants completing the program intervention, the sample size was decreased somewhat from the initial target of 1000, however the sample size proved large enough to provide reliable results.

Some challenges

While a digital approach provided many benefits to improving the efficiency and effectiveness of the evaluation approach in comparison to more traditional methods, there were challenges and issues encountered in the automation and integration of multiple digital systems that were resource and time intensive to manage. For example:

- the different systems needed to be reconciled regularly to ensure the interface business rules were working optimally and all data was being transferred correctly.
- Where there were data inconsistencies found in the reconciliation, these needed to be resolved and often data would need cleansing.
- there was no centralised reporting system to extract the data across the disparate system and was done manually using Excel formulas and functionality. In the case of game data, this meant manually processing close to a million data points, and several hundred thousand lines of email communication data.

Even though the RYJ team had underestimated the system administration resources that would be required in an automated, digital solution, the skillset and tenacity of the delivery team and supplier support teams meant these challenges and issues were resolved in a timely manner.

PROJECT MANAGEMENT

CitySmart has a strong reputation for delivering effective energy efficiency and sustainability programs and has built an experienced team of passionate technical experts and project management systems to support delivery. Traditionally, CitySmart delivers large scale programs for a mass market audience, using a well-worn project management approach to successful delivery. RYJ deviated from this traditional approach, trialling a new style of program delivery.

As the Low Income Energy Efficiency Program (LIEEP) aimed to trial new and innovative approaches to improve the energy efficiency of low income households and enable them to better manage their energy use, CitySmart viewed LIEEP as an opportunity to deliver a different style intervention for a group of participants who are traditionally underserved, difficult to reach and engage, and least likely to take action in traditional energy efficiency programs.

RYJ was a bold, ambitious and innovative concept which aimed to use a digital delivery approach to help solve the challenge of energy efficiency for the target group. The approach required the team to re-examine its traditional project management approach at a fundamental level, impacting the operation, mechanisms and processes used to design, develop and deliver the program.

CitySmart moved towards a more flexible, agile approach which enabled the project team and third party stakeholders to work collaboratively on issues and challenges to explore and develop a new digital approach for delivery. This section discusses CitySmart's approach as the lead project delivery agent in facilitating a multi-disciplinary collaboration which created and delivered the RYJ program.

Vision

From the outset there was a bold and ambitious vision for the project. The original project vision was as follows.

Our vision is to create a stimulating, challenging and rewarding program that is so straight-forward and convenient that all those who can participate will choose to do so.

We intend to change how the target group interacts with energy efficiency information by making the subject matter portable, personalised and participatory.

We intend to supply energy efficient appliances to incentivise and reward specific action from the target group to reinforce positive behaviour change.

The trial's digital engagement platform and data collection methodology will provide a clear, data-driven view of the target group and their needs to assist in the development of future policy and service delivery approaches.

The vision for the program was to:

Create an evolutionary recipe for driving action in a low engagement category.

The project management approach

CitySmart participated throughout the LIEEP program development process, including submitting initial input on the program design through the consultation paper, an expression of interest, attending industry briefing sessions and two rounds of competitive grant applications. The value of participating in the processes was two-fold; CitySmart gained an understanding of what the Department was trying to achieve, and the process allowed for the creation of project management foundations including the establishment of a consortium of experienced subject matter experts to help design and deliver the desired solution.

Undertaking the grant application process enabled CitySmart to develop a clear vision for what we wanted to achieve, although it took some time to unpack how we were going to execute this, as many interdependent issues had to be worked through. The initial stages of development took a fairly long amount of time as multiple stakeholders and experts were engaged in a collaborative development process. This intensive groundwork paid off in the longer run as the final solution was developed with a great deal of care and consideration for its many interdependent aspects.

The project commenced with a broad, high level definition of what we were trying to achieve and a program strategy was systematically built out to deliver the solution. Minimum requirements for the project were captured in the Funding Agreement, a Project Vision document was created, and a high level Proposed Delivery Model diagram (as provided in the grant proposal) was used to communicate this vision to the many project stakeholders.

As the project unfolded, the project team explored many potential design options and faced a variety of challenges along the way. Rather than being committed to highly defined requirements from the start of the project, the team took an agile approach to working through issues and exploring options. The project vision and high level requirements always remained front of mind as the team searched out creative, innovative options from partners and stakeholders to ultimately solve the energy efficiency issue for the target group.

Extensive consultation with stakeholders was undertaken to collectively work towards solving key challenges, often resulting in multiple, small iterations until the best solution could be agreed upon. CitySmart's role was to balance the competing needs of the different stakeholders and subject matter experts, managing the risks of the project whilst also allowing the flexibility to facilitate multi-disciplinary collaboration. Having stakeholders come along the proverbial journey provided additional depth and rigor to the final solution and also meant that our target group's needs were better understood, and catered for.

The delivery of the project was supported by project management practices that ensured adequate controls and governance which allowed for agile program development. The systemised approach was supported by following documentation including:

- **Project Management Plan**- outlining the scope, budget, deliverables and engagement activities, and constraints by which the project was managed
- **Project Task Tracker** - defined the key activities required for successful completion of the project, timelines, milestones and target outcomes
- **Risk Management Plan** – identified the key risks associated with the project and key strategies for mitigation
- **Compliance Plan** - defined how CitySmart complied with the funding agreement obligations, relevant legislation, policies, and information privacy requirements
- **Data Collection and Reporting Plan** - identified the data collected, frameworks and methodology, and outlines the analysis and reporting strategies.

The project team used this core documentation to capture, define and work through the key issues, with the documents capturing a number of iterative changes as the program took shape. The

documentation was provided to the Department at key Milestones throughout the program to provide updates on progress and key issues being managed.

User centred design approach

The user-centric design approach was discussed in the earlier Social Marketing and Program Design sections, however it is important to note this concept was supported by the project management approach through allocation of appropriate resources and the culture of the delivery team.

In the context of the digital delivery approach, the extensive data collection requirements were difficult to manage and posed a key risk to successful program delivery. With the failures of previous energy efficiency programs attempting this approach in mind, user experience and engagement levels were elevated in importance for RYJ to avoid high attrition and ensure participants received the desired learning experience and intended social benefit. CitySmart had to balance the need for a data rich trial and rigorous trial design with the importance of the user experience and the needs of the target group as critical design decisions were faced and trade-offs made along the way. This meant that more effort was expended in finding a simple, user friendly solution that could be adequately measured and evaluated, which added complexity and challenge to the management of the project. While this design approach was difficult to execute, the development team embraced the concept and it became an important part of the project culture and delivery approach.

Partnership approach

CitySmart worked with a diverse range of organisations and subject matter experts in the design and delivery of RYJ, taking a collective partnership approach to create something innovative through interdisciplinary collaboration. To foster this approach a number of working groups were created to facilitate open conversation and ideation between different subject matter experts.

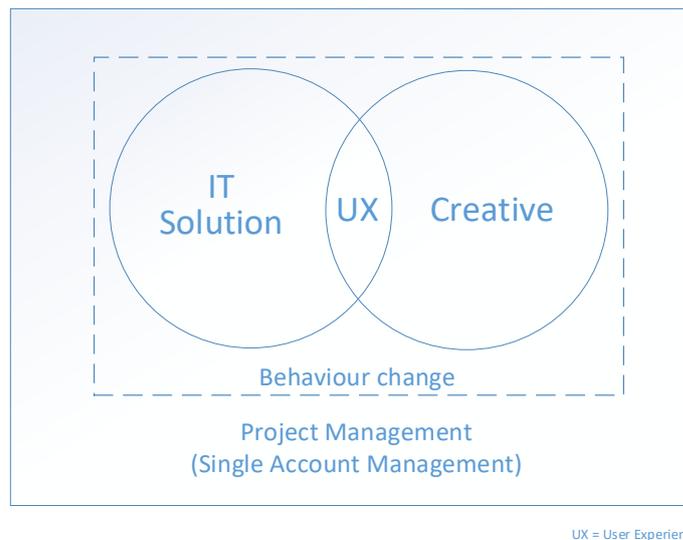
This collaborative approach was extended to suppliers of key services and products to enable flexibility and innovation in the delivery of the RYJ solution. A partnership approach was also used across procurement activity to drive value for money and provide flexible and customer centric solutions. This approach did not work for all stakeholders involved, however where the vision and goals could be shared it was more effective.

Digital partner

Cognisant of the challenges that data collection posed to the program's success, a different approach to procuring and working with the digital provider was taken. The aim was to work with an innovative digital provider that could bridge creative, IT, and behaviour change requirements and balance them with the user experience for the digital solution (see Desired supplier delivery model diagram following). The digital supplier role was viewed as being a program partner that would provide strategic input into both the design of the program and the digital solution.

Traditionally, CitySmart would seek to procure experts in each of these fields (creative, IT and behaviour change) and then coordinate delivery amongst the different providers. Previous experience with this approach posed difficulties in that each provider is focused on their own area of responsibility and is often unwilling or unable to compromise to find solutions, with the user experience suffering as a consequence. The goal of having these competing interests managed by one provider we could resolve some of the conflicts between creative and the back end IT solution required to collect the amount of data required.

Desired supplier delivery model



The digital provider's scope included the following key areas of delivery:

- **Technology aspects of the solution**

Design and build a digital solution to meet the needs of the target group's preferred communication and engagement channels. CitySmart viewed the ideal digital solution as more than just a website – it needed to be an integrated digital presence. At a functional level, the solution needed to be able to collect comprehensive data to allow rigorous analysis. With multiple digital systems required (including the CRM, survey tool and digital engagement tools), system integration was important for data and the scope for the digital provider extended to IT infrastructure and system requirements. CitySmart had existing IT infrastructure which needed to be incorporated into the development of the technical solution for cost efficiency. Whilst this was approached with the best of intentions, some legacy systems added additional complexity to requirements and cost to the delivery of the solution. CitySmart had to reallocate additional resources to the IT build budget to upgrade and extend licensing and core IT infrastructure to control and run the program.

- **Creative execution of the digital solution**

The provider was also required to work with CitySmart to develop a creative and innovative design for the digital solution. The solution needed to be an integrated design across multiple channels demonstrating creative application to achieve project objectives. This was a factor in the success of the program, as the creative elements helped engage the target group to drive unprecedented engagement and interaction.

- **User experience requirements**

As previously discussed, CitySmart sought a provider who shared a strong advocacy for the end user to ensure a seamless user experience across all channels could be achieved that resonated with the target group. The end solution had to be lightweight and intuitive to provide a simple, easy to understand experience that would not impact on cost through the use of smartphone data. While the user experience was simple and elegant, it should not be confused with being simplistic.

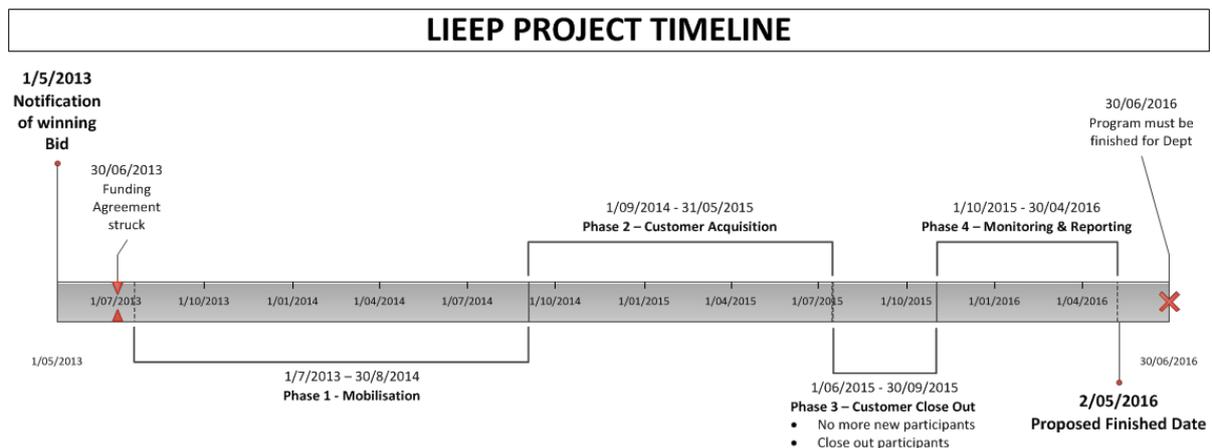
- **Behaviour change requirements**

CitySmart sought a provider that could provide expertise in developing and achieving behavioural change using digital media. As this is a new area of knowledge, strategic guidance in developing and robustly measuring the behavioural change solution was required.

Overall, a considerable amount of time, effort and resources were invested in an extremely complex technical solution, which was ultimately the centerpiece and engine room of the program.

Scope

The RYJ project had two significant delays that compressed the infield activity from 12 months to 6 months. The impact of these changes required two deeds of variation to the Funding Agreement. The following diagram illustrates the original timeline.



1. Change of key supplier

The first delay to the project was caused by CitySmart’s decision to terminate the IT supplier that was developing the digital solution. This was a decision that wasn’t taken lightly, however the creative concepts tabled at the end of their first milestone did not meet expectations and CitySmart had lost confidence in the supplier to deliver what was required. In April 2014, the key IT provider was terminated, exit arrangements were managed in line with the supplier agreement and intellectual property developed as at that point in time was transferred. CitySmart appointed a replacement provider from the original short listed providers. The impacts were as follows:

- A delay in the launch of infield activity from September 2014 to February 2015
- The recruitment method changed to recruitment of three discrete waves due to shorter timeframes
- The Funding Agreement Milestones were reworked.

During the changeover to the new digital provider, QUT’s social marketing expert provided guidance on the behaviour change approach for the program which helped develop the program’s model for behaviour change and was an unexpected benefit of the consortium approach.

2. Apple changes rules on App configuration

Changes to Apple’s technical requirements for all new Apps caused a second delay to the launch of the RYJ Program to May 2015. Apple announced in November 2014 that from 1 February 2015, all new Apps upload to the App Store would need to move from a 32-bit to a 64-bit architecture. The 32-bit RYJ App was scheduled to be released to the App Store on 11 February 2015. The impacts were as follows:

- Delay in the launch of infield activity from February 2015 to May 2015
- Lead to infield time was compressed to five months
- The 3 recruitment waves planned were reduced to 2
- Target participant numbers were 350 in wave 1 and 650 in wave 2
- The Funding Agreement Milestones were reworked.

While this change added pressure to the launch, there were some marked benefits in this scope change, with the reduction to two waves resulting in efficiencies in resourcing, recruitment and fulfilment. Having two waves also meant there was a greater number of participants in each wave which allowed for more highly engaged communities during the program. There were no significant variances in the trial to what was envisaged in the Funding Agreement. The RYJ project has been funded to deliver the following activity:

- interactive base program;
- energy efficiency rewards;
- digital communications and social media interaction;
- optional assistance modules to engage landlords; and
- provide support to participants.

CitySmart met its obligations under the Funding Agreement and the outcomes of the program were discussed previously within the report.

Minor changes

A number of minor changes occurred during the development of the RYJ program that are discussed briefly below.

Structure of treatment groups

In November 2013, CitySmart received feedback from CSIRO on its Data and Reporting plan. Based on this feedback, two additional treatment groups were added, to isolate the impacts of energy efficient products. It was not envisaged that we would have four different treatment groups in the initial trial design. A key decision was made at this point in time to not have a treatment control group that did not receive rewards – this decision was done with extensive consultation with the consortium, steering committee and QUT. While it may be seen to provide some weaknesses to the research findings, the decision was made in the best interest of providing participants with a fair outcome.

Minor energy efficiency rewards

The changes to the treatment group structure meant that CitySmart had to change the reward strategy away from only providing energy efficiency products to also include an alternate batch of rewards which were referred to as lifestyle rewards. The impact of this was that two treatment groups did not receive the energy efficiency rewards. In changing the rewards, it was important to ensure that all treatment groups were treated fairly and received similar perceived value in rewards.

Consortium structure

The change of the treatment groups also impacted the structure of the consortium as the consortium partner initially envisaged to provide the energy efficiency rewards did not have the product range to supply lifestyle rewards. The reduction in the base number of energy efficiency products meant that orders would drop below their minimum levels of supply. This also put at risk the in-kind contribution commitments to the Commonwealth government. CitySmart was able to pivot and negotiate alternate arrangements with providers who were able to provide some in-kind contributions, however this did cause a large amount of disruption and stress for the project team.

Recruitment area

Another minor adjustment to scope was made in consultation with the Department, adding Logan Local Government Area as an area from which participants could be recruited. This was a positive enhancement to the program due to the large population of low income households in Logan.

Resources

The RYJ program was well resourced to enable the development of an innovative digital approach. CitySmart built an internal team project team of skilled and experienced professionals who were responsible for delivery. Additional expertise and capability was drawn up by the project team

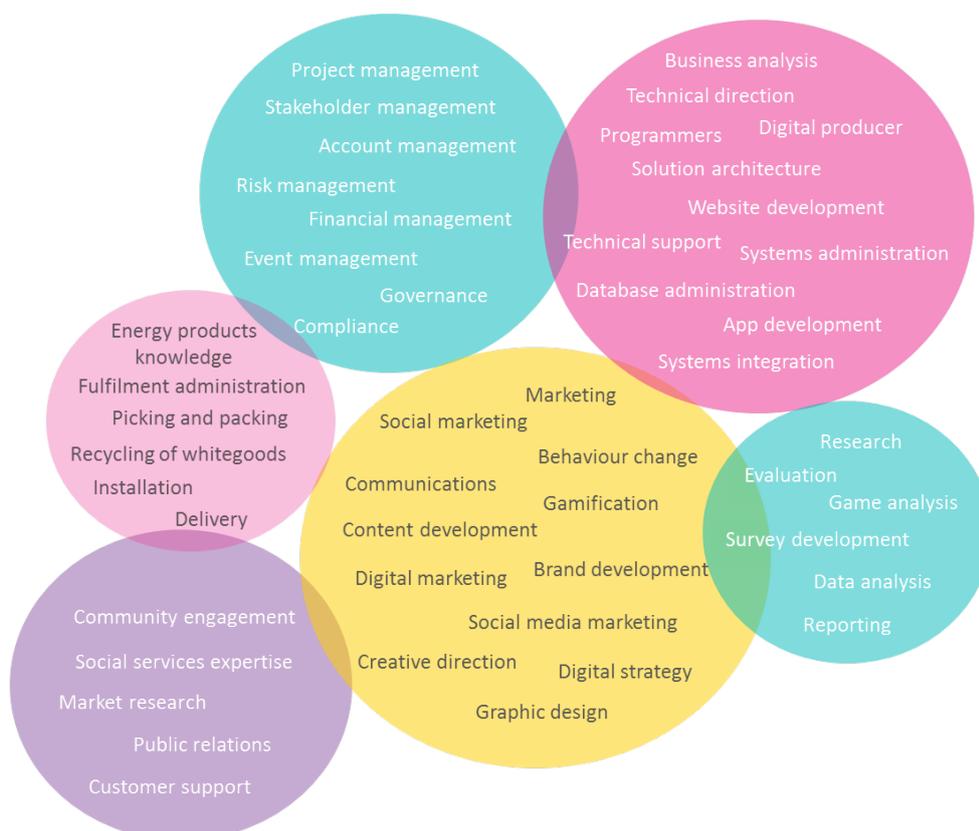
through the consortium partners and other third parties. CitySmart adopted a collaborative approach to this process to draw through expertise and create shared ownership of the program.

Project delivery team



A Skills map has been created to demonstrate the breadth of skills required to develop and deliver the program.

Skills map



Upon executing the Funding Agreement a multi-faceted team was mobilised around the key functions of project management, marketing and communications, research and evaluation, community engagement, technical solution and product solutions. A number of project specific roles were created (as detailed below) and existing CitySmart resources were used to assist in the development, delivery and dissemination of program outcomes. CitySmart made provision for additional external expertise and resources to support the project team in a number of strategic areas where gaps in knowledge, capability or experience were identified.

These parcels of work were delivered through consortium partners including:

- QUT - research and evaluation partner
- QCOSS - community engagement with social services providers/community groups
- Energex - supply of energy consumption data and incentives for landlords
- The Good Guys - major rewards

Other third party suppliers that added value to the project were:

- BCM - development of brand, creative and digital solution
- Evolution Marketing - development of back end of technical solution
- Big Fish - developed marketing and communication materials
- TNS - undertook market research and customer segmentation

A key element of the program’s success was its adequate resourcing which enabled the project team to draw on expertise, capacity and experience to deliver the program. In particular, during the development of the program strategy and design a number of external parties were consulted to help shape and form the program. Examples included capturing insight through a series of workshops with QCOSS and the community groups to add to the extensive market research and help form a deep understanding of the target group; QUT’s input into the innovative behaviour change model being trialled; and strategic design input from BCM in using serious games and gamification.

Relationships

Consortium

The table below details the roles and responsibilities of the consortium:

Consortium partner	Project role and responsibility
<p>CitySmart works with governments, the community and businesses to design and deliver initiatives with sustainability benefits.</p>	<ul style="list-style-type: none"> • Consortium lead with project and consortium management • Government relationships, contract management and reporting • Budget responsibility • Marketing and communications • Digital engagement and social media management • Lead the development of program materials • Procurement and supplier management • Co-ordinating reward distribution • Customer service support • Program monitoring and evaluation

<p>Queensland University of Technology (QUT) is one of Queensland's leading universities. The School of Advertising, Marketing and Public Relations along with the Urban Informatics Research Lab in the School of Design were the key groups.</p>	<ul style="list-style-type: none"> • Development of research plan, surveys and data collection activity • Strategic input into behaviour change approach • Data analysis and reporting • Input into development of surveys and data collection activity • Participation in strategic review at key milestones • Development of research papers to disseminate program findings • Oversee and guide Doctoral and Masters students research of complementary themes to RYJ
<p>The Queensland Council of Social Service (QCOSS) has a mandate to promote social justice in the community and is committed to helping low income households overcome rising energy costs.</p>	<ul style="list-style-type: none"> • Engage community organisations to promote the program through existing channels in driving recruitment. • Co-ordinate community sector workers to deliver recruitment activities • Communicate with and capture data from community organisations
<p>Energex distributes electricity to customers in South East Queensland and has many programs that save energy</p>	<ul style="list-style-type: none"> • Meter data provision at key stages throughout the program • Provision of energy related subject matter for the base program • Rebates to landlords upgrading air conditioning, pool pumps and hot water systems
<p>The Good Guys is a national electrical retailer with a strong association with CitySmart.</p>	<ul style="list-style-type: none"> • Supply energy efficient rewards - pedestal fans, refrigerators, washing machines, BBQs • Liaise with customers to determine like for like refrigerator and washing machine exchange • Coordinate delivery of produces through Boys Town • Coordinate recycling of old fridges through Boys Town program

The Consortium member's involvement in the project can be split between strategic and operational functions. QUT and QCOSS played a more strategic role being actively involved in the program design through shaping and influencing key strategic decisions. Whereas the Good Guys and Energex played a more operational role, being the fulfilment of their obligations as outlined in the table above. That is not to say their input was less valued, however there was less scope for them to impact the program design at a strategic level. As outlined previously, Crest Electronics role within the consortium was reduced due to the changes in trial design which lead to a change in product range.

