THE IMPACT OF SOCIAL INTERACTION COMBINED WITH OTHER INFLUENCES ON HOUSEHOLD ENERGY-BASED PRACTICES

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Abstract

Climate change mitigation places household carbon reduction as a key issue, but household infrastructure, new technology and information-based behaviour-change programs are failing to deliver the desired outcomes.

This research was motivated by the observed failure of residential programs to achieve energy reduction objectives and a lack of focus on social influence within these programs also inspired this research into understanding the role of social influence in achieving sustained change.

Current individual-based behaviour-change models offer insights into the change process but remain challenged in achieving sustained outcomes at a societal level. Social practice theory provides insight into what is occurring, with competing and interwoven household energy consumption practices and the diminished role of the individual as practices become embedded. However, it does not explain how the change process occurs, or the role of influence from other individuals.

This research aims to explore the role and patterns of social influence combined with other influences evident between the take-up of an energy-based action and its sustained practice in the context of this research. The research is focused on aged, vulnerable populations in Victorian households who are impacted by high energy bills and low thermal comfort, whose properties often can be more structurally constrained but for whom little research has been completed on social influence impacts. The research is intended to provide a better understanding of the role of social influence on sustained change and a model of influences that can be used to improve future programs. Social influence in the context of this research is the feedback from an individual’s social contacts and the consequent impact on their energy practices.

The research covered three key areas:

- Literature review of the role of social influence in sustainability programs
- Development of a conceptual model framework incorporating social influence in combination with other influences as determinants in establishing new household energy practices
- Field research assessment of the impact of social influence on energy practices using the developed conceptual framework

The literature review confirmed that social practice theory offers a sounder basis for understanding normative behaviour than individual-centric models around which behaviour change programs have traditionally been framed. However, social practice theory does not explain how the change process occurs and new behavioural norms are established. In particular, there is no consensus on the degree of agency of the individual within the change process. Furthermore, the role of social influence on energy practices and new normative behaviour is under-researched relative to other influences of competency, material and infrastructure.

Based on the literature review and direct experience in the field, a conceptual model of influences was developed; this was used to assess the impact of social influence in combination with other influences on sustained energy practices in a program called the Energy Saver Study.

The field research was designed to answer the following 3 research questions:

The key three research questions are:

1. What are the types and frequency of social influences needed for new and sustained household energy practices?
2. In what ways does social influence combine with material and infrastructure influences and competencies to impact new actions and sustained household practices?
3. How and in what way does social influence initiate and sustain change in household energy-based practices?

The research methodology comprised:

- Recruiting volunteers from among participants in the Energy Saver Study
- Mapping participants’ social networks
- Conducting secondary analysis of quantitative data from the Energy Saver Study
- Collecting participants change stories through a community-based evaluation methodology: Most Significant Change
- Conducting qualitative data analysis through semi-structured interviews.

The research found the following:

- Social influence is relevant to achieving sustained new energy practices and may be at least as important as infrastructure and individual-based information.
- Social practice theory is effective in framing influences evident in the context of household energy-based practices.
- Patterns of influence show that social influence combines in different ways and to different degrees with material and infrastructure and competency influences, depending on the particular activity, and at different stages of the change process from conscious action to unconscious and embedded practice.
- The immediate social networks of individual participants impact the change process by giving positive reinforcement, or conversely by undermining confidence in undertaking new actions, and as such should be considered in program design.

It is posited that future intervention programs would benefit from greater consideration of social influences and the incorporation of intervention plans as part of the program design. More generally, the body of research could be usefully extended by further examination of the role of social influence both theoretically and in the field, including an examination of influencing factors for different demographics.

Key words: Household energy use, Social influence, Low-income households, Vulnerable households, Social practices, Social norms
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Declaration

1. Editor Caroline Glascodyne

2. Completed a single copy-edit of an early draft of this thesis.

3. The editors area of expertise, current or former area of academic specialisation is not in household energy practices or in an area of academic specialisation that is similar to that of the candidate.

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Glossary of terms

EAP – Energy Action program is the behaviour intervention introduced as part of the Energy Saver Study

ELO – Energy Liaison Officer is the part of the Energy Saver Study employed by the Council Health and Community Care Department

ESS – Energy Saver Study, a federally funded program within the Low Income Energy Efficiency Program

HACC – Health and Community Care department, also known as the Aged and Disability Sector; it can be run through local government, private sector or the not-for-profit sector

IHD – in-home display, which is a device used to visually demonstrate energy usage in a home fed directly from the smart meter

LGA – Local Government Authority

LIEEP – Low-income energy efficiency program

MSC – Most Significant Change which is a technique used in the methodology of this Research

SECCCA – the Southeast Council Climate Change Alliance includes eight councils in the southeast of Melbourne of which six are part of the Energy Saver Study. These are Bass Shire, Baw Baw Shire, City of Casey, Bayside City Council, Mornington Shire and Cardinia Shire
1 Introduction

This research explores the role of social influence on energy efficiency practices among low-income, aged households. Social influence is the feedback from a householders social contacts and the consequent impact on the energy practices of that householder.

The inspiration for this research was driven by my personal desire to find a change model in the context of household energy use that leads to sustainable change.

After nearly a decade of managing environmental behaviour change programs throughout Australia, some key elements emerged as needing further research. During that period, much of my time was spent driving change through information targeted at individual householders or implementing new and retrofit technologies that rarely delivered to their full potential. Many of the programs were implemented using social marketing models that emerged in the early 2000s by introducing professional marketing practices to achieving environmentally orientated objectives. In my experience, these methods, which include some social influence elements, were often deployed in the engagement process but did not form part of the implementation process.

Social influence comes in the form of feedback and such feedback can have a positive or negative influence. Feedback from multiple contacts or different types of practice can combine to have a cumulative effect. The householder’s decision-making is complex, with many variables to consider. Understanding the role and impact of social influence within that decision process will help us better understand the influences of change.

I reasoned that capturing these many variables for each desired action and framing them in a manageable way could be useful, maybe even essential to the design of successful change programs.

As successive programs were reviewed and fine-tuned, it became increasingly apparent that the role of social influence was a key determinant in the success of the recruitment process. In particular, the role of trusted sources, appropriate communication channels and reinforcement of key messages through multiple sources were evidently important in driving initial engagement and action.

However, there was a lack of theoretical research supporting my observations and empirical data from other studies was quite sparse. Unanswered questions emerged about whether social influence really was as key as my experience indicated and, if so, what kinds of social influence – in terms of type and sources and at what stage – would be most effective.

Following initial engagement, it also became clear that intended practices frequently reverted to pre-existing behaviours irrespective of any good intentions on behalf of the householder. Despite persistent commentary from householders about becoming more aware and acknowledging the need for ‘good’ energy practices, there remained a mismatch between intention and outcomes. This fuelled my desire to develop a better understanding of achieving sustained household energy-based practices from theoretical and empirical perspectives. Desk-based study of the few programs that reported sustained change yet again turned my attention to social influence and the role individuals played at a ‘grass roots’ level within these programs.

In essence, social influence involves some form of transfer of information that varies demographically. In parallel with this understanding, social marketing theory highlights the importance of normative behaviour in achieving desired outcomes yet is silent on how norms might be altered. Each discipline seemed to offer insights into experience in the field yet, frustratingly, each fell short of an effective solution. My readings indicated that there were some gaps in our understanding of social influence and its role in turning new actions into sustained practices.
This research seeks to identify whether social influence impacts change in energy practices among low-income Victorian households and, if so, how social influence combines with other influences to deliver sustained change. It does so from theoretical and empirical perspectives. The research begins with a literature review to assess whether the role of social influence on household energy practices is well understood and, if so, in what way. The second part of my research looks at field research to assess the role of social influence and identify any learnings from the findings. This thesis sets out how this research was conducted, the findings from that research and suggestions for further areas of enquiry.

1.1 The research question

The key three research questions are:

4. 1. What are the types and frequency of social influences needed for new and sustained household energy practices?

5. 2. In what ways does social influence combine with material and infrastructure influences and competencies to impact new actions and sustained household practices?

3. 3. How and in what way does social influence initiate and sustain change in household energy-based practices?

It is hoped that learnings from this research will guide greater improvements in the design of household energy reduction programs.
2 A critical summary and analysis of the relevant literature

2.1 The problem of climate change and energy reduction in households

Climate change mitigation in Australia demands a domestic energy-reduction response (Department of Primary Industries and Cabinet 2015), which is dependent upon a reliable behaviour change model (Moloney, Horne & Fien 2010, Newton & Tucker 2011, Frederiks, Stenner & Hobman 2015a).

Human-induced (anthropogenic) climate change has been described as the ‘great moral challenge of our generation’ (Rudd 2007). Australia contributes about 1.5% to global greenhouse gas emissions (Garnaut 2008, p. 53). The resultant per capita carbon dioxide emissions are more than four times the world average (Garnaut 2008, p. 153). Australia’s total greenhouse gas emissions in 2014 were 523.3 million tonnes of carbon dioxide emissions, an increase of 8.25% on net emissions recorded in 2000 (Australian Government 2014). Australia’s current emissions reduction target is to reach 5% below 2000 levels by 2020 (United Nations 2015, p. 3, Australian Government 2015a), with the potential for further targeted reductions. Energy production (power generation and transport fuels) accounts for 75% of Australia’s total greenhouse gases (Australian Government Department of the Environment and Energy 2012). As a result, achieving short-term and longer-term carbon reduction targets will require change from all sectors of society. While change is required in both production and consumption, this thesis focuses on consumption.

The average Australian households energy consumption is 4618 kw/year, which is double German household levels and 70% higher than UK households (World Energy Council 2010). This equates to more than 18 tonnes of carbon dioxide emissions per household each year (Environment Protection Agency Australia 2015) which generates 46 million tonnes of Australia’s greenhouse gases,. This emphasises the importance of addressing household energy reduction in Australia for both carbon reduction and also for bill management. Housing is a key challenge for the disadvantaged (Stone & Reynolds 2012) and management of the energy bills is a challenge for low-income households. Poverty and disadvantage is not just caused by individual circumstance but also by inequity within societal structure (Davidson & Evans 2014) and the quality of housing is a key dimension of that disadvantage (Stone & Reynolds 2012). Understanding the household energy practices of those in poverty can help inform effective programs and policy and can empower low-income and vulnerable households.

Analysis of poverty has also been viewed as a ‘lost opportunity’, with many households suffering deprivation of single or multiple essential items and services (Saunders, Naidoo & Griffiths 2008). Work has also been completed demonstrating the link between poverty and social deprivation or social exclusion. Social exclusion is a common problem in disadvantaged households (Saunders, Naidoo & Griffiths 2008). A householder experiencing social exclusion may not have such established social networks and if so the role of social influence could be diminished when trying to drive change. Low-income households are particularly vulnerable to high energy bills and the aged are also vulnerable to unsafe thermal comfort. Policymakers are cognisant of the need to address disadvantage particularly among the aged. Consequently, this study focuses on effective household energy reduction for low-income, aged households in Australia.
2.2.1 Understanding the key influences

**Housing infrastructure and technology initiatives**

National initiatives to reduce Australian household generated greenhouse gases have been evident since the turn of the century (Australian Government 2000). Many of these initiatives have been designed around improving the quality of the housing stock and the appliances within them. Energy efficiency building standards were introduced for new housing stock in 2003, with most states aiming for 6-star ratings (Nationwide House Energy Rating Scheme 2015). However, compliance issues are still a problem, with many new dwellings built below the Building Code of Australia (BCA) requirements (Australian Government 2013), leading the Commonwealth Scientific Information Research Organisation (CSIRO) to advocate for performance-based regulation (Ambrose et al. 2013).

The challenge of achieving energy efficiency in older houses through retrofitting is evident, with houses built in 1990 averaging 1-star rating (Nationwide House Energy Rating Scheme 2015). Australian householders were recently described as ‘living in tents’, as death rates due to cold are twice European equivalents (Gasparrini et al. 2015). Rising energy costs and health impacts from poor quality housing is driving a focus on more research into both energy-efficient behaviours and strategies for supporting the vulnerable (Maller & Strengers 2011, Strengers et al. 2014, Australian Department of Industry and Science 2015).

Policy focus in the last decade is not only on upgrading housing stock, but also on new technologies and encouraging householders to change the way they use energy (Australian Department of Industry and Science 2013). In Australia household energy-efficiency intervention strategies that have been implemented include:

- energy ratings on appliances and new technologies
- initiatives to replace inefficient technologies such as incandescent lighting and electrical hot water systems with more efficient technologies such as heat pumps
- market competition to promote innovative suppliers
- accurate measurement of energy consumption through smart meters.

Household energy usage by categories is as follows (Australian Department of Industry and Science 2013, Zero Carbon Australia 2013):

- heating and cooling 40%
- water heating 21%
- appliances 33%
- lighting 6%.

Opportunities for improved energy efficiency exist in all categories. However, attempts to implement market-driven technological initiatives by category have been inconsistent. Successes have been achieved in the water heating and lighting sectors through the light globe and showerhead exchange program where new technology, low-flow showerheads and energy-efficient lighting, is provided free to householders. By contrast, progress in the heating, cooling and appliance sectors has resulted in unintended consequences. For example, installing air conditioners has improved comfort but has also significantly increased energy usage, which has undermined improvements in energy efficiency (Chappells & Shove 2005, Parkhurst & Parnaby 2008, Strengers 2008). This acts as a reminder to policymakers that housing upgrades and new technologies alone are unlikely to achieve the desired outcome of reduced energy use.

Newton and Tucker’s (2011) study of comparable detached homes in Melbourne, within a range of star ratings, demonstrates five different pathways to low-carbon households. These pathways...
include combinations of thermal shell and plug in and fixed appliances upgrades with or without power generation, One pathway directly compares households with ‘best of breed’ devices, which are of the highest calibre energy efficiency, to ‘standard’ devices. The reduction in carbon emissions can be physically achieved but behavioural elements counter the benefits. This is described by Newton and Tucker (2011) as due to factors such as ‘affluenza’ or ‘comfort creep’. Awareness of the need to link infrastructure change to behaviour has resulted in the use of technology to inform householders of their energy use. All such strategies assume that these innovations would increase householder knowledge and motivate them to reduce their consumption. Carbon emissions of 18 tonnes per Australian household suggest this strategy has not been effective (World Energy Council 2010). Most international interventions that focus on behaviour are information based (UK Government 2008, Mahone and Haley 2011); they may also include interventions such as the requirement to disclose bill data, data access through smart meters and development of energy-efficiency skills and information access (Council of Australian Governments 2009). Housing infrastructure improvements and technology are clearly key influences, but alone they do not achieve effective change. Newton and Tucker (2011) state that ‘policy analysts need to engage with both technology and behaviour based approaches to achieve energy conservation’ (Newton & Tucker 2011, p. 46). Other researchers also state that an associated effective behaviour change model is required to achieve the desired outcome of household carbon reduction (Moloney 2010, Stern 2010, Newton & Tucker 2011). As Frederiks, Stenner and Hobman (2015a) argue, ‘solving many of the world’s energy-related problems requires not only technological advances, but also changes in human behaviour’ (p. 574). This research aims to develop our understanding of the influences that change practices, as related to residential energy consumption among low-income Victorian households.

**Information-based behaviour change initiatives**

To understand why people are not being as energy efficient as possible requires an understanding of the different influences involved in household energy-based practices. Current understanding of influences on behaviour have evolved from ‘individual-centric models’ where the influencing factors impact the individual whose behaviours are targeted for change.

Infrastructure and technology are key elements but they are not effective alone. Information-based campaigns have been delivered as standalone interventions or alongside retrofits. Information-based campaigns target the values, beliefs and attitudes of the individual through new knowledge. Values and beliefs are considered core influences on intent (Azjen 2011) but beliefs and actions do not always match. This is known as the value–action gap (Blake 1999, Spurling et al. 2013). Blake’s (1999) study was designed around the UK Going for Green campaign where those who expressed concern about the environment were asked why their actions did not match their concern. The three reasons identified by the study were individuality, responsibility and practicality. Blake emphasised that people’s values were negotiated, transitory and sometimes contradictory. Blake’s study provides evidence of a value–action gap. It did not explore influences over time from early action to embedded practice.

It is clear that new knowledge alone, although a key influence on the individual’s behaviour, still delivers inconsistent results. This has led to several decades of research on behaviour change and the breadth and quantity is almost too vast to digest. However, the literature of different models and theories present in these ‘individual centric models’ is well summarised by Darnton (2008) and Shove (2010a) n 2008, Shove 2010a). Initially, financial influences for creating new and sustained household energy-reduction were the focus, such as financial cost/benefit (Andreasen 1994). The more recent theories within ‘individual-centric models’ have expanded in the last decade and include
a broad range of influence categories. The ISM (Individual, Social and Material) model (Darnton & Horne 2013) and the comprehensive ‘Model of pro-environmental behaviour’ (Kollmuss & Agyeman 2010) present a broader range of influences. The Model of pro-environmental behaviour includes external factors such as infrastructure, socio and political influences plus internal elements influencing the individual directly, with barriers including previous habits and negative or insufficient feedback on behaviour. Within these models, influences are multiple and encompass internal psychological factors as well as external factors, including infrastructure, social and cultural factors overlain with old behaviour patterns.

Internal psychological factors include values, attitudinal change and normative influences (Schultz, Khazian & Zaleski 2008), which are dominant influences from a social marketing perspective (Mohr 2006, Robinson 2013). Community Based Social Marketing (CBSM) has been a popular method for household energy reduction programs in recent years, led by Douglas McKenzie Mohr (2006). A step-by-step methodology has been well designed and marketed and has achieved some success in the challenging environmental change area. Key influences identified include demographic, barriers, incentives and norms. Sustainability Victoria, in a recent paper commissioned on energy-efficiency behaviour change emphasises, the importance of normative influence and of all behaviour being voluntary (Behaviour Works 2015).

The influences lead to change through the conscious action on the part of the individual and there has been some success in achieving short-term changes. However, the benefits of these changes tend to lapse over time (Chitnis et al. 2014) often due to the rebound effect whereby householders increase their energy usage as a result of cheaper energy or increase their demand for other things that require energy. (Chitnis et al 2014). Hence, these rebound effects can be direct or indirect but the responses are not elastic across variables such as income levels, behaviours or technology uptake (Saunders 2012, Sorrel 2012). Household energy programs are largely driven by measurable outcomes (Chitnis & Sorrell 2015) and energy savings are counteracted with high impact rebound effects quantified as 63% of the initial change for gas and 57% for electricity (Chitnis et al. 2014). The Chitnis study (2014) was a quantitative, longitudinal study, using household reporting together with measured energy usage to evidence the rebound effect and the measurement range of the degree of rebound was broad and varied within different practices. But still ‘there is a lack of agreement and clarity in the literature as to how ’rebound’ should be measured’ (Turner 2013, p. 38). This emphasises the failure of understanding which influences achieve sustained benefits and change (Moloney, Horne & Fien 2010).

Social influence is evident in other theories (Mohr 2006, Robinson 2013, Kollmuss & Agyeman 2010) and yet government initiatives and programs rarely focus on social influences following initial recruitment requirements. A few isolated programs that have had this focus on ongoing social influence show sustained success where others have not. Examples of successful programs based upon social influence include Sustainability Street (Fitzgerald-Ryan & McBurney 2015), Ashton Hayes Going Carbon Neutral (Edwards 2007), Ride to Work (Bicycle Network 2015) and the Ararat health campaign (Ararat City Council 2015). All of these programs were initiated voluntarily within the community through social gatherings, role models, mentors and unconditional support. These programs have self-managed social influence to reinforce practices as core to their strategy and outcomes demonstrate effectiveness in sustained new practices.

The Individual, Social and Material (ISM) model is a mix of behavioural theories. This model identifies that social influence and material and infrastructure and individual-based influences are all important but it remains focused on the individual.
This range of influences targeted at individuals can provide a strong basis for changing actions but the value–action gap and rebound effects highlight that there is a gap in our understanding of how to sustain behaviours. Influences within current behaviour change models for creating new and sustained household energy-reduction practices are failing to deliver a consistent and sustained result at societal level (Moloney, Horne & Fien 2010, Spurling et al. 2013, Strengers & Maller 2015). As the pressure towards climate mitigation increases, policymakers and change agents are moving towards influences of a broader societal nature, with reduced focus on influencing the individual. This has led to interest in exploring social practice theory as a new perspective (Strengers & Maller 2015, Shove & Walker 2014, Moloney & Strengers 2014).

2.2.2 Social practice theory as a framework for understanding influences

The evolution of social practice theory was first outlined in a number of papers from the late 1960s. Andreas Reckwitz (2002) has collated and summarised the evolution of social practice theory in his paper ‘Towards a Theory of Social Practices’, which draws upon the points of difference between classical social theory and other cultural models of behaviour. Fundamentally, social practice theory decentralises the role of the individual and places practices behind all elements of our existence from simple actions through to social structures whereby practices evolve and sustain themselves. Social practice theory describes how individuals are shaped by the cultural environment in which they live and individual agency relies on and produces cultural forms. The individual is merely a subconscious carrier of those practices (Schatski, Knorr Cetina & Savigny 2001, Reckwitz 2002). However, the possibility of actively changing those practices always exists.

Social practice theory has some similar influence categories to ISM, including social and material and infrastructure, yet decentralises the individual and provides a promising framework in the context household energy-based practices. Influences focused on the individual enable change in actions but changing values or beliefs do not always match a sustained change in action. Householders rarely sustain new actions into established practices as the behaviour of individuals rebounds back to their previous state or fails to develop new actions into sustained subconscious habits (Darnton & Horne 2013, Kollmuss & Agyeman 2010, Sunstein & Thaler 2008). Influences constructed from social practice theory explain well the integration of these sustained unconscious practices embedded in daily life, with individuals merely unconscious performers of those practices. As a framework for household energy practices, social practice theory has advantages over individual behaviour theories in that there are less variables, and more tangible outcomes in practices that are both observable and measurable. Social practice theory encourages a broader visionary approach rather than focusing narrowly on outcomes (eg supply and demand). There is an appreciation that technology and infrastructure are inextricably linked with practices, rather than being discrete and separate instruments of policy. Further, the role of the individual is de-emphasised, managing the challenge of addressing individual behaviours.

However, understanding of how the change process occurs without an element of conscious decision-making is a gap in this theory, which is highlighted by several theorists (Maller & Strengers 2011, Reckwitz 2002, Swidler 2001) and discussed further under section 2.3 ‘the Change process’.

The individual is the agent and the degree of agency is very different between individual-centric models and social practice based models in that individual-centric theories assume individuals make conscious rational decisions. However, leading critics of individual-based theories of behaviour believe they share a common blind spot whereby unconscious desires and legitimate social norms are not considered. According to social practice theory, individuals are seen as ‘carriers’ or
‘performers’, integrated within practices while simultaneously reproducing them (Schatski, Knorr Cetina & Savigny 2001, Reckwitz 2002).

Shove (2010b) claims leaders must be cognisant of driving policy encompassing all elements of social practice theory. Leaders driving policy tend to focus on technology, infrastructure, pricing regulation, behaviour change and social norms (UK Government 2008, Council of Australian Governments 2009). Numerous developed country governments or academics have sought to steer social norms in many areas of public policy. Public health and environmental practices have been targeted, with many programs aimed at reducing obesity, road tolls, alcohol and tobacco usage or increasing public transport usage and recycling. Increasingly, governments have realised the problems of using information and individual-based approaches and sought to affect norms through some aspects of social practice theory (Shove 2010a, Strengers & Maller 2015). The sociology team at Lancaster University in the UK have led this research, with Professor Elizabeth Shove motivating debate for leaders on using social practice theory within policy development for household energy reduction (Knott et al. 2008, Sustainable Development Commission 2006, Shove 2010a).

Policies based on social practice theory offer advantages over current policy settings for carbon-reduction actions. Present Australian household energy-based reduction programs focus on discrete interventions in technology, shifting consumer choice and changing individual behaviour. A practice perspective seeks outcomes from changing trajectories of practices, re-crafting or substituting practices or changing interlocking or interwoven practices. It is more visionary than simply extrapolating from our current way of life (Spurling et al. 2013, Strengers 2014). Practices can be empirically observed more easily than meanings, ideas and values (Swidler 2001). It may also be that social practice theory offers a perfectly rational explanation for inaction. Indeed, the Sustainable Practices Research Group (SPRG) argues that observable behaviour is just the tip of the iceberg and it is the practice entity that is the ‘socially embedded underpinning of behaviour’ (Spurling et al. 2013).

Social practice theorists have deconstructed social practices into their constituent elements of materials, competence and social meaning (Shove, Pantzar & Watson 2012) of material and infrastructure, knowledge, skills and socially shared tastes (Spurling et al. 2013). These may be combined as detailed in Figure 2.1, which supports the concept that social practices have these constituent elements of materials and infrastructure, competency from knowledge, skills and values and socially shared tastes and meanings. The triangle exemplifies that the observable behaviour is just the tip of a practice (Spurling et al. 2013).

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<th>PRACTICE AS AN ENTITY</th>
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<td>• Material and infrastructure</td>
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‘Socially shared tastes and meanings’ includes any form of understanding emerging collectively. Social influence from one’s social network is a key element of the formation of these tastes and meaning that constitutes the participant’s energy practices along with material aspects and competencies. To understand the different influences on practices this research aims to look deeper than which energy-reduction behaviours are enacted; we need to look below the waterline to the practice as an entity. All constituent elements need to be considered as influences on a specific practice at the point of uptake of a new action through to a sustained practice.

2.2.3 Elements of a practice as influences on household energy practices

The elements of a social practice are explored in the context of energy-based household practices, with the intention of contributing to an improved model of influences.

Material and infrastructure

Material and infrastructure are formed from the interdependence of cultures and resources (Swidler 2001), meaning resources are core but constructs will vary with localised cultures. Localised cultures incorporate social constructs driven by collective groups. Collective groups influence technology, regulation, pricing and constitutive rules as policy to influence societal energy practices (Spurling et al. 2013). Collective groups influence the Australian energy sector with power generation and supply infrastructure, institutions, regulation of market price controls, compulsory smart meters, household star ratings, new technologies and funding interventions (Council of Australian Governments 2016, Australian Government 2015b).

Across Australia, there is considerable geographical variation in infrastructure. For example, most energy in Tasmania is provided by hydropower; Victoria has high-emissions brown coal power generation; Queensland has limited domestic gas supply; and South Australia has strong pockets of solar or wind power generation. In addition, localised energy retailers drive different offers on peak and off-peak supplies. These create variables beyond the immediate control of the individual and provide a very different context for each household’s actions in relation to energy purchase and use (Australian Energy Council 2016).

The context and infrastructure is also highly variable at a localised household level, with existing households varying considerably by age, style, design and construction. Newer households, built since 2003, have been built to regulated requirements. As numbers of Australian households are projected to increase by 31% to 11.8 million (Australian Bureau of Statistics 2015) by 2031, the proportion of new housing stock will grow, increasing the proportion of regulated housing stock. Across both new and existing housing stock, variations in household infrastructure impact energy efficiency.

Examples of relevant household infrastructure include:

- building design and materials
- orientation
- age and quality of construction
- heating, cooling and hot water systems
- fixed and non-fixed appliances
- information technology such as in-home displays and smart meters (Zero Carbon Australia 2013)
These variations have been influenced through a combination of technology, regulation, pricing and constitutive rules. All enable and constrain particular behaviours. While some infrastructure and new technology may be more efficient in engineering terms, established or competing practices such as hygiene, comfort and convenience (Shove 2003a) also influence energy use. This is exemplified by householders with dishwashers still washing items by hand or lacking the technical skills to use eco-rinse programs (Richter 2010). A capacity is afforded by the technologies or appliances themselves. New televisions have such low wattage the device takes on the competence of standby power (Naidu 2010). Household energy-based behaviours can be divided into habitual or, in the case of technology, ‘one-off’ behaviours (UK Government 2008).