The consortium brought together different and divergent teams to collaborate on the project. This created value by bringing together different approaches, experience and perspectives to work through key challenges within the program. This added depth to the end solution by providing insight to the project team on the consequences of key decisions and approaches.

Good relations were maintained with each of the consortium members, who demonstrated a commitment to deliver above and beyond the scope described in their consortium agreement. This can be attributed to key stakeholders within partnering organisations being personally invested in the RYJ program and being able to draw on broader resources to add more value than CitySmart had originally envisaged. From the project management perspective this was extremely helpful.

One of the key challenges faced was establishing a common language amongst the consortium and key third party suppliers. In particular, during the initial mobilisation of the program communications were challenging because of new terminology, and terminology having different meaning between industries and stakeholders. Some of the early stages of development were confusing because of this miscommunication and there was a visible improvement in team cohesiveness and operating rhythm once a common language was established. CitySmart worked hard at trying to overcome this issue by

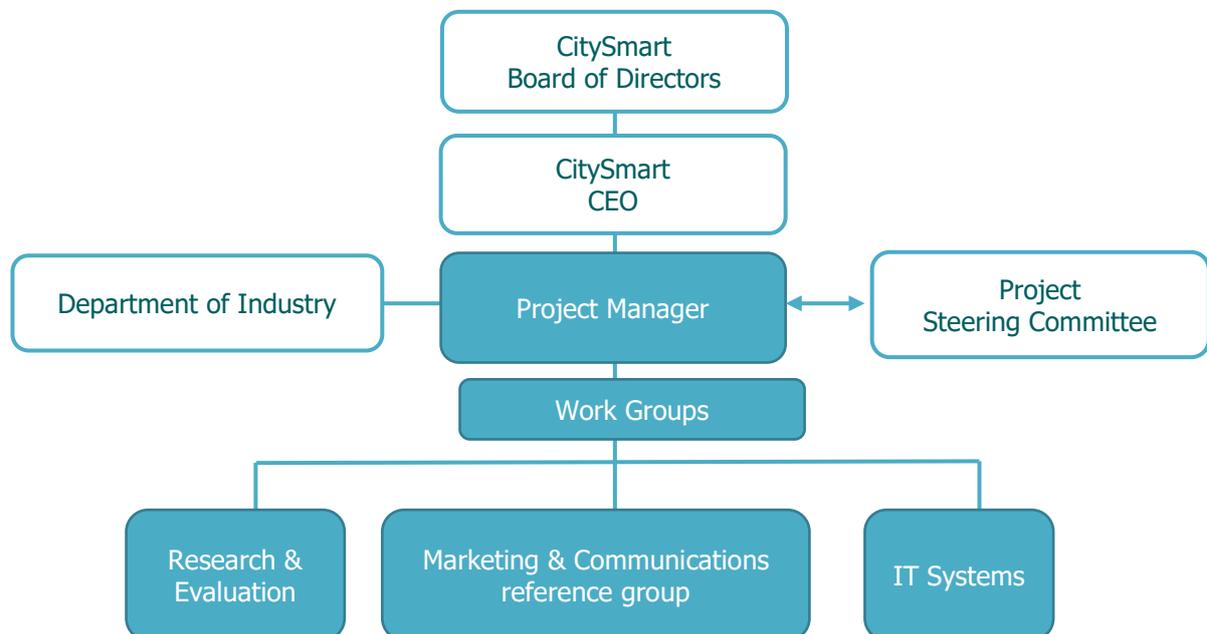
using a number of communication formats to share key themes – one of the most effective was the use diagrams and pictures to communicate a concept.

Another key challenge during the initial development of the program was the large number of meetings required with the large group of stakeholders. Meetings were needed to engage and draw through the knowledge and experience of a broad group of stakeholders, however this process was somewhat unwieldy, and considerable time was spent rehashing the same issues. Often working meetings only covered half of the agenda items and decisions couldn't be made until other interrelated issues had also been discussed and resolved, resulting in the perception of slow progress.

A key learning from this was the need to reduce meeting agendas to focus attention on one or two key issues at a time. Substantial time was spent by the core team in frequent progress updates with other work groups and understanding progress on key issues. During this time, the project team was trying to coordinate and plot a detailed pathway/schedule forward and map interdependencies between parties in a gantt chart format – in hindsight this traditional tool was not effective in communicating iterative progress. Kanban boards or similar would have been more effective in managing this type of agile, consultative approach to communicate the current state, issues and communicate next steps – less is more in this instance.

Project working groups to fostered inter-disciplinary collaboration

CitySmart's project management approach facilitated inter-disciplinary collaboration between the consortium and key third party suppliers through three Project Working Groups who were each responsible for a specific component of the overall project. The working groups existed for a defined period of time and were made up of members from a number of business areas. The structure of these groups is illustrated following.



Empowering those groups with a genuine opportunity to provide input and collaboratively come up with an end solution for the program design assisted in creating an innovative product. This approach differs from traditional project management delivery, where key elements would have already been scoped and well defined as it leaves room for flexibility and innovative ideas to overcome challenges. This process was by no means seamless, with a number of challenging times experienced throughout the project, however it resulted in a superior solution to which CitySmart could have delivered alone.

The LIEEP Grant allowed additional resources to be developed to increase capacity within the consortium, including increased human resource and technical knowledge, building education tools such as the 'App' and communications platform, and information products and communications tools that have been specifically developed for the target group. For example, QCOSS had a specific human resource during the program to engage community groups to work with front line community workers around the energy efficiency challenges faced by low income renters.

Knowledge was built around energy efficiency across the consortium. Whilst there was existing knowledge in this space within the consortium, research and findings for low income households (in particular renters) was significantly enhanced through the delivery of the program. Most specific knowledge was gained in engaging participants to change behaviours through the use of a completely digital delivery approach. Significant research and strategy effort was invested in designing this successful program approach. A new body of knowledge has been built surrounding the use of 'gamification' for low involvement social issues such as energy efficiency and a new behaviour change approach was developed which may have broader application. CitySmart and QUT will be publishing a number of articles as a result of this research activity.

Department

CitySmart had a strong and productive relationship with the Department throughout the design and delivery of the LIEEP program. Early rounds of consultation were invaluable in understanding the Department's vision for the program and priorities for delivery. This helped shape the consortium and trial design.

Following CitySmart's unsuccessful first round application, the Department provided constructive feedback on the areas of this initial proposal and floors in the initial trial design. This feedback was taken on board to ensure a much clearer and more concise second application.

After the Funding Agreement negotiations, an agreement was negotiated within 30 days of receiving written notification for being successful. In the development of the funding agreement, the milestone schedule was developed in consultation with the department to ensure an orderly deployment of the project and accountability on deliverables to demonstrate progress. The Department representatives demonstrated a high standard of professionalism and care throughout the program delivery. The Department were proactive in reviewing and understanding milestone deliverables to ensure the project was on-track for delivery. The set-up of the intranet to enable grant recipients to post questions and share information and the information tools developed were helpful.

The Department was fair and reasonable during negotiations around the two Deeds of Variation. A practical approach to the delays was adopted by the Department, with an overall governance approach to ensure adequate supporting information and risk management was adopted by CitySmart to manage program outcomes. Both teams were able to negotiate the details and required outcomes to ensure a timely turn around and to ensure the Commonwealth did not lose any value from the variations.

The facilitation of LIEEP forums with all Grant Recipients coming together to discuss their projects and share their challenges was helpful. This was beneficial in providing an opportunity to discuss and work through common key challenges such as data collection. From the Project Managers perspective, the forums provided an opportunity to meet with peers and discuss challenges on an individual level, which allowed relationships to be formed and accessed throughout the trial period.

CSIRO

CSIRO played an important role in the industry briefing sessions leading-up to the grant application stage and underlined the value the Department placed on producing an evidenced based program to shape future program and policy design. CSIRO's briefing at these sessions provided a clear expectation around a robust research approach for the individual trials. This feedback was taken on

board and provided additional research resources in the grant applications. This served the CitySmart consortium well and produced a much more robust program.

Having an Academic partner in QUT within the consortium provided more value than what was initially envisaged. The project team was able to tap into considerable resources to assist in the research design, data collection and evaluation. CitySmart therefore had little involvement with CSIRO from a strategy perspective in terms of program design.

Our interactions were limited to submitting an early version of our data collection and reporting plan in November 2013. This feedback took a long time to turn around and CSIRO provided significant feedback highlighting weaknesses in the trial design. CitySmart worked through this feedback with QUT which resulted in a number of changes to the program design. This process was quite difficult for the project team in that the strategic design had started to take shape and the feedback required some restructuring and rework of the trial design. CSIRO feedback earlier in the design process may have worked better, for example feedback on the trial design submitted in the grant application may have assisted CitySmart in rectifying concerns earlier and making the roll out smoother.

The change to the number of treatment groups within the trial had a major impact, particularly around the sensitive issue of CSIRO's request for a treatment group to be created where participants did not receive any rewards as a control group. The potential consequences and negative impact on recruitment and reputational risk for CitySmart, QCOSS and community service providers was substantial. CitySmart consulted the consortium team and steering committee on this issue and based on their feedback advised the Department this change could not be accommodated. Ultimately, the Department accepted this and the project moved forward on this basis.

The learning from this experience was that CSIRO provided feedback from an experimental design perspective; however the program took a field experiment design approach. This meant that some compromises on the rigor of the trial design were made for the sake of participants.

The data-schema designed by CSIRO was well defined and helpful for the IT resources on the project. In compiling the data into extracts to load onto the portal it was helpful that CSIRO had provided the naming conventions, table definitions and zipped examples of the tables and enumerated tables. This made it straightforward and confusion-free when uploading to the portal. As the program was staffed with adequate resources to understand the schema, providing this information was of benefit. CSIRO were responsive with any questions and troubleshooting errors and issues in the energy consumption data.

Procurement

As a social enterprise, CitySmart took a holistic procurement approach that focused on value for money, transparency and equity – thus supporting the 'Partnership' ethos. As such, procurement activity undertaken by CitySmart during the program was performed in line with company financial policies and procedures.

The project team adopted a holistic approach to provide opportunity and economic benefit for local Brisbane and South East Queensland industry. The following tiered approach for procurement was used when selecting suppliers:



The following table outlines the economic benefit across the geographical tiers. The majority of suppliers and budget was spent supporting businesses operating in the Greater Brisbane area. Less than 1 percent of the overall budget was spent offshore.

Procurement

Location	Supplier	Project phase
Brisbane City Council or Greater Brisbane	<ul style="list-style-type: none"> Market research supplier University partner Recruitment agency (QCoSS) Digital agency IT interface supplier (Disclosure, they had some offshore development) Whitegood rewards Energy efficiency and lifestyle rewards Fulfilment agency Server and hosting solutions Computer hardware 	Strategy phase All phases Strategy, build and implementation phases Strategy, build, implementation phases Build, implementation phases Implementation phase Implementation phase Implementation phase Build, implementation phases All phases
Australia	<ul style="list-style-type: none"> Task and knowledge management tools Email marketing tool Postage and delivery services 	Strategy, build & implementation phases Build, implementation phases Implementation phase
Overseas	<ul style="list-style-type: none"> Fluid Surveys App Store and Google Play stores Facebook advertising Back office tools such as Adobe design software, Facebook reporting tools. 	Build, implementation phases Build phase Implementation phase Strategy, build, implementation, analysis phases.

Under the terms of the Funding Agreement, CitySmart was committed to purchasing certain items through consortium members, so the procurement strategy was more focused with these partners. One of the largest procurement activities was engaging the key digital supplier. CitySmart took quite an innovative approach to selecting this partner and this procurement activity is described in more detail below.

Procurement within Consortium

The consortium was constructed with substantial industry knowledge, experience and proven capabilities to design and deliver an end to end product solution which carefully considered the target group's needs, maximised value for the Commonwealth Government, and improved industry participation. When working with Consortium partners, CitySmart provided the following guiding principles when procuring energy efficiency rewards:

- products supplied should be mobile and/or transferrable designed specifically for renters
- energy efficiency products need to be both durable and appealing to the target group
- rewards products will compliment or assist behaviour change activity
- distribution will ensure households without transport are not disadvantaged
- products need to provide value for money
- where possible, products and services should provide industry participation opportunities for employment and/or training of low income or disadvantaged households.

The whitegoods major rewards were one of the most significant spends associated with this project. CitySmart worked closely with the Good Guys to gain access to their extensive supplier network and bulk purchasing arrangements to source energy efficient whitegoods that meet the needs of the program. For the whitegoods, there was strong focus on delivering value for money, energy efficiency gains, and durability. Extensive due diligence was undertaken on a short list of whitegoods to select the preferred products.

A range of different size refrigerators and washing machines were selected to enable the program to replace participant's existing refrigerators and washing machines on a 'like-for-like' basis to ensure replacement products are not more energy intensive.

CitySmart made arrangements with the Good Guys to review the product range between the program waves to ensure the most effective products (cost, energy efficiency, and durability) were offered and new more efficient product opportunities could be utilised if they became available. The commercial arrangements struck meant that CitySmart would only be charged for whitegoods delivered to participants. This contractual flexibility allowed CitySmart to mitigate the risk of budget overspends on expensive products while ensuring low income households maximise their energy savings.

An extended three (3) year product warranty was been purchased to support the longevity of the whitegoods earned by program participants. When taken into consideration with the manufacturer's warranty, this provides participants with a minimum warranty period of at least (5) years. During this period any repairs to product will be either undertaken at a participant's home or the cost of removal and replacement product will be covered under the warranty. Another important consideration was that the administration or support of the warranty is the responsibility of the Good Guys which will ensure continuity for the participants once the project team has been disbanded upon conclusion of the program in June 2016.

Procurement of IT provider

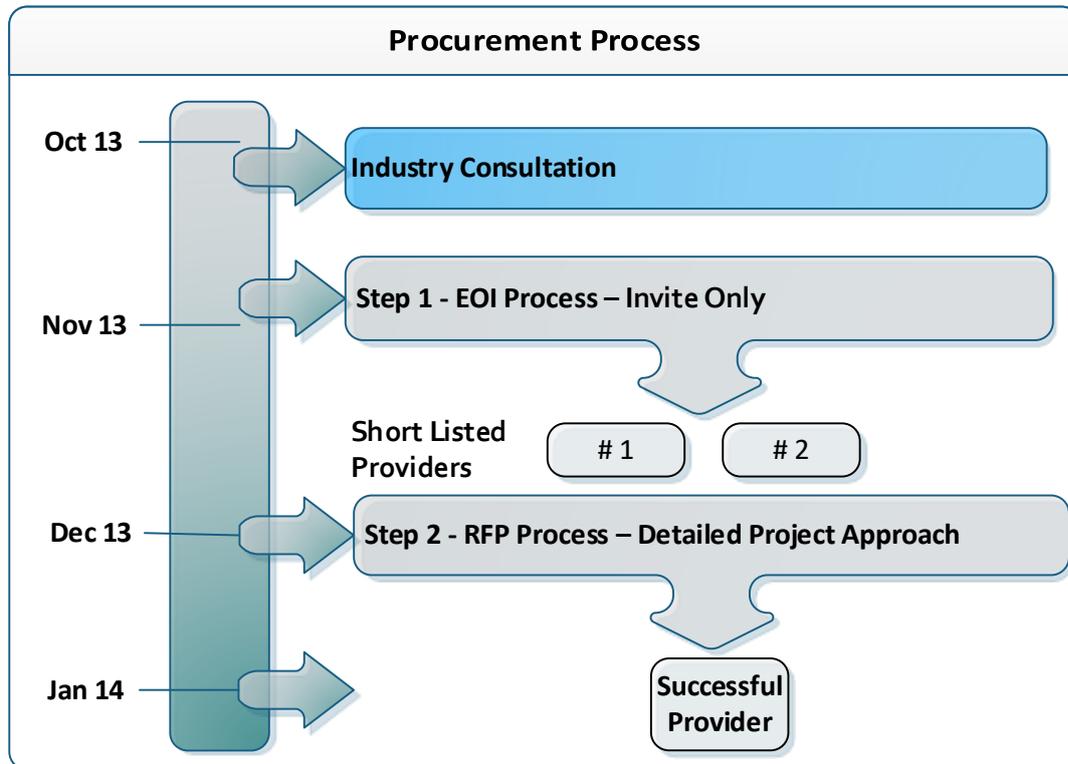
As described previously, the procurement of an IT supplier/partner was a critical component of the success of this project. CitySmart aimed to partner with an innovative and creative provider for the strategic design, build and support of the RYJ digital solution.

This required a partner that could bridge creative, IT and behavioural change requirements with user experience underpinning the solution. Furthermore, it was expected that this partner would be able to work with subject matter experts within the CitySmart consortium to draw their knowledge into the solution.

The model was both ambitious and complex and provided quite a procurement challenge. The objectives of the procurement process were to:

- provide commitment to a 'partnership approach' to development,
- source technical capability and single account management point
- gain a fixed price fee structure commitment to manage budgetary risk,
- improve local industry capacity and participation.

The following discussion summarises the procurement approach taken by CitySmart to deliver these objectives in acquiring a provider for the strategic design, build and support of the RYJ digital solution.



Industry consultation

In the industry consultation phase, CitySmart undertook an extensive market scan of the Brisbane and Australian market place for suppliers that met the required brief. During this phase, awareness of the program was raised to attract the interest of the best possible suppliers to meet the brief.

Expressions of interest (EOI)

In undertaking industry consultation, CitySmart generated considerable interest from a number of suppliers with varying technical ability and capability. Given the delivery model set out by CitySmart, only a selected number of suppliers were invited to submit expressions of interest proposals.

The purpose of the EOI process was to select suppliers that could demonstrate the capability (technical skills, experience and culture) to successfully partner with CitySmart to deliver this ground breaking project.

In the procurement plan only two providers were intended to be selected for this stage, however based on the high quality of responses a third was added. The outcome of this process saw three providers selected to work with CitySmart to prepare a detailed project approach in Step 2 - Request for Proposal – Detailed Project Approach.

Request for Proposal (RFP) – Detailed project approach

The purpose of the RFP process was to select a delivery 'partner'. Three organisations were selected to participate due to their demonstrated capability to meet CitySmart's needs. The RFP process focused on the application of the capabilities and approaches described in EOI submission and provided an opportunity for CitySmart to meet and work with the key staff that would be attached to the project.

The successful partner was selected using the following criteria:

1. Ability to demonstrate thought leadership and innovation.
2. Skills and experience of the delivery team attached to the program.

3. Quality and appropriateness of approach.
4. How we work together and cultural fit.
5. Value for money.
6. Organisational compliance and due diligence.

CitySmart designed the following procurement process to engage deeply with the potential providers:

Workshops

Each provider was given the opportunity to meet with CitySmart project team, giving providers an opportunity to discuss and learn about the project with the project team to aid in the preparation of the written proposals.

Undertaking workshops gave CitySmart an opportunity to experience working with the preferred partner's key staff to collectively work through an 'approach' to deliver the best outcome.

Written proposal

Providers were required to submit detailed project approach proposals to address the following key areas:

- A detailed approach/methodology to design and build the solution
- Project Plan including timeline and resource requirements to meet the launch date
- Pricing and risk sharing mechanism.

Proposal presentation

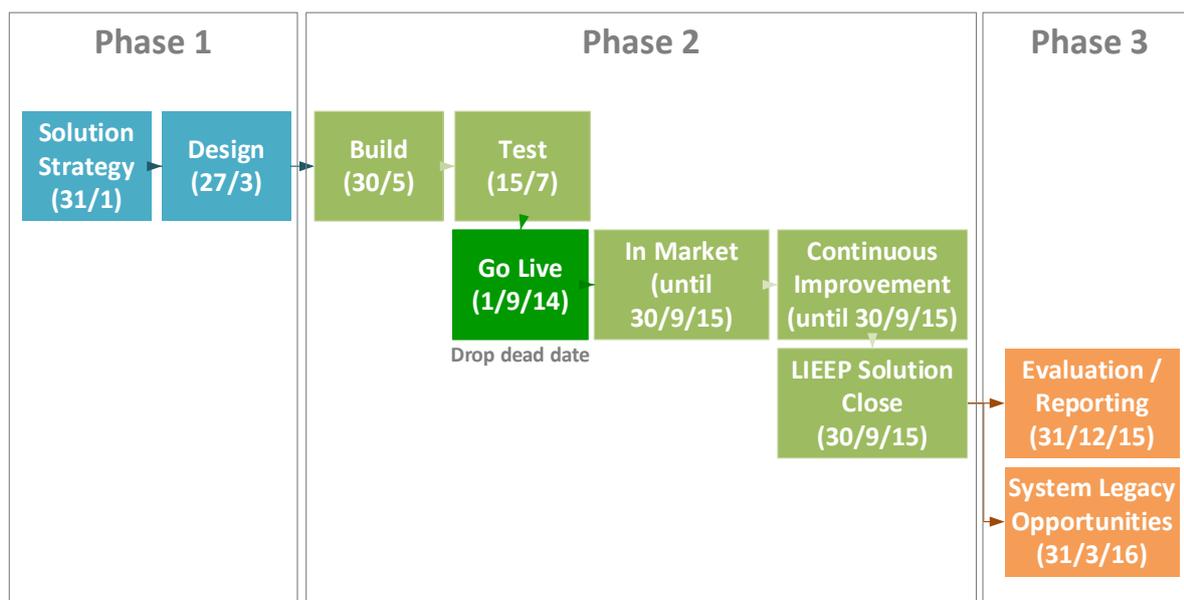
Finally, each provider was required to present their methodology, the proposed team, provide case studies of how methodologies had been applied to previous projects and demonstrate how they would bring their innovative approach to the program.

Outcomes from the process

In summary, this detailed process was able to deliver a more informed approach to tackling the complex challenges that would need to be solved within the project. It also enabled smoother, faster transition into delivery because the RYJ project team had briefed the IT provider/partner on key issues during the procurement stage. Working through the procurement process also demonstrated the depth of talent and world class capability on offer within the local Brisbane market. A supplier was selected and formal agreement struck with work commencing in early 2014.

Risk mitigation strategy for IT delivery

CitySmart was aware of the risk attached to non-performance of the chosen IT provider. To mitigate this risk, CitySmart separated the delivery of the IT solution into three parcels of work to provide flexibility to change providers, should it be required. This risk did eventuate and the first provider selected was ultimately terminated at the design stage in Phase 1. The section below discusses how this was structured.