Material and infrastructure influences that are considered in this research (Newton & Tucker 2011, Australian Department of Industry and Science 2013, Zero Carbon Australia 2013) as detailed in Figure 2.2 will include:

- household building and construction (this includes building design and materials, orientation, age and quality of construction)
- fixed and non-fixed appliances (this includes heating, cooling and hot water systems)
- data (this includes in-home displays and smart meters)
- power supply
- regulation

These influences are outside the immediate sphere of influence of the individual at the point of decision-making for habitual energy-based practices. One-off purchases of infrastructure or appliances are not classified as habitual behaviours and only habitual practices can be assessed longitudinally to determine if they have been sustained.

Figure 2.2 Material and infrastructure influences


There is no research on the positioning of influences such as weather within social practice theory influences although weather is recognised as an influence (Rantala, Valtonen & Markuksela 2011). For this study, environment is considered part of material, which includes both human-made and natural influences (Rantala, Valtonen & Markuksela 2011) and weather is included under material influences.
Competence: The intersection of knowledge, skills, attitudes, beliefs and values

Competence is the intersection of knowledge and skills, which are interwoven with attitudes and beliefs (Spurling et al. 2013). High competency is the ability to do something successfully and confidently, influenced by knowledge, skills, attitudes and beliefs. Sikula (1996) discusses the different definitions of attitudes and beliefs in teaching. The definition of attitudes by Fishbein is ‘a learned predispositions to respond to an object or class of objects in a favourable or unfavourable way’ (1967, p. 257). Goodenough (1963) described beliefs as propositions that are held to be true: ‘accepted as guides for assessing the future, are cited in support of decisions, or are referred to in passing judgment on the behaviour of others’ (p. 151).

Social marketing has placed an information-based learning approach and consequent competency as core to effective sustainability change. Considerable progress has been made in the last two decades on improving individual skills of understanding how to deliver practical competency (Mohr 2006). Active learning is accepted as delivering the most effective response (McMichael & Shipworth 2013) as information alone does not necessarily lead to action (Kollmuss & Agyeman 2010). Enhanced skills and knowledge of a practice enables a greater behaviour competency and includes a willingness or inclination to act (Kollmuss & Agyeman 2010) but do not always deliver change.

Competency within a practice requires not only knowledge and skills but also priority within competing practices. Each competing practice must contest for its place in the hierarchy. For example, if comfort practices are a priority for reasons of health they may override financial practices, with high bills and low energy reduction practices, with regard to turning the heating down or off. To introduce a new practice, an existing practice will lose its priority. For example, if reduced thermostat settings are actioned due to prioritised financial practices then social etiquette practices when entertaining may lose priority, resulting in a cold house for visitors. Anchored practices are rarely changed. Anchored practices are embedded, habitual and largely subconsciously enacted (Swidler 2001). The positioning and embeddedness of the practices are discussed in more detail in section 2.3 on the change process. This is due to the role of social norms and personal values and attitudes establishing and sustaining themselves.

Multiple competing and interwoven practices within the context of household energy-based practices include financial, health, entertainment, comfort and social etiquette practices. Each different practice has a competency level and each practice is competing for the single agent. The skills, knowledge and competency of each practice are significant when these practices are competing or supporting each other. The degree of competency for each practice will impact which one becomes dominant; therefore, practices associated with a target practice and the agent’s level of competency need to be understood as influencing factors.

There are multiple influences that are evident in household energy-based practices but environmental attitude, altruism and personal responsibility, health, hygiene, comfort and convenience, finances and social etiquette are key to adopting sustainable practices (Strengers 2008, Kollmuss & Agyeman 2010, Southeast Climate Change Council Alliance 2016).

Environmental values, attitude and beliefs influence household energy use (Barr & Gilg 2006). Climate change awareness has increased over the last 10 years, with 75% of individuals in Australia believing that reducing carbon is a genuine concern (Leviston et al. 2011). Environmental values are shaped by our intrinsic motivations and are driven by childhood experiences in nature, environmental destruction experiences, values of family, organisations and role models as well as knowledge (Kollmuss & Agyeman 2010). The definition of environmental beliefs refers to what a person believes about the environmental issue, person or object. The definition of environmental
attitude is an enduring positive or negative feeling about the person, issue or object (Kollmuss & Agyeman 2010).

Altruism is an influence on household energy practices as studies show that concern for the wellbeing of future generations can motivate the adoption of carbon reduction practices such as household energy reduction (Bramston, Pretty & Zammit 2010, Maréchal 2010). An altruistic act delivers outcomes for the greater good and pro-environmental behaviour is an example of altruism (Kollmuss & Agyeman 2010). However, it is accepted that concern for others, such as future generations, is not always the motivation; motivation can still be personal (Daube & Ulph 2014).

There is a competency in understanding the impact of comfort levels as an influence on household practices. Comfort is both physiological and psychological, and subject to localised context. The need for thermal security of safe temperature levels between 16 degrees and 27 degrees challenges the ability to build temperature adaptability and better health from natural ventilation. The perception of ‘comfort’ is highly variable among householders and people have reported being comfortable at temperatures ranging from 6 degrees to 30 degrees Celsius (Shove 2003a, Chappells & Shove 2005, Newton & Tucker 2011).

Financial practices assume choices are based on a rational cost/benefit analysis (Azjen 2001) by the individual and yet the decision process is not always so simple or driven by financial needs (Saunders 2013). Many energy efficiency initiatives have been focused on the more vulnerable sectors of society where fuel poverty is evident. Fuel poverty occurs when more than 10% of income is spent on fuel for heating. In this context, energy costs may prompt reduced comfort levels. Saunders (2013) completed a longitudinal study comparing income and household energy usage data from 1987 to 2002. He concluded that while income level is an influence on energy usage there are other influences that need to be accounted for and lower income households exhibited larger rebound effects in energy efficiency than any other socio-economic groups (Saunders 2013). Examples of other influences on low-income households may include the comfort needs of ageing bones and poor health, which negatively impact the financial constraints of living on a pension. Conversely, high competency in financial management enables understanding of long-term investment such as in insulation, enabling greater comfort levels and ongoing reduced costs. This again highlights a mix of interwoven and competing practices with comfort levels and financial management.

Shove (2003a) in her theoretical study of changing practice norms over time uses cleanliness, comfort and convenience to demonstrate how different practices interact. Social etiquette is an evident influence in her research, as laundry and bathing norms demand more frequent washing for purposes of display. Another example of social etiquette practice increasing energy usage is an extra fridge for convenient cool drinks or an increase in thermostat settings when visitors come to stay.

Competency also leads to confidence and confidence reduces perceived levels of risk and improves comfort zones. Comfort zones are significant influences in performing a new action (Robinson 2013). When information is acquired and understood, a level of confidence is achieved (Gladwell 2000; Rogers 2003). Belief that the action matters will improve likelihood of that action occurring, called self-efficacy within the Theory of Planned Behaviour (Azjen 2-11) and self-efficacy is connected to confidence. Confidence is a core element of competence (Robinson 2013) and confidence leads to instinctive behaviour as demonstrated with the ‘Four Stages of Competence’ (Howel 1982) evolving through different levels of consciousness and competence specifically from:
This research explores how social influence in combination with competency impacts household energy-based practices in their transition between conscious action and subconscious habit. However, the competing and interwoven practices are not fully understood within the context of household energy practices. Moloney and Strengers (2014) identified that the answer to the world’s environmental problems potentially rests in addressing the elements’ mutually binding practices together, and understanding the ways they are enacted and reproduced in everyday life.

**Influences contributing to individual competency**

The individual’s knowledge, skills and attitudes and beliefs influences household energy-based action decision-making (Shove 2003a, Middlemiss 2011) and should be regarded as competencies. The household energy-based practices, as well as the competency of practices that are interwoven, such as environmental attitude, altruism and personal responsibility, health, comfort, convenience, finances and other less prevalent competing influences such as social etiquette and hygiene are included as influences as detailed in Figure 2.4.

**Social influence**

‘Socially shared tastes and meaning’ as the third element of a practice allows for consideration of the culture, localised variation and social context (Shove 2003a, Spurling et al. 2013). During the change process where the level of agency is high, discourse links social practice and ‘meaning’ through common understandings, norms and ‘common sense’ (Spurling et al. 2013). Discourse is
interchange within a social context whereby the transfer and evolution of information, practices, cultural norms and common understandings or constitutive rules occurs. The role of discourse is regarded as fundamental in the change process whereby ‘practices evoke discourse and from discourse further practices arise’ (Swidler in Schatski, Knorr Cetina & Savigny 2001, p. 84, Lachlau & Mouffe 1985, p. 83). Discourse, structures, constrains and restricts our perception. Michael Foucault refers to discourse as ‘practices that systematically form the objects of which they speak’ (Jones 2008, p. 614). Schatzki et al. (2001) describe discourse as the site or context in which activity occurs and meanings evolve (p. 53). There is a subjective element at play – not just rules – including culture or contextualised common understandings. ‘The determined response of an individual to a situation is based on what makes sense to him or her to do in that moment’ (Swidler 2001, p. 84). Discourse, ideas and practices are interactive. All the elements of the discourse feed what is acceptable to the agent for a particular practice in their context at that point in time and such habits and routines are observable patterns of action that are socially conditioned (Southerton 2012).

Social interaction enables discourse and social learning comes from conscious interaction between two or more people (Glasser 2007). As such, ‘practices are more persistent and more likely to structure other domains of thought and action when they constitute social relationships’ (Swidler 2001, p. 95). Individual choices are continually being shaped and reshaped by the social contexts in which they take place (Shove 2003a, Jackson 2005). Needs should be considered at the collective or social level including social community relationships such as trusted role models and peers (Moloney 2010). As Christie, Donn and Walton (2011) maintain, the social psychological position suggests that ‘householders’ behaviours result from the need for social approval or [are] due to biases in collective action’ (Christie, Donn & Walton 2011, p. 452). Identifying and understanding how social feedback influences behaviour patterns at a local level is core to this research.

The discourse and consequent social feedback can influence social norms. All norms can be conceptualised as being social because they emerge from collective activities and the emergence of shared knowledge and practices (Sheriff 1936 cited in Reynolds 2015, p. 47). Normative influence is a factor in determining whether householder feedback is negative or positive. Negative feedback is enforced by the feelings of embarrassment, anxiety, guilt and shame that a person suffers at the prospect of violating them (Reynolds 2015). However, not all householders may regard challenging the norms as a negative experience and some householders may choose to react against norms (Brehm 1989). This challenging response to norms may provide some insight into who the change-makers are that can challenge and change established societal norms. Social influence interacts with norms at a localised householder level, a community level and a mass societal level. McMichael and Shipworth (2013) in their community case study research demonstrated that seeking information among personal contacts is often associated with adoption of energy-efficiency innovations increasing the likelihood of adoption up to four times. Understanding the social influence an individual householder experiences helps in understanding the perceived norms for that individual householder because social networks are a key influence.

The social network of an individual determines the personal contacts he/she may have and the type and frequency of social influence and feedback evident. For this research, the Social Network Index (SNI) for the ageing population developed in the UK (Zawisza et al. 2104) is used to determine the social network categories used. This research includes measurement of the size of the network, closeness of the relationships, the level of support and frequency and type of contact.

Understanding an individual’s social network helps clarify the social influence and normative influence on their behaviour. The literature identifies a gap in our understanding of social influences and the impact on norms and behaviour uptake, particularly at a localised level on household energy
reduction practices (Shove 2003a, Moloney, Horne & Fien 2010, Reynolds, Subascis & Tindall 2015). Therefore, this research identifies the presence of social influence, whether positive or negative and the frequency of each type of feedback, the networks, the relationship embeddedness and social capacity as applied to a new action and a sustained behaviour.

The process of social influence

Social influences in this project include social feedback received from others to demonstrate, endorse or repel a practice, which is itself influenced by social norms, as detailed in Figure 2.5.

The combination of social, material and infrastructure and competency may give insight into practices that are sustainable. Social practice theory provides an effective framework to assess influences within the context of established household energy-based actions. Furthermore these influence categories are consistent with behavioural theorists whereby behaviours are composed of actions from cognitive, physical and social activities (Savolein 2008) and the more recent ISM framework which describes influences of individual, social and material (Darnton 2015). The patterns of these influences at each of the different stages of the change process may vary so it is important to have an understanding of the change process.

2.3 The change process

The literature is not only unclear as to the change process but also as to the terminology. Behaviour and practice is often blurred in their definition, and practices are also referred to as patterns of behaviour (Schatski, Knorr Cetina & Savigny 2001). Using a series of definitions from a range of theorists, a synthesis of the change process is presented in Figure 2.6. The theorists are predominantly practice theorists who are trying to relate practices to behaviours (Schatzki, Knorr Cetina & Savigny 2001, Southerton 2012).

There is a lack of agreement globally between social practice theorists and behaviourists on the change process. The debate is fuelled by the different disciplines (Whitmarch et al (2011) and complicated by a lack of defined terminology. Savolein (2008) a practice theorist from the United States and Wilson (2008) a behaviourist from Europe throw some light on the common ground between social practice theory and behavioural theory. Wilson (2008) does not view behaviour and practice as being in opposition but as slightly different and differently 'pitched' concepts. Savolein (2008) regards different disciplines and consequent terminology as important to different interpretations. ‘Behaviour draws more strongly on the tradition of psychology (or social psychology)
while the conceptualizations of practice draw more on sociology (Bourdieu, Giddens) and social philosophy (Schutz, Schatzki, Wittgenstein). The terminology is core and the exact definition of the concepts of behaviour, action, activity and practice is very difficult, due to their generic nature."

Terminology for the purpose of this research has been defined below but there still lacks a broad consensus on definitions;

The debate is largely centred round the level of agency of the individual during the change process, with the individual being the primary agent in behaviourist theory and the individual being an unconscious social actor within social practice theory. Yet Wilson emphasizes that within behaviourist learning theory, values and social norms play a key role and there is no suggestion that the individual is some kind of isolated organism, unaffected by the surrounding society. Similarly even the most staunch social practice theorists question the level of agency of people.

“As carriers of a practice, agents are neither autonomous, nor the judgmental dopes who conform to norms”. (Reckwitz 2002 pg 256)

“Of course, we must not forget the most critical change agents of all; the performers of household practices, those everyday innovators who, in the context of extreme heat, blackouts and changing cooling technologies, are variously involved in inventing and adapting ways to keep cool “(Strengers, 2012 pg 233).

This research uses social practice theory as a framework for established practices but assumes an ontology of consciousness during the change process.

The lack of universally accepted definitions at the nexus of practices, habits, norms, routines, behaviours and actions fuels the gap in understanding about the level of agency involved in the change process. The relative merits of the different theories and the degree of agency during the change process remains unanswered. Early definitions provided somewhat functional descriptions such as ‘social practices are routines’ (Reckwitz 2002, p. 255) or ‘patterns of behaviour’ (Schatzki 2001 cited in Turner 1994, p. 57). Later, more nuanced definitions emerged with the notion of ‘habit’ learned by imitating the public performances of others (Swidler 2001, p. 94) or ‘an interwoven activity in a social domain, an organised web of activity, exhibits two overall dimensions: activity and organization’ (Schatzki, Knorr Cetina & Savigny 2001, p. 56). This emphasises the transition between a single action, through behaviours and practices, to an anchored practice as detailed in Figure 2.6.

![Figure 2.6 Transition from new actions to anchored practices](Source: (Schatski, Knorr Cetina & Savigny 2001))

Collated definitions of some of the key terminology used in this research include practices are regarded as an interwoven web of activities commonly recognised within a group (Schatski, Knorr Cetina & Savigny 2001), actions are physical transactions that come from doings and sayings (Schatzki, Knorr Cetina & Savigny 2001), habits and routines are observable patterns of stable practices and actions, that are socially conditioned (Southerton 2012) and anchored practices are the combination of norms, personal values and attitudes establishing and sustaining themselves (Swidler, Knorr Cetina & Savigny 2001).
Practices are not a single process but are interwoven and compete with one another. Reckwitz (2002) describes an example of a practice as ‘a way of cooking, consuming, working which forms a “block” whose existence depends on the specific connections between these elements and which cannot be reduced to any one of these single elements’ (p. 249). Practices can then become interwoven with other practices to create a complex web. An example of this is the now anchored practice of ‘9 to 5’ work patterns in Mexico, which became established following the regulated banning of the siesta. However, this was only made possible by new infrastructure, technologies and materials in temperature controlled buildings (Shove 2003a). New air control technology gave rise to changed behaviours in sleep patterns, mealtimes and social interaction that overrode the competing practice of the siesta. This may not be regarded as a good outcome for carbon-reduction efforts.

Practices are interwoven, re-crafted or substituted and all compete within the one person. As one practice is adopted, another is diminished. This is how practices change and evolve (Spurling et al. 2013) and may be seen as similar to competing habits used in social marketing (Mohr 2006). Social practice theory provides a framework for understanding the evolving patterns of human behaviour. Not only are practices themselves connected, they are also interwoven into the environment, infrastructure, culture and consequent constitutive rules (Swidler 2001). All these different facets of society act as influences on the practices themselves, emphasising the complexity of this area.

2.3.1 Single versus multiple actions

Moloney, Horne and Fien (2010) researched 100 different programs in Australia, which were all attempting to create low-carbon communities. They concluded that although many existing household energy reduction programs aim to change environmental attitude or educate on specific energy actions there are many other significant influences (Moloney, Horne & Fien 2010). Those that do not acknowledge the science of climate change responded better to programs that targeted actions not attitudes (Edwards 2007, Middlemiss 2011). Programs that target lifestyle are effectively targeting multiple actions. This single action approach is also consistent with the community-based social marketing approach of taking small steps and having a positive and successful experience, however small the outcome (Mohr 2006). Clarity of the action targeted by a program is core to success with understanding of the present action performed, the target action, context and time and who performs it (Fishbein & Azjen 2010). Successful outcomes are increased if they are reinforced by selecting measurable actions with high impact, low penetration and a high probability of uptake (Mohr et al. 2012).

Moloney and Strengers (2014) through their ‘Going Green’ research interviewed 19 households who were part of the Australian Conservation Program of sustainable workshops. They concluded from the data that approaching household sustainability through changing broader societal practices would be more effective than trying to change existing lifestyles individually. In summary, environmental attitudes and beliefs influence energy use (Barr & Gilg 2006, Leviston et al. 2011), but pro-environmental attitudes and beliefs are not always evident as an influence in the household energy reduction process (Kollmuss & Agyeman 2010).

2.3.2 Degree of consciousness

Social practice theory provides great insight into everyday practices but does not depict the role of the agent or individual within the change process and the transition between conscious action and subconscious practice. While the role of the individual is de-emphasised within social practice theory, it is not completely discounted, as change agents are continually inventing and adapting new
ways to manage their energy practices (Maller & Strengers 2011). Reckwitz (2002) also explained that:

As carriers of practice, the householder is neither autonomous nor the judgemental dopes who conform to norms: they understand the world themselves, and use know-how and motivational knowledge, according to the particular practice. There is a very precise place for the ‘individual’ (p. 244).

Social practice theory literature does not yet offer a predictive model for establishing practices and consequent norms (Schatski 2001, Swidler 2001, Reckwitz 2002). Norms drive change subconsciously and yet the role of the individual is evident (Maller & Strengers 2011, Reckwitz 2002). The gap in social practice theory is the change process and how this occurs without some level of consciousness and agency. I posit there is an interaction between degree of agency and the transition between conscious action and subconscious practices as detailed in Figure 2.6.

Different researchers emphasise different influences as key to sustained change. Strengers and colleagues (2014) emphasise broader societal norms, whereas Jackson (2015) emphasises the breaking of established personal habits. Strengers et al. (2014) study on comfort and cleanliness practices is viewed through a social practice perspective. The study involved the impact of feedback using ethnographic interviews, and observation. It was clear that many householders felt their practices were non-negotiable and fundamental even though they ranged widely in reality. Strengers et al. concluded that for new practices to be sustained, a change was needed in subconscious norms, not just at an individual level, but also at a householder and a broader societal level. Conversely, Jackson (2005) argues that a vital ingredient for changing habits is to ‘unfreeze’ existing behaviour to raise the behaviour from a level of practice to discursive consciousness. The degree of consciousness is also questioned within ‘Nudge’ practices that emphasise both reflective and automatic thinking within behaviour change (Sunstein & Thaler 2008). The influences on conscious action and subconscious practices or the transition between these two stages remains inconclusive. It is clear there is a lack of consensus in the literature as to the degree of consciousness of the agent and the role of norms during the change process.

There is a lack of consensus in the literature in the degree of consciousness involved in the change process. The sociologists who advocate social practice theory where there is a diminished role of the individual accept there may be a stage in the change process when there is a greater element of agency (Strengers et al. 2014, Shove & Walker 2014, Moloney & Strengers 2014). Conversely, the behaviourists state that conscious decision-making by the individual is core to the change process and yet acknowledge that this is constrained by the subconscious norms of society (Mohr 2006, Fitzgerald-Ryan & McBurney 2015, Cialdini 2009, Kollmuss & Agyeman 2011). Kollmuss and Agyeman (2011) conclude in their model that subconscious habits are an additional influence factor alongside conscious values-based reflective change. The conscious decision-making is challenged by old subconscious behaviour patterns or existing habits that compete for priority with any new conscious actions. Hobson (2006) posits that the value–action gap exists because of the influence of subconscious habits.

2.4 The role of householders as a change agent

As the Sustainable Development Commission 2006 suggests that change in attitudes, beliefs, aspirations and a sense of self-efficacy need to be addressed at four key levels of society:

- Friends and family
- Organisations and workplaces
Leadership at a national policy level through to local level leadership has a role in energy reduction practices. The importance of feedback and social commitment at a local level is promising as an effective measure of influence on change (Maréchal 2010). This research focus was at a local level, and includes ‘friends and family’ where discourse on daily household matters are most evident. At a local level change-makers are the householders that show leadership for change. This leadership is defined as a process of social influence, which maximises the efforts of others, towards the achievement of a goal (Chemers 1999).

A wicked problem may be defined as a social or cultural problem that is difficult or even impossible to solve because of contradictory or incomplete understanding, large size and varied opinions, economic challenge and the interconnectedness of so many influences (Fien & Wilson 2014). With wicked problems, such as household energy-based practices, a more nuanced and multi-pronged approach is needed for change, including ‘collaboration and shared decision-making’ (Fien & Wilson 2014, p. 14). This is reinforced by Grint (2005) who regards an effective process as one that uses soft, normative power such as collaboration and empowerment. To achieve this, policymakers need to manage a balance of regulation and empowerment as explored within the UK with the popular ‘Nudge’ approach. There is considerable difference between a policy and a single mandate (Sunstein & Thaler 2008).

A strategy for community change is exemplified by the ‘four E’ strategy of: Enable, Encourage, Engage and Exemplify, which all relate to distributed and transformational change-makers (Knott et al. 2008). However, the roles and process of community change-makers within the conservation area remains underdeveloped (Higgs 2003).

The emerging school of thought from Higgs (2003) in the UK is to focus on what change-makers actually do, their ability to perform and their impact on followers. This research will focus on what individuals do in terms of creating the environment to enable others to fulfil their potential and then helping them believe in their potential.

To enable others to believe in their own potential a change-maker needs the ability to stand up for and share their actions, be they a single action or an interwoven practice, regardless of external pressure such as majority norms (Hernandez et al. 2011). The measure of norms is usually obtained by asking respondents to rate the extent to which important others would approve or disapprove of their performing a given behaviour (Reynolds 2015). Acting as a role model demonstrates integrity in terms of congruence of words and actions (Kouzes & Posner 2008). Role-modelling requires a level of competency including skills and motivation, which drives confidence, integrity and self-belief, or as is often attributed to Gandhi: ‘You must be the change you want to see in the world’.

An effective change-maker requires both a level of competency and communication skills to influence others, especially with wicked problems (Fien & Wilson 2014). At a local level, knowledge transfer tends to occur through social interaction. To enable social influence through interaction requires social capability. ‘Leadership requires the management of social relationships’ and it is only through a full understanding of the social networks and individual’s role within them that change can occur (Balkundi & Kilduff 2005 p.956).

Within this study, capacity to evoke change has been researched based on the following criteria:
• competency through confidence in performing a household energy practice (Gladwell 2000, Rogers 2003, Fien & Wilson 2014)
• self-belief in standing up for one’s actions against norms or through endorsement (Hernadez et al. 2011, Kouzes & Posner 2008)
• social network capacity (Balkundi & Kilduff 2005)
• local change initiated by the householder (Higgs 2003, Dinh et al 2014).

2.5 Gaps in the literature
Social influence at the point of change and creating subconscious norms with sustained household energy reduction practices at a local level needs greater understanding (Moloney, Horne & Fien 2010, Reynolds, Subasic & Tindall 2015).

Understanding social influences and their interaction with other influences is core to this research. A ‘model of influences’ framed on social practice theory (Kollmuss & Agyeman 2010, Spurling et al. 2013, Shove & Walker 2014, Strengers & Maller 2015) is a relevant model in the area of household energy-based practices that needs to be researched.

The role of householders in socially influencing change of household energy practices at a community level (Maréchal 2010) needs better understanding. This can be explored through their social competency and communication (Fien & Wilson 2014), social network capacity (Balkundi & Kilduff 2006), self-belief and response to norms (Hernadez et al. 2011, Kouzes & Posner 2008), as related to specific energy actions taken (Higgs 2003).

Social practice theory and individual-centric models demonstrate a lack of consensus as to the level of agency or conscious versus unconscious normative behaviour needed during the change process from a new action to a sustained practice (Strengers & Maller 2015, Shove & Walker 2014, Moloney & Strengers 2014). This research study identifies the influences evident during this transition, from conscious new action through to subconscious sustained practice.

2.6 Conceptual framework
The conceptual model detailed in Figure 2.7 shows how social influence interacts with other influences present and at different stages of the change process. These different stages represent the transition between existing practices and new actions and new actions and sustained practices. Understanding social influences may provide insight into the role of householders in initiating the change-process.
The conceptual model of influencing factors in this research includes material and infrastructure, individual competency including attitudes, beliefs and skills plus social influence. The competencies of all the different practices that are interwoven are included. Focus is placed on social influence in a localised context and on behavioural reinforcement. To understand social influence in context and in comparison with other influences the model of influences needs to be proven. The listed influences on the model of influences need to be evident in households that complete new energy actions. This research focuses on the social influence and how social influence interacts with each type of influencing factor for successful, failed and sustained household energy consumption practices. It also expanded learning of the role of householders as change-makers within their local community.

2.7 Relevance and significance of the research

This research identifies whether all the influences detailed on the model of influences exist with householders making change. The research identifies the relationship between material and infrastructure and competency influences and social influence when household practices change and are sustained. The research also identified whether the social influence of householders enables others to change through their social capacity, behavioural competency and self-belief.

Low-income households are challenged by rising energy costs, which is impacting their health and resulting in deaths following extreme temperatures. Improved housing and new technology require an effective model of change to ensure sustained change. More research is needed on behaviour strategies for the vulnerable, however (Strengers et al. 2014, Australian Department of Industry and Science 2015).

Climate change mitigation in Australia demands a domestic energy-reduction response (Department of Industry, 2013), which is dependent on a reliable model of change (Moloney, Horne & Fien 2010, Newton & Tucker 2011, Frederiks, Stenner & Hobman 2015a). Current behaviour change models for creating new and sustained household energy-reduction practices are failing to deliver a consistent and effective result at societal level (Moloney, Horne & Fien 2010, Spurling et al. 2013, Moloney & Strengers 2014).

The practical implications of this research include a greater understanding of household energy practices and an improved understanding of influences of change. Emphasis is on understanding patterns of social influence and change-makers at a local level. A greater understanding of this may
result in an improved community-based change model. This would result in positive changes in sustainability, health and wellbeing.
3 Research methods

This research aims to improve our understanding of the presence of social influence on new and sustained household energy practices framed through social practice theory. Policy has placed emphasis on the power of technology and physical retrofits in recent years, which comes from the material and infrastructure influence category of a practice (Council of Australian Governments 2016, Australian Government 2015b). Many programs also still focus on skills and attitudes through new learning (e.g. Moloney, Horne & Fien 2010), which comes under the individual competency, skills and attitudes influence category. A few successful and sustaining campaigns (Edwards 2007, Ararat City Council 2015, Bicycle Network 2015, Fitzgerald-Ryan & McBurney 2015) have identified social influence as key to effective change and placed social interaction high on the agenda through role modelling, face-to-face interaction and group-driven activities. However, often these social-based techniques are used for recruitment, and the focus on ongoing longer-term social influence diminishes. This research aims to understand the role of social influence in combination with other influences during the process of changing household energy-based practices and the type of social influence present with successful outcomes. A successful outcome is uptake of a new action. A sustained practice is an energy action that is sustained over time.