Phase 1 – Strategy and design

The Service Provider was guaranteed the strategy and design stages at the fixed price as a result of being selected through the RFP process. Once the solution had been designed and agreed upon in Phase 1, CitySmart would review/negotiate terms and contracts for Phase 2. CitySmart committed to using its best endeavours to negotiate Phase 2 with the Service Provider selected in the RFP, however if mutual agreement with partner cannot be reached, CitySmart reserved the right to go back to market for the build and delivery phase.

Phase 2 – Delivery

This phase was to execute the design strategy agreed in Phase 1. It was envisaged to include building, testing and rolling out of the digital solution and supporting systems. We also believed that this would include any feedback and continuous improvement to enhance the program, as well as support and maintenance as required.

Phase 3 – Evaluation and legacy

Upon the completion of the program, the evaluation of the program will be undertaken by CitySmart and QUT. It was expected that significant support and maintenance of the back-end systems would still be necessary. Furthermore, we believed that there would be a longer term relationship with CitySmart through adopting innovative models to co-seek commercial or funding opportunities for the use of the legacy infrastructure.

Local industry engagement

As a social enterprise, CitySmart took a holistic approach throughout the all stages of delivery of the RYJ program to build capacity and participation within the local industry. The following section looks at the opportunities the project provided for local industry.

Building awareness and engaging local suppliers

CitySmart and the consortium partners were all Brisbane-based, Australian owned companies. CitySmart announced the awarding of the LIEEP program grant funding through local media and made use of its own significant business network with over 700 business contacts through a monthly newsletter and direct email. Consortium partners were provided with a media statement to distribute through their own channels to a wider audience. CitySmart undertook consistent promotion of the

program to a broad audience to generate awareness and opportunity for smaller organisations to participate in procurement activity.

The project team implemented strategies to prioritise purchasing from local suppliers (Brisbane-based Australian owned enterprises) for the supply of goods and services. CitySmart as a Brisbane City Council subsidiary was able to gain access to Council's procurement panels where due diligence on potential suppliers had already been undertaken. The relationship was used to tap into local suppliers and negotiate better commercial arrangements to drive additional value for the Commonwealth and participants due to Council's purchasing power.

Creating economic development opportunities for low income households

As the program targeted low income households, the project team took the opportunity to explore non-traditional fulfilment and supply options to create opportunities for employment opportunities for the target group. In the delivery of the program, opportunities were created for the following organisations:

- BoysTown, who provide training and skills for long term unemployed youth.
- Mylestones Printing, who provide training and employment opportunities for young adults with Cerebral Palsy League and 60 individuals with a disability
- Helena Jones Correctional Facility, who provide training and skills for women in the correctional facilities.

Our experience working with these fellow social enterprises was that they provided high quality service for competitive price. Whilst they were not the cheapest supply options, we found that they provide more flexibility and service delivery that was above and beyond the contractual agreements. Our experience was positive and we would recommend this approach to other potential government agencies and corporates looking for these solutions.

Build capacity in Brisbane IT industry

In the delivery of digital program, there was a substantial budget attached to the development of the technical solution. An extensive procurement process was put in place to select a partner who had the skills and ability to assist in developing the ultimate solution for the program. This approach enabled additional capacity within the supplier and the wider IT industry.

The approach enabled CitySmart to tap into world class capability on offer within the local Brisbane market. A number of innovative measures were developed in the analytics and data collection of customer data as part of the technical solution. Partners were also able to bring knowledge and ideas from other industries and apply it to the energy efficiency industry for the benefit of the target group.

Building capacity in research sector

The partnership approach adopted by CitySmart created additional study opportunities within the QUT Business Faculty and Creative Design Faculty. The projected identified gaps in existing knowledge as well as created new knowledge from research undertaken by Masters Students and PHD candidates attached to the program. It provided real world experience and problems for the students to apply their expertise to solving which in turn created value for CitySmart's project team.

Consortium member feedback

The following statements were received from QCOSS and QUT regarding their respective roles and benefits of being involved in the RYJ project.

QCOSS

Meeting the needs of community services and their clients.

The Queensland Council of Social Service (QCOSS) plays a crucial lobbying and advocacy role in a broad number of areas including cost of living pressures such as increasing electricity prices and the impact on low-income earners. QCOSS is pleased to have been involved in the RYJ program from its inception, drawing on our

expertise in working with community services supporting low income people across Queensland, to help shape and guide the project from design to delivery.

The cost of electricity has risen sharply in recent years and has become a major financial pressure for many low-income households across the state. QCOSS remains concerned about the impact of rising electricity bills, and the resulting risk debt and disconnection can have in compounding disadvantage for vulnerable households. The opportunity to extend this work as part of the RYJ program and engage and empower low-income young people to take control of their energy bills was a natural fit.

The QCOSS team was able to provide insights into the experiences of low-income people and the community services sector during the design phase to help target the program to meet the needs of services and their clients. There were several issues to address to ensure the program effectively met the needs of its target audience, including a technology barrier with several services reporting clients not having access to smartphones and unable to afford the data required to participate in the online program.

Also of importance was making the application process as simple as possible to ensure clients with low literacy were not excluded. Another challenge involved the appliance-swap reward process which was made more difficult as many people on low incomes have fridges and washing machines purchased through rent-to-buy schemes.

QCOSS' primary role in the RYJ program was to recruit participants through our network of community service providers who work with low income people on a daily basis. Limited resources and timing of funding cycles meant some services weren't able to participate or commit to rolling out the program, making recruitment planning a challenge. QCOSS was able to establish good relationships with several service providers upfront and worked on an agile recruitment strategy that was able to respond to emerging opportunities and leverage those relationships for the best results.

Targeting services which complemented the aims and objectives of the program was also important. QCOSS was able to facilitate and link the RYJ team with community organisations already providing programs and services to the target group supporting the energy efficiency messages behind the program – these included financial savings programs, employment programs, and housing and tenancy services. While seeking to reach low-income people, it was important to acknowledge that the program was not intended for disadvantaged people at risk or in crisis situations such as homelessness or domestic violence.

The Smith Family Saver Plus program was one of the most successful conduits for recruitment of RYJ participants. Saver Plus is a matched savings and financial education program based on eligibility criteria very similar to the RYJ program. Saver Plus clients, both past and present, receive regular email correspondence which provided a great mechanism to promote RYJ. Saver Plus clients are also very focused on building their financial management skills and reaching their savings goals, making them more likely to be open to energy efficiency messages provided by RYJ. Information about RYJ was promoted heavily through the Saver Plus network of community workers, and also via emails to clients who had attended the Saver Plus Money Minded workshops – which included a hyperlink to the RYJ registration page.

Leveraging QCOSS' relationships within the community services sector also enabled the program to be promoted through face-to-face communication which was invaluable to kicking off recruitment – particularly in the first wave. For some people, the promise of free whitegoods was "too good to be true", so it was important that these concerns were addressed by trusted service providers who knew their clients and had their best interests in mind. Delivering the program through community service programs enhanced the value of all relationships, and saved time and money by harnessing numerous existing communication channels and networks.

Fostering community sector partnerships with agencies such as Citysmart enabled opportunities for greater innovation. It is clear that programs can better reach their target audience and meet their unique needs when leveraging the collaborative strengths of those involved. More opportunities to learn new skills are presented, for example sharing social media skills, or cost-effective solutions to build the capacity of the sector to better communicate with clients and supporters.

QCOSS believes the RYJ program clearly demonstrated the often hidden value of the community services sector in directly engaging with low-income people. The enthusiasm of the sector for this program was a great way to build excitement and interest in something that sought to improve the lives of young people in need, a group which can often be difficult to engage and retain.

Twenty-two-year-old 'Miranda' is a perfect example of how the RYJ program benefited her and helped change her life for the better. Miranda heard about the program through a community worker who had been directly

briefed by QCOSS. At the time Miranda was unemployed and living in a small apartment in Mt Gravatt. Miranda shared her thoughts about the experience saying it was an “easy program to do. I knew a lot of the energy efficiency information but didn’t necessarily put it into practice. I did pick up some big tips such as washing in cold water. I received the fridge as a reward. This has made a big difference to the electricity bill. The last fridge was very old and not keeping the temperature. I would recommend Reduce Your Juice to other people”. Miranda has since found employment, love her new fridge and continues to put her energy efficiency knowledge to good use.

QUT

The collaborative relationship between CitySmart and QUT resulted in a highly satisfying project experience from the perspective of QUT. Often projects in government funded schemes such as LIEEP bring together consortium members in a highly structured manner where roles are defined prior to project start and where the lead member retains a significant amount of control and responsibility for the project. This approach could be classified as traditional whereby there is little opportunity for consortium members to be proactive and respond to opportunities that arise along the way. This traditional approach often constrains creativity and the possibility of a truly innovative outcome. Innovation means thinking differently and that’s exactly what the Reduce Your Juice team members at CitySmart and QUT set out to achieve; both in project outcomes and project process.

The initial brief for QUT was a minor role as the evaluation partner; to undertake research design, collect data, and analyse results. However it became apparent early in the project that QUT could offer far more to the project (for no additional funds) with the QUT team quick to offer expertise in social marketing strategy and a willingness to participate as an equal intellectual partner in the design of the program. CitySmart could have easily pigeon-holed QUT into the evaluation box (thanks but no thanks) to maintain control and thus minimise potential mistakes however innovation requires risks and so CitySmart openly embraced the involvement of QUT. This involvement created many benefits for the QUT team; the opportunity to work on designing a real world behaviour change project that was substantially funded and learn the process, the ability to provide capacity-building opportunities for research students and junior academics to ensure their theoretical knowledge was complemented by real world experience and the ability to demonstrate the usefulness of theory-led practice for achieving behaviour change. The Reduce Your Juice project is being used as a best-practice case example at QUT for demonstrating real world impact which enhances the reputation of QUT staff and the university. The data from the project will be used for several significant scholarly publications and thus provides the benefit to the scholarly community of knowledge generation. The project provided opportunities for the best and brightest at QUT; a honour student, two phd students and a masters student to extend their contribution to theory into the practical domain thus enhancing their career prospects.

The project management approach used by CitySmart quickly moved from a traditional tightly controlled inflexible approach to an agile approach. This change from a client-expert model to a co-creative partnership model allowed the team to be responsive, to learn from mistakes quickly, to take the leaps required for true innovation, to be able to troubleshoot and move to Plan B without compromising either the project goals or the scientific rigour of the study. The recognition by CitySmart of the knowledge that QUT could contribute led to high levels of trust; trust amongst team members is a necessary factor for an agile approach. This approach made the QUT team members feel valued and respected by CitySmart and they were willing to go above and beyond the minimum required contribution. The collaborative research model whereby QUT contributed the full-time academic staff member’s time in exchange for the opportunity to work together and publish meant that the QUT academics came to view the project as in-role and the time required to work on the publication was not an hourly amount to be accounted for but part of their daily job. This commitment meant risks could be taken as if work needed to be redone due to mistakes or dead-ends this wasn’t coming out of the budget. Generating external funds is a key performance indicator for an academic; academics cannot dedicate significant amounts of time to projects that do not provide adequate funding back to the university. The financial resourcing of the project to QUT for the analytic staff and funding of student research was sufficient to incentivise the academic staff members to participate actively.

The end result of the project is one that the QUT staff on the project are very proud of; QUT staff are already presenting information in the international arena and demonstrating that Australia is leading the way in the use of digital tools for behaviour change. Now that the team has a demonstrated track record of excellence and innovation (a rare combination), we are open for business; further funding is needed to take advantage of the development investment and roll out Reduce Your Juice to the broader community. It is hoped that the approach used in this project can be replicated by other government-funded projects across other areas that seek to combine the skills of practioners with scholarship to innovate and improve Australia.

Risk and compliance

Approach

CitySmart promotes a culture where quality and reliability of delivery is the responsibility of every team member. The Company's risk management and compliance practices set out a structured and focused approach to managing risks across projects, helping staff to identify, prioritise and manage all our risks, including strategic, business, and operational risks. This enabled the project team to successfully achieve objectives, maximise opportunities and reduce uncertainty effectively. Broadly, this was achieved through:

- Conforming to obligations under the Funding Agreement and regulatory requirements,
- Documenting compliance with Commonwealth, state, and local government legislation and policies,
- Understanding and managing compliance with the latest Information Privacy requirements,
- Using the risk and audit committee for compliance activities,
- Effective communication with participants, consortium partners and suppliers,
- Identifying, reporting, investigating and resolving all non-conformances and taking action to prevent recurrence,
- Educating and training our team members in order to continually improve their skills, awareness and knowledge of required quality outcomes and safe practices.
- Identifying improved practices that contribute to the overall sustainability of the company's business.
- Following ethical research practices including gaining ethics approval for data collection processes and instruments.

Risk assessment and management plan

A detailed risk assessment was undertaken at the commencement of the project using the company's risk assessment tool. The tool was used to identify potential risks, prioritise the risks, allocate responsibility within the project team for each risk and develop a plan of actions to mitigate the risks to prevent or reduce the impacts of the risks identified.

For the purposes of the RYJ program, a risk was defined as a chance of something happening that would have a negative impact on objectives of the program and was measured in terms of impact of consequences and likelihood of them occurring.

In undertaking the risk assessment the project team used their industry experience and expertise to identify the risks that may impact the project. Further consultation was undertaken with the Steering Committee to identify and mitigate further risks. At a practical level, the risk assessment and management plan was used by the project team to develop, document and track actions taken to avoid or reduce risk in a complex and time sensitive environment.

The document was a continuously evolving tool that was updated on an ongoing basis by the Commercial Projects Coordinator to reflect changes and progress made within the project. Eight versions of the risk assessment and management plan were published throughout the project period.

Compliance plan

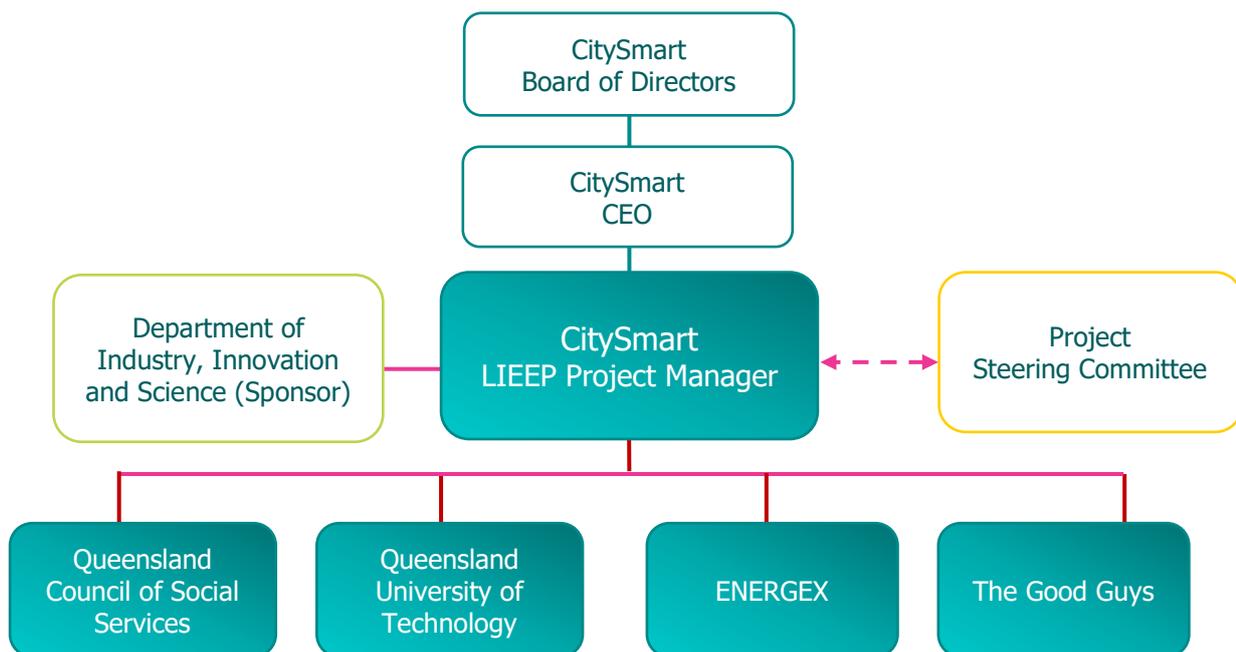
A compliance plan was created and managed by the Commercial Projects Coordinator. The focus of this plan was to document compliance to Commonwealth, state, territory and local government legislation and policies such as workplace health and safety, procurement and due diligence practices, compliance to key areas within the Funding Agreement, management of information privacy including our approach to the collection, storage, disclosure and use of personal information. Again, this was a detailed plan that documented systems and processes implemented by the project team.

Governance arrangements

CitySmart is governed and managed by CitySmart Pty Ltd Board of Directors who meet every six weeks and is responsible for the overall governance of the company and the delivery of the project within the company.

The Commercial Projects Manager was responsible for the implementation of the program, and coordinated the establishment of the RYJ project team. The Department of Industry Innovation and Science was the Project Sponsor and accepted all major deliverables in line with the Funding Agreement. The governance structure and roles are shown and discussed below.

Governance structure and roles



Project Steering Committee

The LIEEP Steering Committee was responsible for providing direction and advice regarding the strategic issues associated with the project that were essential to ensuring the delivery of the project outputs and the attainment of project outcomes.

The Project Steering Committee responsibilities included;

- providing strategic oversight of the project through its life cycle
- providing oversight, scrutiny and challenging the project team which may result in:
 - increased understanding and transparency of risks and benefits of the project
 - increased likelihood of successfully executing the project
- providing strategic contributions to the assessments of measurable benefits
- providing advice and input to address strategic risks or issues
- promotion of the project where relevant or assist in stakeholder management where relevant.

Ryj Steering Committee

Background	Area of Expertise
CEO CitySmart Pty Ltd	Energy Industry
Community Engagement Manager - Ergon Energy	Community Engagement
Director – Smart Grid Partners	Energy Industry
ICT & Digital Services Consultant	ICT & Digital Services
Team Leader - QCOSS	Community Services

The governance arrangements implemented provided value by drawing through a greater depth of experience as well as different and divergent perspectives to the risks and issues being managed. This engendered a more holistic solution for the ultimate benefit of program participants. It also made the project team accountable and forward thinking in navigating challenges and barriers to success.

An example of this was the process of choosing targeted energy behaviours for the program – one of the steering committee members facilitated a workshop with the team to use a Community Based Social Marketing technique to scope and score the behaviours for the program. The outcome of this was quite different to the initial behaviours selected by the internal team and improved the outcome of the trial.

Budget

Final budget

	Budget	Actual	Variance
Income			
Funding (ex GST)	\$5,548,258	\$5,548,258	
Interest Income		\$74,915	
Total Income	\$5,548,258	\$5,623,173	
Expenditure			
6-3410 Project Management & Staffing Costs	\$1,992,436	\$2,122,133	2.34%
6-3415 Products and Rewards	\$1,122,112	\$709,874	-7.43%
6-3420 Support Materials	\$197,925	\$256,058	1.05%
6-3424 Online Engagement	\$140,000	\$64,377	-1.36%
6-3425 Customer Engagement	\$108,425	\$60,929	-0.86%
6-3426 Digital Interfaces	\$123,350	\$288,089	2.97%
6-3427 Distribution and Installation	\$174,326	\$36,067	-2.49%
6-3430 IT Platform	\$549,000	\$935,230	6.96%
6-3431 Community Engagement	\$190,150	\$190,150	0.00%
6-3432 Professional Services	\$90,000	\$118,502	0.51%
6-3433 Behavioural Research	\$184,085	\$175,222	-0.16%
6-3434 Project Evaluation	\$352,821	\$354,668	0.03%
6-3435 Customer Support	\$93,061	\$0	-1.68%
6-3436 Project Office	\$230,567	\$168,981	-1.11%
TOTAL	\$5,548,258	\$5,480,281	
Closing bank account		\$142,891	

CitySmart had a substantial budget to manage for this project. The grant funding was managed to a position of being underspent by \$142,891 or 2.54% of the total grant funding available that was returned to the Commonwealth. The financial management of project was carried out in line with CitySmart's financial policies and procedures to ensure strong financial controls were in place. The Queensland Audit Office undertook annual audits of the project's finances to ensure activity undertaken under the scope of the grant was done so in compliance these policies and procedures. Control and authority of budget spend was allocated to the relevant disciplines within the project delivery team within their delegated spend authorities, to ensure the budget was understood by key decision makers when resourcing and project activity was being undertaken. The administration of the budget was the responsibility of the CitySmart accounts team and Commercial Projects Coordinator. Having this resourcing available to administer the budget was of considerable value to the project team to track and manage changes in resourcing as well as from a compliance perspective.

Changes and variations

Two key areas of expenditure caused changes to the budget being the products and rewards and the IT platform. The financial management strategy of these two items is discussed below:

Major rewards – budget management

Due to the nature of the project, it was unclear how many participants would actually complete the program to earn a major reward. On one end of the spectrum, there was a risk of under subscription, and at the other end was over subscription and in turn an overspend budget risk. Furthermore, upon consultation with the program stakeholders, it became evident that we could not provide one medium sized fridge product as planned in the grant application, which would have delivered more energy efficiency savings and enable a stronger bulk purchase arrangement to drive cost savings. Therefore, CitySmart undertook initiatives to claw back budget and took a very conservative approach to ensuring adequate budget was available to meet its obligation to participants and the Commonwealth.

CitySmart took a number of steps to mitigate this risk. Firstly, the project team designed minimum requirements or obligations within the program that would deliver an element of participant attrition and in turn reduced demand for expensive major rewards – please note this was done with sensitivity and extensive consultation with stakeholders attached to the program. Through the development of the program the white good offer broadened to include a washing machine and Webber BBQ which are lower cost items. An unintended consequence of this decision was that it eased budgetary pressures. When reviewing the product range of whitegoods available, there was a considerable cost impact of the providing the most energy efficient white goods, (i.e. an extra \$1000 per unit for five star products) therefore we took a common sense approach to balance the budget and deliver energy efficiency outcomes. CitySmart negotiated flexible procurement arrangements with the Good Guys to manage under subscription, so that any underspend would be returned. The project team proactively managing this issue throughout the life of the project to deliver a satisfactory result at the end of the program.

IT platform – budget management

The IT platform was the key deliverable in a digital engagement program. IT development is a high risk activity, with cost blow outs and lengthy delays common – we experienced both of these. CitySmart underestimated the cost and resources that would be required to deliver this critical element of the program.

The key cost consideration that was not well understood at the beginning for the project was that cost of IT infrastructure needed to support a program of this level of integration and complexity. (e.g. the user plays the game in one system, their data is collected in a third party product called Parse, game play data is then drawn upon by the CRM to drive automated communications, the communications are delivered in to participants in the Email Platform.) CitySmart had an existing infrastructure platform that it felt could run the program at the point of writing the grant submission – what we found during delivery was that this infrastructure need to be substantially upgraded and changed, additional expensive licencing was also needed and legacy systems actually increased the cost of development because the systems were not as tightly integrated as we needed. This activity is a sunk cost for a digital engagement approach, but once this initial investment has been made it can provide scale for activity.