The influences are categorised using social practice theory as it is important to frame the data theoretically (Coffey, Holbrook & Atkinson 1996). Using social practice theory, a practice was dissected into three constituent parts as follows (Shove 2010a):

- Material and infrastructure
- Competency, which includes skills, beliefs and attitudes of the individual
- Social influences

The definition for each of these constituent parts is detailed below.

‘Material and infrastructure are formed from the inter-dependence of core resources with localised culture’ (Swidler in Schatski Knorr Cetina & Savigny 2001, p. 87). Collective groups within the culture drive social constructs, influencing infrastructure, technology, regulation, pricing and constitutive rules (Spurling et al. 2013).

Competence is the intersection of knowledge and skills, which are interwoven with attitudes, beliefs and values (Spurling et al. 2013). Enhanced skills and knowledge of a practice can change beliefs and attitudes, and enable a greater behaviour competency and inclination to act (Kollmuss & Agyeman 2010).

‘Social influence is shared tastes and meaning’, which allows for culture, localised variation and social context (Shove 2010a). During the change process, where the level of consciousness is high, discourse is evident and discourse links social practice and ‘meaning’ through common understandings, norms and ‘common sense’ (Spurling et al. 2013).

This study is focused on low-income, disadvantaged households where poor housing quality is a key dimension of that disadvantage (Stone & Reynolds 2012). Understanding the household energy practices of these householders can help inform effective program design (Moloney, Horne & Fien 2010, Reynolds, Subasic & Tindall 2015), and can empower vulnerable householders (Strengers et al. 2014, Australian Department of Industry and Science 2015). This makes understanding why practices are sustained or not all the more important. The research explores influence patterns on successful actions leading to sustained practices in the context of this research.
The selection of the research sources, the methodology and analysis is determined for each of the three research questions. This is detailed in Appendix 13: Data collection plan.

3.1 Selection of the methodology

In designing the study it was important to understand the techniques used by others in this research context. Qualitative and quantitative techniques have been used to research different aspects of energy-based household practices (Abrahamse et al. 2005, Moore, Strengers & Maller 2016). Many studies researching effective household energy reduction have been empirical studies using quantitative techniques, often driven by architects, engineers, environmentalists and economists (Lopez, Antunes & Martin 2012). Retrofit upgrades or behavioural interventions are commonly found techniques and effectiveness is measured using quantitative measurement of outcomes such as energy usage, cost-benefit and carbon reduction. Quantitative techniques also tend to be used to measure ‘rebound’ effects (Turner 2013, p. 38).

Alternatively, a range of qualitative techniques have been used in studies driven by social marketers, social scientists and psychologists. Schelly (2016) demonstrates the value of qualitative techniques to understand social practices. Qualitative techniques tend to be used to research how and why questions such as how social influence links to household practices. Within energy-based household practices, a range of qualitative techniques are evident, such as interviews and observations (Strengers 2010). The research sample of households who changed behaviour in this research is 32 and although a small sample this sample size can still enable effective learnings (Small 2009).

Mixed methods can add insights that are missed by a single method. In this complex context of household energy practices the qualitative techniques improve our understanding while quantitative techniques help us visualise the potential strategies (Tashakkori 2003). Hybrid approaches are considered most relevant since they integrate multiple dimensions (Lopez, Antunes & Martin 2012), and mixed methods are already actively used in measuring household energy-based practices (Christie, Donn & Walton 2011, Hargreaves, Nye & Burgess 2013). A mixed methods approach gives a broader aspect of household energy practices but can challenge the scope of a research study.

The study assumes that individuals are conscious of their actions (Reckwitz 2002, Strengers 2012). Interviews were used to develop an understanding of the influence model but unconscious actions could still be captured through observation during the interviews. Limited observation was used in this methodology to verify interview data and ensuring that privacy was upheld.

The interaction of different practices, agents, timelines and influencing factors adds many variables. Therefore, when multiple data sources are collated to review all influencing factors in this research, focus is placed on the single practice of heating and cooling. Heating and cooling practices contribute to over a third of household energy usage (Australian Department of Industry and Science 2013, Zero Carbon Australia 2013).

Understanding the constraints and strengths of previously used methods within household energy-based practices has informed an appropriate research design which addresses the key research question and each sub-question, as determined from the literature review and the gap in knowledge that emerged.

The key three research questions to be answered is detailed below:

1. What types and frequency of social influences were evident for new and sustained household energy practices?
2. In what ways does social influence combine with material and infrastructure and competency influences to impact new actions and sustained household practices?
3. How and in what way does social influence initiate and sustain change on household energy-based practices?

3.1.1 Research design

For a complete picture of the influence of social factors in combination with other factors influencing new energy actions and sustained practices, this research used a hybrid, mixed methods approach, combining quantitative data analysis with qualitative research and a hybrid evaluative technique. The in-depth qualitative interviews answer why and how householders make these decisions. The quantitative data answers who they are and to some degree what is happening. The hybrid evaluative technique expands on the researcher’s understanding of what is happening and why the householder thinks it is relevant. To manage the complexity and number of influences the research frames, these influences use social practice theory, dividing the practices into three constituent parts as detailed earlier.

This mixed methods approach helps enable data comparison from three different methodologies and perspectives:

1. Secondary analysis of quantitative data from the established Energy Saver Study
2. A community-based evaluative method called the Most Significant Change
3. Qualitative in-depth, semi-structured interviews

An overview of the techniques to be used for each research question is detailed in Figure 3.1.

![Figure 3.1 Overview of the research design](image)

Each of the three methods is explained in detail in section 3.2 of this section on data sources. These three methods are outlined below in their relevancy to the research questions and the data that was collected. This will be followed by a section specifying how the data were applied and analysed to answer each of the key research sub-questions.
This research used quantitative data from an existing study called the Energy Saver Study (ESS), which is targeted at low-income, vulnerable householders recruited through Health and Community Care (HACC) departments in Victoria. Recruitment for the research is from within this total ESS sample. Each ESS participant was recruited by the local council Energy Liaison Officer (ELO).

The Most Significant Change is a community-based evaluation technique (Davies & Dart 2005). Brief stories of significant change were gathered from participants and evaluated for key influences by the participant householders and project team members.

The in-depth interviews explored the participant’s experiences and influences behind household energy-based practices using qualitative techniques.

The first sub-question is informed by all data sources as this is fundamental to the key question. The data used from the qualitative interviews includes the type and frequency of social interaction and data from the social network capacity mapping. The quantitative data from the secondary analysis assesses social contact levels against actions taken, and the data from the Most Significant Change technique identifies presence of social influence in successful change stories. The social influence evident is mapped against the actions taken to show correlation or patterns of variation.

In order to answer the second research sub-question, it was important to understand what influences are evident overall and classify them under the theoretical framework provided with social practice theory. Due to the complexity of the context of household practices, a mixture of quantitative data and qualitative methods were used (Moore, Strenger & Maller 2016). A full range of influences was not identified in a single interview or from a single perspective. To capture a complete picture of all the influences, more than one source was used. This research combined quantitative data from an existing study together with in-depth qualitative interviews to inform influences evident and demographics. Secondary analysis was conducted on the quantitative data from an existing study called the Energy Saver Study (ESS). This data included new household infrastructure and behaviour interventions, financial stress, comfort perception, environmental attitude and demographic data and is detailed further in section 3.2.1. The in-depth qualitative interviews also informed this research question by exploring the evident influences on new energy actions in the context of their home.

Research sub-question 2 demands an understanding of not only the influences that are evident, but how these different influences combine and their consequent patterns. To understand the patterns of these influences, a qualitative technique could identify some emerging patterns within a specific context and a quantitative technique could provide specific patterns but only once a greater understanding of all the evident influences and their context is gained. The qualitative route or the quantitative route in isolation do not provide an appropriate methodology so in this research a mixed method evaluative technique was adopted. This mixed methods, evaluative technique used for the research provided an overview of influence patterns, with influences categorised into the three groups framed through social practice theory. This community-based technique called the Most Significant Change provides an overview of influences patterns through the perspective of the household. The technique involves householders telling their household energy stories of significant change, classifying those stories by influence category (in this case the influences categories are the three elements of social practices detailed above). The householders telling these stories were placed in evaluation groups to determine which stories were Most Significant in terms of impact on change and why. This technique is a mixed methods approach in that the group evaluations provide qualitative data through the evaluation groups but the sample size justifies statistical classification of the influences in a quasi-quantitative style. This analysis provides a
groundwork and understanding for further quantitative studies. This technique is discussed in detail under section 3.2.2.

Qualitative in-depth interviews informed all research questions. These in-depth interviews aimed to understand the participants’ influences, concerns and social context. Using open-ended semi-structured interviews, the householder talked about what is important to them, encouraging greater discourse and depth of understanding. It was important to get the right balance of power between steering the interview and letting the interviewee just talk (Waller, Farquharson & Dempsey 2016). For effective communication and to establish rapport during the interview, an appropriate and rehearsed introduction was designed, explaining the purpose of the research, the format of the interview and that there were no right or wrong answers. The participant could drive the discussion format but there were consistent areas within household energy practices that were covered across all interviews. A list of prompting questions and areas covered are listed in Appendix 1. As actions become more habitual and sustained practices emerge over time, a longitudinal approach was required to measure if change was sustained. Therefore, two qualitative interviews were completed at least five months apart on each household that has completed a new household energy action. The in-depth interviews explored householder motivations, details on social influence and other interwoven influences that impacted changing actions and sustained practices. Data on the householder social network was also captured in the first interview as detailed in Figure 3.4 (explained in greater detail in section 3.2.3). The data collected from these interviews was analysed using QSR NVivo under defined nodes listed in Appendix 2 and detailed in section 3.2.3. The data analysis includes a comparative word analysis (CWA) which was compared to the different influence categories. A ‘conceptual grid’ to identify data patterns was completed which can be a powerful tool (Atkinson 1992, in Silverman 2011 p. 459).

The third research sub-question on how householders encourage social influence was also informed through the qualitative interviews by exploring in interview 1 the social confidence of the householder, response to feedback and starting conversations.

The research design was a mixed methods approach that sourced data from three differing perspectives and methods. The quantitative data was sourced by analysing data from the ESS study to determine influences evident, actions taken and established, and demographics. The Most Significant Change captured a longitudinal qualitative data by bundling influences into categories, framed through social practice theory, which determined patterns of influences impacting household energy practices. The in-depth qualitative interviews informed social influence and other influences evident in the transition phase between new action and sustained practices.

3.1.2 Data reliability and validity

The reliability of data was enhanced by using three different data sources and correlating their outcomes (Neuman 2011). The Energy Saver Study and Most Significant Change data was collected by the Energy Liaison Officer, independent home auditors or directly from scientific monitoring equipment. This data was correlated against the Masters primary research data, which was collected by the researcher. The data collected from different interviewers, and separately added reliability to the data.

Data reliability was enhanced for the financial stress measurement whereby five different questions with alternative themes within financial stress were measured for correlation. The same quantity of data does not exist for the comfort priority influence and energy efficiency attitude influence so comparison is not as reliable.
The reliability of data in this context is challenged by the need for self-reporting. The claim of behaviour change has all too often been shown to mismatch the actions in reality (Geller 1981). For this reason, observation was added to the methodology. The Energy Saver Study surveys and observations from ELO visits were used to validate the claims of energy actions undertaken. The energy actions captured through the Energy Saver Study include an observational element as the ELO not only asked the householder what new actions they undertook but also observed change. For example, claims of adjusted thermostat settings from the householder can be observed in reality by looking at the thermostat setting and also cross-referenced if available against actual temperature data from the thermometers in the living and bedroom areas. The Energy Action Program (EAP) is the behaviour intervention program used within the ESS. The EAP used tools in the intervention, which included fridge magnets on which the householder ticked a new action every week it had been completed (see Figure 3.2). Observing the engagement with these tools helped to validate the householder claims. This same process of observation was used by the researcher during the primary and secondary interviews.

![Figure 3.2 A fridge magnet used to reinforce new actions](image.png)

The validity of the research is often questioned with qualitative methods (Waller, Farquarson & Dempsey 2015) and the need to call upon self-reporting challenges validity but there is limited choice of methodology in this context. The novelty of the Most Significant Change technique needs further research to verify validity but the methodology has a clear technique.

**Triangulation**

In this research study each householder was researched in up to three different ways using mixed methods, and using different researchers with the common goal of improving the carbon reduction of household emissions or improving household comfort and wellbeing. The Most Significant Change process included an element of respondent validation if it was extended over time. However, this method also has its flaws (Reason & Rowan 1981). Different perspectives do not necessarily validate the data (Silverman 2005) but can add to learning and techniques; that is, constant comparison can lead to more valid findings.

The Energy Saver Study survey data on new and sustained energy practices is cross-referenced to the Masters primary interview research data. The Most Significant Change captures such a small snapshot of the householder actions and not all householders may consider that they have stories of change. It is, therefore, less relevant in comparing data. A select number of case studies were assessed for influence patterns on householders with new heating and cooling actions introduced in the previous 12 months. For example, if data on financial stress, or comfort priority is missing from the ESS for a particular householder then the pattern of influences is incomplete. Data from that household may inform learning on other influence domains such as social but cannot give a full pattern of influences.
3.1.3 Constraints of the methodology

Level of consciousness
The methodology of face-to-face interviews was adopted for the research, requiring a conscious observation from the householder. However, the area of transition from conscious action to subconscious habit assumed that there could still be an element of consciousness in the participant in identifying if the action had become a habit. An improvement to the methodology would have been a longitudinal observation method for this phase of the research. However, the practicality of achieving such a technique remains challenging as the habits in the home are very personal and potentially cross the lines of acceptable privacy. The capacity to include an element of observation in the data collected through the trusted Energy Liaison Officers (ELOs) within the Energy Action Program and through the researcher did add to the appropriateness of the methodology used.

Factors driving different perspectives from each researcher
Each interviewer’s perspective, from key researcher to ELO, is different, based on acquired knowledge, personal beliefs and capacity. Every ELO was given the same training and followed a common process, but skill sets were variable from ‘first job out of college’ to ‘university lecturer’. Many of the questions asked in the surveys required a deduced response due to the frailty of the participant. The training was comprehensive and consistent and reinforced in the field but each council had different protocols and variation was still evident even within these protocols.

Existing relationships
Some of the ELOs had very strong relationships with the householder, built up over three years and this may have biased a natural response.

The primary researcher also had the role of Team Leader within the Energy Saver Study and was familiar with all the data of the different householders. This had several benefits in understanding the terminology used by the householders and the different interventions but had potential to add bias. The primary researcher tried to manage this by not researching each householder prior to the visit and thereby interviewing without detailed prior knowledge. There were some challenges where the primary researcher had already interviewed the householder as a participant in a case study as part of the ESS and some of the questions were similar. To counter this, it was explained to the householder that there would be some repetition to the case study interview and that this interview was to be used for a different purpose. Most householders were quite happy to chat and may not have even been aware that they were repeating responses. When questions were repeated the responses were generally consistent.

The researcher’s perspective, built from personal experience, knowledge and beliefs can bias interpretation and expectation. This can lead to a consequent self-fulfillment of that belief. Recording of the interviews and a consistent methodology was important in overriding such bias from the researcher.

The partnership with the ESS
Benefits included:

- Access to data
- Use of resource in data capture
- A recruitment channel for the primary research
- A targeted energy action intervention program to create a change environment
The benefits of partnering with the ESS were considerable, with access to data within the ESS which was professionally captured and not always being analysed for the Low Income Energy Efficiency Program (LIEEP). The additional benefit was the capacity to use ELOs as a resource to capture the stories of Most Significant Change and inclusion of the ELOs in the evaluation groups.

The data included:

**Qualitative in-depth interviews**

- Total interviews completed in the research and analysed for social networks = 49
- Interviews with new actions completed and analysed in depth = 32
- Second longitudinal interviews completed for those with new actions = 28

**Most Significant Change Stories**

- Total number of Most Significant Change Stories collected for evaluation groups = 83
- Most Significant Change stories collected overall (including non-significant and partial) = 127
- Most Significant Change Stories collected overall (including complete stories only) and analysed for influence patterns = 71

See section 3.4 for the method used to grade Most Significant Change stories.

Disadvantages included:

- Some householders were interviewed too often
- Bias in research due to prior knowledge, relationships and incentives

The negative was that some of the householders towards the end of 2015 had had enough of being asked questions and receiving visits from researchers. A lack of enthusiasm in a small number of households was evident and some second interviews were completed by telephone due to interviewees’ limited availability.

**Timing**

Timing was a constraint for the research methodology.

The research field data collection time allocated was nine months, which constrained the longitudinal element of the study, particularly across seasons. The second interviews in the research to demonstrate sustained practices were comparing winter practices with practices during the summer. For example, if a new thermostat action had been completed in winter 2015 and a second visit was 6–8 months later, in February 2016, there was still no need for heating. This constraint was countered by discussing intent and how they planned to manage their thermostat.

The Most Significant Change stories were collected with the ESS surveys. The ESS surveys were delayed due to safety concerns with contractors who were delivering the retrofit interventions. Consequently, full collection of the Most Significant Change stories was delayed by two months and they were only partially collected at the time of the evaluation group stage. As only a representative sample was required for the evaluation stage this did not impact the technique. All the stories had been collected when the data on influence patterns was analysed.
3.2 Data sources

3.2.1 Quantitative data from the Energy Saver Study

This research used quantitative data from the Energy Saver Study (ESS), recruited through Health and Community Care (HACC) departments in Victoria. The profile of the 320 ESS participants was low-income, vulnerable householders, predominantly aged over 70 years. Each ESS participant was recruited by the local council Energy Liaison Officer (ELOs) who established a relationship with participants. Within this critical research, participants are divided into four research groups:

1. Home retrofits – providing energy efficiency upgrades to the house and appliances
2. Behaviour change – providing information and support to householders
3. Retrofit and behaviour change – providing both the home retrofits and behaviour change program
4. Control group – these households only partook in the surveys and monitoring and received no other intervention program.

This research design had different interventions, which were behavioural or retrofit based (A or B) or both interventions combined (C) and all were matched to a control (D). Each group also had a different degree of social support from the ELO, which was mapped against uptake of new energy actions.

Quantitative data from the Energy Saver Study on householder demographics, new energy actions and influences were assessed within the research, framed through social practice theory and intended to provide a ‘Model of Influences’ that could be used to improve current programs within the context of household heating and cooling practices.

The data from the Energy Saver Study included in this research included:

- infrastructure and material influence (changes in household infrastructure specific to heating and cooling infrastructure)
- competency, beliefs and attitudes influence (householder financial stress, comfort priority, energy efficiency attitude and underlying motivation to change practices)
- demographics (of gender, age, occupancy and income)
- validation of new energy actions taken (EAP program results)

This data informed the three influence categories within social practice theory, which were material and infrastructure, competency, beliefs and attitudes and social, and may validate the self-reported claims of household energy actions implemented. A more detailed analysis of influence patterns was completed on a sample of four households with full data sets specific to heating and cooling practices. Selection of this sample is detailed under recruitment in section 3.3. Details of the specific quantitative data collected can be found in Appendix 3.

**ESS data to inform the Infrastructure and material influence domain**

Household infrastructure data help inform influences that are evident under the material and infrastructure influences domain and may combine with social influence to form patterns of influence. Focus was placed on whether change occurred to the household infrastructure that may influence change. Data analysed in the research included new infrastructure installed after February 2015, as part of the retrofit intervention by the Energy Saver Study. For those households in the sample of heating and cooling case studies, the data were simply captured as a yes or no for receiving new infrastructure.
ESS data to inform the competency, beliefs and attitudes influence
Les Robinson demonstrates that frustration motivates change (Robinson 2013) and financial stress, health and comfort priority and environmental concerns may be regarded as frustration and is assessed as an influence on change.

Financial stress
The degree of pressure from financial stress is determined using ESS data.
Data on financial stress is captured from the householder in the baseline pre-intervention survey. The data collected from the baseline pre-intervention survey on financial stress was from seven key questions, which used either a Likert scale or a broad range of options in the response. The seven questions were categorised under financial support, financial control, empowerment and capacity and general control and are detailed in Appendix 4 and correlated using the Alpha Cronbach technique (Cronbach 1951).

A rating of 0.7 or above is deemed acceptable. This technique takes different ways of measuring the same construct and checks for correlation. Reliability of data was enhanced by checking for correlation of all the responses and merging them to check reliability using an analysis of variance (ANOVA). The analysis of variance takes the mean of each response group and the deviation, which is the difference from the overall mean to the individual responses. The standard deviation of these groups is compared which determines variance. The measure of variance denotes reliability.

Comfort priority
Comfort influence was assessed using preferences for heating and cooling in the summer and winter seasons. These two questions used a Likert scale in the response options, which can be converted into a numerical rating.

The in-home temperature data from bedroom and living room thermometers were mapped to give an indication of the range of temperatures practised for the research sample.

All questions are captured in Appendix 4.

ESS data to inform demographic data
Demographic data was collected by the Energy Liaison Officer before February 2015 during the household assessment phase of the study and the data was collected for the following questions:

- QD1: Age bands – Under 59 years/60-69 years/70-79 years/80-89 years/over 90 years
- QD2: Number in household – 1, 2, 3, more than 3
- QD3: Gender assessed by Energy Liaison Officer – Male/Female/Other
- QD4: Dwelling status – Owned outright/Mortgaged/Tenant/Renter/Other
- QD5: Income status – $200-299/$300-399/$400-599/$600-799/$800-999

ESS data to inform new energy actions
New energy actions undertaken by the householder were assessed by the Energy Liaison Officers during two separate visits. These visits were part of the Energy Action intervention program. This intervention was only applied to Group B and Group C within the Energy Saver Study, which equates to 51% of the total research sample of 32 which is those that had completed an action. Data was self-reported and the implementation was observed by the Energy Liaison Officer. An example of the data capture form is detailed in Figure 3.3 but the full list of energy actions are detailed in Appendix 5 plus a pictorial presentation detailed in Appendix 6.
Whether the householder was completing a new action and which category this fell under was captured on this form. The sample analysed by the researcher was only for those households that had implemented a new action.

Figure 3.3 Example of the energy action form

3.2.2 Community-based evaluation technique – the Most Significant Change

A community-based evaluation technique called the Most Significant Change (Davies & Dart 2005) involved collecting stories of change and assessing those with greatest significance. The key influences within each story are evaluated by the participant householders and project team members.

Brief stories of significant change were gathered from participants by the ELOs, from the Energy Saver Study (July–September 2015). The researcher allocated stories by each of the key three categories within Social Practice Theory to the separate evaluation groups made up of volunteer participants (October 2015 – February 2016). Each group debated and discussed the merits of stories under the three categories and by consensus selected the stories of ‘most significance’. These selected stories were debated and discussed by a separate evaluation group made up of members of the project team who selected the overall story of Most Significance.

Stories were sorted into three key influence domains, accepting that stories may have multiple influences. Key domains were:

1. Most significant change through influence from social interaction
2. Most significant change from increased individual competency
3. Most significant change from material and infrastructure influence

The stories evaluated as delivering the ‘most significance change’ were assessed using measures determined by the participants such as personal effort or greatest outcome. Headings were provided by the researcher to stimulate evaluation structure. The key selected stories were fed back to the participants and published within the Energy Saver Study as a case study.
Most Significant Change extensions and modifications

The community-based evaluative technique the Most Significant Change aimed to give a broader overview of the influences and those of significance. The Most Significant Change highlights which influences were evident and their priority from the participant’s perspective. The Most Significant Change (MSC) technique has evolved in practice over the last ten years and was specifically designed for measuring the effectiveness of complex community-based social change programs where the problem is too ‘wicked’ to isolate a single variable or simple solution to effect the social change desired. Household energy practices are such a problem.

Storytelling and case studies are commonly used in community evaluations where the community can have a voice but rarely is the selection process of these stories captured and openly retold. This creates trust and more ownership of the actions they are being asked to implement (Davies & Dart 2005). In many community programs the stories are used for example setting and media purposes to further promote the change process and this in turn has resulted in change (McClintock 2004). To elicit the householder narrative with some accuracy their words were recorded and an ‘interview based’ and not ‘participant controlled’ technique was used (Waller, Farquharson & Dempsey 2015). The householder was invited to tell, in their own words, what they regarded as their story of Most Significant Change. The interviewer had prompting questions to channel a response with a specific action and to explore all possible influences evident in that situation.

This continuous filtering of stories of evolving practices selects those that are most aligned with the values in the localised context and therefore the practices most likely to be sustained. It also has the added value of re-aligning or exploring program stakeholder values, similar to the Fourth Generation Evaluation technique (Guba & Lincoln 1989). In an ideal context, this process would be repeated over many years with the intent of these stories becoming self-perpetuating and ultimately manifesting in change.

In this research the MSC technique was extended and modified to enable a greater breadth of data and an improved understanding of the core householder’s motivation for changing household practices related to energy usage. Collecting of stories from a broad sample is viable because collection, verification and screening of the stories was enabled through the Energy Liaison Officers. This preliminary screening of the stories excluded stories where one-off change or change that is not new has been specified. However, all parties have a voice from the start of the process.

The original design by (Davies & Dart 2005) had evaluation groups allocating stories into the different domains as well as selecting the stories of significance. In this case, as the domains of influence were self-explanatory this part of the technique was completed by the researcher. Each evaluation group had the stories presented to them already allocated to domains of influence. Each evaluation group was required to evaluate the stories and select those of ‘most significance’. Many of the evaluation groups consisted of elderly participants and they were able to allocate all the group time to evaluating the stories. Each group was presented with between 8 and 10 story choices for each domain of influence across a range of actions detailed in Appendix 7. There were five first-tier geographically based evaluation groups with between two and seven participants reviewing these stories. A single project team based evaluation group at the next tier looked at the findings from the first tier groups.

Most Significant Change evaluation groups

The participants in the evaluation groups were not selected but based on an open invitation to all participants in the research. The different groups were divided up geographically by local council area and a minimum of three participants was preferred for each evaluation group. The project team group was a second tier of evaluation that chose stories from the selections made by the separate
council groups. The project team group was made up of Energy Liaison Officers and only four were invited due to workload constraints.

Appropriate venues, catering and confirmation of attendance was organised. The mood of the event was designed to be informal and relaxed; consequently, no sessions were recorded. Support materials were organised to ensure good communication of the tasks for each group session as detailed in Appendix 8.

Some of the stories required editing for the evaluation groups where there was long discussion or pauses and silences, or distracted conversation within the audio recording.

Each story used in the evaluation groups was classified by domain as detailed in Appendix 7. Between 8 and 10 stories were selected for each domain from the total sample. There was considerable duplication across the stories in the total sample but each of the selected stories was different. These same stories were provided to each of the evaluation groups from which to select those of most significance.

The evaluation groups included five different council groups and one project team group and dates and attendance of group sessions are detailed in Appendix 9.

Each council evaluation group debated the merits of each story at length and then tried to reach consensus on the selected story of ‘most significance’ for each influence category. Each group specified why they had made this choice and notes were taken by the facilitator. The second tier evaluation group, made up of the project team, selected stories from the stories selected by the five council evaluation groups. Consequently, their choice of stories tended to be smaller in number.

3.2.3 Qualitative data from semi-structured interviews

The qualitative in-depth interviews explored influences on household energy-consumption practices, with emphasis on social interactions and encouraging and enabling social influence. The research was conducted as a series of two qualitative interviews across two phases. In the first phase a total sample of 49 participant householders were interviewed and all analysed for social mapping data, demographics, occupancy, income levels and household ownership. Of these 49 participants, 32 (65%) participants who completed new actions had their interviews analysed for influence patterns.