We implemented the following initiatives to manage the over spend risk of IT platform: firstly we negotiated fixed price deals with our digital provider for the design and build of the infrastructure. This shifted some of the risk to the supplier rather than CitySmart. It became evident in the early consultation phase with our digital provider that the IT budget was at risk. The project team undertook a number of budget reviews to redirect resources towards this cost centre. This meant that resources were reduced from other areas of delivery to ensure enough resource was available for the IT budget. We undertook extensive reviews of the different products and licencing

arrangements, negotiated better deals and licence arrangements for example we took advantage of discounts available for 'not-for-profits' and charities. Finally, we had to compromise on some areas of the scope in order to reduce costs The key lesson was that IT project delivery is complex and can be costly, it's important to have internal skills and experience to assist in the development and management of the solution.

In-kind contributions

Summary of in-kind contributions				
	2013/14	2014/15	2015/16	TOTAL
Budget	\$283,899.00	\$428,502.00	\$240,496.00	\$952,897.00
Actual	\$254,049	\$470,397	\$488,265	\$1,212,711

The Reduce Your Juice consortium partners provided \$1,212,711 worth of in-kind contributions towards the program. This is \$259,814 or 27.27% more than the budget .

The structure of the Commonwealth's funding agreement and the CitySmart Consortium enabled Crest Electronics to be removed from the proposed consortium due to the change in the trial design described above. This is a key learning for future consortium management, because invariably in large scale projects there may be a need to enable the lead organisation to have the flexibility to manage a consortium partner whose function has become redundant.

CitySmart has discussed its approach to value for money in the procurement section above. We feel confident that we achieved value for money in the execution of activity within the program. However, our holistic approach also provided flexibility which was also a key component to successful delivery and very high levels of participant satisfaction. The reality of running a program for low income households is that it is more resource intensive to make up for some of the target group's limitations.

When analysing the outcomes of the trial in terms of value for money for the Department, we have provide a cost benefit analysis in the following section. In summary, CitySmart ran this trial with a discrete 1000 participants, however a digital delivery approach is scalable and we could use the system infrastructure built to run the program on a much larger scale. The trial has proven a light touch, digital engagement approach works. Therefore, to achieve value for money in terms of delivering this approach again would require larger scale delivery, where economies of scale could be achieved. Some high level modelling has been provided in the cost benefit analysis.

Cost benefit and effectiveness

Identification and quantification of costs and benefits

The Reduce Your Juice program has delivered outstanding results and benefits to low income young adult renters in Brisbane. The project team has undertaken the cost-effectiveness and cost-benefit analysis as per the outline provided by the Department. CitySmart wish to acknowledge some limitations in the analysis that should be taken into consideration when using these as a measure of success of the program:

1. Reduce Your Juice was funded as a trial for a new and innovative approach, therefore by nature of a trial involves testing a number of different elements within the project which in turn lead to cost duplication and additional resource allocation that may not apply to a program that would be operationalised on a larger scale.
2. The infrastructure cost of building the program would allow successful delivery to a much larger audience than the 1,000 participants recruited without incurring significant cost increases. We have provided some high level cost modelling for the program to be delivered to 10,000 and 100,000 people to demonstrate how economies of scale would improve the investment analysis of the program.
3. The analysis undertaken has been expressed on a per participant basis. We have converted the total cost base and benefits into a unit cost based on 1,000 participants that were recruited in order to produce the results reported. (i.e. we needed to recruit 1000 participants to graduate 601 participants through the program) All of these assumptions and workings are detailed in the 'Costs and benefits of Reduce Your Juice project' table below.

Cost-effectiveness analysis

A cost-effectiveness analysis has been undertaken to relate the cost of the program to its desired outcome being reduction in energy consumption. Three measures have been examined below, being estimated energy reduction, reach of the program through traditional media channels and social media reach within Australia.

The cost effectiveness analysis has been undertaken in line with the Department's guidance and the table below provides the four levels as described in the Costs and Benefits of Reduce Your Juice Project table below:

	Unit of effectiveness in kWh		
	(A)	(B)	(A) / (B)
Cost Level (as described in the Costs and benefits of Reduce Your Juice Project table)	Cost Per Participant	Unit of Effectiveness Per Participant	Cost effectiveness ratio Per Participant
Direct trial approach (Level 1)	\$1,002	3,175	\$0.32/kWh saved
Trial Component (Level 2)	\$2,018	3,175	\$0.64/kWh saved
Total Business (Level 3)	\$4,110	3,175	\$1.29/kWh saved
Total Trial (Level 4)	\$5,480	3,175	\$1.73/kWh saved
	Unit of effectiveness 'Traditional' Media Reach		
	(A)	(B)	(A) / (B)

Cost Level (as described in the Costs and benefits of Reduce Your Juice Project table)	Cost Per Participant	Unit of Effectiveness Per Participant	Cost effectiveness ratio Per Participant
Direct trial approach (Level 1)	\$1,002	754	\$1.33/person reached
Trial Component (Level 2)	\$2,018	754	\$2.67/person reached
Total Business (Level 3)	\$4,110	754	\$5.45/person reached
Total Trial (Level 4)	\$5,480	754	\$7.26/person reached

	Unit of effectiveness 'Social Media' Reach		
	(A)	(B)	(A) / (B)
Cost Level (as described in the Costs and benefits of Reduce Your Juice Project table)	Cost Per Participant	Unit of Effectiveness Per Participant	Cost effectiveness ratio Per Participant
Direct trial approach (Level 1)	\$1,002	1,300	\$0.77/person reached
Trial Component (Level 2)	\$2,018	1,300	\$1.55/person reached
Total Business (Level 3)	\$4,110	1,300	\$3.16/person reached
Total Trial (Level 4)	\$5,480	1,300	\$4.22/person reached

Cost-benefit analysis

A cost-benefit analysis has been undertaken to translate all benefits and costs into monetary units. The cost benefit analysis has been conducted by determining the estimated cost and then dividing it by the estimated benefit to obtain the Cost Benefit Ratio as per the Department's guidance.

	Actual RYJ Trial (1,000 Participants)		
	(A)	(B)	(A) / (B)
Cost Level (as described in the Costs and benefits of Reduce Your Juice Project table)	Cost Per Participant	Estimated Benefit Per Participant	Cost benefit ratio Per Participant
Direct trial approach (Level 1)	\$1,002	\$5,495	0.18
Trial Component (Level 2)	\$2,018	\$5,495	0.37
Total Business (Level 3)	\$4,110	\$5,495	0.75
Total Trial (Level 4)	\$5,480	\$5,495	0.99

The RYJ program at a high level looks economically viable because the net benefits greater than the total costs as indicated by the Cost Benefit Ratio.

Cost benefit analysis forecast – to demonstrate economies of scale available

On a relatively small scale basis of delivery to 1,000 participants, each dollar invested by the Commonwealth yielded a dollar of benefit due largely to the high set-up cost. The economic viability of a digital approach significantly improves at scale, for example delivery to 10,000 and 100,000 participants would deliver \$2.02 and \$2.70 in benefits for each dollar invested, thus providing a strong economic case for future investment.

	Forecast for 10,000 Participants		
	(A)	(B)	(A) / (B)
Cost Level (as described in the Costs and benefits of Reduce Your Juice Project table)	Cost Per Participant	Estimated Benefit Per Participant	Cost benefit ratio Per Participant
Direct trial approach (Level 1)	\$803	\$2,545	0.32
Trial Component (Level 2)	\$905	\$2,545	0.36
Total Business (Level 3)	\$1,137	\$2,545	0.44
Total Trial (Level 4)	\$1,258	\$2,545	0.49

	Forecast for 100,000 Participants		
	(A)	(B)	(A) / (B)
Cost Level (as described in the Costs and benefits of Reduce Your Juice Project table)	Cost Per Participant	Estimated Benefit Per Participant	Cost benefit ratio Per Participant
Direct trial approach (Level 1)	\$739	\$2,232	0.33
Trial Component (Level 2)	\$763	\$2,232	0.34
Total Business (Level 3)	\$801	\$2,232	0.36
Total Trial (Level 4)	\$826	\$2,232	0.37

The Cost and benefits table following identifies the costs and benefits used in the cost benefit analysis above. Economic costs and benefits were quantified where market values were available and other economic costs and benefits were discussed qualitatively.

Costs and benefits of Reduce Your Juice project

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
Costs:				
Direct trial approach (Level 1)	The delivery of an outcome for the: a. cost of delivering the trial approach to a participant. For example: The calculated cost of delivering: - the retrofit hardware and install cost per participant - the home energy audit and coaching cost per participant - the education program per person	Government, Industry	Allocation of the follow costs as described in Budget Section, General Ledger Items: <ul style="list-style-type: none"> • 6-3415 Products and Rewards • 6-3427 Distribution and Installation • 6-3420 Support Materials 	CitySmart General Ledger
Trial Component (Level 2)	The delivery of an outcome for the: a. the cost of delivering the trial approach to a participant, and b. costs associated with: i. recruiting a participant, and ii. maintaining a participant.	Government, Industry	Items described in Direct trial approach (Level 1), and Allocation of the follow costs as described in Budget Section, General Ledger Items: <ul style="list-style-type: none"> • 6-3424 Online engagement • 6-3425 Customer Engagement • 6-3431 Community Engagement • 6-3410 Project Management & Staffing Costs (1/3 Costs) 	CitySmart General Ledger
Total Business (Level 3)	The delivery of an outcome for: a. the cost of delivering the trial approach to a participant, and b. direct costs associated with: i. recruiting a participant, and ii. maintaining a participant. c. cost of running an organisation to do the above	Government, Industry	Items described in Trial Component (Level 2), and Allocation of the follow costs as described in Budget Section, , General Ledger Items: <ul style="list-style-type: none"> • 6-3426 Digital Interfaces • 6-3430 IT Platform • 6-3436 - Project Office • 6-3410 Project Management & Staffing Costs (1/3 Costs) 	CitySmart General Ledger

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
Total cost of the trial (Level 4)	The delivery of an outcome for: a. the cost of delivering the trial approach to a participant, and b. direct costs associated with: i. recruiting a participant, and ii. maintaining a participant. c. cost of running an organisation to do the above d. cost of participating in a government funded trial	Government, Industry	Items described in Total Business (Level 3), and allocation of the follow costs as described in Budget Section, , General Ledger Items: <ul style="list-style-type: none"> 6-3432 Professional Services 6-3433 Behavioural Research 6-3434 Project Evaluation 6-3410 Project Management & Staffing Costs (1/3 Costs) 	CitySmart General Ledger
Direct Benefits:				
Energy Savings Relating to Behaviour Change	The economic benefits attributed estimated energy savings reported by Reduce Your Juice Participants and electricity consumption data of program participants. QUT undertook statistical analysis of the data supplied to provide estimate.	Participants	<ul style="list-style-type: none"> \$277.47 per participant based on an \$54.82 avg. per quarter per participants for 601 graduates. Savings expected to dissipate over time – assumed 100% year 1, 66% year 2 and 33% Year 3. Total 3 savings for 601 participants / 1,000 total participants 	<ul style="list-style-type: none"> Self-reported data from participants Electricity consumption data from Energex QUT Statistical analysis
Energy Savings Major Rewards	The economic benefits attributed to the electricity saved based on new for old exchange of whitegoods for participants that graduated the program. Estimates are based the old whitegoods surrendered and the new whitegoods installed by Boys Town. It should be noted that this energy efficiency will be achieved in addition to Energy Savings Relating to Behaviour Change because the rewards were installed after this was measured.	Participants	<ul style="list-style-type: none"> 246 participants saved on average 121kWh per year or \$26.97 per annum for the life of product being 10 years. New Fridgers were on average 469Ltr and 3.5 star rating. Average fridge energy consumption before intervention was 481 kWh per annum. Total 10 savings of 246 participants / 1000 total participants 147 participants saved on average 114kWh per year or \$25.41 per annum for the life of product being 10 years. 147 participants saved on average 114kWh per year or \$25.41 per 	<ul style="list-style-type: none"> Primary data collected by Boys Town at point of collection QCA Regulated retail tariffs and prices for residential customers (excl. GST)

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
			<p>annum for the life of product being 10 years.</p> <p>Benefits relating to BBQ come from fuel substitution – no direct cost benefits have been provided for in the estimated unit costs expressed above.</p>	
Whitegoods supplied to participants	The economic benefit for participants who earned the major reward. The reward was a new Whitegoods supplied and installed in exchange for their old energy intensive Whitegoods (Refrigerators, Washing Machined and BBQ) The 601 participants that graduated the program earned this reward. Low Income Households don't have the capital to purchase these products energy efficient products by themselves.	Participants	<ul style="list-style-type: none"> • Average of \$709.83 per participant • 246 refrigerators delivered to participants • 147 washing machines delivered to participants • 208 participants received a BBQ pack including Gas Cylinder 	<ul style="list-style-type: none"> • Primary data from the Good Guys
Minor Rewards supplied to participants	There are a number of potential economic benefits for participants who were supplied with minor rewards during the program to inspire and support energy efficiency behaviour change. (e.g. Energy saving standby power board, picnic blanket, beach chair, cooler bag, clothes line, pedestal fan) These items supported energy efficiency behaviour and were also set and forget energy efficiency devices. Low Income Households don't have the capital to purchase these products energy efficient products by themselves.	Participant Industry	<ul style="list-style-type: none"> • 601 participants receiving goods to the value of \$75 • Primary survey data provided by participants, around the social benefit and use of products however only the cost of suppling product has been included. 	<ul style="list-style-type: none"> • CitySmart General Ledger • Survey data from RYJ program
Indirect Benefits: Improvement to householder health, lifestyle and social well-being.				
Benefits in replacing new for old refrigerator	There are a number of potential health benefits and associated economic savings in replacing old, poorly maintained refrigerators and/or inappropriately sized fridges as a result of the program. The benefits collected from participants includes keeping food fresher longer, enabling more fresh food to be purchased because they have more room in the fridge and therefore creates opportunity to buy in	Participants, Community, Government, Industry	<ul style="list-style-type: none"> • Averaged spend for Australian Household on Food and non-alcoholic beverages \$204/week in 2009-10 (ABS data) • Assumed 5% average saving for groceries savings • 246 participants that graduated and received a fridge, however we have 	<ul style="list-style-type: none"> • Primary data from The Good Guys and Boys Town who coordinated delivery of Whitegoods • 6530.0 - Household Expenditure Survey, Australia: Summary of Results, 2009-10

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
	bulk for a week or fortnight.		<p>applied a conservative estimate of only 25% receiving the saving.</p> <ul style="list-style-type: none"> Estimated savings forecast for the life of the fridge. No indexing on costs applied 	
Reduction in landfill and associated waste management costs and environmental externalities.	Cost savings associated with a reduction in waste management costs and environmental externalities. The Department of Environment in 2009 engaged the BDA Group to prepare a report to provide estimates of the costs of the disposal of waste to landfill. This ranged between \$45 and \$105 per tonne of waste in urban areas and between \$42 and \$102 per tonne in rural areas depending on the level of management controls and prevailing climate.	Industry, Environment, Community	<ul style="list-style-type: none"> 19.2t of scrap metal collected and sold at estimated 45c/kg 900kgs of cardboard recycled at 45c/kg of landfill diverted 246kgs of polystyrene recycled at 45c/kg of landfill diverted 92kg of plastic recycled at 45c/kg of landfill diverted 	<ul style="list-style-type: none"> Primary data from The Good Guys and Boys Town who coordinated delivery of Whitegoods. Spot price for scrap metal Department of Environment publication - The full cost of landfill disposal in Australia
Benefit of reduced carbon emissions	There are a number of health implications associated with emissions and their detrimental environmental effects. A reduction in emissions has the potential to reduce these adverse health outcomes.	Community	<ul style="list-style-type: none"> Average lifetime energy reduced \$706.06 National Greenhouse Factors Indirect emission factors for the consumption of purchased electricity. Emission factor 0.79kg CO₂ e/kWh for Qld Estimated price on carbon from Emissions Reduction Fund November 2015 auction \$12.25 per tonne. 	<ul style="list-style-type: none"> Primary energy consumption data collected from participants. National Greenhouse Factors Emissions Reduction Fund Average Bid price from November 2015 Price
Health benefits from Reduce Your Juice Program. i.e. Significant improvements in comfort.	Program participants reported an improvement in comfort. (i.e. including thermal comfort) There are a number of potential health benefits and associated economic savings that may be achieved as a result of the program. These benefits include: improvements in health and life expectancy; fewer days away from work or with restricted activity; fewer medical consultations; fewer hospital	Participants, Community, Government, Industry	<ul style="list-style-type: none"> These benefit were observed but no benefit estimate was included in the calculations 	

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
	admissions; reduced use of medication; and increased productivity.			
Benefits from educating children within households where the program was run.	Program participants reported a high level of engagement with children within the household. The game was used as an education tool and key messages and behaviours within the program were adopted by children as a consequence of the program	Participants, Community, Government	<ul style="list-style-type: none"> These benefit were observed but no benefit estimate was included in the calculations 	
Health benefits from Reduce Your Juice Program. i.e. Significant improvements in comfort.	Program participants reported an improvement in comfort. (i.e. including thermal comfort) There are a number of potential health benefits and associated economic savings that may be achieved as a result of the program. These benefits include: improvements in health and life expectancy; fewer days away from work or with restricted activity; fewer medical consultations; fewer hospital admissions; reduced use of medication; and increased productivity.	Participants, Community, Government, Industry	<ul style="list-style-type: none"> These benefit were observed but no benefit estimate was included in the calculations 	
Indirect Benefits: Other economic benefits such as supporting local business grow, including local business engagement and employment opportunities				
Supporting employment opportunities for long term unemployed youth	Estimated benefits associated with building the knowledge and capacity of low income households and vulnerable members of society.	Community, Government, Industry	<ul style="list-style-type: none"> Assumed 80% of the cost of delivering white goods 	<ul style="list-style-type: none"> CitySmart General Ledger
Supporting employment opportunities for people with a disability	Estimated benefits associated with building the knowledge and capacity of low income households and vulnerable members of society.	Community, Government, Industry	<ul style="list-style-type: none"> Assumed 80% of the cost of packing service fees 	<ul style="list-style-type: none"> CitySmart General Ledger
Supporting employment opportunities for people in the corrections and rehabilitation system	Estimated benefits associated with building the knowledge and capacity of low income households and vulnerable members of society.	Community, Government, Industry	<ul style="list-style-type: none"> Estimated a conservative \$1,000 worth of benefits created for the community 	<ul style="list-style-type: none"> CitySmart General Ledger
Supporting opportunities to develop knowledge and capability through education	Estimated benefits associated with building the knowledge and capacity of consortium members. Dissemination activity to show case program outcomes and share learnings with the energy industry	Community, Government, Industry University sector	<ul style="list-style-type: none"> Assumed 90% of the cost of research and evaluation fees paid to QUT were applied to employing and supporting students This is a not-for-profit model, 	<ul style="list-style-type: none"> CitySmart General Ledger

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
			therefore higher direct benefit ratio applied	
Supporting the development of local energy efficiency knowledge and skills	Estimated benefits associated with building the knowledge and capacity of consortium members to encourage long-term energy efficiency among their customers or clients.	Community, Government, Industry	<ul style="list-style-type: none"> CitySmart's wages paid to RYJ project staff 	<ul style="list-style-type: none"> CitySmart General Ledger
Supporting employment opportunities and capacity building in the social services sector	Estimated benefits associated with building the knowledge and capacity of consortium members to encourage long-term energy efficiency among their customers or clients.	Community, Government, Industry	<ul style="list-style-type: none"> Assumed 90% of the cost of community engagement fees paid to QCOSS were applied to employing social services resources within the community This is a not-for-profit model, therefore higher direct benefit ratio applied 	<ul style="list-style-type: none"> CitySmart General Ledger
Supporting local business engagement and employment opportunities in IT industry	Estimated benefits associated with building the knowledge and capacity of local business. Supporting local business grow, including local business engagement and employment opportunities.	Community, Government, Industry	<ul style="list-style-type: none"> Assumed 80% of the cost of IT services procured within the program were spent on employment of local staff 	<ul style="list-style-type: none"> CitySmart General Ledger
Supporting local business in professional services sector	Estimated benefits associated with building the knowledge and capacity of local business. Supporting local business grow, including local business engagement and employment opportunities.	Community, Government, Industry	<ul style="list-style-type: none"> Assumed 80% of the cost of professional services procured within the program were spent on employment of local staff 	<ul style="list-style-type: none"> CitySmart General Ledger
Earned Media Value	Earned media (or free media) refers to publicity gained through promotional efforts other than advertising, as opposed to paid media, which refers to publicity gained through advertising.	Community, Government, Industry University sector	<ul style="list-style-type: none"> As per report detailed under Results for Media and PR promotion 	<ul style="list-style-type: none"> Media/PR agency
Benefits of dissemination activity to build awareness and knowledge in the commercial, government, and	Dissemination activity undertaken by CitySmart, QUT, Suppliers attached to the program has the benefits of building awareness and knowledge within the industry. This activity includes domestic and international conferences, awards, presentations to industry, briefing to local, state and	Participants, Community, Government	<ul style="list-style-type: none"> These benefit were observed but no benefit estimate was included in the calculations 	

Cost/Benefit	Description	Bearer/ Beneficiary	Costing Assumptions	Source of information
education sectors.	federal ministers and senior bureaucrats, energy retailers, hardship program managers, and social services providers.			

Challenges and key learnings

Delivering innovation

Ideas are easy. Implementation is hard – Guy Kawasaki

The national innovation and science agenda sets out a bold vision for Australia in the digital economy. Under this agenda, “Innovation is about creating new products, processes and business models. It is also about creating a culture that backs good ideas and learns from taking risks and making mistakes.” Implementing this agenda will involve an extensive transformation across the economy and broader society, in the context of the LIEEP program it means changing the way we do things and how we deliver government services. The Reduce Your Juice program is a positive case study of bringing innovation to life.

Key learning

The challenges associated with delivering innovation idea shouldn't be understated. The success of the program can be attributed to:

Managing risk and uncertainty

The program proposed a new and untested approach to delivering a service to vulnerable members of society. The risk of negative potential outcomes for the target group often provides a significant challenge to exploring innovation and new approaches. The Department and Consortium demonstrated the courage to move forward with this trial in spite of this uncertainty.

Collaboration creates new ideas and innovation

The ultimate program solution was the result of collaboration. The collaboration approach adopted required collective decision making, which took more time and at times lead to slow progress as interdependent issues were unpacked, discussed and rehashed until the solution was agreed. Facilitating this collaboration requires significant stakeholder management to make it work.

Learning from mistakes

Creating a new approach and product is challenging because at times there is no clear pathway forward. This meant that mistakes were made and sometimes the project team had to back track. However, each mistake brought us closer to the ultimate solution and delivered valuable experience to the team and broader industry.