First phase (June–September 2015): the first in-depth interview explored influences on an adopted energy action and the experience of how and why this occurred. Each interview lasted between 35 and 60 minutes. It was audio-recorded with prior permission and aimed to encourage storytelling from the participant to understand the experience of implementing new energy-based household actions, what had been influential in impacting their actions and how and why. Participants were encouraged to discuss actions they had and had not implemented and the influences on their actions.

The participants were encouraged to discuss social interactions and detail the frequency and degree of trust within the specific social interactions. The constituent parts of a social network might include partner, family, friends and the wider community. The social network of an individual helps determine the type and frequency of social influence and feedback evident. A pictorial form of data capture was used to locate the relationships of most value to them. The picture is a Bull’s Eye where the centre of the Bull’s Eye represents the relationships of greatest value to the householder as demonstrated in Figure 3.4 below.
The second phase (February–April 2016) enabled longitudinal research into influences on sustained practices. This second interview was conducted with households that undertook a new energy action identified in themed interview 1. The second interview assessed whether the action was sustained, what influences had been evident and why. If the householder had not successfully implemented any energy action in interview 1, then they were not asked to participate in interview 2.

The interview encouraged open discussion and storytelling of their experience, but prompting questions were provided to ensure all aspects of the research enquiry were covered. In interview 2, the householder was asked to talk about one of the actions they had previously tried and whether they still practised it. They were invited to talk about the influences and challenges on sustaining this specific behaviour. This interview was shorter than interview 1.

Introductions, themes and prompting questions for each interview are detailed in Appendix 1 – The Thematic interview schedule.

The analysis of the interviews took the form of transcription of audio-files, post-interview notation by the researcher if audio recording was not viable. Transcribed interviews and field notes were coded using the qualitative data analysis software QSR NVivo10. Coding was captured under predetermined ‘nodes’ as detailed in Appendix 2 and text within the transcript was allocated to the appropriate ‘node’ within the software. Searches and queries could then be completed under specific nodes or for combinations of nodes.

As the research only explored influences on new actions, all interviews completed where no new actions were evident were not analysed. The interviews with the 32 householders who had completed an action were transcribed by a transcribing company who contracted to 5 different transcribers using a common methodology and agreed terminology. Care was taken to use a service that protected the confidentiality and privacy of data. Audio files of interviews were only identified...
by householder identification codes and interview dates, and did not contain full names or addresses of participants. The process of transcription was managed to achieve ease of analysis, quality and trustworthiness. The date was inserted at the beginning of each new interview section. Transcribers were asked for verbatim transcriptions, including the exclamations and sound actions. General laughter and pauses were recorded. Transcripts were checked by the researcher against the audio file in their entirety for completeness and accuracy. Where necessary, the transcripts were corrected to ensure quality, privacy and consistency. Corrections applied primarily to words misheard and technical terms. Any names were removed. Some sections were marked as unintelligible or inaudible in the transcript.

The transcriptions from all first interviews were coded for social influence. The social index mapping with the Bulls Eye tool in Figure 3.4 was used to determine the number of contacts in each householder’s network and who was the most important to them in this context. Analysis was captured within the influence domains framed within social practice theory (such as material and infrastructure, competency beliefs and attitudes and social influence). These households were coded and analysed for both new energy actions and for sustained practices. Additional analysis was also completed on the four households that had new heating and cooling practices and had complete data sets.

3.3 Recruitment

3.3.1 Primary research recruitment

The research sample sizes are detailed in 3.1.3 Constraints of the methodology page 35. The first interviews included a total sample of 49 householders and analysis was completed on only 32 householders who had successfully completed a new energy-based action. The second longitudinal interviews were complete don 28 and four households that introduced a new heating and cooling action in the last 12 months and for whom a full data set was available were analysed.

Household recruitment occurred with the support of an existing study on low-income households who received health and community care services. With the private rental market at a current high of 26% of the Australian Housing System (Stone et al. 2013), the sample invited to participate in this research included renters. The Energy Saver Study was funded by the Low Income Energy Efficiency Program, with participants engaged through Health and Community Care Services departments within local government alliances and identified as low income through a pensioner or a disability card. Participant income data was provided through the local council community care database. Within the Energy Saver Study, 83% of these randomly selected low-income householders were 70 years and over and 78% were female, as shown in Figure 3.5.

Figure 3.5 Age and gender of household participants in the Energy Saver Study

n=320
The Energy Liaison Officer sent out a letter from the Council about the research, with an attached Expression of Interest form. The research study participants were Energy Saver Study participants who returned an expression of interest form in the research.

The research sample is spread across each of the different intervention groups within the ESS and all six Local Government Authorities as detailed in Figure 3.6.

![Figure 3.6 Location of the Masters participants](image)

The Participant Information Statement (see Appendix 10) was given to the householder when they were invited by the local council to participate in this research study. Each householder that completed an expression of interest form was telephoned to discuss the research and book an interview date. The participant was encouraged to consult with family, partner or carers if they did not feel comfortable or confident that they understood the nature of the research or the commitment. All participants signed a Participant Consent Form (see Appendix 11), if they were comfortable with participating in this research. A copy was left with the householder.

Four householders were not available for second interviews as they had either died or moved away, and one had ongoing health issues thereby reducing availability.

The age and gender of the initial research sample is detailed in Figure 3.7 and occupancy in Figure 3.8.
Of the total sample of 49 households, there were three renting and two that lived in a retirement village with a tailored arrangement. The remaining 44 participants owned their property, with 91% stating that they owned their property outright without a mortgage.
The majority of households recruited had an income $599 per week or under but 20% chose not to state their income. However, all were on pension or healthcare cards, indicating some level of disadvantage.

3.3.2 Recruiting stories for the Most Significant Change

Most Significant Change stories were sourced from the Energy Saver Study households by the ELO. They were asked at the end of the post-intervention survey if they had a story of Most Significant Change that they wanted to tell. ELOs were given full training on this and were trained specifically to prompt for a repeated energy action change as opposed to one-off changes or multiple actions.

Collecting the stories of ‘most significance’

Each Energy Liaison Officer within the Energy Saver Study collected the story of Most Significant Change at the point of completing the final post-intervention survey. The android device used to capture the Energy Saver Study survey was also used to record the story of Most Significant Change. The Energy Liaison Officers were provided with a script and trained to that script.

The Energy Liaison Officer was also asked to classify the acceptability of the Most Significant Change story into four levels:

1. Not applicable – some were not audible or not related to the subject.
2. Not significant – story had no evidence of any change.
3. Partial change – only had one-off actions specific to infrastructure retrofits or purchase of goods
4. Significant change – repeatable actions that could be transitioned from an action to a sustained practice.

Classification of the stories received in time for the evaluation groups can be seen in Figure 3.10.
Of the 50 stories classified as complete stories, 24 were classified as duplicates whereby the action detailed, the influences evident and the story told were similar. The remaining 26 stories were allocated to each of the three domains for evaluation by the participant groups. How this allocation was completed is detailed in the section that follows, and the selected stories are detailed by domain in Appendix 7.

Quality and classification of stories

Control of the quality of the stories from the householders was varied. Quality of stories was impacted by some factors that were out of the control of the researcher. These factors included:

- Some of the more participants found any interview challenging and relied on support from the ELO to answer questions, which easily led to prompting and assumption by the ELO.
- Some participants found it challenging to isolate a single action or practice.
- The recording element was sometimes too confronting for some householders or not effective in capturing quiet voices. A summarised transcription could be provided by the ELO.
- Despite consistent training, the ELO performances were inconsistent with some key questions missed or over-prompting inhibiting responses.

Many participants found it hard to focus on one action they had completed and, despite prompting from the Energy Liaison Officers, they frequently cited everything they had done. Secondly, when they gave stories of one-off infrastructure changes they were prompted to think of an action that required repeated change rather than a one-off action and many participants found this difficult. The scripting prompted for social influence with the question ‘Have you chatted to anyone about this?’

Stories of one-off actions instead of repeated actions were classified by the ELO under partial stories. The total sample of stories of the MSC technique was 129 and of these 77% (102) were stories of either complete or partial change as shown in Figure 3.11 below. This sample was used for overall influence domain pattern analysis within the research.
Most stories could have been classified under multiple domains but were allocated based on the
dominant domain as perceived by the researcher. The process of domain classification is
demonstrated below with three stories that all had multiple domains evident. The key phrases have
been highlighted in italics.

Updating our *insulation was our biggest thing*. We can now go into another room and it is not
dead cold anymore. I never thought of doing it as we had some in the roof already. Nothing
else really, I become more aware of lights being left on and appliances.

This was selected for infrastructure domain but the individual competency domain is also evident
with an increased awareness for lights and appliances being left on.

Mixer taps were left on hot and now switched to cold. The awareness of the impact caused
change as I was wasting energy. *My dad used to do it* and I did the opposite to annoy him.
Now I have got over it but it is tricky as breaking a habit you have to consciously think about it.
*I had not considered it before chatting to anybody else.*

This was selected for the social domain although the competency domain was also evident.

Insulation and draught sealing but I *have taken more personal responsibility and realising the
cost impact* and with the help of the ELO just thinking about what was going on. It is not
challenging and [it is] good to do it and I had not considered [it] before the ESS program. I am
managing the lighting more effectively and turning appliances of at the wall. I received
insulation and draught sealing and I am more comfortable, taken edge off the cold particularly
in the mornings and I don't use heating as much. Turn heater off a lot more, shut the doors
and enjoy the warmth.

This was selected for the individual competency domain even through all three domains were
evident.

Some of the stories required editing for the evaluation groups where there was long discussion or
pauses and silences, or distracted conversation within the audio recording. Each story used in the
evaluation groups was classified by domain and coded as detailed in Appendix 7. Between 8 and 10
stories were selected for each domain from the total sample. There was considerable duplication
across the stories in the total sample but each of the selected stories was different. These same

![Figure 3.11 Story classification for all audios of Most Significant Change stories](image)
stories were provided to each of the evaluation groups from which to select those of most significance.

The key data sources are detailed in Appendix 12 and the data collection and analysis plan is detailed in Appendix 13.

3.4 Data and data analysis to be used for each research question

3.4.1 Defining a new action and a sustained practice?

As actions are core to the data analysis required, it is important to identify terms used within the research. An ‘energy action’ is a single element of a practice (such as adjusting a thermostat) and a ‘practice’ is an established collection of actions towards a common goal; for example, actions such as putting on clothing, drawing the curtains and adjusting the thermostat to achieve an effective ‘temperature control’ practice. This terminology is consistent with the terminology found in the literature.

- Actions are physical transactions that come from doings and sayings (Schatzki, Knorr Cetina & Savigny 2001 p. 56).
- Practices might be regarded as an interwoven web of activities commonly recognised within a group (Schatski, Knorr Cetina & Savigny 2001 p. 56).

As practices require repeated actions and not one-off actions to sustain, sustained practices in the context of the research was measured by the new action still being practised six months after initiation. It is accepted that rebound effects can occur over very long time periods (Saunders 2013) but the time constraints of the research limited extending the timelines. The actions within the context of household energy were classified under four key categories: heating and cooling, hot water, appliances and lighting as detailed by Sustainability Victoria in Appendix 14. Bill learning was captured as a category linked social discussions and confidence in financial management.

The list of actions assessed in this research can be found in Appendices 5 and 6.

3.4.2 Types and frequency of social influence

Research question 1: ‘What are the types and frequency of social influences needed for new and sustained household energy practices?’

The primary research data from the in-depth interviews provided the core data to answer this research question. The ‘Bulls Eye’ data (see Figure 3.4) informs social networks, level of social contact and which contacts are perceived as important. This was mapped onto the model of influences for this influence category as detailed in Figure 2.7.

Also, the questions explored under the themed interview discourse are:

1. Is feedback evident? Feedback can be defined as the process in which the effect or output of an action is ‘returned’ (fed back) to modify the next action.
2. What type of feedback is evident? (Negative feedback slows down an action whereas positive feedback accelerates an action.)
3. Negotiation in decision-making
4. The role of emotion (emotion is an indicator of the impact of feedback)
5. Social influence for sustained practices

There was analysis of the transcription of the interviews for sustained practices and the social context of these practices was discussed and observed. Habits and routines are observable patterns of stable practices and actions that are socially conditioned (Southerton 2012).

3.4.3 Range of influences and influence patterns

Research question 2: ‘In what ways does social influence combine with material and infrastructure influences and competencies to impact new actions and sustained household practices?’

Data were considered alongside the model of influences for the relevant influence category detailed in Figure 2.7.

Social influence

- The ESS had different study groups with different levels of contact from the ELO, which informed social support levels.
- The MSC group evaluations of the influence categories informed social influence.
- Interview transcript analysis by NVivo nodes informed social influence levels.

A pattern of influences was mapped out for the sub-sample of households with new heating and cooling practices. The data was evaluated from all these houses to map the influences evident and influences encouraging change as detailed in Appendix 15.

Key influence patterns on new actions and sustained practices were mapped against demographic data on gender, occupancy and age.

Infrastructure and material influence

Understanding material and infrastructure influence sets in context the social influence. The data collected from the ESS pre-intervention survey, together with the analysis of the themed interview discourse informs the infrastructure influence. If retrofit interventions within the four key retrofit areas of heating and cooling, appliances, lighting and hot water had occurred, this was captured. Energy bill actions were covered separately under the competency influence domain as they are linked to financial competency. In-depth analysis of influence patterns have been completed on a sub-sample of the research participants who have completed new heating and cooling actions. This energy action category has undergone in-depth analysis of influence patterns as over a third of household energy use comes from this heating and cooling (Zero Carbon Australia 2013) and a range of influences are evident. Heating and cooling infrastructure data collected from the ESS surveys includes new retrofits in this heating and cooling category.

The MSC evaluation groups’ analysis of the infrastructure and material influence stories informed influence patterns for this research question.

Competency, beliefs, attitudes and skills influence

Understanding the competency influence sets in context social influence. ESS survey questions on financials, comfort and energy-efficiency attitude were captured to inform the competency influences detailed in Appendix 4.
The competing, supporting and interwoven practices were explored by comparing three of the key influences against each other.

- Financial stress versus comfort
- Financial stress versus energy efficiency
- Comfort versus energy efficiency

The Most Significant Change’ groups evaluated the competency, beliefs and attitudes influence of most significance and why to answer the research question about the patterns of different influences.

The themed interview discourses were assessed using NVivo to determine patterns of interwoven practices and their impact in combination with social influence. Focus was placed on interwoven practices evident in heating and cooling practices, such as comfort, financial stress, environmental attitude and social etiquette. New learning was analysed for impact on change.

3.4.4 Encouraging change through social influence

Research question 3: ‘How and in what way does social influence initiate and sustain change in household energy-based practices?’

The data from the themed interview discourse was analysed for evidence of social competency. Householders who demonstrated experience in social influence within their networks and community or who had capacity as a change-maker. This was identified during the first interview and several questions were explored from this discourse were changing norms, starting the conversation and social competency. The focus of the methodology was to answer the research questions by firstly, capturing evidence of social influence and, secondly, capturing the relationship of social influence to the other associated influence categories. The methodology included three sources of data collection to answer these questions, which gives reassurance as to the thoroughness and breadth of influences collected. Although multiple data sources add complexity to the analysis they also provides robustness to the insights and findings.
4 Findings

4.1 Key findings

The first research question asks the types and frequency of social influences evident for new actions and sustained household energy practices and is detailed in section 4.2. Key findings demonstrate that social influence is evident as an influence in households completing a new energy-based action and the householders' social networks are a key influence factor. The typical number of contacts in the social network for this demographic is six, and partners and family are important. Feedback patterns and response to feedback are varied and significant and role modelling is evident.

The second research question asks the way in which social influence combines with material and infrastructure influence and competency, beliefs, attitudes and skills to impact new actions and sustained household energy practices is detailed in section 4.3 Findings are framed on social practice theory and demonstrate the robustness of the model of influences. The influence patterns evident show variation for different action categories demonstrated through the Most Significant Change technique and also vary with the interwoven and competing influences present. Competing competencies represent a significant factor within the patterns.

The third research question, asks The way in which social influence initiates and sustains change on household energy-based practices is detailed in section 4.4 Learnings regarding social influence on the change process are presented, including degree of consciousness and the need to overcome a range of challenges in the change process. Findings demonstrate that these challenges include starting the conversation and understanding change-maker householders and their social capacity.

4.2 Social influence on household energy-based practices

This section reports findings of social influence in the decision-making process for household energy-based practices. This was researched with analysis of data from all data sources, with emphasis on social networks; these networks provide the conduit through which social influence is delivered.

4.2.1 Social influence from the ELO

The ELO was a key contact on the participant social networks detailed in section 4.3 and participants classified them as either an expert advisor or a friend. The levels of ELO contact against actions taken up is shown in Figure 4.1.

This mapping indicates a strong pattern that the number of new actions taken increased with the number of ELO visits. There were other variables within the ESS study such as the different treatments for each sub-group so this data needs further analysis.
4.2.2 Social influence from the Most Significant Change data

Most Significant Change stories reveal social influence and the types and degree of social influence, including feedback, role modelling and expert or personal advice.

Findings demonstrated that social as an influence category represent 34% of all influences for the Most Significant Change stories of repeated actions. Also, some of the Significant Change stories selected by the evaluation groups were in the social influence category.

The Most Significant Change story was driven by consideration for others

The Most Significant Story was selected because, in the evaluation group’s experience, social influence overrode other influences in causing change. Also, within the selected story, the social element was ‘consideration towards others in the household’. The selected story was:

‘Following draft sealing I have reduced energy use as my thermostat was turned 2 or 3 degrees lower. I felt the difference immediately and the economy savings helped. It is hard to tell the exact savings from bills as prices have changed. It was not very challenging to do and there was no discomfort. I had thought of doing it before but I have others to consider and whether they would get cold. However, other family members were fine with it.’

The influences evident for each of the 71 complete Most Significant Change stories were captured by influence and category of action and the different patterns are detailed below. Figure 4.3 demonstrates influence categories on actions that require repetition and social influence is 34% of all influences. A marginal dominance towards the competency influence is also evident.
4.2.3 Social networks from interview data

Social networks are important medium for enabling social influence. Immediate family members seem to be important for this demographic and ‘experts’ have some influence. Neighbours seem quite diminished and some householders have very few people in their network.

Research data showed social network capacity was varied. The data on social networks was captured using a pictorial ‘Bulls Eye’ tool during the primary interviews. Forty-four householders completed a map of their social network, detailing all their social contacts in their network. These social networks were analysed to understand the different relationships within the networks and who was
considered the most important when consulting on energy-based household actions. The different relationships were classified into contact groups such as children or friends; the analysis of the number of householders consulting each group is shown in Figure 4.5.

<table>
<thead>
<tr>
<th>Contact group</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner</td>
<td>10</td>
</tr>
<tr>
<td>Children</td>
<td>70</td>
</tr>
<tr>
<td>Greater family</td>
<td>30</td>
</tr>
<tr>
<td>Friend</td>
<td>20</td>
</tr>
<tr>
<td>Group</td>
<td>30</td>
</tr>
<tr>
<td>ELO</td>
<td>10</td>
</tr>
<tr>
<td>Contractor</td>
<td>10</td>
</tr>
<tr>
<td>Salesman</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
</tr>
</tbody>
</table>

**Who do householders consult for advice on energy in the home?**

The 44 households specified 264 contacts in total so an average number of contacts per household is six but many of these contacts are not geographically close. Within the sample of 44 households the partner contact group was specified 18 times and there was only one partner per household. The family contact group was specified 76 times. There was more than one family member specified as a key contact for advice and feedback on household energy practices. Similarly there were households that specified more than one group and one household specified that they sought feedback from up to 5 groups. For this profile the role of the children (please note children were 50 years plus) is highly significant and the average number of family members consulted per household was just under 2. The range of contacts spread from 1 to 10 and it must be noted that out of a sample of 49, five householders were not comfortable with completing the exercise and two claimed they had no social network or took no advice from anyone.

Figure 4.6 shows the number of relationships by category of relationship. It exemplifies the importance of those relationships to the participant in the context of household energy. The relationships the householder thought were most important were plotted in the centre of the Bulls Eye, progressing from the centre as they became less significant. The bands on the Bulls Eye were numerically rated so that the importance of the relationship could be determined across the sample. This data is captured in Figure 4.6.
Figure 4.6 Relationships rated 1 to 7 in order of importance to the householder when seeking advice on energy in the home

The question asked of each householder was ‘Who would you go to for advice on energy use in your home?’ Each householder was then asked to plot their advisors by degree of importance. There was differentiation between those seeking ‘expert’ advice and those seeking ‘feedback’. The three highest priority relationships are the partner, the children and the Energy Liaison Officer. Many partners went through complex negotiations, while some had established processes, with one person in the partnership dominant depending the context and the decision. There were strong examples of supportive families and also active group engagement.

From the total sample, the households who were interviewed and did not carry out new energy actions had a marginally smaller network than those that did carry out new energy actions. Also, those that did not carry out new actions had a dominance of friends in their networks and those that did complete new actions had a dominance of family.

A variety of social network options were evident, and how householders classified their social network also varied. Some householders claimed they did not need a social network at all as detailed in the quotes below.

(Householder 38XX27) ‘I have not chatted much about this to anyone but I am not really very sociable. I have probably mentioned it to about six people.’

(Householder 39XX40) ‘Guys do not need the circle of friends that girls do. Because girls need a network.’ (from a male householder)

(Householder 38XX25) ‘I think women are used to networking. It's just something we do.’

(Householder 31XX30) ‘I just used the internet because I felt there’s a hell of a lot of people on the internet’.

For those who were partnered, partners were the most important relationship in terms of uptake of energy saving actions. Of research households, 32% were couples and, because of the demographic, the majority had been married for over 40 years. Consequently, relationships showed established patterns and some amusing negotiations within one household (38XX25).
Female interviewee: We’ve been married 57 years this month and it’s lucky we haven’t killed each other yet.

Interviewer: So how do you negotiate?

Male interviewee: It’s not a negotiation. What she says goes.

‘If you don’t do the dishes every night, I’m not cooking.’

Perceptions of comfort were very varied within couples, as physiological needs vary. The temperatures evident from the participant households displayed in Figure 4.7 shows a range from 10 degrees through to over 30 degrees, although many households judged their comfort on physiological feel and not temperature. Within Figure 4.7 both the bedroom (blue line) and living area (orange line) temperatures are displayed with the bedroom generally kept colder. There were strong opinions on comfort and different temperature

(Householder 38XX25) ‘I’m just a devil for the heat. I would die for warmth!’

(Householder 38XX27) ‘I just feel it – I cannot correlate my physiological feel to the temperature.’

Figure 4.7 The trends of average minimum, maximum and average temperature ranges for bedroom and living areas for research households by month

The social process of negotiation was required to determine acceptable comfort levels. There seemed to be a pattern within couples whereby one party had different physiological needs and one member of the couple needed more heat than another. This was not gender specific but the process of discussion seemed to embed the actions taken as demonstrated from household 38XX25. Male interviewee: We set it on about what ... 22 or 23 or
something 23, maybe?

Female interviewee: I turn it up, when he’s not looking.

Male interviewee: I’m fine with the cold actually, I’ll take clothing off if it gets too hot.

In another household (31XX25) the couple located themselves in different parts of the house to accommodate their different temperature needs.

Within other partnerships, partners showed extreme levels of flexibility to accommodate the needs of the other partner. In one partnership, the wife showed a passionate environmental belief; however, this belief was compromised by having multiple fridges and freezers (over five appliances) that were turned on but largely empty. The husband used to cater for the community but had been ill and was no longer able to do this. The ‘environmentally aware’ partner understood the unnecessary energy consumption maintaining these white goods and, although conflicted personally, was not prepared to upset her husband. Another couple had water coming out of the taps at 80 degrees, which was highly dangerous, but the wife had a medical background and strongly believed that water needed to be that hot to be hygienic. The husband did eventually reduce the water temperature but it took support from many people and a very subtle and gradual transition so as not to upset the wife.

Couples clearly completed more energy-based actions than single households as shown in Figure 4.8. Within single households 43% completed a new action, regardless of whether male or female whereas 80% of couples completed a new action.

Figure 4.8 New actions taken by partner households compared to single male or female households

Children were also very important sources of advice, feedback and support for this demographic. Often the sons and daughters provided technical or contractor based information or support and advice on comfort and health. Not all children were supportive and some lived too far away but the majority were dominant and positive influences as evident from the 5 different household comments below..

(Householder 31XX15) ‘Because my daughter said.’
(Householder 38XX39) ‘I have discussed it with Sue, my daughter.’
(Householder 39XX03) ‘The children come and give advice but we make our own decisions.
(Householder 31XX53) ‘She [participant’s daughter] checks everything. She’s told me I’m not to sign anything.’
(Householder 39XX34) My son is very good but he is not local.’

For many households the family contact was important and supportive and for this demographic the children were aged in their 50s and 60s.

Some participants valued the feedback of friends highly and they trusted them and demonstrated no fear in approaching them. There was an inconsistent response to neighbours as one householder valued their neighbour’s feedback but conversely, one felt threatened by their neighbour’s one-upmanship.

‘Where are you getting your information from apart from your friends?’
(Householder 38XX28): ‘Just different people. I’m asking questions.’
(Householder 38XX39): ‘Yes, because you trust them [friends and neighbours]. You’d sooner trust them than what you hear on the telly; you trust your peer group.’
(Householder 39XX03): ‘He is the best neighbour you can get.’
(Householder 39XX07): ‘How do I say it…? With [neighbour’s name] whatever I have got, his is better.’

Neighbours were an important source of social influence for those who had neighbours in their social networks, both in terms of providing advice, but also in terms of showing participants what was possible.

Groups seemed less significant as a source of feedback in this demographic but for those involved in groups they valued the feedback. There was a mix between those in many groups and those in just one group. The range of groups for this demographic was broad, and included exercise and social groups.

(Householder 31XX25) ‘No, I am a one-group person; I cannot do two groups.’
(Householder 38XX39) ‘I’m in Probus and also bushwalking, we all chat about our bills and things.’

For those householders engaged in groups, the members were important sources of feedback and information.

For those that engaged with media and online technology for information they clearly valued the advice. Several householders clearly stated the internet and mass media as an information source.

(Householder 31XX30) ‘Well it was all on the news.’ [increased electricity prices] ‘I got it on the internet and there’s a number of very good sites, I read about it in magazines.’
(Householder 38XX28) When asked where the householder went for information: ‘Yes, on the net, and I also have got a pamphlet.’

For those householders that sought advice and feedback from different forms of mass media including social media there seemed to be confidence in the quality of the information.

Expert advice was sought by some who believed that those that were employed to do the job would provide reliable advice. Conversely, a small percentage of the participants valued expert advice highly but when the advice was linked to payment, a defensive response was evident, which suggested there was less trust. ELOs were regarded by householders as someone who gave expert advice. (Householder 38XX39) ‘The people who we employed to put it in [heating system] – we talked to them about it.’
(Householder 31XX54) ‘If I’m making decision, I’m getting people that I think can give me the right answers.’
‘Also, as [ELO’s name] pointed out, the detergents are better now than they used to be.’

‘ELO informed us.’

‘ELO recommended that we drop these blinds on these large windows.’

The relationships developed with the ELO over three years was deep and trusting in many cases, with the level of trust surpassing the level of trust felt towards an external advisor. Some participants regarded the ELO as an expert but one that was not biased by personal financial gain.

The network patterns show some bias towards females having larger networks. Within the sample of households completing a successful action, average contacts for females were 6.33 and average contacts for males were 4.75. Two household comments on this are detailed below.

‘[Husband’s name] really has got no old mates left.’ Female interviewee: ‘Girls, it is a support group. Male interviewee: ‘So that they have got somebody who they can complain about their husband to.’ ‘But guys tend to be more solitary. We are a bit like the old elephant. You know? Where you get a herd of elephant cows and one solitary bull.’

Male interviewee about the ‘ladies’: ‘They don’t talk the same language.’

Social networks are key to the transfer of information and consequent social influence, and this was shown in many ways. Social networks were found to be an important information source for the well-networked in particular; very well networked widower sourced all his contractors or tradespeople for his house through his local club. One householder could name a carpenter, heating and cooling specialist and an electrician with lighting knowledge from within his club. Another householder networked through his radio club and the members actively discussed all types of topics, including household energy matters or specific related technologies:

‘I discuss these problems with the guys of similar age group. If you’re not prepared to ask, you’ll never find out.’

‘We could have conversations over the air. Meets every night at quarter to five and we discuss the day’s events, what we’ve been doing.’

Social networks were the conduits through which feedback was transferred to and from the participant.

‘Have you chatted to anyone about it?’

‘Yes, all my visitors think it is a good idea.’

‘I do talk to my girlfriends.’

Feedback progressed into recommendations and role modelling depending on the participants’ self-belief and confidence in undertaking the action. A recommendation by the ELO: helped a householder get rid of an old chest freezer.
A householder recommending a type of insulation service she had: ‘Yes, the next door neighbour is thinking about getting her insulation done and the other neighbour has already done it.’

Active role models were evident in the findings and role models were often family members. There seemed to be some common areas of laundry or cooking practices where role models were mentioned by the householders.

‘Yes. I’ve just followed my mother’s example, she used cold water for a little while but she preferred to wash in hot water and that’s what I’ve done.’

Comparison to others was evident in certain social networks and the householder was comfortable to discuss this when they compared favourably or had conformed with the suggestion.

‘It actually makes me feel rather smug, I’m rather generally just under a single usage.’

‘Everybody tells me that in the bedroom at night, a fan is the way to go.’

There was evidence of comparison against norms as well as feedback in helping to set new norms.

4.2.4 Social feedback influence
Social feedback provides a response to energy actions considered or taken, and can be a powerful influence. The types of feedback can be negative, positive, aggregated or conflicting. The examples of different feedback evident in the research, the participant response to different feedback types and any consequences are clearly influential.

This section collates findings on different types of social feedback and other consequent social influence impact such as role modelling and norms. Social networks are an important means by which feedback, role modelling and norms are driven.

Findings show that feedback is actively sought and there is fear of a negative response but a desire for behaviour reinforcement from positive feedback. In some cases, householders just needed help in problem solving their household energy-based issues. To add complexity, these feedback patterns were interwoven with other factors such as a need for conformity to role models or norms or a response against conformity. A few householders were clearly reacting against the norms and trying to do something different. Role modelling appeared to be a powerful form of feedback and often came from embedded relationships within the householder’s social network.

Evidence of feedback was found throughout the households interviewed but the degree of influence or impact on householders was varied. Some householders were adamant that they had not been influenced by others and that they made up their own minds regardless of what others thought.

‘Their advice is good but we still do what we want.’

Some, on the other hand, would actively seek feedback from as many people as possible before they made a decision.

‘It’s that networking that you got to have. The guy, who does the electrical work here, now belongs to a Yacht Club that I’m a life member of. The guy who’s the plumber is also a member of another Yacht Club. If you’re that, not prepared to go out and talk to people, you’ll never find out what they do and how they can help you in living from day to day.’
Types of feedback

There was positive, negative and mixed feedback evident and examples are given below.

Positive feedback

Positive feedback associated with a new action often meant feedback from more than one person.

(Householder 38XX39) ‘Actually, my grandson commented we ought to get rid of it (old fridge), but that was a couple of months before the ELO came along and said – so when she said it as well, we decided that it has to go.’

(Householder 38XX39) New heating system: Interviewer: ‘Your partner and your son-in-law and the contractors, were the key people that you spoke to on that.’
Interviewee: ‘Yes.’

(Householder 38XX39) Hot water action: Interviewee: ‘Yeah, well as I say, a couple of people have commented on it’s very hot, and it is. Yes, she did give us feedback of you know what the best type of temperature was to set your thermostat at and things like that.’
Interviewer: ‘Okay and so have you changed it in anyway?’
Interviewee: ‘No, I haven’t.’ (This action had been completed by the second interview stage.)

Aggregated positive feedback (more than one source of positive feedback) was common and evident in households that had taken up new energy actions.

Mixed feedback

When negative feedback and positive feedback from different people is combined their feedback is mixed and the impact was diluted.

(Householder 39XX22) Interviewee: ‘I spoke to family and different friends.’
Interviewer: ‘What did they think?’
Interviewee: ‘Some agree; some don’t.’

(Householder 38XX28) When asked about feedback: ‘Well you get different opinions, sometimes yes.’

The types of feedback received by a householder on a particular action were not always consistent and this mixed messaging diluted the consequent confidence in that particular action. There was an acceptance that feedback would not always be consistent but mixed feedback would only occur if the householder risked inviting feedback from someone who might give them a negative response.

Negative feedback

Negative feedback had a strong impact in limiting the uptake of a new action, but many did not choose to dwell on it or even recall it. Confidence was undermined although some of the participants in this sample of change-makers became more determined when confronted with negative feedback.

(Householder 38XX25) Interviewee: ‘Well, there was a couple of them that were not bothered. But they are not really interested in doing it. They said, why do I want to save money at my age?’

(Householder 38XX28) ‘My son doesn’t like it being there, because he says, ‘what do you got that [the ESS new action reminder tool designed as a fridge magnet] on there for? It’s not really a fridge magnet.’
(Householder 38XX40) ‘When I was putting the solar panels on one of my friends clearly said you know, you’re just wasting your money because it will take many years for you to recoup 3 or 4 thousand dollars.’

Cognitive dissonance was evident where negative feedback was given or where a contradictory decision was made. One householder rejected a standby device when presented as a standalone device because it was inconvenient in disrupting movies. However, when the householder purchased a new TV without realising it had a similar standby feature there was justification of the decision despite previously rejecting standby technology. Some of the householders did not regard feedback highly and yet still sought it. This participant requested feedback from her sibling but clearly did not value it.

(Householder 38XX25) Interviewer: ‘What sort of feedback do you expect to get from them on that?’
Interviewee: ‘With my brother he’d probably go into a spiel about this or that or the other as he tends to talk a lot.’

(Householder 31XX52) Interviewee: ‘Most elderly people are polite, young people would say ‘what is she talking about’? One householder felt that the different generations had different ways of responding and believed that the younger generation were more inclined to provide negative feedback delivered in a straightforward manner. This householder (31XX52) was clearly assessing the response in advance and not only the feedback to be received but also the method of presenting that feedback.

Role modelling was a key influence in introducing new actions as demonstrated in the quotes below.

(Householder 31XX11) ‘Yes. I’ve just followed my mother’s example: she used cold water for a little while but she preferred to wash in hot water and that’s what I’ve done.’

(Householder 38XX40) ‘I chatted to my sister because she had it installed before me.’

The Most Significant Change project evaluation group selected a social influence story because in their experience many people only changed actions after social influence. The household may have new retrofits and behaviour support to encourage a new action but still do not change without social influence.

Norms are a key influence in introducing new actions as demonstrated by three households.

(Householder 39XX03) ‘I look at that [household averages on the bills] and I compare myself to other households that’s useful.’

(Householder 39XX03) ‘...And our friends and they said “Oh electric blankets are dangerous” and we say “Ah well, we never sleep with the electric blanket on, that goes off when we go to bed – we turn the blanket off”.’

(Householder 39XX03) ‘This winter has been colder than last year and that’s what everyone says: it’s colder than it was twenty years ago.’

Social influence was evident, within householders completing new practices. However, the patterns of social influence varied slightly across different action categories. The social networks of the householders averaged 6 contacts for this demographic and families and partners were key contact groups for household energy advice and feedback. Feedback was evident in many forms – positive, negative, aggregated and mixed – and there was an awareness and anticipation of the likely feedback that would be received. Responses to the feedback interacted with influence from role models and a reaction to the norms.
4.3 Social influence in the context of other influences

The scope of this research does not include in-depth analysis of the non-social influences under the material and infrastructure and competency influence categories. However, understanding the other influences evident and how they combine with social influence is required under research sub-question 2. To understand all of the influences that combine with social influence is core to understanding influence patterns and the complexity of the energy-based decisions made by the householder. The model of influences, depicted in Figure 4.9, helps set social influence in context.

Findings in this research demonstrate support that the model of influences is robust in that all the influences evident in the research on changing the household energy practices could be categorised under the model of influences. Every category within the model was evident as an influence on household energy actions.

Figure 4.9 Model of influences

4.3.1 Material and infrastructure influences

Findings show that the full range of material and infrastructure influences in Figure 4.9 are evident in the research. Power sources and orientation have influence but the design of the house and fixed appliances can both enable and constrain change. The material and infrastructure influences are often out of the immediate control of the householder and cannot be changed in the short-term; yet they strongly influence energy practices. The selection of all these material and infrastructure influences interacts with and can be affected by social influence. Material and infrastructure influences impacting energy-based household practices evident in the research and on the model of influences are detailed below in the following areas: source of power; building design; orientation and vegetation; construction; fixed appliances; non-fixed appliances; regulation; technology/smart meters and weather

A full range of power sources was evident across the households interviewed, including solar power, electricity only, electricity and gas, oil and wood heating and use of the sun.

(Householder 38XX40) ‘In the day time, the sun is my heating.’

(Householder 39XX30) ‘I just used electricity here for my cooking and my heating. There’s no gas.’

One participant had changed appliance usage and energy actions to accommodate solar power generation during the day. The range of power sources available is varied and can dictate not only
the appliance selection but also the energy practice. Building design clearly impacts the capacity to manage energy practices. Building design factors were evident in conversations as these factors start to be understood.

Building design influence was evident with the open-plan households influencing zoning capacity and different building materials used for the house impacting heating and cooling practices. Construction includes the quality of the building and the fixed furnishings used. The challenge of adjusting the construction as a retrofit in installing energy-efficient solutions to save energy rather than in the initial building phase was evident as was the outcomes. This is exemplified in the quotes below.

(Householder 39XX43) ‘We have just had the ceiling insulated and it has made an enormous difference.’

(Householder 31XX04) ‘If you’re building this house from scratch again, I would certainly insulate under the floor.’

Some of the householders were also clearly aware of the influence of the house orientation, vegetation for effective shading and building materials on energy usage.

(Householder 31XX52) ‘It is a solid brick house; it really takes a long time to get hot.’

(Householder 31XX04) ‘The tree of course is deciduous. In the wintertime it’s bare so it lets the sun in. Perfect.’

(Householder 39XX34) ‘I have got a north-facing house. There’s beautiful sun coming in the window.

The influence of the sun on seasonal heating and cooling for households with a north-facing orientation and with or without vegetative shading was evident. The quality of the building and the inclusion of basic insulation or appropriate access during the construction phase had an influence on ongoing energy practices. Householders knowledge on construction, orientation and power sources were evident.

Fixed appliances represent the more permanent fixed infrastructure that impacts energy usage in the house, such as heating and cooling systems, hot water system, lighting and cooking systems. Many of these appliance purchases are strongly impacted by social influence and these one-off purchases are regarded in this research as a one-off action.

(Householder 31XX11) ‘I upgraded the ducted heating to a new one and the usage [of energy] dropped dramatically.’

Fixed appliances impact heating and cooling and hot water practices in particular and often these fixed appliances cannot be easily changed due to cost or the practicality of implementation. Non-fixed appliances can be moved from house to house. They can be quite large and heavy, such as white goods – washing machines and fridges; or they can be smaller, often less expensive items such as kettles and phone chargers. Social influence on the selection of these appliances is evident and appliances are topics of conversation, with new technological features popular among male participants. Examples of non-fixed appliances influencing energy-based practices include:

(Householder 31XX38) ‘Despite her personal frugality with her house heating and cooling she had put an electric bar heater on in her guest room which will have added to her bill.’

(Householder 39XX12) ‘Every night I turn on the heating and the electric blanket on the bed.’
Non-fixed appliances impact energy practices and there were examples of many different types, with varied levels of energy usage.

The impact of regulation on energy practices was evident within five of the households. Regulation responses in this research were motivated by safety factors more than energy factors. Safety was a common topic of conversation. Evidence of regulation influencing energy practices includes one household who had an illegal un-flued heater, which gave off carbon monoxide fumes. Another householder was dangerously over-heating the water. There was no mention by any of the households interviewed of the star rating regulations on household standards to improve energy efficiency even though some houses were built post 2003 when the minimum star ratings were introduced. Regulations, while unenforced, seem a low priority with the households, but they were evident as an influence.

Technology was evident as an influence; uptake was varied but it was popular as a topic of conversation.

(Householder 31XX11) ‘United Energy provide access to real-time energy usage data for customers through their website ... So that for me was a very powerful tool, to actually change my behaviour.’

Technology has led to more energy-efficient appliances, householder convenience and energy usage information, and this has clearly influenced household energy practices.

Multiple households changed their actions as a result of the weather. Weather forecasts were a motivator for energy practices and a frequent and acceptable topic of conversation for many householders. This is evident in the quotes below.

(Householder 39XX12) ‘We had frost for the first time in the 30 years so the fire’s been on.’

(Householder 39XX12) ‘When we get two or three days of 42 we just shut the house up and put the air conditioner on.’

(Householder 31XX25) ‘These wintery mornings I put it on early’

Householders responded to the weather by adjusted energy practices and by not only discussing the weather but also ways they had adapted to manage changing weather patterns.

4.3.2 Competency, skills, attitudes and beliefs influence

To understand how social influence combines with competency influences, it is first important to have some understanding of the competency influences evident. A range of competency influences was identified from the literature review, and the in-depth interviews and Most Significant Change stories in this research were used to evidence those competencies. Social influence was evident throughout. There were competencies that had strong influence within this demographic, and some competencies that were embedded with social influence. Competencies such as health and comfort were common topics of conversation within this demographic, and hygiene and cooking practices had been embedded through conversation and role modelling over generations. It is these conversations that can evoke new debate and new actions.

The competencies detailed in Figure 4.9 within the model of influences are all evidenced in the research under the following sub-headings: health; comfort; finance; personal responsibility;
environmental attitude; safety; hygiene; social etiquette; ventilation; other competencies. Each is discussed in turn.

Health is a frequent topic of conversation in this demographic and an influence on energy practices. Health is an influence mentioned in 22 of the 30 households who implemented a new action. Health impacted a range of issues such as mobility, dexterity, temperature regulation and vision, which all interacted with social influence and all influenced household energy practices.

(Householder 38XX17) ‘He has a muscle disease and he can’t cope with cold – he has to be warm all the time.’

(Householder 38XX39) ‘My husband is nearly blind – we accept the fact that if the bills are high lights have been left on.’

Health considerations were evident as an influence in the way householders used appliances and managed their heating and cooling practices.

Comfort includes comparison with others and is a popular topic of discussion, resulting in feedback that influences energy usage.

Comfort is a dominant competency influence within the findings and participant perception of comfort was very varied, and the temperature ranges evident in Figure 4.7 demonstrate the ranges of temperature and the averages in both bedrooms and living areas.

(Householder 39XX03) ‘So we made a decision for both of us really, I want to be comfortable.’

(Householder 31XX30) ‘I want to be comfortable temperature wise, I don’t want to be cold and I don’t want to be too hot, I know a lot of pensioners who go to bed at dusk and have the heater on a minimal amount at a time. I don’t, I set the temperature to about 20–21 and that’s in winter and I’ve got central heating, which heats up the whole house.’

One householder highlighted that extreme measures could be taken to keep warm, such as blankets or even going to bed, but there were fewer options to try and cool down. An uncomfortably hot house can limit social entertaining in the home and consequent social interaction.

Comfort was evident as a strong influence on heating and cooling practices as thermostats and appliance usage patterns were altered to attain personal comfort.

Financial competency strongly interacts with social influence as a topic of conversation in enabling access to social networks and capacity to entertain. Findings demonstrate that money, as an influence, is evident in nearly all householders in some way. The word search demonstrates the importance of financial considerations.

- ‘cost’ was mentioned in 74% of households
- ‘money’ in 90% households
- ‘bill’ was mentioned in all interviews.

Some are completely in control of their finances and have high competency; others are not and stress is evident from the householders when high energy bills are received.

(Householder 31XX52) ‘I do a panic, look at the date and see when my pension is coming in and I pay if I can.’

The financial considerations influenced householders’ energy practices, resulting in changed usage patterns and often with this demographic demonstrated highly frugal practices.
Personal responsibility was evident in five householders. It was vocalised during interviews as an influence where they were aware of the impact of their actions on others.

(Householder 38XX17) ‘It is the right thing to do – to save energy’.
(Householder 39XX43) ‘It is knowing I am doing my bit’.

For those householders that felt they had a personal responsibility for the environment and for the wellbeing of future generations, the influence on their energy practices was powerful.

Awareness of the environment was evident as a motivation in seven (22%) of the household interviews. (Householder 39XX12) ‘It’s about the climate and the emissions.’
(Householder 38XX27) ‘I also do love Mother Earth.’

Environmental attitude, where relevant, was clearly an influence in how householders used their energy and the motivation behind different energy actions.

Other competencies such as safety, social etiquette and ventilation were competing or supporting interwoven practices that impacted heating and cooling practices and many other household energy-based actions. Safety was a popular topic of conversation. Safety was evident as an influence with participants and was a dominant influence for some of this demographic. Safety influences were evident under action categories such as lighting, ventilation, cooking devices, standby and doors. Installation of external sensor lights, no ventilation without security doors and the danger of leaving appliances turned on influenced decisions and energy practices. Safety was evident as a strong influence for this demographic, influencing the selection of appliances and the range of energy practices.

The research identified that hygiene practices influenced hot water energy usage. One example is detailed on page 67 and another example of the influence of hygiene:

(Householder 31XX52) ‘I think a lot of people do use cold water. I don’t know whether it’s me. My father was a dry cleaner [and] when you see young people sitting next to you [I] think ‘you have been washing in cold water’ – their clothes have a smell about them.’

Hygiene influenced washing practices and consequent hot water energy usage. Many of these hygiene practices were very embedded.

Social etiquette is strongly linked to social influence but still remains an independent practice or competency and clearly influences energy usage.

(Householder 31XX25) ‘Perhaps maybe if some of the grandkids are coming, we might turn it (heater) on early.’

Social etiquette influenced heating and cooling practices while householders were entertaining and washing practices were also influenced as acceptable hygiene and presentation standards were maintained.

Social generational learning was evident with ventilation practices and ventilation a factor in seven households. Ventilation influenced energy use and was motivated by health needs, a desire for fresh air, as a response to draught sealing or to keep equipment working.

(Householder 39XX03) ‘We often have the window open when we go to bed to keep the fresh air going’.
(Householder 39XX03) ‘I keep the bedroom window open always as I like fresh air in the house.’

(Householder 38XX18) ‘A room with no air is stuffy.’

(Householder 38XX49) ‘Ventilation in the bathroom is better for health and energy use as natural ventilation draws air from outside.’

(Householder 31XX54) ‘With the ducted system to get that movement of air you need to leave the doors and windows open’ (some mis-information here).

There was evidence that effective ventilation reduced energy usage but poor ventilation practices either reduced comfort or increased energy usage.

Other competencies of safety, social etiquette and ventilation were evident as influences on household energy-based actions. Other competencies evident in a few households included cooking, physical activity and entertainment.

4.3.3 Influence patterns

Findings demonstrate the emergence of several influence patterns. These are captured through both the Most Significant Change technique and the in-depth interviews. The Most Significant Change technique mapped patterns of influence categories evident against specific action categories. Findings showed social influence is evident in similar proportions to the competency and material and infrastructure influences for repeated actions. For one-off actions such as appliance purchase the findings showed that social influence is evident but less frequently and less significantly.

The focus of this research is on repeated actions and not one-off actions. There are clear patterns of influences evident that are categorised under the three influence: social, competency and material and infrastructure.

The findings identify four different combinations of influence domains:

- all three influence domains
- competency and material and infrastructure
- competency and social influence
- competency alone.

Competency is always evident and is the only influence in evidence on its own. Social influence is evident with the competency influence alone or together with all three influences.

These four different combinations of influence are evident more frequently, with some energy action categories, as detailed in Figure 4.10.
The energy action category influence patterns are detailed in Figure 4.11.

Only repeated actions were captured in Figure 4.11 but for hot water and lighting categories the material and infrastructure influence is dominant. Conversely, the material and infrastructure influence is evident in lower proportions for appliances and the competency influence appears dominant. The social influence is evident across all the different action categories. The heating and cooling category has all three influences evident equally overall, but when exploring the different types of heating and cooling actions within the practice the influence patterns vary again.
The different heating and cooling actions within the practice are detailed in Figure 4.12.

Figure 4.12 Different actions evident in the heating and cooling practices

Different heating and cooling actions identified in this study include heater usage, thermostat settings, draught control, physical activity, zoning, clothing and ventilation. Adjusting clothing and heater usage does not always require a material and infrastructure influence, whereas to alter the thermostat may not involve a social influence. A combination of all three influences was evident within the heating and cooling practices. As detailed earlier, zoning as a competency can be constrained or enabled by the building design or fixed appliances, and can be determined by a response to a social influence. Closing doors or uncomfortable room temperatures can be socially unacceptable and will influence the action taken. Influences can also move from one domain to another. For example, a transition from a competency influence to a material and infrastructure influence comes from technology and is the transition from manually placed door-snakes to permanent fixed door seals. The changing influence patterns are also evident in adjusting heating and cooling practices with a zoning action. To zone may be a simple competency influence only if it just requires the door to be closed. However, if it cannot be zoned without a new door being installed then material and infrastructure influence is evident, or if a friend or partner says it ‘is claustrophobic’ then social influence is also evident.

The findings from the in-depth interviews demonstrated that the competency influences are often interwoven with both other categories of influence domain. For example, competency was intertwined with the social influence with the early standby devices. Many participants had had poor experiences with these devices, which they actively recalled in the interviews. The key issues for these devices were poor training, inconvenience and low competency. However, because the devices were free the participants were not embarrassed to say they had them and they did not like them. Without fear of negative feedback, the social interaction and sharing of these stories was evident and had influenced attitudes and future uptake of standby devices.

Competency influences were evident in combination with material and infrastructure influences for weather management. For example, learning in advance about the weather through forecasts or
barometers is linked to housing infrastructure such as heating and cooling appliances or relocation or closing off parts of the house. Social influence and material and infrastructure influence combined was evident when selecting appliances and making housing infrastructure choices. In this research these actions are called one-off actions, as they do not need a repeated response. The material and infrastructure and social influences are not in evidence as influences alone – only in combination with other influences. No social influence was evident without the competency influence but competency was evident as an influence in isolation.

To check that no other influences were evident and to identify any other influence patterns evident a word search was completed. No other significant influences were found but the top three words with highest frequency were ‘think’, ‘things’ and ‘people’. These key words may be well correlated to our key influences acknowledging that social practice theory diminishes the role of the agent suggesting these sub-conscious embedded practices do not involve conscious thinking:

- Think – competency
- Things – material and infrastructure
- People – social influence

4.3.4 Interwoven and competing influences

For each influence, infrastructure and material, competency and social influence there was evidence of interwoven and competing influences. Not only are the influences within an influence category interwoven but the influences across influences are interwoven. This demonstrated the complexity of influence patterns in the household energy sector. Examples of interwoven practices across the three influence domains are detailed below and include social combined with material and infrastructure influences and social combined with competency influences such as health or finances.

Social and infrastructure influences combined when a key area of conversation was new technology or appliance or service selection. Many participants referred to their social networks for advice on household energy appliance purchases or installation contractors on use. These conversations generate social influence and the feedback received impacts the infrastructure decisions made. Topics of conversation provided evidence of combining influences and popular topics of conversation were energy bills, comfort and health. A source and reference search of the interviews captured in Figure 4.10 within NVivo showed a dominance of comfort and finance, followed by health within the competency influence domain. The link between competency levels and social topics of conversation are evident and discussed further in section 4.4.

Acceptable temperature bands and norms for comfort had clearly evolved through social influence. There were eight households in NVivo that specified their settings as 18 degrees for the winter. However, ‘socially acceptable’ temperature bands and norms for hot weather was less evident than temperature bands and norms for cold weather. There was also no correlation between perceived and actual comfort, with many of the participants and 20% of the new actions within the heating and cooling category using a thermometer to understand what temperature they were comfortable at. The temperature of a house also impacts on social interaction because an uncomfortable house may discourage social visits.

The research showed that social influence also combined with specific competencies such as health or finances. With this demographic it was evident that as health diminishes, the social isolation can increase and consequently social influence can reduce.
(Householder 38XX40) ‘No because of our difficulties in mobility both for me and my wife, while we tried to have our grandchildren and visitors and things, we just can’t run around them, so they have never sort of come and stayed with us, which is something I regret but that’s part of life.’

Social influence has a strong correlation to finances where families are trying to influence these aged householders to move to more appropriate housing or nearer to family members. The motivations are very varied but the finances or health are key influences.

(Householder 31XX25) ‘I want to live life a little more, not have to be constrained. I’d like to sell this house.’

(Householder 31XX27) ‘I don’t care if I went into a serviced home.’

(Householder 39XX25) ‘They wanted us to move and we said no.’

Finances clearly influence emotions such as guilt and pride, which impact social influence of the network parties involved. Many family members were supporting these householders with energy bill payments.

(Householder 31XX52) ‘No I don’t like to think – oh you want more help, Mum!’

(Householder 39XX52) ‘My daughter helps and it is a bit unfair.’

Interwoven influences within the competency domain

To understand social influence and influence patterns it is important to understand interwoven competency influences. As was evident from the influence combinations detailed under section 4.3.3, competency is a highly significant influence, evident in every action taken. Within the competency influence there are many competing and combining influences and these combinations can dramatically reduce or increase the impact of social influence. Therefore, to understand social influence and influence patterns, it is important to understand interwoven competency influences.

Findings suggest that there is a hierarchy of competency influences and these are dominated by comfort, finance and health. These influences are interwoven and some combine for impact while others compete. Findings suggest that finance and comfort tend to compete, and health and comfort combine. Certain combinations can be dominant and, significantly, this frugal cohort was willing to discard their strongly embedded financial practices when told they needed to activate certain conditions to retain best health.

This demographic show strong social influence from generational learning has led to high competency in frugal living and financial practices.

(Householder 39XX03) ‘If you’re not rich you have to be smart.’

(Householder 31XX15) ‘Look after the pennies, the pounds will look after themselves.’

High financial competency includes understanding of return on investment, cash flow with smoothing and seasonal variation, challenging energy retailers for the most competitive option and controlling the actual energy usage.

To understand the impact of finances as an influence this research analysed four different financial factors, each with different social considerations. These factors were bill management, support required, level of empowerment and control. All led to different levels of confidence and that confidence impacted the social influence.
To compare these four concepts captured from ESS survey questions responses all questions were converted into numerical values and compared using Cronbach’s technique. The variance between these different concepts using an analysis of variance (ANOVA) showed a high value of 0.788, which indicates the data is reliable and the concepts comparable.

A single measure of financial competency would help develop clearer patterns with social influence and material and infrastructure influence categories, and warrants further research.

However, health and comfort has clearly overridden some strongly embedded financial practices for some participants. More research is required in this area, as comfort requirements increasingly impact on financial stress and energy usage.

Interwoven comfort and finance competencies were evident in 43% householders that completed an action. This was assessed by identifying the word ‘cost’ and ‘comfort’ in the interview transcripts. This relationship can change and often one competency becomes dominant.

(Householder 31XX30) Comfort dominance: ‘I decided that in my retirement I want to be comfortable. I don’t want to sweat in summer and I don’t want to be cold in winter. If it’s going to cost me money, it’s going to cost me money.’

(Householder 31XX11) Finance dominance: ‘Now I look at the bill, and work out the cost and how many kilowatts I can use. In the past when energy was cheaper I probably just thought am I too hot, am I too cold, I’ll use the appliance.’

The patterns of influence demonstrate that there are many interwoven and competing competencies and different influences impacting household energy-based actions. In programs aiming to reduce household energy usage a full understanding of the influences, their priority and demographic relevance is important.

4.3.5 Influence patterns in the context of heating and cooling actions

The findings demonstrated a full set of influence patterns for heating and cooling practices, with material and infrastructure often a core influence evident in most cases. The competency motivation varied from financial stress to comfort requirements, and social etiquette, safety and ventilation were evident. Social influence could be identified in all examples. The number of different influences combined to evolve new actions is evident in the four case studies on the heating and cooling practice detailed below in Figure 4.13.