Key insight

Delivering innovation requires tenacity and agility to overcome barriers to success.

Speaking different languages and managing different philosophies

The RYJ program incorporated many stakeholders across different disciplines and areas of expertise. Stakeholders used different language, terminology, and understandings of concepts which led to confusion. Not only was the language different, stakeholders also brought different philosophies from which issues were worked through. For example:

- CitySmart operates with a environmental outcome base.
- QCoSS operates with a social outcome base.
- QUT operates with a knowledge/academic base.
- BCM operates with a commercial base.

Collaboration extends beyond simply bringing people together, the group needed to buy into the vision for the program in order overcome barriers and challenges. CitySmart played the role of

bringing disparate stakeholders together, acting as a bridge for translation to build understanding among different stakeholders, while ensuring the group collectively kept the program's vision in mind.

Key learnings

- Communicate a shared goal and bring stakeholders together for better outcomes.
- Shared ownership of the goal assists with facilitating compromise for the greater good.
- Good collaboration provides flexibility for experts to explore issues outside of their traditional roles.
- Collaboration among multiple stakeholders requires time, effort and cost but has proportionate rewards.

Digital verification for participation

One of the key challenges for a digital delivery approach is verifying a person was in fact a low income household. This process is normally done through human intervention in traditional delivery approaches. CitySmart invested considerable time and effort understanding the implications and creating a solution that was both rigorous but also fair and equitable.

The Centrelink's Confirmation eService can verify potential participant's concession card or if they were in receipt of a government benefit. This solution provided a strong form of verification to manage the risk of fraud, reputation risk for all parties and the inappropriate use of public funds. The challenge was obtaining permission to access the Centrelink system. CitySmart went through a stringent and lengthy application process which took nearly 10 months to get approved.

Where the participant didn't have a Human Services CRN to be verified through Centrelink's Confirmation eService, a process was developed for the customer support resource to contact the participant, giving them the opportunity to electronically send a photo of their last Tax Assessment Notice and payslips to prove their low income status. Again, technology was effective in overcoming the challenge. This gave the opportunity to include low income professionals such as childcare workers, apprentices and tradespeople to register to join in the program.

Key learning

- Having access to Centrelink's portal and an alternative system ensured access to the program was fair and equitable for all low income participants, including those not on government benefits.
- Integration of different areas of the government can improve service delivery and convenience for end users and improve quality for delivery agents. (win-win)
- CitySmart were able to turn a traditionally perceived weakness into a strength of the approach.

System integration doesn't mean less resource intensive

An integrated digital platform was designed and built to support the delivery of the program. This platform was highly complex, due to the integration of several data systems to meet the rules and different pathways that were necessary to accommodate the treatment groups, trigger communications in real time and provide a simple customer experience.

CitySmart chose to integrate systems as much as possible, under the assumption that it would improve the customer experience at the front end and cut down on resources required to administer the program at the back end. The associated complexity of developing a fully-integrated solution were not properly quantified and understood at the start of the project. This required additional budget to develop the system and human resource to monitor the systems when in-field.

Key learnings

While there were great benefits in linking the systems through interfaces and triggering actions based on business rules, the solution was also resource-intensive in constantly monitoring the end-to-end solution and trouble-shooting technical challenges.

A key learning is to only integrate essential components of the program that are business-rule driven and necessary to create a meaningful customer experience. The team found that with some automated participant communications, it would have been more effective to send them out manually to maintain more control over the process and allow more agile marketing delivery.

Key insight

When interfacing multiple systems, ensure there are internal resources within the project team who can understand the different systems, administer the systems, troubleshoot and translate marketing and customer language with the technical language used by suppliers.

Customer centric versus data-driven

One of the key objectives of the LIEEP program was to capture and analyse data and information to inform future energy efficiency policy and program approaches. This evidence based approach provides greater confidence for policy makers that the trials either worked or did not work.

CitySmart understood and supported this data driven, evidence based approach. However, the key challenge for an entirely digital program was to collect this data from participants whilst minimising the impact on the customer experience and in turn customer drop out. This provided significant complexity to the program.

Digital delivery approaches will always come up against this challenge. By adopting a customer centric approach as demonstrated by CitySmart in Reduce Your Juice, and allowing a pragmatic approach to data-collection, this challenge can be overcome.

Key learning

Data collection to provide evidence based policy is important, but should not be done at the cost of ruining the customer experience and the benefits of the intended program or intervention.

CONCLUSION

Key findings and outcomes

The RYJ program was ultimately successful in trialling a new and innovative approach to energy efficiency for low income rental households in Brisbane to become more energy efficient. The trial has provided a range of measurable outcomes and benefits which offer insight into future energy efficiency programmes and policy.

RYJ demonstrated the effectiveness of interactive digital learning for energy efficiency, including the effectiveness of components such as community, rewards, and digital and social communications. The trial showed that a digital learning program can in fact change energy consumption behaviours, achieving the main program objective of helping the target group to reduce their energy consumption by changing their habits and providing a meaningful cost benefit for participants.

In addition to improving the energy efficiency habits of its participants, RYJ significantly improved a range of psychological factors which more broadly impact the lives of participants. Participants' learning resulted in positive changes and improvements to their lives including willingness to give up comfort, as well as significantly improved attitudes and behavioural intentions, self-efficacy, bill control, and opportunity to save electricity. By reducing energy consumption, participants reduced the cost of living impact of their energy bills.

The trial showed no significant difference in behaviour change results for the different reward and communication based treatment groups. As the trial included high value rewards products, the different type of rewards was insignificant in relation to the provision of rewards themselves. While participants may have benefited from the choice of final reward to better suit their circumstances, the offer of a substantial reward was more than adequate to inspire appropriate action in the target group. In fact, the provision of a prize pool may have been a more cost efficient option likely to produce similar results. The program's intrinsic reward component proved to be of high value to participants, with the intrinsic motivation of learning, achieving and being rewarded via intangible means just as effective in engaging participants. In the context of communications, it is likely the difference in the treatment groups was not significant enough to show an impact, especially given the nature of the program involving a high number of short bursts of communications and touchpoints with participants compared to traditional interventions.

The trial's landlord engagement component may be viewed as a shortcoming, with no evidence of participant's landlords taking up the Energex rebate offers. Although participant engagement with this 'Ultimate Energy Quest' was high, it did not translate into action. This element of the program differed from the simple, easy approach taken more broadly, involving larger, more complex barriers to action.

The development of a new and innovative program was full of complexity and risk, however the appropriate resourcing and collaborative, positive approach of the multi-disciplinary team was crucial in delivering a successful final product. The innovative approach of the RYJ program provided many benefits and expanded the capacity and experience of the participating consortium and partnering organisations. This includes the broadening of knowledge surrounding energy efficiency for young low income renters, as well as in the delivery of a complex, sophisticated digital solution integrating multiple digital channels to benefit both user experience and research and evaluation.

In developing an innovative program, the use of agile development techniques and the infiltration of this mindset amongst the team proved an effective way of managing multiple risks and uncertainty while working towards achieving the program goals. The use of agile marketing was also effective in testing and refining content and messages with the target group to create a more relevant experience to resonate with participants. Holding the customer at the heart of all approaches proved beneficial

for the outcomes of the program, with strong customer results achieved and positive feedback received.

The program results reinforce the relevance and usefulness of digital channels applied appropriately to create a meaningful experience for participants, especially surrounding the use of serious games and gamification to change energy related behaviour. The use of fun and entertainment has been shown to be an effective way to help participants learn and change, especially with the mundane, low involvement nature of energy efficiency behaviours. Gamification techniques were especially helpful in bringing together the multiple elements of the intervention into a fun experience for participants designed to elicit action.

The inclusion of a community as part of the intervention ended up being an important gamified component of the program which provided an essential element of collaboration for participants. Creating a shared experience for participants was an effective way of adding visibility, tangibility and value to energy behaviours through peer discussion and community comparison. The combination of community collaboration with a dash of fun competition from the app games improved social norming for participants, opening the door to further exploration in this area for behaviour change.

The fit-for-purpose behaviour change model developed for RYJ was a congruent fit with game and gamification techniques in affecting positive change, with the use of fun activities, rewards, communications and community positively meshing together to form an effective multi-element intervention. Basing the intervention on core behaviours decided through the use of techniques taken from Community Based Social Marketing provided direction and focus for the program which helped ensure the program was easy, impactful and relevant to participants.

With the intervention comprising of multiple, integrated digital channels, the fracturing of content into small, bite-sized portions was an effective approach to integrate content into the digital lifestyles of participants. Providing many small pieces of largely graphical content through different channels including games, community, email, SMS, app messages was consistent with the continuous learning approach used in the intervention, allowing participants to digest small simple pieces of information to continually learn by doing.

While the user experience of the program was designed to be simple, this should not be confused with the program being simplistic – complex thought and careful consideration went into building a sophisticated digital system capable of delivering a simple and relevant experience for participants.

Overcoming the low involvement nature of energy consumption, RYJ helped make the invisible visible, the intangible tangible and the undervalued valuable.

Recommendations

Future research

RYJ provided a breadth of information and insights into energy efficiency and low involvement behaviour change in the digital space, however the results have also generated interest in further areas for future research. For example, research in the use of serious games, and gamified communications and community for behaviour change. The application of the behaviour change model for broader use in issues-based programs outside of energy efficiency is another area of interest. This research supports the national innovation and science agenda creating new products, processes and delivery models.

Wider applications of the Reduce Your Juice recipe

Following the success of the RYJ program and the evaluation of the program in more detail, CitySmart is investigating different options to apply the RYJ recipe more broadly. The learnings from RYJ have provided the CitySmart team with valuable insight into developing and delivering a digital intervention to help change behaviour which has potential application in different areas.

The RYJ digital platform built for the program can be used for broader application with minimal changes, which allows for scalability over larger areas. The success of RYJ in engaging and changing the energy behaviours of low income young adult renters suggests that the program or the 'recipe' for the program could be applied more broadly. Suitable areas for consideration are:

Other target groups and geographic locations

Using a digital, gamified approach would be suitable for other demographic or lifestyle-related target groups of participants. Research suggests that games and gamification have broad relevance beyond younger demographics, with 65% of Australians shown to play video games and 93% of households have a device that can be used for playing games (Digital Australia, 2014). This includes expanding dimensions such as age, income levels and housing tenure of participants. Despite advertising the trial's program criteria for participation, the program received numerous enquiries as to whether the program would be available to broader groups of people, both geographically and for other demographics (age and income), showing the broad appeal of the program.

In developing RYJ for broader target groups, a key factor in future success would be to reassess target behaviours for the program that are most relevant to the target group. The behaviour change model and selection of core behaviours used in RYJ can be easily reapplied to develop a suitable intervention. To make the program relevant to a broader age range of participants, the language and graphical style used in the program could be reassessed for broader appeal.

Other causes and issues

The elements of RYJ can be tailored for other sustainability behaviours such as saving resources in areas such as water and waste. The use of a low involvement behaviour change model is particularly relevant to these behaviours where people may not prioritise their importance within the broader context of their lives. Selecting the right behaviours to make the intervention easy and impactful would be vital to the success of this style of program development, as is the use of fun to create an intrinsically motivating experience for participants.

With ever growing digital noise and busy consumer lifestyles, the low involvement RYJ approach may have application looking further afield than sustainability to other important issues such as communities, education and health where people struggle to prioritise the importance of boring or mundane issues within their busy lifestyle.

Program enhancements

Following the analysis and learnings gained, CitySmart and its key program partners are in the process of applying changes that will allow the program to roll out to new target groups and wider geographic areas, with interest from energy retailers, government departments and councils.

The following key improvements are being implemented:

Simplification

As a completely digital program, entry into the program needs to have adequate compliance yet a simple and enticing user experience. To reach a wider target group, the team is simplifying:

- The registration form to remove previous restrictions such as tenure, age, geographic and Centrelink verification requirements.
- Communications to remove complexities from previous participation restrictions and research and evaluation requirements such as treatment groups.

- Back-end system processing in that the stringent research requirements will be removed going forward and participants no longer need to be assigned into different treatment groups.
- The terms and conditions to be further simplified and the removal of stakeholders in an alternate operational model would also assist in the simplification of this issue.

Make it fun and engaging

The key to targeting low engagement behaviours is to create a user focused experience which requires low effort but provides high value for participants to return high results. In doing so, the team has increased the emphasis on community and the intrinsic motivation of participants.

Learnings from RYJ found that the time limit in the game (ie 10 minutes per game) was not essential, with participants playing over 5 times more than required. Instead, focus will be directed towards the game user experience of unlocking badges and other game rewards to create intrinsic motivation and reward, which was found to be an important element for participants. The team has enhanced the visibility, functionality and value of the badges within the program in games, communications and the community.

Rewards

As the distribution of major and minor reward products is unlikely to be financially sustainable on the scale of the original program, the program's reward system has been restructured to prioritise intrinsic rewards. This decision was also influenced by the feedback from participants who, even though communication stated they would *earn* rewards, thought they were in the running to *win* a reward. Therefore, rewards could be amended to be largely intangible (i.e. no cost) rewards or chances to win a relatively high-value tangible reward.

The game badges play a major role in this strategy, with the more badges participants unlock acting as immediate reward for action in the program and providing participants with a greater chance to win a tangible reward (with each badge serving as one entry in the chance to win a prize). The badge element will be extended beyond the app games to be included in email communications and community discussion. This is more cost effective from a program perspective, and has the benefit of building the confidence and motivation of the participant.

Another benefit of restructuring the rewards is to meet the participant's expectation of instant gratification with real-time rewards as well as larger scale progression through the program towards a final goal, which was a learning that came out of RYJ. Changes to the program will make the badges and status level trophies more visible at time of earning them within the app games, and generate an automated email congratulating participants on achieving their new status level trophy (ie Bronze, Silver or Gold).

Community

A key learning from RYJ was the role of the community in creating a shared social experience for participants which affected social norms for the energy efficient behaviours. In the next iteration of RYJ, the aim is to create a more overt shared goal (rather than just reducing energy consumption) and incentivise the community to reach a collective goal that will benefit the community.

The use of Facebook for the community element of the program would continue given the relevance of the medium remains with the chosen target group for future iterations (which is likely, even with older demographics). This is especially important for low involvement topics, in reaching people in a non-intrusive manner that fits in with their busy digital lifestyle. The management of the community via Facebook can be enhanced by more heavily integrating content with the games and other communications. Management of the community can be improved by dedicating resources to respond to enquiries around the clock, especially given the propensity to engage later in the afternoon and evening outside of normal business hours.

Relevance

A key learning of RYJ was that relevance is important. Due to schedule delays, the Temperature Defender game which focused on reducing the use of air conditioning was presented to participants during winter. This was not as impactful on habit change as when it was presented during warmer months. In the next iteration of RYJ, a Winter Temperature Defender game will be developed, so that the heating related behaviour can be targeted in close proximity to the seasonal climatic conditions of participants. The program will be designed to allow for the flexible ordering of the RYJ games so that participants can engage with relevant content.

Relevance is also important for the core behaviours being targeted. As the target groups are expanded, the behaviours may need to be reassessed and targeted for relevance to a particular group. For example, if the program was broadened out to include homeowners, the messaging or games may need to incorporate capital improvement to households for larger impact.

Recruitment

While the recruitment of participants for future iterations of RYJ may depend on the program's application and participants, CitySmart has developed knowledge and skills in this area that could be applied more broadly. The strong popularity of digital channels as part of the recruitment mix provided insights into the new world digitally savvy consumers.

The use of highly measurable digital channels would be included in the future mix of recruitment avenues for the program. Participant's willingness to engage on social media to sign up to the program would provide an efficient, cost effective way of targeting and recruiting future participants. While this will never replace social service interventions, the use of digital channels to recruit and communicate with in need groups of people can be effectively applied using appropriate resources to save time and effort that could allow more focus on the core social service at hand. The use of digital channels can also be effectively implemented to manage sign ups within a shorter, more defined period of recruitment.

Reporting and analytics

As future iterations of RYJ likely won't have an academic or stringent research focus, the pre and post surveys can be reduced to only collect key analytics and information and improve the customer experience.

In the original program, only a limited number of game analytics was interfaced into the CRM. With the increased importance of game metrics in creating a relevant and customised user experience, more participant level game analytics will need to be interfaced with the CRM to ensure the CRM can be the single-source of truth and to cut down on manual analysis and manipulation of data. This data will be used to improve the participant's experience, being able to send more meaningful and instant feedback communication integrated with the games.

If the program was to be extended to geographical locations where smart meters are present, real-time energy data could be integrated into the program for more meaningful, immediate feedback about real household energy use and actual savings.

Beyond the individual

At present the RYJ experience is largely developed around an individual. Future improvements of the gamification component of the program would build upon the community learnings to design more social aspects within the game experience to improve the level of social value generated for participants.

Future iterations of the program could incorporate the whole household more formally in the program, through shared or team logins. This would require considerable redesign of the architecture and experience of the game however would be a meaningful improvement given the household level consumption of energy. As an interim improvement, communications and activities can be redesigned

to create a household incentive scheme as part of the program, so that participants have the tools to incorporate activities and changes within their home. Households could create their own reward to work towards using the money saved from reducing their electricity consumption.

Longer term sustainability for participants

RYJ was a program with a defined start and end date, participants have been invited to participate in a new longer term sustainability program launched by CitySmart called Live For Less. This is a movement with a mission to empower the community with tools and knowledge to make cost saving choices that reduce environmental impact.

By transitioning participants from a short-term program to a complementary longer term solution, with a range of activities and communications will help participants maintain their momentum for energy and other cost saving behaviour change.

Innovating for sustained change

RYJ provided insight extending beyond the energy sector, with the program providing broader insight and evidence for the innovation of government services. These services could be health, education, employment, communities; any and all services in the public sector. In providing proactive outcomes to contribute to these areas, a simple recipe has been developed which outlines the steps involved in innovating for sustained change.

5 step recipe

Ingredients

1. Human-centred design thinking
2. Consumer insights and evidence
3. A theoretical framework
4. Programmatic implementation
5. A shared experience.

Method

1. Putting the customer at the heart of the service design approach is important. Designing a service in response human behaviour will be more effective than forcing your approach on people. Test and iterate to get it right.
 2. Know your customers, how they behave and will interact with you. Research what works and draw insights from successes and failures.
 3. Find an appropriate theoretical framework to apply or adapt which reflects the consumer insight and evidence you have. Combining academics with practitioners allows for a practical, multi-disciplinary approach.
 4. Using discrete programmatic implementation provides the opportunity to be agile in trialling, monitoring, evaluating and improving the approach. Discrete start and finish times can help participants overcome commitment barriers. Waves of participant cohorts is an effective way of managing iterations and has the added benefit of creating a social experience where brand advocates, word-of-mouth and social referrals can occur. The use of a program over a single interaction allows for continuous learning.
 5. Think beyond an individual to creating a shared experience at household and community level. Providing a shared goal encourages collaboration for the benefit of the community.
- Combine all ingredients, mix well with some fun!

Declaration

The Authorised Officer of the organisation makes the following declarations:

- I declare that I am authorised to submit this Final Report (including any attachments) on behalf of CitySmart.
- I declare that the information provided in this Final Report is true and accurate.
- I understand, and acknowledge that giving false or misleading information in this Final Report is an offence under the *Criminal Code Act 1995*.
- I understand that final payment will only be made in accordance with the Funding Agreement including on satisfactory completion of Milestones.



Authorised Officer Signature: Date: 15/03/2016

Name: Neil Horrocks

Position: Chief Executive Officer

Organisation: CitySmart



Witness Signature: Date: 15/03/2016

Name: Tim Swinton

Position: Commercial Projects Manager

Organisation: CitySmart

The use and disclosure of information provided in this Final Report is regulated by the relevant provisions and penalties of the *Public Service Act 1999*, the *Privacy Act 1988*, the *Freedom of Information Act 1982*, the *Crimes Act 1914* and the general laws of the Commonwealth of Australia.

Information contained in the Final Report may be disclosed by the Department for purposes such as promoting the program and reporting on its operation and policy development. This information may also be used in answering questions in Parliament and its committees. In addition, the selected project information will be made publicly available. Public announcements may include the name of the grant recipient and of any project partners; title and description of the project and its outcomes; and amount of funding.

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APPENDICES

QUT research

Working in conjunction with QUT, a number of students performed complementary research to RYJ. An overview of each student's research outcomes is included following.

A study performed by QUT is also attached following the student research regarding empirical evidence that has been reported that gamification has any impact on domestic energy consumption.

Investigating the Impact of a Digital Game on Low-Involvement Energy Consumption Behaviour in Low-Income Households

Alpha Yam, 1st Class Honours thesis, Queensland University of Technology,
Supervised by Professor Rebekah Russell-Bennett and Professor Marcus Foth

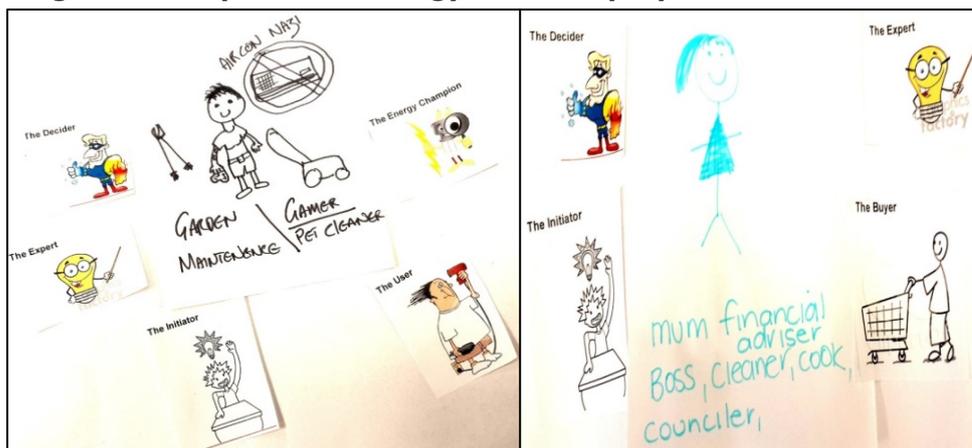
Key Findings

People in low-income households took one of three roles in making decisions about energy use:

- the energy champion
- the decider
- the budgeter.

The role of the 'decider' was typically shared between household members emulating the role of the parental figure (even in adult share houses).

Figure 1 Examples of the energy roles that people take in the house



There were two types of decision-making processes households used for energy use:

- functional - dealing with everyday tasks such as bill-payment and monitoring use
- latent - making the rules, enforcing power over members not following rules.

The game influenced household decision making and roles by:

- Creating new household norms for making decisions
- Altering the strategies being used to manage energy
- Sharing the 'Energy champion' role became across all household members.