<table>
<thead>
<tr>
<th>Influence</th>
<th>Households</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>New infrastructure</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>New technology</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Financial influence</td>
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<td>High</td>
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<td>Comfort priority</td>
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<td></td>
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</tr>
<tr>
<td>Feedback</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>New action</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Sustained action</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.13 Influences evident for heating and cooling householder case studies

All four householder case studies demonstrate multiple influences were evident for new and sustained actions. In all cases there was new infrastructure introduced and feedback received but
the competency influences were more varied, oscillating between comfort and financial needs. In only one case was technology evident as an influence. This analysis demonstrated a degree of motivation from the householder in that they either had stress about something such as health or finances or positive feedback and a new opportunity. The precise impact of each influence and the combined effect of all these influences warrants further research.

Householder 1

**Material and infrastructure influence** – a poorly constructed house, removal of vegetation, a new air con system, plus insulation and a new concertina door for zoning.

**Competency influence** – financial opportunity from a new part-time job, unbearably hot in summer. In winter they could use blankets. Strong belief it is not right to have hot bedrooms.

**Social influence** – negotiated plan with partner, feedback from ELO, recommendation and role modelling on completion with friends and neighbours.

**Motivation for change** – new money available, the ESS support and an unbearably uncomfortable summer.

Householder 2

**Material and infrastructure influence** – ESS insulation and draught sealing, access to data through distributor online portal, external blinds, new gas heater.

**Competency influence** – financial stress from leaving workforce early.

**Social influence** – media and feedback from ex work colleagues.

**Motivation for change** – financial stress and a challenge for an active mind.

Household 3

**Material and infrastructure influence** – house design no longer suitable for life-stage, very hard to heat, built new downstairs extension for bedroom, new reverse-cycle for heating.

**Competency influence** – very cold, major health considerations.

**Social influence** – partner negotiation and family and ELO feedback.

**Motivation for change** – health concerns and comfort.

Householder 4

**Material and infrastructure influence** – changed from using ducted system to reverse cycle in living room, adjusted thermostat, ESS insulation.

**Competency influence** – big bill and financial stress, comfort, female always cold, male hot.

**Social influence** – did not want to ask family for support, negotiation between couple, advice from ELO.

**Motivation for change** – financial stress.
Findings from the influence patterns exemplify the evidence of social influence in encouraging new actions. Social influence is not evident with every new action but in most, and interaction with other influences categories helps answer the summary research questions.

The findings on the sustaining of these new actions and the change process follow in section 4.4.

4.4 Encouraging and sustaining change through social influence

This section aims to answer the research sub-question 3:

How and in what way does social influence initiate and sustain change on household energy-based practices?

Findings are presented in sub-headings:

4.4.1 Understanding the change process
4.4.2 Starting the conversation
4.4.3 Embedding and increasing new actions through recommendation
4.4.4 Social capacity

Overall, findings demonstrated that anchored practices were not thought about as they were subconsciously embedded and, as a consequence, such practices were rarely discussed. Also the subject material was thought to be boring or ‘crossing the line’ and intruding into personal matters.

Starting the conversation was difficult and common topics such as the weather, increasing bills and new technology were ‘safe ground’ and a way of introducing the questions. How the conversation was started was important because the process of verbalising and defending or developing an action develops confidence in that action.

Confidence in an action is a prerequisite to recommendation to others. Findings demonstrated that recommendation to others was clearly an area of challenge. There was still a range of competency and confidence evident for specific actions, but there was also a mixture of wariness and wisdom in response to making recommendations to others. It was clear there was a fear that a negative response may be received and negative responses clearly were received, causing memorable ‘pain’. By contrast, the reward of making a good suggestion made the householder feel popular or perceived of as clever in their immediate environment, causing great ‘pleasure’. Many householders not only received recommendations but also actively sought them. Personal justifications given to explain negative feedback were varied but clearly impacted further recommendation. Some clearly held the experience strong in their memories as one not to repeat, whereas others took pleasure in evoking that response.

Many of the householders interviewed in the qualitative research had demonstrated strong capacity to lead at a community level with volunteer leader awards, setting up major community support services or running community groups. Many had fallen into their community leadership roles rather than actively seeking them. Despite this leadership and communication capacity, few chose to promote environmental concepts or energy saving ‘missions’. Instead they tended to focus more on social ‘missions’. There was little ego evident, with this demographic seeking only pleasure in the people they shared with and what they had achieved by way of Influences on a sustained action.

Findings suggested that actions were still sustained six months after being introduced in 96% cases. Of the 30 householders that had completed a new energy action, 27 had second interviews. These interviews revealed that in all but one case the action was still being carried out. There were, however, four households whose resolve was being challenged. This data is largely self-reported with some minor observation so there remains a risk factor on reporting reliability, with the
householder either struggling to accept a relapse in practice or embarrassed to tell those involved in helping them change, initially. There was a progression among these householders from trying to establish a routine and finding the routine had become completely automatic. These repeat at the different stages between a new action and sustained practice. For those that seemed to suggest an automatic response and an established routine, the level of consciousness is explored in section 4.4.2.

4.4.1 Understanding the change process

**Sustained behaviours**

Findings on sustained behaviours inform sub-question 3 where observation was combined with self-reporting demonstrated that:

- 96% were still doing the action six months later.
- 16% (5) of householders claimed their new action was now a habit or automatic.
- Two households were challenged by new occupancy, which increased energy usage.
- 1 was no longer doing the action due to the inconvenience that resulted.
- 2 were challenged by the actions of others in the household.

Comments from one householder included:

(Householder 38XX28) ‘Just habit that before I go to bed I turn the lights off at the power point.’

**Interviewee:** ‘No – just become a habit – just automatically do it.’

**Interviewer:** ‘How long did that take?’ **Interviewee:** ‘About a month.’

The timeline of six months was long enough to develop a practice but not to assess whether a new practice has been embedded or may later rebound.

One of the barriers to sustained change was changing occupancy. Occupancy is an important part of incentive; although beneficial in terms of social inclusion, it counters the measure of success in new energy-based household actions because bills increase with higher occupancy and control diminishes.

A couple of houses were evidently discouraged from energy saving actions due to a change in occupancy. One household had a grandchild move in unexpectedly who was using energy freely through hot water and heating. Another household had a friend to stay for many weeks and was very aware of the impact on her energy bills.

‘My friend came to stay so that affected my bills.’

**Single action versus multiple practices**

Actions involved in just the single practice of heating and cooling include heater usage, thermostat settings, draught control, physical activity, zoning, clothing and ventilation. This complexity is also relevant for other household energy practices. Findings demonstrated that within appliance management there is standby control, turning off appliances when not being used, better management of appliances.

The key action categories are heating and cooling, hot water, appliances and lighting and bill challenge. Bill challenge is where the energy retailer is contacted to try and get lower energy tariff rates. The uptake of these actions for the householders in the research is detailed in Figure 4.1.
Figure 4.14 Percentage of households the research study that undertook a new energy action by energy action category

This diagram demonstrates that the largest category of actions completed was in the heating and cooling space, with 42% of households completing a heating and cooling action. Multiple actions were taken across all action categories. ESS energy action data for the research households showed that over half of the households completed more than one action.

Degree of consciousness
Findings demonstrated that many of those that had sustained an action claimed it was a habit or now automatic. They were still conscious of the new action but words such as ‘automatic’ or ‘habit’ suggested an element of progression towards subconscious practice whereas ‘always done that’ demonstrates an established practice and a move into sub-conscious norms. Some of the responses from different participants include:

(Householder 39XX12) ‘It’s just something that we do, it just happens.’
(Householder 31XX15) ‘And I’ve just always done that.’
(Householder 31XX11) ‘It takes a while to get into a habit, so you’ve got to sort of push yourself a little bit or remind yourself.’
(Householder 38XX25) ‘I’ve got a routine going.’
(Householder 39XX43) ‘I shower every second day. I have just got into doing it, the water went short and I just continued.’

The householder was often unable to explain their more automatic practices and why these practices just kept happening without much consideration or effort. This suggests that these practices have moved from a conscious action to a sub-conscious practice.

4.4.2 Starting the conversation

There was a low awareness or consciousness of the conversations about energy practices but on digging deeper and with specific subjects in ‘comfort zones’ such as bills, new equipment and weather-related comfort, there was evidence that these conversations occurred.

(Householder 39XX40) ‘Well, when women – they’re chatting amongst themselves. Sometimes it comes up but on a rare occasion.’
Some regarded home energy practices as a dull topic of conversation.

(Householder 31XX30) ‘Well, it’s not something you want to talk about, not exciting like sex.’

Others regarded the topic as crossing the line of acceptability in that it was too personal. One householder regarded any commentary on things inside the front door as too personal.

(Householder 31XX25) We don’t talk about that kind of thing.’

The research suggested interest was evoked in discussing a new learning and householders were prepared to consider new ideas if they fitted in with their present practices. A new learning that evoked interest within this research was the impact on the hot water usage of keeping a mixer tap set on cold. This was clearly new learning and for one household and one of the evaluation groups in the MSC technique it was discussed avidly. Another householder adjusted their appliance usage and daily routine on understanding about solar production patterns.

(Householder 31XX08) ‘I now wash my clothes and turn the dishwasher on during the day. I also vacuum and cook using the microwave in the day. It is so I can use my solar power whilst I am generating it. I hadn’t realised it but it was the ELO that told me.’

Technological information was also a new source of learning for those that would engage with it and was quite gender specific.

The number of householders that talked of new learning was low, suggesting the level of understanding was high but the options had been considered and not acted upon. Findings demonstrated that households in this demographic were already implementing many actions and aware of their energy use.

Conversations about incorrect information were evident leading to potentially lower energy efficiency. Control over the quality of information is difficult and the spread of mis-information can be a challenge for energy-efficiency programs. Community leaders potentially have a role to play in managing accuracy of information within communities.

(Householder 38XX28) ‘I believe the fluorescent lights are more economical than the LEDs anyway. They don’t heat up very much either, so I will stick with them.’

(Householder 31XX54) ‘You need to leave windows open to drive the heating and cooling system to make it work better.’

4.4.3 Embedding and increasing new actions through recommendation

The power of recommendation was evident throughout the research data, but some were guarded about giving others recommendations because of the fear of a negative response, or being perceived as intrusive.

(Householder 31XX52) ‘I have suggested it to others. I don’t know if they have or not taken it up.’

(Householder 39XX43) Interviewer: ‘Have you spoken to anybody about it?’
Interviewee: ‘Yes the next door neighbour is thinking about getting her insulation done and the other neighbour has already done it.’
Interviewer: ‘How does that make you feel?’
Interviewee: ‘It is a good feeling.’

(Householder 31XX30) ‘I’ve put up an extremely bad review on that particular site and so far about 300 people have read it.’
A few said: ‘waste of time’, ‘they don’t like change’, ‘there is not much I can do there’.

Confidence levels impacted recommendation, and confidence levels grew with capability. The range of capabilities varied considerably.

(Householder 38XX39) ‘It has been a bit of a problem resetting it (thermostat on heater). I was going to get on to the people that put it in, actually, because they set it at 21 degrees.’

One participant was clearly capable of complex tasks as the engineer in charge of a large educational institution for 20 years.

Technical skills were also a matter of confidence through capability, and for many in this demographic, technology was a challenge.

(Householder 39XX33) ‘Anything connected to technology ... I do not use it – I avert my eyes and my thinking.’

‘(Householder 39XX07) My daughter gave me an iPad and I had such trouble with it my self-esteem plummeted.’

There tended to be gender bias linked to capability and confidence, with clear task allocation of household practices.

(Householder 31XX25) ‘Wife cooks and I do the washing up.’

Mortality for this demographic was high and resulted in a high incidence of widowed partners. Many householders who had recently been widowed or lost a housemate were not only impacted by their income halving but also by loss of skills and consequent loss of capability and confidence, such as handyman practical skills.

(Householder 31XX15) ‘He was very, very capable in terms of things to do, in terms of, his background was automotive, so I never had to worry about anything to do with cars. In the training, he also did electrical, so that he was a handyman.’

Recommendation is clearly a powerful social influence and can be both received and given. Those householders with confidence and high competency were able to recommend new energy actions to others and householders changed their actions because of recommendation from somebody else.

4.4.4 Social capacity

Out of the 32 households that had changed their energy-based household actions, eight had demonstrated high leadership capacity in their past. None of them had been involved in carbon reduction or sustainability actions. The lack of motivation to drive change in the sustainability area was evident but high social capability and leadership skills were evident as detailed below.

Examples of social capacity experience included:

- Setting up a complete social support organisation from scratch, which still sustains as a business 20 years later
- Designing community programs and running community organisations and awarded the community volunteer of the year for the local council area
- Running local community facilities and events over decades
- Running major sporting organisations at a state level
- Voluntary office householders for community organisations
- Leader of a state-based religious sect
- Leader within an academic organisation.
Many of these householders had volunteered their time over decades and made genuine community contributions and actioned change. Some of the more modest householders may also have made contributions to charities but these were not detailed in the interviews so do not appear in the findings.

Other householders deliberately chose to support but not to lead.

‘I’ve been involved in the various communities I’ve lived in but not in leadership things. Generally, I’m usually at the back. I mean, I’m usually making the slices and cooking the cakes. I’m happy at doing that. I’m not really a leader.’

One householder told a story of how he managed temperature control at the seniors club, which was quite enlightening as regards negotiating temperature control in a shared environment.

*Interviewer:* Would you ever chat to anyone about how you manage your heating and cooling, or advise them?

*Interviewee:* Oh no, being at the seniors club, there’s a number of people who you can chat to about how they operate their place. A lot of them are a bit older than me and they like their temperature hotter. At the club they’ve got individual controls for all of the heaters and the air conditioners and I’m absolutely certain someone will have got ice-water in their veins. They turn it up, at one stage they had it 25 in winter so they were very comfortable but then you look over the other side and there’s a few there almost ready to faint, they’re red as lobsters.

*Interviewer:* So what do you do, how do you manage down at the social club.

*Interviewee:* Oh well, in my usual manner, I just turn it down!

*Interviewer:* And how do people give you feedback?

*Interviewee:* Oh they hate me!

*Interviewer:* Except for the lobsters?

*Interviewee:* Yes. They like it, but I don’t know why they don’t say anything. They don’t, they just sit there and start to melt and start thinking oh this is a rotten club, I’m not coming back.

It is clear that the acceptance of discomfort is related to social confidence and that many householders do not have that confidence. It takes a socially resilient individual as in this case to challenge others because clearly the feedback can be negative.

### 4.5 The Most Significant Change technique

The new energy action categories for the stories of Most Significant Change captured from the households perspective showed a consistent pattern of actions to this research sample and the overall ESS sample. The Most Significant Change method is simpler and potentially less costly than face-to-face interviews or survey techniques. The least tried and tested technique in this context is the Most Significant Change evaluation method. Comparison from all three data sources helped determine reliability of the data techniques.

The purpose of using three different methodologies within the research design was for the three different sources of data to provide three different perspectives on the same research question. Also, each method has different strengths and weaknesses and, combined, deliver a stronger research design. The new energy action categories were captured from the three different sources with different samples:

- primary interview data
- the Most Significant Change stories
- ESS sample for behaviour change groups.
The percentage allocation of actions taken by category from these different sources are captured in Figure 4.15.

<table>
<thead>
<tr>
<th>Source</th>
<th>Heating &amp; cooling</th>
<th>Appliances</th>
<th>Hot water</th>
<th>Lights</th>
<th>Bill challenge</th>
<th>Number of active participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters primary interviews</td>
<td>42</td>
<td>30</td>
<td>15</td>
<td>3</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Most Significant Change</td>
<td>44</td>
<td>34</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>71</td>
</tr>
<tr>
<td>ESS sample</td>
<td>33</td>
<td>29</td>
<td>19</td>
<td>15</td>
<td>4</td>
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</tbody>
</table>

Figure 4.15 Category of new actions by data source %

Common findings across the three sources of data showed heating and cooling to be the dominant category, with percentages ranging from 33% to 44%. The order of priority of action categories was consistent for two of the sources: first heating and cooling, then appliances, hot water, bill challenge and lighting. The ESS sample had technology give-aways for appliance standby and lighting, which may have biased the uptake of those actions.

The patterns of influence captured from the Most Significant Change technique and detailed in section 4.3 are consistent with the model of influences. Findings suggest the Most Significant Change technique could be a reliable method by which to capture actions taken and the pattern of influences for those actions.

4.6 Conclusion of findings

Findings demonstrate that social influence is evident as an important influence in households completing a new energy-based action. Social influence for this demographic is driven by consultation for feedback from partners and immediate family. The average number of contacts was six, with a range from zero to 10 social contacts. There was differentiation between specialist/expert advice and feedback. Negative feedback had a strong impact which was remembered and impacted future risk-taking for new behaviours. Cognitive dissonance was also evident for fear of negative feedback or low self-belief, particularly where there has been high financial commitment.

Using social practice theory as a framework, influence patterns demonstrate each category of influence is evident in similar amounts. However, certain action categories have different influence patterns. Smaller simpler actions are dominated by competency influences, whereas when there is major investment by the householder in infrastructure, the impact of other influences diminishes. Competency is evident for all actions, whereas social influence and material and infrastructure influence are less consistent. For example, appliances have more of a competency influence, whereas hot water has more of a material and infrastructure influence. Heating and cooling practices have many separate actions within the practice itself, each with a different pattern of influences.
Social influence is impacted by the competency influence. Within the competency influence, competing competencies were evident, with comfort and finance frequently competing against each other for impact. There were other interwoven competency influences, which either supported or hindered influence. Health frequently drove and supported the comfort demands, but more subtle competencies in social etiquette, safety, ventilation and hygiene also had an impact. Financial competency remained a dominant influence and skill sets for financial management were high for this demographic. Ventilation was an emerging practice which seemed linked to health and was led by a desire for fresh air.

Interwoven influences within all the different social practice theory categories of influence either hindered or empowered the impact of social influence. The model of influences was robust and the model encompassed every different influence present in the research, and every influence category within the model was found during the research.

Sustained behaviour was claimed in all but one of the households questioned but there was reliance on self-reporting with some observation. Social influence was evident as an influence in households with sustained behaviour. However, increased occupancy seemed to reduce momentum to sustain change as control over household energy usage diminished. Conversely, time and weather was a motivator for change. Time saving relates to convenience and convenience is often driven out of technology and consequent automation.

Starting the conversation was core to creating change and it was approached differently by gender and linked to confidence from skills and competency. The findings demonstrated that leadership capacity and social competency were not critical factors here but others’ privacy and right to choose how they live together were. Social acceptance and consequent feedback were also major influences. Also, household energy practices were regarded as rather boring and therefore not an automatic topic of conversation.
5 Discussion

5.1 Introduction

The discussion highlights the findings within the research that answer the three key research sub-questions. The primary research question is about understanding the presence and extent of social influence on householders changing their household energy-based practices. To understand the role of social influence it is first necessary to identify the full range of influence factors and determine how social influence fits within these. A model of influences placed social influence in context and this is framed from social practice theory.

These influences are then applied to the different stages of the change process to try and better understand what influences are evident with initial actions and then with sustained change. The capacity of the householders themselves as change-makers and the process of sustaining change and making household energy actions a higher priority in the daily agenda are also discussed.

These learnings are explored under the following key themes:

- The power of social influence
- Social influence in the context of other influences
- Understanding the change process
- Starting the conversation

5.2 The power of social influence

Research sub-question 1 asks: ‘What are the types and frequency of social influence needed for new and sustained household energy practices?’ There was never any doubt about the existence of social influence (Cialdini 2005), but how significant it is, in what form it is found and how impactful it is in initiating and sustaining change remains under-researched. This research paper demonstrates that social influence is highly impactful in household energy-based practices. I posit that existing programs do not give social influence sufficient focus.

Social influence is evident throughout the research findings as a key influence on householders taking up new energy-based household actions. The research findings demonstrated that within social influence the type and number of relationships is a key influence factor and it needs to be considered in program design. For the demographic in this research, the role of partners and immediate family is fundamental. The embeddedness of the relationship and any emotional attachment is very powerful in influencing new practices. These findings suggest approaching the householder’s network as a whole as this may be an effective route to encourage change for this demographic. It is through the social networks of people in this demographic that feedback is channelled. Feedback is core to the householder decision-making process when considering a new energy-based action.

This research study used three different methods to gather and compare data. All three methods demonstrated evidence of social influence frequently impacting change and sometimes overriding other non-social influences.

- Through the ESS data the social influence of the Energy Liaison Officer (ELO) was evident. The ELO not only provided expert advice but also influenced uptake of new actions and new practices because of the trust and strength of relationship that had been developed.
• The in-depth interviews revealed the power of feedback and the importance of embedded relationships which for this demographic were dominated by a partner, if relevant, close family and then friends.

• The Most Significant Change story selected was chosen because of the experience of the evaluation panels in social influence impact. Throughout the ‘stories of change’ there was evidence of social influence, often dominating other influence categories.

Social influence impact varied across different household energy actions:

• Social influence is high with smaller appliances. This proved to be a good topic of conversation because smaller appliances are accessible to many and new technology is a safe topic. The standby device developments in the marketplace and feedback through this research describe well the power of social influence on this action category. The Eco switch within the ESS received frequent word-of-mouth recommendation. The Eco switch device overcame issues of personal control which had been evident in the market with a previous standby device that automatically turned TVs off after a set time period (McColl 2012), sometimes in the middle of movies. The inconvenience of this early device had hindered a significant area of energy reduction potential. The findings in the Most Significant Change evaluation groups clearly state the criteria of genuine benefit and mass applicability as factors to drive significant change. Therefore, if the benefits are genuine and the applicability is high, uptake will drive itself.

• The impact of social influence on heating and cooling overall was equivalent to the other influence domains, but within this heating and cooling category, there was enormous variability in influence patterns across different actions. For example, social influence had a higher impact on thermostat settings but less impact on draught controls.

• The impact of social influence on hot water use is less evident as change is driven by investment in new improved equipment, and because the topic of personal water usage can be regarded as very intrusive.

The research study captured numerous examples of these different patterns of social influence. Consequently, the variability of influence patterns across different action and practice categories is a fundamental learning for program design.

The research findings demonstrated the fundamental need of the householder for feedback from someone else in their social network before enacting a new energy-based action. The Oxford Dictionary definition of feedback is ‘Information about reactions to a product, a person’s performance of a task, etc. which is used as a basis for improvement’ and two-way communication needs feedback to be effective. Feedback helped to determine what others do and whether there were better ways to do the particular action; it also helped to reinforce the action (Glasser 2007). Feedback was a way of measuring the level of social risk involved in taking that action. Robinson would call this ‘confidence’ or ‘comfort zones’ (Robinson 2013) because if the decision cannot be justified then negative feedback is the likely outcome. Negative feedback is embarrassing and a defence-mechanism will be developed to ensure it does not happen again (Reynolds, Subasic & Tindall 2015). The Ashton Hayes project in the UK is a world-leading example of successful community-driven change (Dalziel 2016). Over a period of 10 years an English village reduced its carbon footprint by 24% and no negative feedback was core to the strategy of the villagers.

There are two types of feedback evident in this research: ‘feedback sought’ and ‘feedback given’. ‘Feedback sought’ tends to help determine the decision to take up a new energy action, whereas ‘feedback given’ suggests a householder has already taken an action and may be able to help impact
change for others. ‘Feedback given’ may be feedback asked for by others or actively suggested by the householder.

Firstly, where does any householder go to for that feedback? They go to the safest place, where they can trust people not to make them feel embarrassed (Reynolds, Subasic & Tindall 2015). The social networks captured in this research for this demographic clearly demonstrated partners and close family as core channels of feedback. The children were extremely important influences and actions were frequently dictated by feedback from family members. It should be noted these ‘children’ are of a mature age, ranging from 30 to 60 years. Although the network patterns showed average contacts of six per householder, it must be noted that for many the social influence from family networks were constrained by geographical location and in reality may be less. The average social network size was slightly smaller for the households not taking up a new action and some householders, despite a reasonable network size, were clearly still rather lonely. Males had a smaller social network than females.

The low-income and socially disadvantaged householders are targeted in this research to drive social equity and effective policy through understanding how best to support these households with energy-based practices. More research is needed on behaviour strategies for the vulnerable (Strengers et al. 2014, Australian Department of Industry and Science 2015). Housing is a key dimension to disadvantage and vulnerability (Stone & Reynolds 2012), and poverty and social exclusion have been linked. Social exclusion can be a key indicator in disadvantaged households (Saunders, Naidoo & Griffiths 2008) and the social network measure captured in this research study gives contact levels of just six on average, with not all in the local community. The geographical dispersion of personal networks is increasing (Saunders, Naidoo & Griffiths 2008). It should be noted that a small number in the study refused to give their network data and these householders may be among the most vulnerable householders. Vulnerability might be classified as level of risk and ability to respond to that risk (Alwang, Siegel & Jorgensen 2001). This supports the findings in this research that trusted sources were used for feedback as the ability of householders in this demographic to respond to negative feedback may be lower than for other householder profiles. The ESS report demonstrates that the ELO was trusted and consequently behaviours were changed almost as a thank you for the unconditional support provided through the Energy Saver Study (Southeast Climate Change Council Association 2016). Therefore, vulnerable householders who respond badly to negative feedback may be even more unlikely to take future social risk. This makes positive feedback all the more important for this profile of householder (Reynolds, Subasic & Tindall 2015), and enabling a positive environment should be built into program design.

Social influence through feedback from the partner was fundamental for those householders that had a partner relationship. In most cases in this research, the partners within this demographic had been together for some considerable length of time. Consequently, the negotiation process was established and considerate. Emotion was evident in the social influence from partners and in some cases this social influence was very powerful (Wetherell 2012, Twine 2014).

Some of the compromises made for the love of a partner were extreme and quite unconditional. The social influence of the partner warrants a research study in its own right. The power of the partner relationship and the contrasting needs for temperature management was a strong influence. Partners often have to debate an issue before it is actioned and this process of negotiating and determining one’s standpoint reinforces the behaviour. However, it was clear that many couples came at decisions from very different perspectives and often one was dominant in a specific decision area. It was a common finding for one partner to prefer the household temperature to be higher than the other partner.
Intra-couple negotiation exposed key roles of responsibility along with strong gender patterns. Inter-house negotiation may be more complex in other demographics or more complex household environments such as a teenage family where wants and needs are very varied. Within this elderly demographic, there is a high percentage of single householders and this makes an action easier to take, as there is nobody else to consider or negotiate with. However, this may impact the embedding of the practice as it is not discussed or debated, and consequently may not be sustained.

There was a lack of neighbours specified in the networks although some householders were very active in groups such as Probus or Seniors. Some householders relied on group social interaction, particularly if they were less reliant on or had fewer family relationships.

There still remains the challenge of methodology in this space as there was a denial of social influence, with many professing their independence with regard to decision-making and denying consultation and feedback took place. This phenomenon is clearly demonstrated by Cialdini’s 2005 study, with participants rating influence from others as very low, whereas field research rated it as high (Cialdini 2005). This emphasises the methodology challenges in measuring social influence and the inconsistencies of self-reporting.

It was, however, evident from this research that it was safe to seek and acknowledge expert advice. I posit that this is because it is socially reasonable to expect specialists to be more knowledgeable and, in general, most people seek the best or most convenient solution. However, such feedback may be biased or not readily available. Some householders in this research were very good at using their networks to acquire specialist advice for free and to source trusted contractors.

Understanding these patterns of social influence is important in understanding how to design household energy-based programs and to effectively increase and sustain change. Feedback can be unpacked to reveal the need for social conformity or the need to stand out from the crowd. It is norms that drive what the majority does. The individual householder response to the norms impacts the justification of a new energy-based action or risk management of a potential energy-based action (Robinson 2012, Schultz, Khazian & Zaleski 2008, Brehm 1989, Reynolds 2015). These considerations in the decision-making of the householder to take or sustain an action all link back to normative influence.

The research findings demonstrate that feedback is sought by most householders and the type and number of relationships is a key to the feedback received. It is not only whether the feedback is negative or positive, but it is also the householder’s response to that feedback that drives or constrains change. Negative feedback can be powerful, as embarrassment lingers in the memory (Reynolds, Subasic & Tindall 2015) and this can not only constrain uptake of an action but prevent any future social risk taking. Future risk taking is driven by confidence (Robinson 2013) and confidence depends on experience with negative or positive feedback (Reynolds, Subasic & Tindall 2015). Not everyone is driven by conformity. There was a clear minority in this research study that relished countering the norms, which can be either helpful or counterproductive, depending on individual circumstances and program design.

The role of the individual versus the wider society (immediate community and society at large) represents a classic ‘chicken and egg’ in terms of establishing new norms of household practices (Reid, Sutton & Hunter 2010, Schenk et al. 2007 cited in Maréchal 2010). Which came first, the chicken or the egg? And in this case, which came first, the individuals or the societal norms? Societal norms strongly drive the actions of the individual and constrain change in the conformity that they demand. Conversely, norms are the result of many individuals combining to determine an acceptable and desired behaviour, which consequently becomes the norm (Reynolds, Subasic &
The chicken and egg of norms asks the question as which element comes first since one does not exist without the other. If norms need to be changed, is it better to tackle the society as a whole or the individuals themselves? This research suggests there may be a more practical compromise in targeting networks.

Perception of norms is driven by all forms of feedback. Verbal feedback is core but observation of what others are doing is a form of indirect feedback and messages from the mass media create perception of what is acceptable by society as a whole (Göckeritz et al. 2009). It is evident that the householders in this study primarily look to their personal networks and then to greater society for feedback on what is ‘the right thing to do’. The internet was also a source of feedback in this research but for a minority of this demographic. Aggregated norms were evident in this research, whereby observation of practices across different sectors of society and associated practices can combine to have a sustained impact. A classic example of this is ‘comfort creep’ (Chappells & Shove 2005).

Feedback from broader society is ‘treat yourself’, you have ‘earned the right’ not to do it the hard way (Hamilton & Dennis 2005) and this adds impact to localised feedback and personal desires.

There were different types of normative influences evident – ‘injunctive and descriptive’, which can influence change in a practice in a different way (Jackson 2005, Schultz et al. 2007). Injunctive norms describe what an individual thinks others disapprove or approve of and descriptive norms refers to what an individual thinks others might do in the same situation (Göckeritz et al. 2009). Personal responses to social norms have been captured in two key theories: Social Identity Theory (Göckeritz et al. 2009) and Reactance Theory (Brehm 1989). Social psychologists tie norms to social identity as our social relations and definitions of who we are shifts to what we do (Reynolds, Subasic & Tindall 2015). This helps us understand the situations whereby individuals disregard rational decision-making in order to retain association or loyalty to their group (Göckeritz et al. 2009). Conversely, the reaction against norms from the threat of losing an established practice, be it through regulation or social majority influence, can cause a psychological reaction and the motivation to fight for the freedom to establish or maintain a practice, regardless of the outcome (Brehm 1989). This varying response to norms is compounded by aggregated norms where individual goals and social norms combine (Reynolds, Subasic & Tindall 2015). For example, societal norms for consumerism are embedded in society, ‘material goods and services are deeply embedded in the cultural fabrics of our lives’ (Jackson 2005 p. 134), whereas ‘simplified lifestyles’ and ‘reduction practices’ are uncommon in society although pockets of acceptance are emerging from role models such as the increasingly popular ‘little house living’ (Alink 2015). Furthermore, the response to majority and minority norms can be quite different publicly, compared with how people behave privately (Maass 1986). This emphasises the importance of voluntary action based on informed choice as recommended by Sunstein and Thaler (2008).

Normative influence is so powerful at a personal level, both for injunctive (perceived expectation) and subjective (assumed expectation) norms (Gockeritz et al. 2009). It takes a strong individual to dare to challenge the thinking of others and be prepared to manage negative feedback and potentially public embarrassment. However, some people do try as discussed under section 4.4. Perhaps this might be explained by conformity with normative influence being more than evading negative feedback; it is just as much about seeking positive feedback.

The power of the group standing together against the mass societal norms has led to a sense of pride, which fuelled further and sustained change. Mass societal norms are not congruent with the pathway of what is trying to be achieved with household energy practices. Achieving effective household energy reduction with the ultimate challenge being zero carbon emissions is a really difficult challenge to achieve. Many individuals do like to be challenged and conquering the right
challenge would be highly rewarding, leading to almost ‘hero’ status. The research findings demonstrate that the individual householder’s response to norms was variable. Some reacted against the norms (Brehm 1989), whereas others tried to identify with those around them (Göckeritz et al. 2009). There is still more research needed in this area.

A major conflict lies in that the budget holders that instigate reduced energy usage programs are often motivated and obligated by environmental and carbon reduction targets and yet the householder themselves may have a completely different motivation as detailed under the influences section, such as comfort, health or bill reduction. Bill reduction may come from reduced tariffs and not just a reduction in energy consumption. This creates inconsistent messaging, which reduces the impact on changing societal norms; and such confusion reduces householder confidence to start the conversation.

Many individuals are highly creative (Strengers and Maller 2011) and to change attitudes on reducing household energy from being a bore to an exciting challenge involves first getting household discussing household energy practices among themselves. The answer to research sub-question 1 is that the power of social influence is evident throughout the initiation and sustaining of new energy practices. All methods of research demonstrate this and the social network and consequent feedback from those consulted in that network influences that change.

5.3 Social influence in the context of other influences

The second research sub-question asks: ‘In what ways does social influence combine with material and infrastructure influences and competencies to impact on new actions and sustained household practices?’

Research findings suggest that social influence is equivalent to material and infrastructure influence and competency influence in importance as an influence. Consequently, the balance between influences must be a consideration when designing a program to change household energy-based practices. Within social practice theory, the relative patterns of different influence categories varies for different action categories so all influence categories and the practice being targeted need to be a consideration when designing change programs within householder energy-based practices. For example, if appliances have a high competency influence, more training and support may be needed for this energy action category.

The research study demonstrated the variation in the patterns of influence and the need to consider the different influences in combination with social influence to achieve effective change and for specific action categories. Social practice theory proved to be an effective framework for understanding household energy-based practices and for building this intervention model. The conceptual ‘model of influences’ was verified by the research findings as a comprehensive model by which to assess influences evident on energy-based household practices. Social influence demonstrated at least equivalent presence to the other influence domains.

5.3.1 Using social practice theory to frame energy-based household practices

Social practice theory proved to be a highly relevant theory on which to frame energy-based household practices although the category of competency could possibly be dissected a little further to consider new learning, skills, beliefs and attitudes by each type of practice.

The area of household energy-based practices is complex, multi-layered and multi-faceted, so finding the appropriate framework is key. The conceptual ‘model of influences’ is framed on social practice theory and is detailed in Figure 2.7, Figure 4.9 and Figure 5.1. This model has been tested by
the data in this research and demonstrates that all influence categories are covered within the model, and all influences were evident across the study. The evidence demonstrated influence from social, material and infrastructure, and competency categories. As many programs still place emphasis on information and competency development or infrastructure and technology upgrades, this model is important to highlight the role of social influence and the integration of all these different influences.

Social practice has evolved in recent years as an alternative ground theory for this household energy sector (Shove 2010a). This interest in exploring social practice theory as a new perspective has been developed further (Strengers et al. 2014, Shove 2010b, Moloney & Strengers 2014) and the model of Influences holds up as a comprehensive model during this research study.

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Figure 5.1 Model of influences

5.3.2 Mapping influences to actions to improve program design

This research demonstrated where different influences were more impactful with certain actions.

Competency was evident as an influence in every household taking up a new action in this research study. It is clear from this why competency has been such a focus of intervention for so many years by governments (UK Government 2008). There is high complexity within the competency influence category, with attitudes, beliefs, values and skills within each of the different practice areas all combined under this one category. Trying to challenge a householder’s established thinking and values through new information, be it through technology or other means is an understandable strategy but the ‘value–action gap’ demonstrated that this strategy can be constrained (Blake 1999).

Moloney, Horne and Fien (2010) researched 100 different programs and concluded that although many existing household energy reduction programs aim to change environmental attitude or educate on specific energy actions there are many other significant influences impacting outcomes. This research demonstrated that even though skills and beliefs may be very advanced there remains a hierarchy of priorities that can still prevent the implementation of new practices. This research study helps explain why, with the best intent, a householder may not complete an action. For example, the householder with strong beliefs on energy efficiency still had several fridges that were switched on and nearly empty because not upsetting their partner was a priority. Rational choice theory suggests an individual will ration out the cost benefit of a decision (Blake 1999) but this research and other researchers (e.g. Maréchal 2010, Frederiks et al 2015b) demonstrate there may be other considerations, and householders may not be as irrational as once thought.
This research also demonstrated material and infrastructure influence or social influence can clearly constrain an action regardless of the householder’s competency, skills or attitude. The research findings within heating and cooling practices demonstrated that, regardless of intent (Fishbein & Azjen 2010), appropriate infrastructure such as doors, or heating systems can override the competency influence and intent. Social influence through social etiquette demands clearly overrode highly competent heating and cooling practices. One householder in this research had very strong environmental skills and beliefs and had already established highly energy-efficient practices but the social influence through the love of a partner introduced conflicting and inconsistent household energy practices.

With the many challenges of driving change through information and skills and the lack of success in implementation, policymakers’ new emphasis on technology and infrastructure change is equally understandable. As technology advances energy savings have been realised that would be hard to achieve by behaviour alone. For example, the efficiency co-efficient of a reverse-cycle heater has improved dramatically and has a much higher energy-efficiency rating compared to an electric bar heater (Australian Government 2016a). However, unintended consequences must be carefully weighed up as householders in this research study talk of quality of air, health impacts and physiological adaption. The quality of heat derived from reverse cycle units may be driving other unintended consequences as heat output can be very dry and the demographic under study clearly missed the radiant heat effect and air quality of other technologies. The Most Significant Change evaluation groups actively debated the challenges of technology-enabled public buildings creating narrow operating temperature bands that may be reducing physiological adaptability and driving lower tolerance to perceived levels of discomfort.

Within the material and infrastructure influence, upgrading the household construction quality retrospectively can be very challenging and often requires advice and consultation with others. There is a tendency with this demographic to retain old inefficient appliances until they cease to function instead of purchasing more efficient new ones (although the embedded energy cost of some of these new appliances is debatable). Some of this demographic also struggle to transition from larger family homes and often disregard regulation.

Findings in the research demonstrated technology influenced infrastructure and information but the patterns were inconsistent and still in the minority. The market is tending to drive the improved designs and the federal government is incentivising technological innovation (Australian Government 2016b). Information-based technology is highly effective for the few that are interested in the technology. The social influence of effective technology was evident with new devices being a safe topic of conversation, as it was not considered to be too personal, often representing new information. Furthermore, being up to date with new technology generally leads to interest from peers and possibly the ultimate incentive of gaining positive feedback.

Technology remains an interesting area and findings in the research demonstrated an interaction between technology and competency. For example, the introduction of door seals have overridden the daily action of using door snakes and the automation of appliances has overridden the competency of daily household temperature control. The latest reverse-cycle equipment even had settings that sense the presence of people and ensured hot air was redirected so it was not blown directly at the person (Daikin 2016). Technology and automation is an important area but can lead to reduced personal choice. The disregard of regulation was evident in the study despite regulatory motivations being built around household safety and levels of reinforcement were low. This emphasised the need to drive change by voluntary action rather than regulatory compliance.
The merging of the competency influences with the material and infrastructure influence was evident where new learning and new power sources drove new practices. Conscious manipulation of household energy practices was influenced by new solar power sourcing when new learning was received on how billing and power generation worked.

Certain categories of influence within the ‘model of Influences’ are being driven hard already by specific disciplines such as engineering and social science. Ensuring that individual disciplines have an appreciation of all the influences involved in the process of change could assist effective program design and therefore more collaboration and interdisciplinary communication would be beneficial. The complexity of the influences deems this area of household energy-based practices to be a ‘wicked problem’ that will require collaboration if it is to be conquered (Fien 2014). The research findings demonstrate that many influences are interwoven and impactful, and need greater understanding and consideration if unintended consequences are to be managed.

5.3.3 Interwoven and competing influences

Moloney and Strengers (2014) identified that addressing mutually binding practices was important in understanding influence patterns. This research starts to unpack those interactions. There is clear differentiation between demonstrating the relationships between interwoven influence categories framed within social practice theory and interwoven competencies of different practices. Some of the stand-out findings within each influence category that impact change are detailed below.

Interwoven influences within the different social practice theory categories either hindered or empowered the impact to change. Close examination of heating and cooling practice demonstrated the complexity of these interwoven influences: the infrastructure and material influences changing the household environment, the heating systems available, the technology that drives them and the consequent choice of actions that could be taken. The multiple competencies driving heater usage and settings – clothing, room usage and traditional habits – are all potentially overridden by feedback from others.

Each practice and scenario can be highly detailed and the householder may not always be able to explain or understand their own behaviour. It is therefore not surprising that there was evidence of householders unable to isolate or verbalise reasons for their choices and consequently choosing not to discuss this subject area.

As evident in the research findings, not only are the main practice categories interwoven, but there are subcategories within each main category that are also interwoven within a hierarchy from a simple action to an anchored practice (Swidler 2001).

Interwoven competencies show variation on influence impact, depending on whether they are competing or combined. Competing influence categories are different to competing competencies and both of these were evident. Competing competencies were evident throughout the research, with comfort and finance found with high frequency. The comfort improvement in many studies superseded the financial or energy saving (Gabrielle et al. 2016, SECCCA 2016). Financial competency remained a dominant influence and skill sets for financial management were high for this demographic.

There were interwoven competencies other than finance and comfort, which either supported or hindered influence for change. Health frequently drove and supported comfort demands but more subtle competencies in social etiquette, safety, ventilation and hygiene also had an impact. Financial competency remained a dominant influence and skill sets for financial management were high for this demographic.
This competency influence category tended to be viewed by types of practice with a trajectory from new learning through to entrenched habit. Under the competency influence, competing influences such as comfort and finances throw some light on the householder decision-making process and how conflicted they might be. Not all competencies were competing, however; others combined for impact. Health frequently drove and supported the comfort demands. A person with high health competency was more mobile and energetic and kept warmer easier. It was clear that one competency practice could affect another. For example, a householder with high financial competency may have invested in energy efficiency and this enables higher comfort competency. There were many more subtle interwoven competencies in social etiquette, safety, ventilation and hygiene, which added to the influences in different ways.

Ventilation was an emerging practice that seemed linked to health and was led by a desire for fresh air. Fresh air was shown in the research to both conflict and combine with other influences. Several householders left doors and windows open for air, which led to higher energy bills or low temperatures in the house. Arguably the comfort levels may not have been impacted if fresh air led to perceived comfort as it is important not to measure comfort purely by household temperature. The increasing installation of reverse-cycle systems may be a particular influence. Many householders talked of the types of heat they preferred, with radiant heat loved by some and several talking about the poor air quality from reverse-cycle heaters. Hydronic heating was mentioned as providing warm, moist heat. However, hydronic heating, although cheap to run, is expensive to install in Australia (Australian Department of Industry and Science 2013). This might lead back to the quality of housing in Australia (Bennett 2015) where double-glazing and quality heating systems are not commonplace.

Other competing practices were health and hygiene and social etiquette practices, but these were less evident than the core health, comfort and financial influences. It was clear that competency of one influence would affect another. Correlation between comfort and bill levels was demonstrated in the Tasmanian Get Bill Smart program (Gabrielle et al. 2016). Also, a person with high health competency was more mobile and energetic and kept warmer easier, whereas a householder with high financial competency may have invested already in energy efficiency to enable higher comfort levels. Hygiene competed with energy saving and social etiquette was powerful in countering many hard-earned savings from reduced comfort.

‘Comfort creep’ is where norms for temperature levels increase surroundings become more luxurious. ‘Affluenza’, which is the desire to spend more money not based on need but because you can, has become a common phenomenon in developing countries including Australia in the last decade (Hamilton & Dennis 2005). This is linked into affluence and sedentary lifestyles, with household temperature levels higher than recommended in winter and lower than recommended in summer. This phenomenon exists across all demographics and the vulnerable populations are no exception. It may be logical to think that low financial capacity would limit high comfort levels and this research study showed in some cases but not all. Low-income householders may feel too financially constrained to eat out and, if unemployed or retired, they would spend more time at home. The research demonstrates that comfort levels are a higher priority than financial influence.

Government has a role in driving norms and acceptable strategies for managing comfort levels, and household temperature guidelines are core to managing household energy usage. Convenience and comfort creep are evident in this research as a key influence on householders not sustaining new practices. Not sustaining new practices and reverting back to previous habits is known as a rebound effect (Chitnis et al. 2014). A long timeframe is required to measure rebound effectively (Sweeney
and this follows an understanding of the journey in embedding a new practice from first gaining a new learning through to taking an action and then establishing a practice.

Competing influence categories is different to competing competencies and both of these were evident.

The answer to research sub-question 2 is that the patterns of social influence in combination with material and infrastructure and competency influences do impact new actions and sustained household energy practices. The patterns vary based on the type of action and the combination of social influence with each other influence category. However, the model of influences is robust and is an effective tool for program planning.

5.4 Understanding the change process

5.4.1 Targeting single actions or multiple practices

This section answers sub-question 3 on how social influence initiates and sustains change in household energy-based practices. The decision to target a single action or a total lifestyle poses different challenges and drives different influences. Program strategy in trying to change single actions versus multiple actions and how this links to attitudes and beliefs poses some questions. The social marketers advocate for an action-based strategy, with small successfully completed actions leading to taking further actions and a longer-term attitudinal change (Mohr 2006). Programs targeting only specific actions tend to be more effective in engaging those that do not acknowledge the science of climate change (Edwards 2007, Middlemiss 2011) and environmental attitude is often not a requirement for pro-environmental behaviour (Kollmuss & Agyeman 2010). Conversely, empirical research has demonstrated that household attitude to sustainability and acknowledgement of climate change can be important in programs targeting lifestyle (Moloney & Strengers 2014) and environmental and personal responsibility beliefs influences energy use (Barr & Gilg 2006, Leviston et al. 2011, Maréchal 2010).

In identifying change, the outcome measurement remains an issue. Not only do different and associated actions still need further definition, but traditional measurements such as energy usage does not identify the variation across different practices, comfort increases and rebound effects. In this research many changes in practice occurred but some changes increased energy use and some reduced energy use. The measure of energy usage alone is misleading program managers on the effectiveness of interventions.

The research findings from the Most Significant Change evaluation groups identified strong criteria for an energy-based household action of relevancy, ease of implementation and outcome, which could be a good starting point in defining an action. The work of social practice theorists demonstrates a progression through initial action to embedded practice. Social practice theorists have advocated for a step-by-step approach whereby a single successful approach will progress into another simple step (Mohr 2006). It is the accumulation of these multiple small steps that leads to a lifestyle change (Edwards 2007). The research findings question that environmental attitude is a strong influence for the energy-based actions taken. There still remains the challenge of sustaining those actions and turning them into automatic subconscious practices.
5.4.2 Sustaining change

The research findings demonstrated that householders who did not sustain their actions did so for reasons of convenience and changing occupancy (such as family or friends as visitors), which impacted the social influence and diminished control. Sustained actions were clearly evident for the majority of households but the timeline of this study constrained this research to six months’ follow-up. Studies carried out by Saunders et al. (Saunders 2013, Chitnis et al. 2014, Darnton & Horne 2013) tend to review rebound effects over longer time periods and demonstrate significant relapses in energy savings. Methods to measure sustained behaviours are challenged by self-reporting and privacy issues in introducing observation, which would otherwise counterbalance limitations in self-reporting alone. Influences that counter sustained change are multiple, but convenience, occupancy, comfort priority and social feedback were evident in this research.

The process of change shines light on the gap in Social Practice Theory as to the level of consciousness during the change process (Schatzki, Knorr Cetina & Savigny 2001, Swidler 2001, Reckwitz 2002). The role of the individual is evident in the initial moment of change (Maller & Strengers 2011, Reckwitz 2002) and yet norms drive change subconsciously. The theory demonstrated a gap in the level of consciousness and agency as a practice becomes embedded and this was evident in the research findings. Awareness in the research was an indicator. The frequent use of the phrase ‘I became more aware’ was an indicator that the action had moved from the subconscious to the conscious. However, the use of such words also indicated that the householder was not yet ready or had enough positive influences to take the next step and complete a new action. This finding is consistent with the first two stages of the ‘Four Stages of Competence’ (Howell 1982)

The findings demonstrated that the majority of householders sustained their actions. Words used included ‘automatic, habit or just do it’. For new actions to sustain overtime it is important that the initial action is taken voluntarily (Cialdini 2009) and in this research voluntary uptake was evident. The professionalism of the ELO ensured there was no coercion, although there may have been some voluntary reciprocity from the householder. Voluntary reciprocity was evident as extra effort made by the participant to change actions by way of gratitude for the unconditional support provided by the ESS program. There were some negative influences evident, which changed the most established practices. Those evident in the research included change in occupancy or others in the household who were less interested. These negative influences reduce motivation as energy usage increased and it just made it too hard. Convenience was evident in one household and this became an influence factor on rebound very quickly. This emphasises the influence of convenience, which is the time and effort required to make the change.

I posit that there are some challenges in the research design for this element of the research. The timelines of six months are too short to measure if change was truly embedded. Also, once the practice becomes embedded it becomes automatic and transitions towards a subconscious act. The
subconscious element moves the research away from a conscious ontology. Conscious elements can be assessed by interview and self-reporting. Measurement of a subconscious act places a reliance on different techniques such as observation. There was an awareness of this in the research design phase so an element of observation was included. However, a subconscious ontology requires a reliance on observation and the constraints of households energy reduction is the intrusion of ongoing observational techniques inside the home. There is no obvious solution to this program design challenge.

5.5 Starting the conversation

This section looks at why starting the conversation is important and what conversations are acceptable and to whom. It then explores who might drive these conversations and why they don’t at present.

The process of discussing new household energy actions or practices reaffirms the decision in the householder’s mind and starts the process of embedding the practices. Anchored practices (Swidler 2001) come from a constant reaffirmation of the practice to the point that the practice becomes automated. I posit that the embeddedness of the practice moves the householder into the stage of recommendation, providing feedback to others in their energy practices. So, starting the conversation is important to achieve a sustained practice but the research findings demonstrated that this topic of household energy-based practices rarely gets on the agenda.

The research findings identify that there are two factors to be considered in driving this conversation. It is not only confidence in the topic of conversation but also the social capacity of the householder to enable the conversation. Social capacity had been detailed under section 5.1 on ‘social influence’ and involves not only the range and number of people in the network, but also the confidence to challenge others and respond to mixed feedback. The research data demonstrates that this demographic has a range of social capacities. Those that have low capacity are often socially isolated or have little social interaction, and will be unlikely to discuss matters outside their comfort zones. Some householders in this demographic had very high social capacity, are socially skilled, do not fear challenging others and have had prior relevant experience. However, those with higher capacity and strong social integration do not regard household energy practices as a topic of choice.

The acceptable topics of conversation seemed to be linked to norms and societal norms driven through items in the media that are more easily engaged with during conversation. Interest in the topic of conversation will vary with the demographic. Examples of such topics might be new products advertised or services reducing high energy bills. Younger populations or males may prefer new technology, whereas the elderly may prefer supporting services. The demographic is also important in the channels of mass communications because some may use the internet, whereas others may be more reliant on TV. The power of mass advertising links to norms but rarely do the key advertisers have a motivation of reduced carbon. A major conflict in motivations results in mixed messages. The advertiser wants to sell their product or service, the program managers want to reduce carbon and the householder themselves want to be comfortable, healthy and have lower bills. Such mixed messages result in variable norms, and aggregated norms may be required to achieve a sustained change.

These research findings demonstrated that topics such as the weather, high energy bills, new technology and devices, cooking, laundry and products advertised are acceptable. The topic of conversation has some gender variables, with laundry and cooking traditionally a female domain (Strengers 2014), which the research findings suggest is still pertinent to this demographic.
Technology and more complex appliances was shown to be more the male domain for conversation. Finances were more evenly represented across gender. Within the research, a large percentage of this demographic are either widows or single women, so widows particularly may be forced into discussing routines they have had no previous experience in or are not comfortable with. All these factors of gender and skill and familiarity with the energy action lead to a level of confidence and impact the range of topics. If you cannot defend your action you risk negative feedback, which is an uncomfortable experience as discussed earlier (Robinson 2012) and one to be avoided. The range of comfort zones and relationship embeddedness drive the degree of challenge in the discussion. However, even highly socially confident householders (determined by previous successful community leadership) chose not to progress household energy as a topic of conversation. Starting conversations within one’s networks is less risky than starting conversations in the broader community which is more challenging. There have, however, been a few successful models introduced, and Kitchen Table Conversations (Sarkissian et al. 2008) is one such example successfully used in the 2015 Indi election campaign.

Those householders that actively recommended energy-based actions had a resilience to negative feedback and prior bad experiences had not stopped them repeating a recommendation. In some instances there was clearly an adjustment of the style of recommendation or a reality check as to the likely response.

The socially confident tended to be more able to publicly challenge others (Robinson 2013) and were the only householders able to iterate examples of negative feedback. Those who had had socially risky experiences remembered them and this impacted future actions (Reynolds, Subasic & Tindall 2015). Interestingly, the motivation of these householders in helping those in dire need by way of core life necessities, such as housing, food or health, seemed to justify much greater social risk taking than those needing help with reducing energy use. Perhaps the positive feedback was so much more powerful that it was enough to overpower any negative feedback. The householders with strong social capacity in this research all had social well-being as a priority over climate change. This might be a learning to link messaging and conversations to more immediate needs to prioritise motivation to change. These research findings also demonstrate that skill and ability of the local leader alone will not drive change at a community level in this household energy-based context.

The answer to research sub-question 3 is that the power of social influence is evident throughout the initiation and sustaining of new energy practices. The processes of changing single or multiple actions and the transition from conscious action to sustained practice are clearly strongly impacted by social influence. The change process starts with and is sustained by conversation, and this research demonstrates that starting that conversation is core to changing and embedding new energy practices.

5.6 Further research opportunities

This research highlights areas that warrant further research such as life-stage influence variables, defining and classifying of actions through to sustained practices, competing influences with particular note on comfort and finance influences and aggregated norms. Influences by life-stage warrants further research. The pattern of influences provides rich data for this aged and vulnerable demographic, but understanding of the variations in patterns and influences across different demographics would provide key learning and help better preparation. Definition and classification of practices and actions could be completed by desk research and an industry consensus. This would progress the industry evaluation of practices. More longitudinal research is required for rebound measures that assess not just energy usage but also comfort levels and control, and the related social influences evident over time. The challenge lies in the methodology, as observation is the
most effective, but it is highly intrusive. Self-reporting is notoriously unreliable and over-optimistic (Geller 1981) and social influence is often denied (Cialdini 2005). Smart meter data does not provide circuit breakdown and consequent measurement for specific practices. The area of competing and combined competency influences warrants further research, with emphasis on the most prevalent influences of finance and comfort and health. The Most Significant Change technique provided a valuable methodology and the research findings showed a consistency with other, sometimes more expensive techniques such as surveys and interviews. Further studies could benefit from using these techniques.

This research highlights these further areas of research opportunity and also demonstrates the use of the Most Significant Change as a useful methodology for future studies.
6 Conclusion

The research asked how and in what way social influence combined with other influences to impact sustained household energy based practices. Eight key findings have been identified.

1. Social influence is at least as important as competency and material and infrastructure in initiating and sustaining change and needs to be taken into account in program design

Social influence is evident throughout the research findings as a key influence on householders taking up new energy based-household actions and sustaining those actions till they become a practice. There is strong evidence of social influence in impacting residential energy-based change programs. Therefore, in any program design use of an innovative socially driven community engagement process is fundamental, one that aims to encompass the network of the targeted householder.