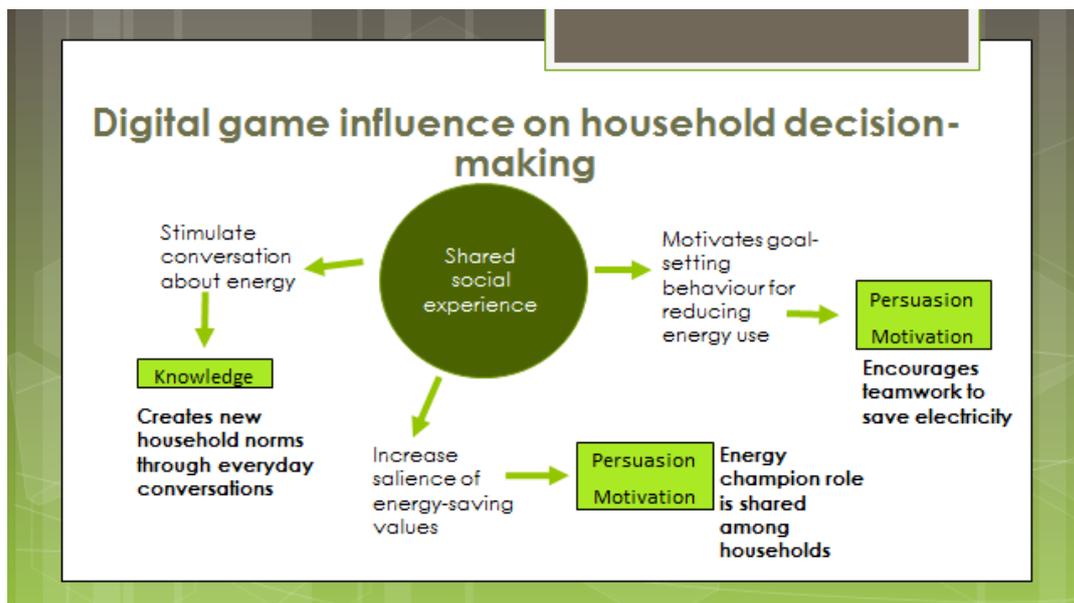
The games created a shared social experience that facilitates three possible processes for affecting energy use:

Stimulating conversations which then generated household discussions on energy, created new household norms through everyday conversations and reinforced current energy-saving behaviour.

Generating knowledge by increasing the importance of energy efficiency values among household members. Subsequently, household members were motivated and persuaded to monitor energy use.

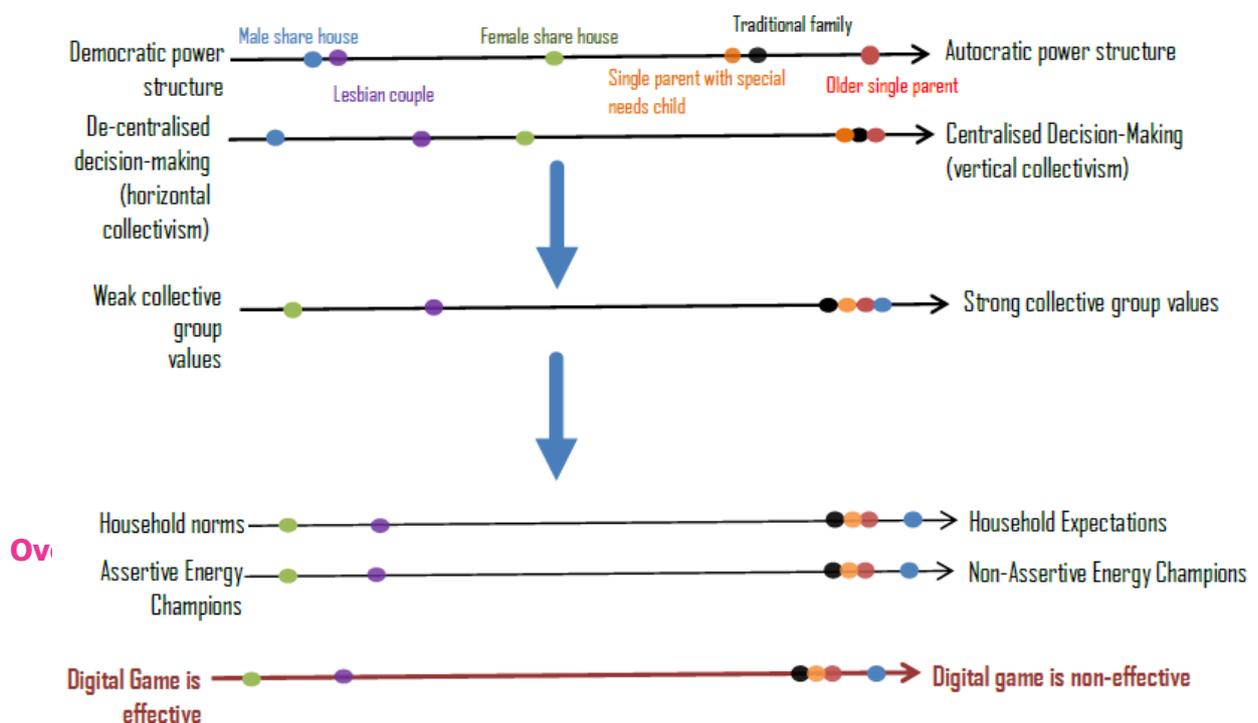
Producing motivation to set goals for household energy use and work as a team to reduce energy use.

Figure 2. The effect of a Reduce Your Juice on low income household decision-making



The game was more effective for households that have a democratic power structure and less so for households that have less shared values about energy use.

Figure 3 . The effect of household power structures on game effectiveness



Social marketing is an approach used by government and non-profit agencies to address social issues such as alcohol abuse, smoking, obesity, recycling and overuse of energy. This thesis focused on the issue of energy use, specifically electricity. Rising energy prices are putting pressure on low-income consumers' household spending, with low-income households spending disproportionately more of their income on energy than their middle or higher-income counterparts in industrialised countries. Government policies aiming to reduce energy use, have been mostly reactive and offer only temporary assistance with a need for more innovative approaches.

This study aimed to address this problem by investigating how a social marketing digital game can influence low-income household decision-making about energy use. Digital games, which are found to have inherently persuasive powers to influence behaviour, present a promising potential to help low-income households reduce their energy consumption, and indirectly, their energy bills.

Group interviews were carried out with 6 low-income households in Brisbane before and after exposure to a social marketing digital game on electricity use; RYJ. The first set of interviews was an exploratory investigation of the ways that low-income households make decisions for energy use, and the second set of interviews sought to investigate the influence of digital game effects on household decision-making. The participants were aged 12 years and over and involved 17 people.

The data revealed that low-income households' decision-making processes for energy use were triggered by the arrival of the electricity bill, and were influenced by certain dominant members of the household, the presence of an 'Energy Champion,' and by a household budget. Although these processes varied by specifics from household to household, the broad decision-making process was consistent. The influence of the digital game had varying effects on different household types depending on the household's existing power structure. In particular the game was more effective for households with a democratic power structure than for households with stronger hierarchal power structures.

A Game of Balance and Disguise: Examining Experiential Value and Game Attributes in Social Marketing M-games

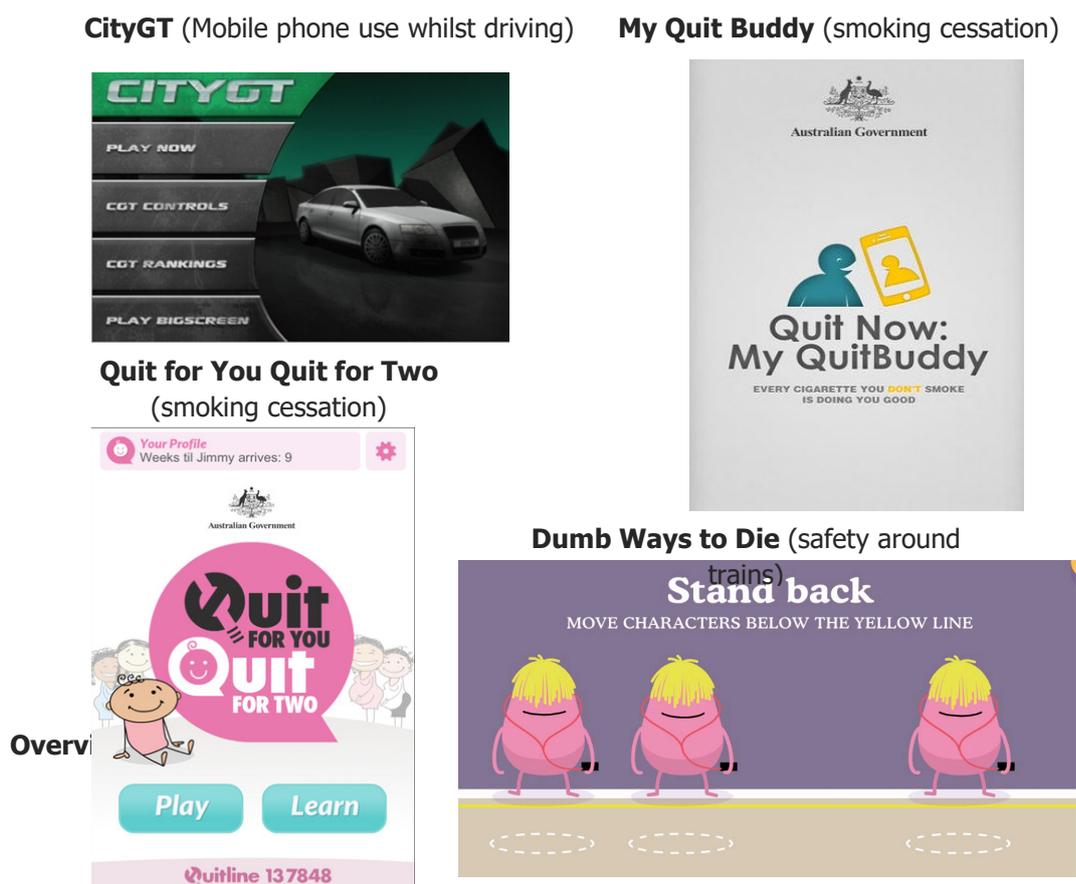
Rory Mulcahy, PhD Thesis, Queensland University of Technology
Supervised by Professor Rebekah Russell-Bennett, Dr. Kerri-Ann Kuhn and Dr. Nada Zainuddin

Key findings

This thesis provided three significant contributions to theory and practice in the areas of 1) understanding value created by m-games for social marketing 2) designing m-games for social marketing 3) evaluating social marketing m-games.

1. Creating value in m-games for behaviour change
 - Experiential value can neither be too entertaining or too focused on changing behaviour
 - Balance of entertainment and behaviour value is best for social marketing m-games
2. Designing social marketing m-games for behaviour change
 - Common game attributes function uniquely in social marketing m-games, disguising the behavioural focus of games through entertaining features
 - Performance game attributes are new to the literature and focus on assisting users to change their behaviour
3. Evaluating social marketing m-games
 - Identifies a structural framework that demonstrates which social marketing game attributes influence experiential value and its balance of entertainment and behaviour value
 - Evaluates four current social marketing m-games

Figure 1 Four social marketing m-games tested in thesis



Overview of study

Currently in social marketing practice mobile games (m-games) are beginning to become an area of interest, with campaigns increasingly including them in their design. However, whilst social marketing practice has begun to explore the opportunities of social marketing m-games little scholarly research has directed social marketers as to how they create experiential value for the user or how game attributes (characteristics) should be designed. In recognition of these current gaps of knowledge this thesis investigates three gaps in practitioner and scholarly knowledge: first, it examines how experiential value is created by social marketing m-games (RQ1); second, it investigates how key game attributes could be categorised for social marketing m-games (RQ2); and third, it investigates how key game attributes influence experiential value created by social marketing m-games (RQ3).

To address the three current knowledge gaps regarding social marketing m-games this thesis employed a two-study, mixed-method approach. Study One qualitatively investigated the experiential value created by social marketing m-games and their key game attributes in four focus groups (n=21), using the pre-established social marketing m-games: *Dumb Ways to Die*, *My Quit Buddy*, *CityGT* and *Quit for You Quit for Two*. The findings of Study One identified three categories of experiential value: entertainment (made up of amusement and social value dimensions), sacrifice value (made up of economic and time dimensions) and behaviour value (made up of information, simulation and distraction dimensions). Further, two key categories of game attributes were identified: disguise (made up of character, challenge and feedback) and performance (made up of virtual training and behaviour monitoring).

The findings of Study One consequently provided the foundation for Study Two, which quantitatively tested a proposed model representing the 11 influential relationships between game attributes and experiential value dimensions. Study Two collected data from a consumer panel using a pre- and post-online survey, acquiring a final sample of n=497. Structural equation modelling (SEM) was then used to analyse the hypothesised relationships in the model, with 8 of 11 relationships being supported.

Combined, the findings of the two studies provide four contributions. First, this thesis demonstrates the complexity of experiential value created by social marketing m-games, illustrating that experiential value can represent motivation to use a game, opportunity to use a game and ability to perform a behaviour. Further, it demonstrates that social marketers should aim to create a balanced package of entertainment and behaviour value. Second, this thesis contributes to the social marketing literature by explaining how key game attributes common to games (character, challenge and feedback) can be used to not only entertain a user but disguise the behavioural aspect of the game. Additionally, two key game attributes not previously identified in the literature were found, demonstrating that social marketing m-games are different in their design to other m-games as they have additional game attributes focused on assisting users to change their behaviour. Third, this thesis provides insight as to how game attributes in a social marketing m-game can influence two desired outcomes (entertainment value and behaviour value) simultaneously. Finally, these three contributions together provide a broader contribution to social marketing by demonstrating the usefulness of leveraging and extending upon conceptual frameworks from related social marketing disciplines.

Practically, this research contributes by providing guidance as to how to develop and evaluate social marketing m-games. These practical contributions include: using experiential value as a diagnostic tool to evaluate the performance of social marketing m-games, developing a checklist of the key game attributes required to be designed in a social marketing m-game, and explaining how social marketing m-games can influence desired outcomes. Several other practical contributions are also outlined. By implementing the findings of this thesis social marketers will be more informed of how social marketing m-games should be designed and how they create value for the user.

Shifting Beliefs and Values in Low-Income Households Towards Energy Conservation: Insights from Practicing Therapists

Heather Hill, PhD Candidate, Queensland University of Technology
Supervised by Professor Marcus Foth and Associate Professor Evonne Miller

Key findings

- Developing a trusting relationship was found to be the most important element in facilitating change;
- One major challenge for people who are disadvantaged is the lack of social support, which makes change more difficult;
- Transformations occur by changing beliefs in three ways: questioning negative connotations, exploring emotions, and positive reframing;
- Communications that activate people's intrinsic values, such as self-growth, community-mindedness, and affiliation by focusing on their resources and increasing their positivity aids in long-term commitment to change;
- To help someone in distress, first inquire about most immediate issues, then facilitate self-reflection, and help find solutions to save energy if it is mentioned.

Overview of study

Few studies have examined the emotional and social experiences of low-income earners living in a material world and how it may influence their energy consumption. This study endeavoured to address this gap by exploring approaches that therapists in diverse psychological fields use to facilitate change in client's self-beliefs and values, and analyses how they could be applied to reducing low-income household's energy consumption long-term.

Two psychologists, two body psychotherapists, two life coaches, and two counsellors were interviewed and asked to explain how they stimulate changes, focusing on the multi-faceted experiences of low-income households and how they might work to change energy behaviours. Drawn from literature on typical low-income earner experiences, two scenarios were given to interviewees. The first scenario described a client being given negative feedback about themselves throughout their lives and believed it and has caused low self-esteem. The second scenario described a single woman on a low-income with three kids living in rental property that lacks insulation and efficient appliances that lead to high energy bills. She is emotionally stressed, and she doesn't feel confident in her ability to manage raising kids, pay her bills or life in general. What would you do?

All therapists believed developing a trusting relationship is the most important element in facilitating change. Further, two therapists that worked with people who are disadvantaged stated that one major challenge for people who are disadvantaged is the lack of social support, which makes change more difficult. Social capital research supports this finding as it emphasises the importance of trusting relationships, reciprocity, and inclusivity and has been shown to be effective at sustaining change in all communities.

All therapists indicated transformations occurred by changing beliefs in three ways: questioning negative connotations, exploring emotions, and positive reframing (Scenario one) and can be facilitated by: *"First ask how they feel about being told that...work with their feelings...look at how they swallowed other people's belief systems...have them spit it out and start to see that it is not actually the truth."*

All therapists stated the importance of utilising communications that activate people's intrinsic values, such as self-growth, community-minded, and affiliation by focusing on their resources and increasing their positivity to aid in long-term commitment to change and can be facilitated by: *"First thing is to help people remember who they are by exploring their values."* Findings are consistent with research

suggesting that activating established intrinsic values is likely to be more effective than convincing people to adopt new conservation values.

In relation to the single mother with multiple stressors, all therapists emphasised first inquiring about her most immediate issues, then facilitate self-reflection, and help her find solutions to save energy if she mentions it as a priority (Scenario two).

Several practical implications can be derived from the results of the present study. First, it may be important to develop energy conservation interventions that facilitate long-term, trusting and supportive relationships with and among low-income households. Second, using inquiry can aid in facilitating households connection to their self-beliefs and intrinsic values because when people determine solutions for themselves they could be more committed to change. Third, it may be important to develop interventions that consider households emotional and social connections, resources, positive attributes, and contributions to society.

The [everyday] Future by Design: Opportunities for the design exploration of everyday sustainability in the home

Heather McKinnon, Queensland University of Technology

Supervised by Professor Marcus Foth and Associate Professor Gavin Sade

Key findings

This design research PhD study delivers deeper insights into low-income households and provide inspiration for further design iterations around the topic of everyday sustainability. This study is exploratory in nature and uses qualitative design methods. Insights include:

- Capturing personal patterns of energy prompted reflection of everyday habits;
- Allowing households to creatively and personally monitor their everyday energy use was encouraged;
- Providing people with the tools to personalise their own energy monitoring as they choose was successful.
- The Cultural Probe method was a successful way to gain access and insight into people's everyday lives (as they went about them).

Overview of study

This research is concerned with ways in which design can support an ongoing creative and adaptable approach towards everyday energy in the home. Within the Interaction Design field, support for sustainable energy practices is largely expressed through the development of innovative eco-feedback technologies, applications and systems to encourage behaviour change through real-time digital feedback. However, alongside the development of these interventions, there has also been much debate over the inherent foundation of these works, with several researchers calling for design approaches that place more emphasis on the everyday realities of energy use. This design study seeks to gain insight into people's energy consuming activities, including what they are doing and when. It aims to explore how people respond to manually or digitally tracking their own activities and gain insight into how much attention is paid to everyday energy use within the home.

A Cultural Probe method was adopted in order to explore and gain unique insight into households everyday energy use. This involved households living with a toolkit designed by the researcher. The 'Everyday Energy Toolkit' consisted of three low-fi tools to track three types of everyday activities in the home: the light counter; shower timer & matchsticks; and washing stickers. The Probe toolkit was accompanied by a logbook that provided instructions for the tools, and pages to log activities. The study was aligned with CitySmart's RYJ



Figure 1: Everyday Energy Toolkit

demographic and targeted towards 18-34 year old low-income rental households across the Greater Brisbane area. Four willing households were recruited to participate in the two-week study. The makeup of the households was varied and consisted of two share-houses, one married couple without children, and one couple with children. At the end of the two-week study, participants were asked to complete an online questionnaire made up of a small number of questions around their reflections and experience of the study.

All four households responded enthusiastically to the cultural probe kit and diligently and creatively logged their energy consuming activities for two weeks. Several participants found the act of documenting their everyday energy patterns a reflective experience, and proceeded to reflect on their energy habits. Others found the visual nature of the energy tracking enjoyable, and liked the idea of creatively monitoring their energy use. Another household thought it interesting if the electricity bills



were divided up based on individual usage patterns. The insights that have come out of this exploratory study will contribute to the next phase of the design process. This will involve the design and development of a second study, which will include other demographics, household types and contexts. Overall the Probe study was successful and has inspired further iterations of the design process at the base of this research.

Figure 2: Everyday Energy Toolkit. From top left: Washing Stickers; Shower Timer & Matchsticks; Light Counter.

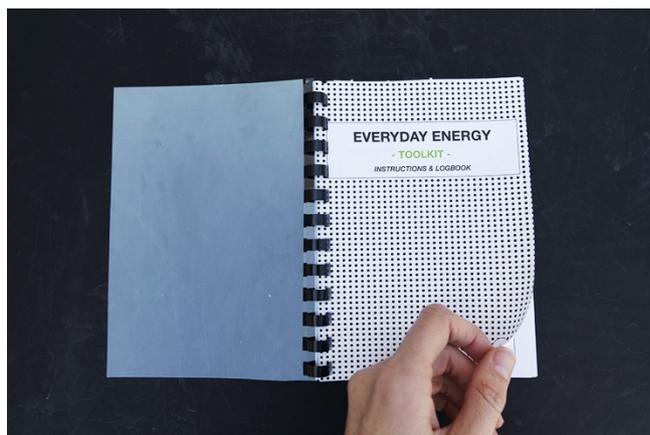


Figure 3: Participant Logbook

Publication arising from this PhD study:

McKinnon, H. (2016, in press). [Domestic reflections, electric reflections: Towards design interventions against everyday energy mundanity in the home.](http://eprints.qut.edu.au/89232/) *Design Issues*. <http://eprints.qut.edu.au/89232/>

Potential and Impact of Tangible and Physical Data Presentation for Understanding Energy Use

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Key findings

A promising research area for interaction design looks at how the presentation of data could be carried out through tangible means. Physical presentations have not been widely considered as a way for data visualisation. As a part of this research project we are interested to look at the potential and the impact of physical data visualisation in the context of low-income households and their energy consumption.

This study will examine the usefulness of physical data visualisations in the below areas:

- Communicating data
- Being more memorable
- Promoting understanding and learning
- Enhancing cognition through manipulation of physical objects
- Supporting analytical tasks
- Increasing both usability and enjoyment via physical interaction

Overview of study

CitySmart's RYJ initiative funded by the Australian Government has focused on digital solutions such as using mobile games. The physical and tangible design approach taken in this PhD study provides a new way to tackle this issue differently. Complementing the RYJ program, this study is concerned with understanding the design of physical data visualisations, which are a novel and innovative way to present and interpret data. This can include 3D printing or other physical representations of information quantities.



Figure 1: Physical data visualization

In this example data mapped based on rainy days in Brisbane over the year 2014 from January to December (top to bottom) and from first to the end of the month (left to right)

This case study focuses on energy usage of low-income households as a part of the CitySmart Reduce Your Juice program. We are interested in the potential of new ways of visualising energy use data through the shape of physical artefacts (e.g. Figure 1), specifically to help household members to collaboratively better understand how they deal with and manage energy consumption. This study uses physical data visualisation as a collaborative tool among low-income household members aged 18 to 35 in the greater Brisbane area. It also seeks to improve the process of decision-making, regarding their collective energy use. Our research findings will tell us if the use of physical data visualisations helps this target group to better understand and make decision together, on saving energy on a monthly basis.



Figure 2: 3D printed Watt family at the board game

At this stage we are exploring the idea of board game scenario including the 3D printed Watt family figurines (Figure 2).

Gamification review

Gamification and Serious Games within the Domain of Domestic Energy Consumption: A Systematic Review

AUTHORS

Daniel Johnson, Ella Horton, Rory Mulcahy, Marcus Foth

ABSTRACT

Background/context: Energy consumption is a significant and critical social issue. Gamification and serious games offer a means of influencing people regarding energy consumption.

Aims/objective: Examine the literature and assess empirical support for the effectiveness of gamification and serious games in impacting domestic energy consumption.

Data sources: A systematic review of articles (written in English) using a comprehensive search of databases identified as relevant within the fields of information technology, social science, interaction design, psychology, and environmental science: EBSCOhost (all databases), ProQuest, ACM (Association for Computing Machinery), IEEE Xplore, Web of Science, Scopus, ScienceDirect, BioMed Central, and Cambridge Journals Online. A manual search of the reference lists of key studies identified during the database search process produced additional studies. The search strategy included a combination of terms relating to gamification and serious games, and domestic energy consumption.

Methods: A comprehensive systematic literature review was conducted according to the specifications of the PRISMA checklist.

Study selection: Only primary studies reporting empirical data relating to the value of gamification and serious games on energy consumption were included. More comprehensive selection criteria were applied throughout the selection process (reported in full in the main text).

Data Extraction: Extraction of data from included primary studies was completed by one author using a data extraction form developed specifically for the review.

Data Synthesis: A meta-analysis of the results was not conducted due to insufficient statistical data reported for the majority of the primary studies included in the review. Data synthesis was therefore focused on summarising the methods and outcomes of the studies.

Results: Search terms identified 25 primary studies published in 26 research articles reporting empirical evidence on the value of gamification and serious games within the domain of domestic energy consumption.

Conclusions: The findings indicate that gamification and serious games appear to be of value within the domain of energy consumption, conservation and efficiency, with varying degrees of evidence of positive influence found for behaviour, cognitions, knowledge and learning and the user experience. A common feature across many articles reviewed was the limited amount and quality of empirical evidence, which suggests that more rigorous follow-up studies are required to address this gap. The article makes specific recommendations to help address this challenge.

Keywords: gamification, serious games, systematic review, energy efficiency, energy conservation, energy consumption, domestic energy usage

INTRODUCTION

Rationale

The conservation of energy constitutes a significant and pressing social issue. Despite efforts to transition to a renewable energy economy, the world is slow to give up its dependency on fossil fuels as its primary energy source. At a time characterised by overpopulation and overconsumption, emission-intensive energy production that drives anthropogenic climate change is a serious global concern. The additional threats of resource depletion and a rapidly emerging energy-hungry middle class in developing economies compounds the seriousness of the issue. Scarcity and an urgent need for energy conservation and reduction manifest at the level of the individual with ever-increasing living costs. This represents another factor in the urgent need to reduce domestic energy consumption, with large proportions of even developed economies living near or even below the poverty line ([Klein 2015](#); [Zehner 2012](#)).

Households represent an important target group, with total energy consumption in the household sector and residential CO₂ emissions rising since 1990 (International Energy Agency, 2007). Human behaviour and its determinants play a key role in energy usage, however, efforts to target behavioural change have produced varying levels of success (Abrahamse, Steg, Vlek, & Rothengatter, 2005). An emerging area of focus is the use of serious games and gamification as tools to motivate, engage and educate people regarding energy consumption and related concerns.

Serious games and the use of gamification share a common goal; to shape human behaviour (or attitude and cognitions) through the intrinsically motivating qualities used in well-designed digital games. Serious games are defined as "*any form of interactive computer-based game software for one or multiple players to be used on any platform and that has been developed with the intention to be more than entertainment*" ([Ritterfeld et al. 2009, page 6](#)). While gamification is most simply defined as "*...the use of game elements in non-game contexts to improve user experience and user engagement*" (Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011, p. 1). Thus, the distinction between the two is that serious games are fully fledged games (e.g., a digital role-playing game in which the player completes challenges or quests designed to educate them about nutrition), while gamification refers to the application of parts of games in a non-game setting (e.g., a mobile phone app designed to track and encourage exercise that uses levels, points and badges). In practice it is sometimes difficult to reliably distinguish the two as the point where a highly gamified application or tool crosses the line to becoming a game can be blurry and is highly subjective. Regardless, both serious games and gamification capitalise on the popularity and engaging nature of recreational (non-serious) digital games with a view to enabling change in the real world. Within the current review the term "applied games" is used to refer to serious games and gamification collectively ([Seaborn and Fels 2015](#)).

As gamification is a relatively new concept, key theoretical understandings are still emerging. One relatively well received notion is that of 'meaningful gamification' ([Nicholson 2015](#)). Nicholson distinguishes between reward-based gamification (e.g., points, levels, leaderboards, achievements, or badges) and meaningful gamification, which draws on game design elements such as play, exposition, choice, information, engagement and reflection. Based on self determination theory ([Ryan and Deci 2000](#)), and the distinction between intrinsic motivation (the drive to do something without external rewards and for its own sake) and extrinsic motivation (performing an activity to attain some separable outcome), Nicholson suggests that rewards-based gamification may be suitable for immediate and short-term changes, but that for long-term change meaningful gamification may be required. This aligns with the point of view of other prominent gamification theorists ([Juul 2011](#); [Walz and Deterding 2015](#)) who have likewise proposed that gamification's effects may be primarily

extrinsically (as opposed to intrinsically) motivating and that any changes to motivation may be short term.

Serious games have seen steady interest in industry and academia over approximately the last decade ([see Connolly et al. 2012 , for a review](#)) and gamification has become increasingly popular since it emerged around 2010 ([Hamari et al. 2014](#)). However, while both are being widely applied, the empirical evidence regarding their effectiveness is still emerging. The most thorough review of serious games to date was conducted by Connolly and colleagues ([2012](#)), and while it found support for the effectiveness of game based learning, the authors noted that further research was needed. Similarly, recent reviews of the evidence supporting the effectiveness of gamification, while broadly positive ([Hamari et al. 2014; Seaborn and Fels 2015](#)), note that any positive effects are "...greatly dependent on the context in which the gamification is being implemented, as well as on the users using it" (Hamari, Koivisto, & Sarsa, 2014, p. 1).

Regardless, existing reviews either approach serious games and gamification across domains (precluding any evaluation of their effectiveness with respect to energy consumption), focus on domains other than energy consumption (e.g., [health and fitness; Theng et al. 2015](#)) or look at specific Information Communication Technology mediums (e.g., [mobile social media; Moreno-Munoz et al. 2016](#)). Despite the lack of a clear understanding of the efficacy of serious games and gamification in the energy consumption domain, these tools are being utilised to influence domestic energy consumption across a range of academic, governmental and commercial settings. Based on this increasing use of these techniques, the evidence for the context- and audience-specificity of gamification effectiveness, as well as the broader debate about gamification's overall effectiveness, the current study sought to closely examine the empirical evidence for the effectiveness of applied games in the domestic energy consumption domain.

Objectives

To examine empirical evidence reported on the value of gamification and serious games within the domain of domestic energy consumption and conservation (both efficiency gains and actual reduction), we reviewed empirical studies that assessed the impact of applied games on a range of energy-related variables in users. Variables were limited to those determined as relevant to energy consumption occurring within a strictly domestic context. The overarching question we aim to explore in the current review is:

What evidence is there that gamification and serious games are effective in influencing users with respect to domestic energy consumption?

METHODS

Protocol and registration

The review protocol was developed by the authors to comply with the specifications of the PRISMA checklist ([Moher et al. 2010](#)), a rigorous and widely-used reporting guideline for systematic reviews. A recently published systematic review of high quality and with a similar research question (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012) was used as a template for developing the protocol. All authors were involved in approving the final review protocol.

In the present review, gamification is defined according to Deterding and colleagues (2011, p. 1) as "...the use of game elements in non-game contexts" and serious games are defined as "...game[s] in which education is the primary goal, rather than entertainment" (Chen & Michael, 2005, p. 17). To enhance clarity and acknowledge significant theoretical overlap, the phrase 'applied games' will be used to broadly reference both concepts throughout the review.

Energy in the context of the present review refers specifically to electricity. However, for the purpose of this review we did not exclude studies that deal with electricity as well as other sources of energy

in the home such as natural or propane gas. Within a domestic context, energy consumption refers to electricity used for lighting, heating, cooling, cooking, and to power household appliances. Whilst we use 'energy consumption' as the umbrella term for all studies relevant to this review's focus, we distinguish energy conservation between energy efficiency gains and energy reduction. Energy efficiency is the use of less energy to provide the same service and receive the same output, and energy reduction is a decrease in or avoidance of the use of and demand on an energy service. While both mechanisms can contribute to energy conservation, the Khazzoom-Brookes postulate demonstrates a paradoxical relationship between energy efficiency gains and consumption whereby a positive correlation occurs that in fact leads to an increase in energy consumption (Saunders, 1992).

Eligibility criteria

The following inclusion and exclusion criteria were applied to the studies identified in the database search:

Inclusion criteria:

- Peer-reviewed (including peer-reviewed conference papers)
- Full-papers (including full conference papers)
- Explicitly stated and described gamification mechanic/s or elements, game or game elements or activities
- Clearly described outcomes relating to household energy consumption/conservation behaviour, including those related to both energy use and/or efficiency and/or reduction
- Empirical research
- Explained research methods / methodology / analysis
- Exclusion criteria:
- Gamification or game element/activity mentioned but not part of the research being conducted
- Energy consumption and/or conservation mentioned but not part of the research being conducted
- Research focusing on environments other than the domestic household (i.e. workplace, school)
- Theoretical, conceptual papers without empirical data
- Short papers reporting on research in progress
- Extended abstracts and posters
- Publications written in a language other than English

Information sources

Electronic databases were searched in the review, as well as a manual search of the reference lists of key papers. Searches were performed between 27th March and 16th April 2015. The databases searched were those identified as relevant to information technology, social science, interaction design, psychology and environmental science: EBSCOhost (all databases) (n = 1061), ProQuest (n = 271), ACM (Association for Computing Machinery) (n = 151), IEEE Xplore (n = 179), Web of Science (n = 10), Scopus (n = 323) ScienceDirect (n = 492), BioMed Central (n = 13), Cambridge Journals Online (n = 92). An additional 16 records were identified through a manual search of the reference lists of key articles in an effort to include all available studies.

Database	No. papers identified	No. meeting inclusion criteria
ACM	151	3
BioMed Central	13	0

Cambridge Journals Online	92	0
EBSCOhost (all databases)	1061	3
ProQuest	271	1
IEEE Xplore	179	0
Science Direct	492	1
Scopus	323	11
Web of Science	10	1
Manual search	16	8
Total	2813	26

Search

Search terms included terms for gamification and serious games in conjunction with possible terms for energy-related outcomes. In order to capture all relevant studies according to the gamification and games criteria, search terms were selected to represent the variety of gaming formats that might emerge within the scope of gamification and serious games as per their definition in the present review. Terms relating to play were not included due to interest in the explicit use of gamification or games of some description. While it is recognised that this may exclude relevant studies where such terms are not used (e.g. playful, persuasive and pervasive applications), these were deemed to fall outside the scope of the current review.

(gamif OR gameful OR "serious game*" OR "digital game" OR "electronic game*" OR "videogame" OR "video game")*

In order to capture all relevant studies according to the energy-related outcomes criteria, search terms were selected to represent the variety of terms used to describe energy-related concepts.

AND ("energy consumption" OR "energy reduction" OR "energy conservation" OR "energy monitor" OR "electricity consumption" OR "electricity reduction" OR "electricity conservation" OR "electricity monitor*" OR "energy efficiency" OR "energy use" OR "energy saving*" OR "energy-saving" OR "energy behavio*" OR "energy meter*" OR "sustainable HCI" OR "sustainable interaction design" OR "energy awareness" OR "energy engagement" OR "personal emissions" OR "carbon saving" OR "ecological footprint" OR "carbon emissions" OR "eco-visuali*" OR "eco-feedback technology" OR "climate change")*

Study selection

Papers identified by search terms in the initial database search were screened in two stages: first by title only, and second by both title and abstract. This was performed by a single researcher, with a small sample independently examined by a second researcher at each screening stage. Papers that progressed through the two stages of screening underwent a full-text assessment for eligibility. This was performed by a single researcher. Two additional researchers examined the results of the full-text eligibility assessment, to ensure compliance with the selection criteria. Following the full-text eligibility assessment, a total of n = 26 papers representing 25 primary studies were found to be eligible for review.

Data collection process

Data was extracted from the 25 primary studies included in the review using a data extraction form developed for use in the present study (appendix). The data extraction form was developed as a spreadsheet by a single researcher, and was loosely based on the Cochrane Consumers and

Communication Review Group's data extraction template ([Cochrane Consumers and Communication ...](#)). The form was not piloted, and was populated by the same single researcher by whom it was developed. No actions were taken to seek additional information from paper authors, with all relevant information identified within the published papers.

The data extraction process identified some cross-over in the papers eligible for review, with two papers found to report the same data from the same primary study and another two found to report different data collected from the same primary study. This was addressed in data extraction by grouping articles reporting data from the same primary study.

Data items

The variables for which data were sought included those related to the publication of the article (discipline, author/s, year of publication, journal), aim(s) of study, hypothesis, research question(s), the intervention (game description, modality, elements, and category), study design (setting, outcome/s, outcome measure/s, method/s of assessment, and reliability and validity), sampling (inclusion and/or exclusion criteria, sample size and characteristics (including age), recruitment and selection), data collection (who, duration, instrument/s, reliability and validity), data analysis (method/s and rationale), and results (findings and statistical significance).

Game classification

The games or gamification elements described in each of the primary studies were categorised based on their degree of digitisation and integration with the real world. The categories (1 to 3) were devised by researchers in the present study and are described below:

1. Fully digital games that have no real world integration but are aimed at influencing the real world (e.g. learning to reduce energy consumption within a virtual apartment)
2. Games that may be digital but have some integration with the real world (e.g. the digital game prompts an action in the real world or pervasive or augmented reality games)
3. Games with no digital elements that occur, and are thus fully integrated, in the real world (e.g. monitoring your shower time by showering for the length of a song)

Quality assessment

The studies included in the review were assessed for quality based on the protocol developed and applied by Connolly and colleagues ([2012](#)) in a systematic review of a similar nature. Papers were assessed for quality across five dimensions and scored between 1 and 3, with 3 denoting high, 2 denoting medium and 1 denoting low for each criterion. The final scores for quality were calculated between 5 and 15, with 15 indicating the highest possible level of quality according to the assessment tool. All eligible studies were independently coded by two reviewers.

The five dimensions as described by Connolly and colleagues (2012) were adapted for the present review and are outlined below:

1. How appropriate is the research design for addressing the question identified in this review. Papers were coded as:
 2. High = 3, e.g. use of randomised control trials
 3. Medium = 2, e.g. quasi-experimental controlled study
 4. Low = 1, e.g. case study, single subject-experimental design, pre-test/post-test design
5. How appropriate are the methods and analysis?
6. How generalisable are the findings of this study to the target population with respect to the size and representativeness of the sample. To what extent would the findings be relevant across age groups, gender, ethnicity, etc.?

7. How relevant is the particular focus of the study (including conceptual focus, context, sample and measures) for addressing the question or sub-questions of this review?
8. To what extent can the study findings be trusted in answering the study question(s)?

Quality assessment of the 25 primary studies eligible for review was undertaken independently by two researchers. A coding matrix was also developed to streamline and increase the accuracy and reliability of the quality assessment process. While this does not address subjectivity in the coding of the papers, it does assist in the establishment of inter-rater reliability. To resolve differences in scoring, an iterative process of quality assessment was adopted. This approach was endorsed by Sirriyeh and colleagues (2012) in their development of a 16-item quality assessment tool (QATSDD) for methodologically diverse research articles. QATSDD was used to assist in the development of the coding matrix used in the present study.

Inter-rater reliability regarding the quality coding of the papers was determined by calculating Cohen's kappa using IBM SPSS Statistics 22. The inter-rater reliability (ρ) for the total scores was .818, showing a good level of agreement between the two coders with respect to the quality of the papers.

Synthesis of results

No meta-analysis was conducted as the primary studies included in the review did not report sufficient statistical information to calculate the necessary effect sizes. Synthesis of the results focusses on a discussion of the empirical trends in the data.

RESULTS

Study Selection

2813 papers fit the initial inquiry, and were screened by title. A total of 2570 papers were removed in this first stage of screening for a range of exclusionary factors, including duplicate articles ($n = 313$), incorrect publication type ($n = 152$), published in a language other than English ($n = 17$), and irrelevant overall based on title ($n = 2087$). A total of 263 papers progressed to the second stage of screening, which involved application of the selection criteria to the title and abstract. A total of 191 papers were excluded as a result of the second stage of screening. The exclusionary factors for removal at this stage of screening were more detailed, with the breakdown as follows: incorrect publication type ($n = 18$), theoretical / conceptual only ($n = 27$), irrelevant outcome ($n = 23$), examining gamification and/or games outside the energy consumption domain ($n = 47$), examining energy consumption and/or efficiency but without incorporating games or gamification in the research ($n = 38$), and irrelevant overall ($n = 38$).

A total of 72 papers remained to be assessed for eligibility based on their full-text. The eligibility assessment process resulted in the exclusion of 46 full-text papers for various exclusionary factors, including papers of a descriptive nature only ($n = 17$), no specification of energy consumption and/or efficiency ($n = 11$), no specification of gamification and/or games ($n = 5$), examining energy consumption and/or efficiency within a context other than the household ($n = 5$), reporting pre-testing data only ($n = 1$), and repeat publications ($n = 1$). A total of 26 papers representing 25 primary studies were deemed eligible for review and progressed to quality assessment.

The results of one intervention was published across two separate research papers (Kimura & Nakajima, 2011) and (Takayama et al., 2009), and therefore considered to represent one primary study. Another two studies reported data from the same intervention, however, were considered to

represent separate primary studies due to methodological differences (de Vries & Knol, 2011; Knol & De Vries, 2011).

Study Designs

A range of study designs were represented across the 25 studies, with the majority employing analytic designs to quantify the relationship between the intervention and specified outcome/s. Descriptive studies comprised a small proportion of the studies, as is expected in a review of empirical evidence.

A mixed methods approach was adopted by the majority of the studies ($n = 17$), however, exclusively quantitative ($n = 5$) and qualitative ($n = 2$) studies were also featured. The majority of studies were based on a survey study design ($n = 11$), followed by quasi-experimental study designs ($n = 5$). Other study designs included case studies ($n = 2$), pilot studies ($n = 2$), and qualitative study designs ($n = 2$). Only one longitudinal field study and one randomised control trial (RCT) were identified.

Study Sample

The included studies involved a total of 4026 participants, however, many studies failed to report or did not clearly articulate participant numbers. For example, some studies referred to families or households and did not clarify the exact number of participants. Sample sizes ranged from 5 (in a rapid usability assessment) to 2580 (in a survey to broadly characterise the target population), however, participant numbers were generally less than 200.

Little information was provided relating to the recruitment and selection of participants. The recruitment of participants was generally conducted by convenience sampling, namely via identification of participants through researchers' personal networks (email listings, acquaintances and family members). Some studies reported having conducted random probability sampling, however, the true representativeness of these samples is unclear due to selection of participants from research subject pools or via other methods, and generally insufficient information has been provided with which to confirm that true randomisation had been carried out. In a few cases, authors constructed purposive samples in order to target a specific subset of the population.

The selection of participants for inclusion in the studies in the majority of cases did not appear to be based on any particular set of characteristics, apart from in the small number of studies identifying their sampling strategy as purposive. In these studies, certain participant traits were especially selected. Many studies provided limited or no information regarding the study sample. Thus it was difficult to assess the adequacy of the study sample in terms of size and representativeness.

The age of participants ranged from 6 years to 55 years. Participant characteristics were broad. The most widely represented group were young adults, with participants generally clustered between the ages of 18 and 30. This information is based on only half of the studies included in this review, as 13 of the studies failed to provide any information pertaining to the age of the participants in the study sample.

The setting for the studies varied, despite the focus of the systematic review on energy-related concepts within a domestic domain. The settings included household ($n = 7$), laboratory ($n = 6$), classroom ($n = 3$), university dormitory ($n = 4$), university campus ($n = 1$), workplace ($n = 1$) and in the participants' private space (uncharacterised) ($n = 1$). No information was provided regarding the setting for three of the studies.

Data Collection and Analysis

Data was predominately a mixture of quantitative and qualitative, with a number of studies triangulating data to strengthen their results and conclusions. The most frequently employed method

of data collection was the questionnaire, which was used to collect quantitative and/or qualitative data in 22 studies. The format and mode of delivery of the questionnaires varied, however, online and paper-based tools administered by the researcher and consisting entirely of quantitative items predominated. In some cases, multiple questionnaires were employed to measure a range of variables at various time-points. For the collection of qualitative data, interviews were the most common technique (n = 13), followed by observations (n = 4) and video recordings (n = 2). Quantitative data was collected from energy meters or monitors (n = 7), game server logs (n = 7) and self-reported activity logs (n = 2). Other methods included audio recordings, focus groups, user photographs (taken during an intervention), and various tools employed in the context of a usability testing protocol (including think-aloud verbal protocol, document analysis and task series).

Reporting of the duration of data collection by each of the primary studies was poor. Based on the information provided, data collection ranged from 3 weeks to over a year, with the majority extending for a period of between 1 and 4 months. Data analysis was poorly reported by many of the eligible studies, with the majority failing to identify key aspects of the process and results (e.g., method of data analysis including techniques used to determine statistical significance was often not identified). Quantitative data analysis employed predominantly statistical methods (including significance testing (t-test), univariate (ANOVA) and multivariate (MANOVA) testing, correlational analysis, Mann-Kendall testing, and descriptive statistics), while thematic analysis was the primary method of analysis for qualitative data.

Quality Assessment

The quality of the studies ranged from 5 to 12. The mean rating for the 25 primary studies was 7.5, and the modal rating was 6. Papers rated 7.5 or over (above average) were considered to provide methodologically stronger evidence in the context of the review question. The basis for determining this cut-off point was similar to the strategy employed by Connolly and colleagues (2012), which used the mode and mean. Due to the relatively low quality of the studies in the current review, the mean was used on its own to determine the quality cut-off point.

Twelve of 25 primary studies (48%) were assessed to be of higher quality (quality score of 7.5 or greater). The remaining 13 studies were given a quality score of less than 7.5 and therefore were considered to provide less methodologically strong evidence in the context of the review question.

Applied Game Type

The applied games reviewed in the present study were delivered in various modalities, using a range of platforms including online web applications, computer games, motion-detectors, and mobile applications. For simplicity, the applied games were classified into two broad categories; dedicated mobile applications (games and gamified tools delivered via a mobile application) and non-mobile applications (games and gamified tools delivered via personal computer (as opposed to mobile devices)). Within the review, 7 studies focussed on dedicated mobile applications, 15 on non-mobile applications and 2 studies involved delivery as both a mobile application and via alternative platforms incorporated within the non-mobile classification. Among the 15 non-mobile applications, interventions included online applications (n = 9), computer games (n = 5) and other platforms (n = 1).

The interventions were further classified in terms of whether they more closely resemble a serious game or a gamified application/tool. Exactly half of the interventions described by the studies included in the review (n = 12) were serious games (Banerjee & Horn, 2014; de Vries & Knol, 2011; Dorji, Panjaburee, & Srisawasdi, 2014; Gustafsson, Bång, & Svahn, 2009; Gustafsson, Katzeff, & Bang, 2009; Knol & De Vries, 2011; Mesquita, Monteiro, De Sena, Ninomiya, & Da Costa, 2013; Pisithpunth, Petridis, Lameris, & Dunwell, 2014; Reeves, Cummings, Scarborough, & Yeykelis, 2015; Salvador, Romão, & Centieiro, 2012; Stone, Guest, Pahl, & Boomsma, 2014; Tsai, Yu, & Hsiao, 2012;

Yang, Kun Huang, & Tzu Chien, 2012). The other half (n = 12) presented gamified applications/tools (Al Mahmud et al., 2007; Gamberini et al., 2011; Geelen, Keyson, Boess, & Brezet, 2012; Kimura & Nakajima, 2011; Kuntz, Shukla, & Bensch, 2012; G. E. Lee, Xu, Brewer, & Johnson, 2012; J. J. Lee, Ceyhan, Jordan-Cooley, & Sung, 2013; Nguyen, 2014; Odom, Pierce, & Roedl, 2008; Peham, Breitfuss, & Michalczuk, 2014; Salas-Prat, Zelco, Carrasco, & Segura, 2014; Senbel, Ngo, & Blair, 2014; Takayama et al., 2009).

The games and gamified tools were categorised based on their level of digitisation and integration with the real world, as per the classification developed for use in the present study (described in methods). The majority of the games and gamified tools/applications (n = 13) demonstrated a certain level of integration with the real world (category 2), followed closely by fully digital games with no real world integration (category 1) (n = 12). No games or tools/applications were classified into category three (games with no digital elements).

Game Elements

The 25 primary studies eligible for review represent a range of game elements embedded in a variety of ways. These included feedback (n = 17), challenges (n = 15), social sharing (n = 11), rewards (10), leaderboards (n = 9), points (n = 8), tips (n = 6), levels (n = 5), rankings (n = 4), avatars (n = 4), badges (n = 2) and user-generated content (n = 2).

It was common for a number of game elements to be incorporated into each intervention, with only five embedding one game element only. Two to three game elements were embedded in seven interventions, four to five were embedded in eight interventions, and greater than 5 were embedded in five of the interventions reviewed.

Studied Outcomes

The outcomes assessed by the 25 primary studies included in the review are grouped into four categories as per the high level classification proposed by Connolly and colleagues (2012). These are: behavioural outcomes, cognitive outcomes, and learning and knowledge acquisition outcomes. The additional outcome category of user experience has been added as a fourth category to adequately classify all identified outcomes.

- **Behavioural outcomes** included both actual and intended behaviour outside the game or application (referred to as real world behaviours), and energy-related behaviours taken by participants within the applied game (referred to as in-game behaviours). The kinds of behaviours measured varied significantly between studies, reflecting the breadth of the domain of energy consumption and efficiency. Real world behavioural outcomes included energy consumption (reported and actual, short, medium and long term), energy saving activities/actions (self-reported) and intention to engage in energy-saving behaviour. Behavioural outcomes within the applied game included the identification and selection of energy-saving actions (in the context of the applied game) and user purpose in terms of energy-related goals.
- **Cognitive outcomes** were related to affective and motivational factors, and included energy-related attitudes, motivation to engage in eco-friendly behaviour, self-awareness of energy conservation, and willingness to conserve energy. There is evidence of a strong relationship between certain cognitive outcomes, such as attitudes, and energy saving (Abrahamse et al., 2005; Brandon & Lewis, 1999).
- **Learning and knowledge acquisition outcomes** included learning effectiveness, identification of specific energy saving actions, knowledge gains, change in awareness of

environmental and energy-related issues, gain of explicit knowledge of electrical appliances, conceptual learning performance and progression, and the gain of knowledge of energy consumption.

- **User experience** refers to the participant's attitudes towards and engagement with the applied game and includes outcomes relating to both user satisfaction and usability (International Organization for Standardization, 2010). In the present review, the scope of user experience was broad and thus incorporated variables ranging from subjective responses to the intervention, such as ease of navigation and enjoyment, as well as more objective measures relating to amount of use of the applied.

The most popular outcome category was user experience (n = 20), followed by cognitive (n = 15), behavioural (n = 13), and knowledge (n = 9). Within the behavioural category, the majority of studies (n=10) looked at real-world behaviour and a minority at in-game behaviour (n=3). It was common for multiple outcomes to be measured, with the majority of the studies eligible for review (n = 17) measuring more than one outcome. Few studies reported data relating to the role of specific game elements in the results of the intervention and the level of influence of its particular features in relation to the target population/s.

Discipline

The studies represented a range of disciplines, including education, computer and information science, business and economics, and science and communication. The most widely represented discipline was computer and information science (n = 12), which included publications from a number of specialised interest areas including persuasive technology, informatics, gaming and human-computer interaction (HCI). The second most popular discipline was education, with seven studies examining the evidence from an educational perspective. Publications included those from education broadly, as well as from the more specialised areas of learning science, innovative learning, e-learning and distance education. Other disciplines represented included business and economics, energy efficiency, industrial design and engineering, behavioural sciences, communication studies, and community and regional planning, with one study published in each aforementioned area.

Reported Effects

The effect of gamification on energy-related outcomes was largely positive, with exclusively positive effects demonstrated in 19 of the 25 studies. No studies reported a solely negative effect, however, both positive and negative effects were observed in 6 studies.

DISCUSSION

The popularity of gamification and serious games as a novel approach to encouraging real-world change is supported by the large number of articles captured in the initial search. The limited number of empirical articles remaining after application of the selection criteria suggests gamification and serious games within the domain of domestic energy consumption is yet to be comprehensively examined. The majority of papers included in the review (n = 21) were published in 2010 or later, with 11 published in the last three years.

The final 26 papers and 25 primary studies eligible for review represent great diversity in terms of research methodology, interventional design and framework, and disciplinary focus. The range of disciplines undertaking research which examines a games-based approach to domestic energy consumption confirms the area is of broad interest and applicability. This suggests a shift away from the mono-disciplinary focus of interventions to influence energy-related behaviours previously identified (Abrahamse et al., 2005).

The review has demonstrated that there is a small body of evidence which suggests gamification and serious games can have a positive effect on energy-related domains and can potentially influence behaviour or behavioural antecedents. The reliability of these results is partially undermined by shortcomings identified in the methodologies of the reviewed studies, including small sample sizes, poorly described methodologies, limited use of validated measures to quantify outcomes, absence of controls, presentation of descriptive statistics only, and narrow data collection timeframes. Some of these limitations are inherent to particular fields, such as purposefully small sample sizes in exploratory design research intended to produce rich qualitative insights, or narrow data collection timeframes that are commonplace in case study research conducted by higher degree research students. The present review does not critique or object to the peer review assessments that the selected papers underwent. The papers are categorised as low quality only with respect to the aim of the present review (assessing the empirical evidence they provide regarding the effectiveness of applied games in this domain), and indeed, these papers may be considered high quality based on other aims and criteria.

Game Elements

A variety of game elements were employed in the studies, with the most common inclusions being feedback, challenges, social sharing, rewards, leaderboards and points. As described below, there is evidence for these having various positive influences across impact types. Unfortunately, few studies compare the impact of differing game elements, which precludes many conclusions regarding the relative impactfulness of specific game elements. Of the five papers that did compare game elements only two were rated as high quality. Gustafsson (2009) and Senbel (2014) both found evidence for the value of competition and social sharing as a means of encouraging participants. Additionally, Senbel (2014) found that points and prizes worked as an initial incentive but other game elements (e.g., challenges) were more useful throughout the period of participation.

Looking across the full range of papers (regardless of whether the impact of specific game elements was isolated), the present review aligns with that of Abrahamse and colleagues (2005 ; [looking at interventions related to energy conservation](#)) in finding that feedback is often applied as a tool to promote energy conservation and appears to be an effective strategy. Similarly, the current study aligns with Abrahamse et al. in providing support for the utility of rewards as a means to encourage energy savings. In addition to providing further support for these existing connections, the present review provides evidence of the common use of challenges as a means to engage people in energy conservation and initial support for an associated positive impact.

User Experience

Empirical evidence was identified for a wide range of outcomes within the four classifications, with positive effects reported in all 25 studies and negative effects in just 6. The most frequently measured variables were classified as user experience (n = 20). This was also the most successful classification, with positive effects observed in all 20 of the eligible studies investigating user experience. Of these, only 7 were high quality (as per our own ratings). A positive attitude towards the game or experience playing the game was the most commonly reported user experience outcome amongst the high quality studies (Gamberini et al., 2011; Gustafsson, Bång, et al., 2009; Gustafsson, Katzeff, et al., 2009; Senbel et al., 2014; Stone et al., 2014; Tsai et al., 2012). This suggests that users generally respond positively to applied games, however, in the context of the review, user experience is not regarded as an outcome that adds weight to the evidence that applied games are effective in influencing domestic energy consumption. Additionally, it is unfortunately not possible to effectively explore whether any relationship exists between key demographics (e.g., age) and the user experience of applied games as no studies test for this and many studies do not report the required demographic information.

Cognitive Outcomes

Cognitive outcomes were measured in 15 studies, all of which reported positive effects. Two studies reported both positive and negative effects. These were further classified into attitudes (n = 4), motivation (n = 10), and awareness (n = 4). A total of 4 studies measuring cognitive outcomes were classified as high quality (as per our own ratings), with quality assessment scores of 7.5 or greater. Despite clear interest in the impact of gamification and serious games on cognition in the context of domestic energy consumption, there was limited evidence to demonstrate the actual effect of the intervention in terms of the cognitive outcome measured. The high quality studies reported positive changes in attitudes towards energy saving behaviour (Gustafsson, Bång, et al., 2009; Knol & De Vries, 2011) and increases in awareness of domestic energy consumption (Stone et al., 2014). Negative effects relating to cognitive outcomes were reported by two studies, one of which was assessed as high quality. Gustafsson (2009) found that while players indicated a more positive attitude towards energy saving as a result of engagement with Power Explorer, they displayed a more negative attitude towards the environment in general. The authors attribute this finding to the "...occurrence of cognitive dissonance induced by the esthetic message of the game". Overall, the results of these studies provide a basis for understanding the importance of cognitive outcomes in the context of the review, however a much greater body of evidence is required to determine the true effect.

Behaviour (Real World)

Popular opinion that gamification and serious games lead to real-world behaviour change was found to be largely supported. It should be noted though, only some of the supporting papers were assessed as providing high quality evidence. Specifically, a positive effect for real-world behavioural outcomes was observed in nine of the ten eligible studies examining this outcome, five of which were assessed to be of high quality (Gustafsson, Bång, et al., 2009; Gustafsson, Katzeff, et al., 2009; Reeves et al., 2015; 2014; Senbel et al., 2014). The effects reported by the high quality studies were all positive, with the exception of the absence of a long-term effect in terms of reduction of energy consumption observed by Gustafsson and colleagues (2009). Kimura and Nakajima (2011) reported a lack of effect, with no energy consumption behaviour change observed whatsoever, however, this study was assessed as poor in quality.

Behaviour change was examined in various contexts, predominantly the consumption of energy in self-reported and actual terms. Intentions to mitigate energy consumption or modify a related behaviour were also measured. Two studies measured behaviour change using self-reported measures only (Kuntz et al., 2012; J. J. Lee et al., 2013), while six studies measured actual behaviour change with energy use data (Geelen et al., 2012; Gustafsson, Bång, et al., 2009; Gustafsson, Katzeff, et al., 2009; Reeves et al., 2015; 2014; Senbel et al., 2014). Only one study measured behaviour change using both actual and self-reported measures (Kimura & Nakajima, 2011; Takayama et al., 2009). Interestingly, no significant correlation was found between self-reported and actual measures, in that, most participants reported they were more conscious of the environment, but this was not reflected in their actual energy consumption. However, as the authors note, this may reflect the short period in which energy consumption was measured as well as the fact the study was conducted during a holiday period in which differing patterns of energy consumption might be expected. The study conducted by Odom and colleagues (2008) described actual behaviour change data in terms of a reduction in energy consumption, however, did not describe the method of data collection. Interestingly, despite the popularity of gamification and serious games within the field of marketing, purchase behaviour was measured by one study only (Peham et al., 2014).

There was also large variation in the periods of data collection, with baseline data collected for between 1 to 5 weeks pre-intervention. Behavioural data collected during the intervention occurred within a range of immediately post-gameplay to 4 weeks, and the timeframe for data collection post-intervention varied from 4 to 18 weeks. Large variations between the studies in how behavioural

outcomes were conceptualised and quantified weakens the ability to make clear cut conclusions regarding the required or ideal timeframes for an effect to occur.

Of the studies measuring behaviour using energy consumption data, two limited the observation of behaviour change to during the intervention (Kimura & Nakajima, 2011; Salas-Prat et al., 2014; Takayama et al., 2009). The remaining five examined behaviour change both during and post-intervention (Geelen et al., 2012; Gustafsson, Bång, et al., 2009; Gustafsson, Katzeff, et al., 2009; Reeves et al., 2015; Senbel et al., 2014). Only one study observed no change in energy consumption as a result of their intervention (Kimura & Nakajima, 2011; Takayama et al., 2009). The remaining six studies reported a reduction in energy consumption during the intervention, however, the extent and nature of the behaviour change differed greatly. Although five of the studies reporting positive effects were assessed to provide higher quality evidence in the context of the review, this is still a relatively small number of studies upon which to base any broad level conclusions. Certainty around such conclusions is also limited by the differing measures used across studies. Overall, however, these studies provide encouraging initial evidence of the utility of applied games for short-term changes in energy consumption behaviour.

The efficacy of gamification and serious games in terms of mid to long-term behaviour change was less well-substantiated, with only one high quality study reporting a statistically significant decline in energy consumption post-intervention (Senbel et al., 2014). The other three high quality studies measuring post-intervention behaviour change reported either too small or not statistically significant changes (Gustafsson, Bång, et al., 2009; Reeves et al., 2015), or no sustained effect whatsoever (Gustafsson, Katzeff, et al., 2009). Geelen also reported post-intervention behaviour change, however, this study did not meet the criteria for high quality. Self-reported behavioural data also provided some evidence to support the efficacy of applied games in influencing behaviour (Kuntz et al., 2012; J. J. Lee et al., 2013), however, these studies were not assessed as high quality. Overall, it appears that when a follow-up was included in the study design, positive behaviour changes as a result of the intervention were not maintained. However, it is possible that the lack of mid to long-term behaviour change is related to a focus, in the reviewed studies, on what Nicholson (2015) refers to as reward based gamification (e.g., points, levels, leaderboards, achievements, or badges). None of the studies reviewed focused specifically on meaningful gamification (e.g., play, exposition, choice, information, engagement and reflection), which has been theorised to be more likely to lead to longer term changes. Overall, the results suggest that gamification is likely to be effective for short term behaviour change, but further research, incorporating greater diversity of types of gamification, is needed to properly assess the implications for longer term change.

The reliability and accuracy of the reported real-world behaviour outcomes and subsequent generalisations are compromised by methodological issues in a large proportion of the reviewed studies, even in those assessed as higher quality. Explicit issues with data collection was reported in a number of studies, including incomplete data retrieval (Geelen et al., 2012), and data corruption (Salas-Prat et al., 2014). In studies collecting energy usage data to quantify actual behaviour, there were inconsistencies in the kinds and quantities of appliances measured and the comprehensiveness of electrical usage data collected. Not all studies measuring behaviour had control groups, with only 5 of the 10 studies measuring behaviour change actually reporting the incorporation of a control group in the study design (Gustafsson, Bång, et al., 2009; Gustafsson, Katzeff, et al., 2009; Reeves et al., 2015; Salas-Prat et al., 2014; Senbel et al., 2014). There were also large differences in control group characteristics and the extent to which confounding variables were controlled for, with Reeves and colleagues (2015) conducting the only study which controlled for household differences. As households who participate in studies of this nature may differ on key variables such as motivation level, income, and education, generalisation of results can be difficult and undesirable.

Behaviour (In Game)

Behavioural outcomes within the game were observed in 3 studies (Banerjee & Horn, 2014; Gamberini et al., 2011; Stone et al., 2014), all of which were assessed as high quality. There was minimal overlap in terms of the outcomes measured, with each study investigating in-game behaviour from a different perspective. Stone and colleagues (2014) examined the identification of energy-saving actions and the level of participant movement and exploration within a virtual apartment, and reported that participants confident in their ability to identify actions interacted with the game to a greater extent. The nature of participant interaction was also investigated by Banerjee and Horn (2014), though the focus was on how game activity was structured and whether it evoked cultural forms (e.g., the game hide-and-seek). Observational data indicated gameplay was dominantly structured around physical assistance and conceptual elaboration, however, no evidence supported the expression of cultural forms. Participant behaviour in terms of purpose was examined by Gamberini and colleagues (2011), with findings indicating that specific goal orientated access, such as checking the consumption of a particular appliance, predominated over more generic goals such as browsing the platform.

Knowledge and Learning

Positive effects were observed in 7 of the 8 eligible studies examining knowledge and learning related outcomes, however, only 3 were assessed as higher quality (Banerjee & Horn, 2014; Gustafsson, Bång, et al., 2009; Gustafsson, Katzeff, et al., 2009). As two of these studies also reported negative effects, the strength of the evidence in support of applied games to improve knowledge and learning related to energy consumption is mixed. The overall findings are further complicated by variation in the conceptualisations of knowledge and learning and subsequently how they have been measured. It appears that there is stronger evidence for the efficacy of gamification and serious games in influencing a user's understanding of household energy consumption and conservation within a broader context, with all three of the high quality studies reporting increases. Less success was reported for the communication of more specific information, with Banerjee and Horn (2014) reporting a poor understanding of the concept and relevance of kilowatt hours (kWh) and Gustafsson and colleagues (2009) reporting marginal increases in knowledge of appliance power rating but a decrease in the ability to determine task-specific energy usage. Gustafsson and colleagues postulate that the decline in knowledge may be due to participants learning only about devices relevant to them, but also note that they found contradictions between quantitative and qualitative data leading them to question the accuracy of the results. Inconclusive results in relation to knowledge acquisition was reported by Tsai and colleagues (2012), and thus the empirical effectiveness of the intervention was deemed unclear. Knowledge and learning related outcomes examined by studies assessed as lower quality generally reported an increased ability of users to recall key themes from the game (Dorji et al., 2014; Mesquita et al., 2013; Pisithpunth et al., 2014; Yang et al., 2012).

Limitations

A number of limitations of the current review should be acknowledged. The review was limited (by definition) by the search terms chosen, the databases used and the selection criteria (e.g., only english language publications). More broadly, our assessment of the primary research question was limited by the relatively low number of studies that met the selection criteria and by the fact that within those selected many studies were found to be relatively low quality. Many of the problems relate to poorly described interventions, issues related to data collection and analysis and related weakening of the accuracy and reliability of conclusions drawn. Overall few rigorous, empirical assessments of the tangible impact of applied games on energy efficiency behaviours have been published. Relatedly, it may be that publication bias has meant that an overly positive picture of applied games is emerging. It may be that studies that find no impact of applied games are less commonly submitted or accepted for publication. Unfortunately, it is not possible to formally assess the potential impact of publication bias based on the data available in the currently reviewed studies.

On the other hand, within the studies reviewed, large within-group variation was found with respect to energy use. Coupled with small sample sizes, there is likely to be reduced statistical power in many studies and an associated decrease in likelihood of significant differences being found. This means the true picture of the impact of applied games in this domain is somewhat obfuscated. Additionally, many studies included in the review did not conduct statistical significance testing or failed to describe their analysis altogether. Similarly, many studies relied on self-reported behaviour which leaves open the possibility that some results reflect a social desirability bias. Previous research has found significant differences between self-reported and observed behaviour related to energy efficiency ([Abrahamse et al. 2005](#); [Luyben 1982](#)). Finally, there is a dearth of research assessing the long-term effects of applied games. The majority of studies did not measure long-term effects focussing on short data-collection periods and follow-ups. As a result it is possible that positive changes observed may not be sustained over time or that new positive behaviours or habits may have emerged post-data collection completion.

Conclusions

The current review aimed to explore what evidence exists that gamification and serious games are effective in influencing users with respect to domestic energy consumption. This goal was identified in response to the urgent need to consider new approaches to motivating individuals to become more energy aware and to translate this knowledge into action. It has been identified that it is essential to consider macro- and micro-level variables that may influence household consumption patterns ([Gärling et al. 2002](#)). The evidence summarised in the current review provides encouraging initial evidence that applied games can have a positive influence in the domestic energy conservation domain, but overall this review provides a good foundation for further work as opposed to conclusive evidence.

Several key areas of focus for future work emerge from the current review. Firstly, there is a need for more quantitative empirical research. Understandably, given the relative youth of the area of focus, much of the existing research is exploratory in nature. More specifically, there is a clear need for studies that isolate the impact of gamification (e.g., RCTs, quasi-experimental studies) in comparison to no intervention and more traditional interventions. Similarly, there is a need for qualitative research that more clearly identifies people's thoughts and motivations in relation to potential energy conservation interventions. Secondly, a number of more specific questions remain unanswered. It is not yet known how the impact of applied games varies across different user groups, nor is it possible to know which game elements are most effective. Thirdly, it is important that research explores the effectiveness of applied games over a longer timeframe. Finally, while user experience is a key element of applied games, research that goes beyond this outcome to include cognitive, learning and behavioural measures will greatly strengthen understanding of the field.

It can be concluded that applied games generally provide a positive user experience. With respect to cognitive outcomes, there is evidence of improved attitudes towards and awareness of energy conservation issues. Applied games appear to lead to improvements in self-reported and actual energy conservation behaviour but it is not clear whether these changes persist long-term. With respect to knowledge and learning, applied games appear to be effective means of improving general knowledge of energy consumption and conservation, but it is less clear that they are effective for communicating more specific knowledge. Overall, there is emerging evidence of the value of applied games as a means of reducing domestic energy consumption with further research needed to answer key outstanding questions.

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