This research demonstrates that social influence is equivalent to material and infrastructure as well as competency influences in terms of being present as an influence. Consequently, the balance between influences must be a consideration when designing a program to change household energy based-practices. Program designers can potentially optimise intervention programs aimed at changing household energy-based practices by understanding the complete range of influence categories and their relative importance. Existing programs have exemplified influence category of competency (Moloney, Horne & Fien 2010) and material and infrastructure (Newton & Tucker (2011), and only a few programs have prioritised social influence (Fitzgerald and McBurnie 2015).

Many programs have engagement and communications strategies as a key component of recruitment (SECCA 2016, Petkovic and Burroughs 2016) but this research study indicates that social influence is required over the longer-term in order to sustain change. The process between individual action and embedded practice is a mixture of repetition, belief and convenience (Southerton 2012, Shove et al 2012) but ‘enthusiasm for ‘new’ behaviour or actions tends to wane and participation decays in the absence of continual reinforcement’ (O’Dwyer et al. 1993).

2. Social practice theory offers a robust framework to capture influences in the context of household energy-based practices

Social practice theory is a practical theory around which to frame household energy-based influences and all influences within the research could be captured within the social practice theory framework. The low levels of consciousness for so many of the embedded practices is explained well within social practice theory. The variable influence patterns for different actions such as high competency influence for standby devices or high material and infrastructure influence for hot water actions demonstrates the versatility of social practice theory as a framework.

Model of influence framed on social practice theory is a useful tool and could be applied in the planning and execution of a wide range of community-based programs. Understanding the influences applicable is critical if a program designer is to achieve effective planning and implementation.

3. The main social influence within this research comes from existing social networks, which for this demographic is primarily partners and immediate family

The research findings demonstrated that within social influence the type and number of relationships a householder has is a key influence factor, which needs to be considered in program design.
For the demographic in this research, the role of partners and immediate family is fundamental. The gender bias and the average number per network is a key learning. The embeddedness of the relationship and any embedded attachment is very powerful in influencing new practices. These findings suggest it is worth considering approaching the householder’s network as a whole as an effective route to encourage change. It is through the householder network that feedback is channelled and feedback is core to the householder decision-making process when considering a new energy-based action.

The embeddedness of relationships within couples in this demographic was powerfully different in the outcomes. The number of new actions taken up by householders with partners rather than singles was much higher and perhaps partners should be targeted within programs.

4. Householders need a trusted advisor within their social network to accommodate risk taking and to avoid negative feedback

Trying something new is a risk and the level of risk is driven by the householder’s comfort zones (Robinson 2013). The research demonstrated quite broad ranges of social comfort. One of the householders was quite prepared to challenge practices in broad networks without any fear of social alienation, whereas others would not speak of matters in others’ homes, which they regarded as personal, or feared the topic boring and likely to be unpopular.

The feedback received by the householder within a trusted relationship was not always what they wanted to hear but the householder often still accepted it and acted upon the feedback because they trusted it was in their best interest. There was often suspicion of paid advice and salespeople, and contractors were used more for technology and equipment choices and management rather than changes in practice. The role of the ELO was felt between paid expert advice and trusted embedded relationships, and program designers could gain from developing such relationships for engagement purposes within program design.

5. Social influence can support change or limit household carbon reduction

The response to feedback is shown to be very powerful in this research and drives and constrains any conversation on household energy actions. The research demonstrated that negative feedback was clearly remembered over time and potentially constrained future progression of new actions for that individual. Conversely, the selection within networks of ‘safe’ and trusted feedback was significant in enabling householder change. The acceptance of the role of feedback in enabling and sustaining change is critical for a program manager to understand. Not only are communications to networks a key program design consideration but they also create the atmosphere of positivity and support. This was well exemplified in one society’s rare carbon reduction successes at Ashton Hayes in the UK.

Conflicting messaging from mass societal norms was evident throughout the research and perhaps a partial explanation for the increasing comfort demands. The role of localised networks and mass societal norms and the importance of consistent messaging in creating aggregated social influence and sustained change. Sustained change leads to new norms and the understanding of aggregated influences on norms is important for program designers.

Continuity of the social influence will make the difference between sustained change and rebound behaviour. Continuity is challenging and often driven by government funding cycles but if self-managing groups and conversations can be developed, these will prolong social influence and lead to more effective sustained change. Sustaining the conversation is perhaps one of the greatest challenges for program designers, requiring innovation, differentiation and creation of something fun that people want to talk about.
The research demonstrated how hard it can be to ‘start the conversation’ and communications within a program design need to be relevant to the householder not the funder. Also, the research demonstrated that if motivation is linked to social good then householders are more likely to be motivated to drive change.

6. Motivating discussion is an important role of government and program designers to achieve sustained change

Starting the conversation about energy use was evident as a key barrier to change. Not only is the topic of conversation a key issue but the opportunity for such discussions are less frequent. There are also strong gender considerations, and social change such as providing food and housing was a priority over carbon reduction.

The conversation of household energy usage was often considered intrusive, boring and many felt they already knew the facts even though they did not prioritise these actions. However, conversational topics such as energy bills, LED lights, standby devices, and new technologies offered genuinely new information that warranted discussion. The impact of gender in this area of conversation and in how actions were implemented were very evident. Discussing a boring topic for your network or getting into others’ personal space risks negative feedback and reduces the desire to start the conversation again.

Householders with strong social capacity and confidence in certain actions were more comfortable about starting conversations. There were many change-makers in this research with a history of change to evidence this but these change-makers were not motivated by carbon-reduction. If the energy-based actions can be linked to social good, these householders are more likely to be motivated to drive change.

7. Understanding competing influences within demographics is core information for program designers

Demographic patterns with the aged in this research showed high financial capacity, with increasing and overriding health and comfort influences, which counter program outcomes. The interwoven and competing influences within each demographic can add great insight into the householder motivations and consequent messaging and barrier management needed for a program.

Interwoven, compounding and conflicting influence patterns need greater understanding by demographic. One of the greatest barriers to reduced energy use evident throughout the research findings was the influence of perceived comfort as a conflicting motivation. The perception of personal comfort is highly subjective and is fuelled by other practices, such as health, ventilation and social etiquette. The influences of comfort and finances within the competency influence were very impactful and could be linked to aggregate norms which are the combination of norms such as societal, local and personal.

Understanding these competing competencies for the target audience is critical for the program designer.

8. The role of social influence is under-researched. More research is required in the following areas: social networks for different demographics, influence patterns for different actions and managing suitable housing for life-stages

There is much more research to be completed to understand influence patterns either by practice type, stage of life or demographic. The demographic researched in this study are low-income and vulnerable populations. The patterns of influence evident in this research are therefore specific to this profile. High comfort and health needs, high financial competency and inappropriate housing
due to low preparedness for the next life stage. These patterns will influence program design and communications. Further research is warranted on understanding influence patterns for other demographics and managing them in program design. The Most Significant Change technique may provide a valuable methodology in this context. Further studies could benefit from using this technique.

Research on household energy-based definitions is warranted to try and achieve consensus in the industry. Also more longitudinal research is needed on rebound measures that assess not just energy usage, but also comfort levels and the related social influences evident over time.
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Appendices

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Appendix 1: Interview schedule including themed prompts

**Thematic Interview Schedule**

**Individual interview 1**

Familiarity with the experience and influences of new actions:
- Trying a new action
- Rejecting a new action
- Social influence that resulted an increased response
- Social influence that resulted in a negative response
- Social networks, social confidence and social influence

**Individual interview 2**

Familiarity with the experience and influences of sustaining a new practice:
- Sustaining a new practice
- Not sustaining a new practice
- Social influence that resulted increased uptake
- Social influence that resulted in negative uptake
- Social networks, social confidence and social influence

**Interview 1**

Prompting Questions

I. Can you choose a new energy action that you have recently carried out and please tell me the story of why and how?
II. Did anybody encourage you to give this energy action a go?
III. Did you talk to others about it?
IV. Who did you speak to and when? (see bullseye technique here)
V. What feedback did you get from them?
VI. How did this make you feel?
VII. Do you think they might have influenced your decision?
VIII. Do you think you have influenced others?

Promoting actions

- Can you choose an energy action that you recently chose not to do and please tell me why and how?

Repeat questions detailed in I to VIII above

**Interview 2**

Prompting questions

I. When we last spoke you were exploring new actions (specify). How are these actions going?
II. Why is that?
### Research Questions

<table>
<thead>
<tr>
<th>Primary nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Actions and practices</strong></td>
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<tr>
<td>Failed actions</td>
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<tr>
<td>New actions taken</td>
</tr>
<tr>
<td>Intent</td>
</tr>
<tr>
<td>Sustained actions</td>
</tr>
<tr>
<td>Intent</td>
</tr>
<tr>
<td>Rebound</td>
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<tr>
<td><strong>Most significant Change</strong></td>
</tr>
<tr>
<td><strong>2 Other Influences</strong></td>
</tr>
<tr>
<td>Competency- skills, knowledge and attitude</td>
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<tr>
<td>Altruism and personal responsibility</td>
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<tr>
<td>Skills and knowledge</td>
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<td>Comfort</td>
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<td>Environmental attitude</td>
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<td>Health</td>
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<td>Hygiene</td>
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<td>Social Etiquette</td>
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<td>Safety</td>
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<td>Ventilation</td>
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<tr>
<td><strong>Other</strong></td>
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<tr>
<td><strong>Infrastructure and material</strong></td>
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<td>Appliances</td>
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<td>Building design</td>
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<td>Draught sealing</td>
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<td>Heating and cooling</td>
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<td>Hot water</td>
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<td>Insulation</td>
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<td>Lighting</td>
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<td><strong>New infrastructure</strong></td>
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<tr>
<td>Orientation</td>
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<td>Power source</td>
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<td><strong>Regulation</strong></td>
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<td>Technology</td>
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<td>Zoning</td>
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<td><strong>Weather</strong></td>
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<tr>
<td><strong>3 Social influence</strong></td>
</tr>
<tr>
<td>Confidence</td>
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<tr>
<td>Expert advice</td>
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<td>Social experience</td>
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<td>Motivation</td>
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<td>Previous experience</td>
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<td>Feedback</td>
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<td>Recommendation</td>
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<td><strong>Networks</strong></td>
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<td>ELO</td>
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<td>Family</td>
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<td>Friends</td>
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<td>Groups</td>
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<td>Neighbour</td>
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<tr>
<td>Partner</td>
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<tr>
<td><strong>Norms</strong></td>
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<td>Majority</td>
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<tr>
<td>Social identity</td>
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<tr>
<td>Regulated response</td>
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<tr>
<td><strong>4 Momentum for change</strong></td>
</tr>
<tr>
<td>Competing and interwoven practices</td>
</tr>
<tr>
<td>Level of Consciousness</td>
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<tr>
<td>Habits</td>
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<tr>
<td><strong>Starting the conversation</strong></td>
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<tr>
<td><strong>Good Quotes</strong></td>
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<tr>
<td><strong>Demographics</strong></td>
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<tr>
<td>Gender</td>
</tr>
<tr>
<td>Lifestage</td>
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<tr>
<td>Occupancy</td>
</tr>
</tbody>
</table>
Appendix 3 – Data to be collected from the Energy Saver Study

Energy Saver Study Data

- Demographics
  - Gender
  - Age
  - Occupancy
  - Income
  - Dwelling status

- Household Infrastructure Data (for groups A and C)
  - Infrastructure – intervention date, category and scale. Heating and cooling data for households with new heating/cooling actions, including zoning capacity, heating system, number of rooms.

- Householder management data
  - Comfort priority for a sample of households from surveys
  - Value of bills and financial management status from surveys
  - Energy efficiency attitude from surveys

- Energy action data (for Groups B and C)
  - New energy actions in the last 12 months by category
  - Heating/cooling actions for select households
  - Motivation for new actions
Appendix 4 – ESS questions to be used

ESS Data to be collected

*Infrastructure and material influence*
Has new infrastructure been installed in the last 2 years
What category is this in?

*Competency influence*
Financial ESS data

QFI: Can you manage your bills? Annual bill levels for electricity and gas are rated and then summed.

a) Electrical energy use per year (bills)? ELO assisted
Less than $500/$500-$1500/$500-$2500/$2500-$3500/More than $3500 Rated 1-5

b) If Mains Gas User: On average, how much does your household spend on mains gas per year? ELO assisted
Do not use/Less than $300/$300-$1000/$1000-$1600/more than $1600 - Rated 1-5

QF2: How empowered do the householders feel in relation to their energy consumption? ELO deduced response
Not empowered/rarely empowered/neutral/empowered/very empowered - Rated 1-5

QF3: How are you managing the cost of your bills?
With difficulty/Can just get by/No problem/Don’t think about it

QF4: How in control of their finances do the householders feel?
Rarely/Sometimes/Neutral/In control

QF5 Does the householder need help in paying their energy bills?
No/sometimes/yes

*Comfort ESS data*

*Comfort requirement*

Heating

QC1: What temperature do you like your heated rooms to be at during a cold day?
Hot warm/Pleasant just warm enough/take the chill off/pleasant just warm enough

Cooling

QC3: What temperature do you like your rooms to be at during a hot day?
Moderate (22-24 degrees)/cold (20 degrees)/Cold( 20 degrees)/As cold as possible (18 degrees)/drop the temperature a bit (>26 degrees)

Energy efficiency attitude

QE1: How interested are you in conserving energy in your home?
Very interested/interested/neutral/not very interested/not interested
### Energy Actions Report Form

<table>
<thead>
<tr>
<th>Energy Action</th>
<th>Benefit / savings</th>
<th>Effort</th>
<th>Action status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Switch heater off overnight</td>
<td>***</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Close windows when heater/cooler is on</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Turn thermostat on heater down to 18 - 20°C Celsius</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Wash clothes in cold water</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Use a fan for cooling on hot days before, or in combination with, an air conditioner</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Open doors &amp; windows the night before a hot day</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Close windows early on hot days</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Close doors inside to reduce the area to be heated and/or cooled (zoning)</td>
<td>**</td>
<td>● ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Try to do some physical activity every day. Activity can make you feel warmer and may reduce the need for heating (especially during the day). Make sure any activity is approved by your doctor.</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
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<tr>
<td>10. Use pedestal lamps instead of whole room lighting</td>
<td>*</td>
<td>●</td>
<td></td>
<td></td>
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<tr>
<td>11. Turn off appliances when they are not being used</td>
<td>*</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Switch off the appliances at the wall to save standby energy</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Switch off the second fridge except for events</td>
<td>***</td>
<td>● ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Switch energy escalier</td>
<td>5</td>
<td>● ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Install and close window coverings to protect windows from heat loss through glass</td>
<td>***</td>
<td>● ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Use a thermometer to manage heating/cooling/house temperature</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Switch lights off whenever they are not needed</td>
<td>*</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Set the thermostat on the air conditioner to 26 degrees and not below</td>
<td>***</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Avoid using portable heaters to save energy</td>
<td>***</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Go to bed early instead of using a heater</td>
<td>**</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Only boil as much water as you need to use</td>
<td>*</td>
<td>●</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 6 – Pictorial representation of energy actions
Appendix 7 – Selected stories for evaluation by domain

Material and infrastructure influence stories

1. **Insulation and draught sealing** - I have taken more personal responsibility and realising the cost impact and with the help of the EIO. I am managing the lighting more effectively and turning appliances off at the wall. I received insulation and draught sealing and I am more comfortable, it has taken the edge off the cold, particularly in the mornings and I don’t use heating as much. I turn the heater off a lot more, shut the doors and enjoy the warmth.

2. **Voltmeter** - Turning off power points was most significant to me. The EIO was the reason to do this and saving energy and money. Power bills were taking most of our pension we needed to do something and did not have knowledge of what appliances were using. I got a voltmeter to measure everything and now we know what is costing us a fortune. Since the voltmeter some appliances got removed altogether and the kettle is only filled with what we what we need. It was not hard to start but just needed the knowledge and to be aware. I have now realised the power each appliance uses when not being used so I turn everything off. The energy bills have come down a lot. I have spoken to others but some have taken advice and others have been sceptical.

3. **Fireplace cover** - There was ash and dust blowing out the fireplace and draughty. The fireplace cover stops the drafts and had not been considered before but offered as part of the energy saver study. Now there is no draughts and no dust on the table.

4. **Stand-by devices** – A switch off device for the television as an energy saver and easy to reach. It was too difficult bending down to the switch at the back now I have got an Eco switch. I never thought of it before although I did know they were around. It was not challenging and I try to remember each night. I have not spoken to anyone except family.

5. **In-home display and turning off appliances** - Turning off the appliances is the most significant. I never thought of doing it before, kettle, toaster, computers and devices. With the in-home display I like to see how much energy I am using. It was not challenging but a pleasure and interesting to learn about it.

6. **In-home display** - Thermostat settings, hot food in the fridge and defrosting the fridge instead of the microwave, air con off at the meter box has all been influenced from the in-home display.

7. **Insulation** - Wall batts in the ceiling was the most important thing as it is much warmer in the house. I turn heaters down now of a night plus a blanket around my little knees. Everything is good, never thought insulation had such an impact.

8. **Cold water** - Started washing in cold water after it was suggested by EIO because it helps save energy. Didn’t occur to her before and hasn’t noticed any difference in the quality of the clothes. Not at all challenging, she just switched machine to cold and has kept it on cold.
Competency, individual beliefs and values stories

1. **Clothing** - Not using heater at all- I wear thermal underwear
2. **Ventilation** - Ventilation in the bathroom in the en-suite, I use fans less with more natural ventilation, which draws air in from outside. Natural draft helps with odours, prevents house fires- embers.
3. **Air conditioner switch for stand-by** - This lady said the main thing she started doing since being involved in the study was turning things off at the wall, especially the air conditioner, which she now turns off at the switch outside when she is not using it. She said “I wouldn’t have thought about it until you came and told me how much energy it’s using, and your advice about saving energy”.
4. **Batch cooking** - I started cooking more things at once while the oven is hot, or putting something else in straight after so there is not as much heating up time required. Started because I noticed the oven was still hot when I took things out. Was cooking a meal and desert for her daughter and thought “this is common sense” to cook them both at the same time so the oven isn’t on for as long. Not thought about it before, talking to ELO who made me more aware of using energy. Not noticed any changes in bills? Not talked to others as “a lot of older people don’t cook” Easy to do. “Made me feel clever”
5. **Washing in cold water** - Started washing in cold water after it was suggested by me because it helps save energy. Didn’t occur before as I hadn’t noticed any difference in the quality of the clothes. Not at all challenging, I just switched machine to cold and has kept it on cold. She spoke to her son about it who is a fanatical washer but she isn’t sure if he started washing in cold.
6. **Stand-by** - I switch off the TV and all those other appliances. I use the Eco switch, energy saver device which is not challenging. Where I walk past at night on my way to bed, the little greenlight reminds me. I had not considered this before the energy saver study and until I got given the device. I also spoke to my son in-law and he said they should get one too.
7. **Zoning** - Closing the doors of rooms you are not using is the most important. I did it for the first time because I was cold and somebody left the laundry door open and I noticed it. When seals were later put on the doors I could tell the difference and I always close the door behind me and tell visitors to shut the door.
8. **Fan instead of air conditioner** - must be saving money in some way. Since ELO came I had not given it much thought before then. I have always been careful, questions about energy made me think of it. It was tricky in the beginning then it just became habit. Grandchildren and daughter think more about it now. Getting into a habit was the challenge
9. **Reduced dryer use** - Awareness changed the way I dry my clothes. I want to know how I can save money and I just focus my mind on turning the dryer off and hanging out my clothes.
10. **Thermostat settings** - Heating and cooling have settings on different temperatures. For cooling I have a higher temperature than 20 degrees to get bills cheaper and for heating I thought 25 degrees was the right one but it is not and I now set it at 20 and I am comfortable anyway. It was not hard. The window and door draught was removed stopping the cold wind from outside. It will keep more money in my pocket.
Social influence stories

1. **Others role modelling** - Washing in cold water. The Energy Saver Study made me aware of how much you save. I realised there is no change to the washing, it is just as clean. It was a challenge but now more aware of waste and high bills and the need to cut down costs. I have not noticed any difference with the washing quality. I got advice from the Energy Liaison Officer and spoke to my son who always washes in cold water before I did it.

2. **Family members consultation** - Following draft sealing I have reduced energy use as thermostat turned 2 or 3 degrees lower. Felt the difference immediately and the economy savings helped. Hard to tell the exact savings from bills as prices have changes. Not very challenging and no discomfort. Thought of doing it before but have others to consider and whether they get cold. However other family members were fine with it.

3. **Awareness of others actions and norms** - Fridge setting is now lower. I had not considered before and spoke to others. Some do, some do not, some have always done it and a few have had a go.

4. **Influencing grandchildren** - Always telling daughter and grandchildren to turn things off. Sometimes they take my advice on board.

5. **Others role modelling** - LED lighting now and I turn it off more. A little bit of difference and I am looking forward to seeing the result. Hefty bills have influenced my change and I had only just finished installing CFLs. My daughter did it too.

1. **Persuading others** - Stand by - Switching off power points when we go away. We turn extra switches off, alarm clock, radio, sewing machine. It is easy to forget and I remember later as I walk past. Somebody else told me they save a percentage per year. I never thought of this before friends mentioned it. Some measured TV power use. Not really seen in bill in hard figures but would not expect a great difference but I still talk about the possible savings.

6. **Recommending to others** - I thought I had enough insulation but more was suggested and I am very happy with it. I told everybody, I am very happy and they should get it done up too.

7. **Reaction against someone** - Mixer taps were left on hot and now switched to cold. The awareness of the impact caused changes as it was wasting energy. My dad used to and I did the opposite to annoy him. Now I have got over it but it is tricky as breaking a habit you have to consciously think about it. I had not considered it before chatting to anybody else.
Appendix 8 – Support material for evaluation groups

Tools used in evaluation groups

Agenda
1. Introductions
2. Material and infrastructure stories
3. Individual competency and attitude stories
4. Social stories
5. Most Significant Story

Suggestions of possible reasons for being ‘Most Significant’
✓ Saves the most energy
✓ The greatest challenge
✓ The most memorable stories
✓ Clever thinking
✓ Best told story
✓ Going to inspire others to do the same
✓ Other

Range of stories
➢ Infrastructure stories
➢ Individual competency stories
➢ Social stories

Influence domains:
### Appendix 9 – Summary of group evaluation details

<table>
<thead>
<tr>
<th>Group</th>
<th>Date</th>
<th>Attendees</th>
<th>Notes</th>
<th>Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Council 1</td>
<td>8.12.2015</td>
<td>4</td>
<td></td>
<td>382037 382017 382014 382025</td>
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<tr>
<td>Council 2</td>
<td>16.12.2015</td>
<td>2</td>
<td>1 participant cancelled at short notice</td>
<td>381049 381027</td>
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<tr>
<td>Council 3</td>
<td>10.12.2015</td>
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<td></td>
<td>399534 399511</td>
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<tr>
<td>Council 4</td>
<td>11.12.2015</td>
<td>6</td>
<td></td>
<td>393922 393922 393940 393943</td>
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<tr>
<td>Council 5</td>
<td>14.12.2015</td>
<td>3</td>
<td>All male</td>
<td>319104 319125 319154</td>
</tr>
<tr>
<td>Project team</td>
<td>17.12.2015</td>
<td>2</td>
<td>1 ELO cancelled at short notice</td>
<td>Council 1 ELO Council 5 ELO</td>
</tr>
</tbody>
</table>


Appendix 10 – Participant information statement

Invitation to participate in a research project

Further Research into the impact of different influences on household energy-based practices by Victorian householders

Research student: Lucy Allinson
Tel: +61 3 9214 5717  Email: tellinson@swin.edu.au

Supervisors:
John Pien - Professor and Executive Director - Swinburne Leadership Institute
Tel: +61 3 9214 5717  Email: j pien@swin.edu.au

Vivienne Waller – Dr in Sociology - Health, arts and design department - Swinburne University
Tel: +61 3 9214 5752  Email: v waller@swin.edu.au

Sam Wilson - PhD Research fellow - Swinburne Leadership Institute
Tel: +61 3 9214 8960  Email: cg wilson@swin.edu.au

You are invited to participate in my research project on understanding the influencing factors on household energy-based practices. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate.

Who is involved in this research project?

My name is Lucy Allinson and I am completing further research at Swinburne University. My supervisors are Professor John Pien, Dr Vivienne Waller and Dr Sam Wilson. Swinburne University and Low Carbon Living through the Cooperative Research Centres Program are funding this research which has been approved by the Swinburne University Human Research Ethics Committee. The research is conducted with the approval of South East Councils Climate Change Alliance (SECCA).
Participant Consent Form

Further research into the impact of different influences on household energy-based practices by Victorian householders

1. I have had the study explained to me and I have read the information sheet.
2. I agree to provide information about influences on my energy actions which includes discussions on heating and cooling practices, use of appliances and hot water.

Please circle your response to the following:

- I agree to participate in the interviews
- I agree to participate in the group interview
- I agree to allow the interviews to be audio-recorded

3. I acknowledge that:
   a) The project is for the purpose of research which may not be of direct benefit to me.
   b) The privacy of the personal data I provide will be securely stored and only disclosed where I have agreed to the disclosure or it is required by law.
   c) The security of the data will be managed and protected during and after completion of the study in accordance with the Victorian Information Privacy Act 2000.
   d) The data collected during the study may be published and a report of the project outcomes will be provided to Swinburne University and SECCA. Any information that will identify me directly will not be used.

I understand that my participation is voluntary and that I am free to withdraw from the research study at any time and to withdraw any unprocessed data previously supplied.

Participant’s consent

Participant: _______________________________ Date: __________________

For further information please contact Lucy Allinson on lallinson@swin.edu.au or call 03 9214 5717

Please retain your copy of this form for further reference.

Ethics number 2015/055

Participant Consent form
Appendix 12: Data sources

<table>
<thead>
<tr>
<th>Date of collection</th>
<th>Data channel</th>
<th>Interviewees</th>
<th>Data to be provided</th>
<th>Research Design</th>
<th>Researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept – Dec 2014</td>
<td>1. Pre-intervention ESS survey</td>
<td>All Research participants</td>
<td>Inform infrastructure and competency influence domains and demographics</td>
<td>SECCCA</td>
<td>LA ELO</td>
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<tr>
<td>Jan-July 2015</td>
<td>2 ESS Retrofit intervention</td>
<td>Research participants in group A and C</td>
<td>Inform household infrastructure changes</td>
<td>SECCCA</td>
<td>LA ELO</td>
</tr>
<tr>
<td>Jan – July 2015</td>
<td>3. Actions and practices Intervention</td>
<td>Research participants in group B and C</td>
<td>Inform motivations-visit 1</td>
<td>SECCCA</td>
<td>LA ELO</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Inform new actions-visit 2</td>
<td>SECCCA</td>
<td>LA ELO</td>
</tr>
<tr>
<td>July – Sept 2015</td>
<td>4. Post intervention survey</td>
<td>320 ESS participants</td>
<td>Generate the Most significant Change (MSC) stories</td>
<td>LA</td>
<td>LA ELO</td>
</tr>
<tr>
<td>July – October 2015</td>
<td>5. Qualitative interview 1</td>
<td>All Research participants</td>
<td>New actions, key influences, social mapping and social influence</td>
<td>LA</td>
<td>LA LA</td>
</tr>
<tr>
<td>Oct – Dec 2015</td>
<td>6. MSC Participant group evaluation</td>
<td>5 participant groups</td>
<td>Evident influences by domain, definition of a new action, priority actions</td>
<td>LA</td>
<td>LA Evaluation groups</td>
</tr>
<tr>
<td>Dec 2015-Jan 2016</td>
<td>7. MSC Project team group evaluation</td>
<td>1 project team group</td>
<td>Evident influences by domain, priority influences - Most Significant Change Story:</td>
<td>LA</td>
<td>LA Evaluation groups</td>
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<tr>
<td>Jan – April 2016</td>
<td>8. Qualitative interview 2</td>
<td>Masters participants with new actions</td>
<td>Influences evident for sustained practices</td>
<td>LA</td>
<td>LA LA</td>
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</tbody>
</table>

Key: LA: Lucy Allinson, Primary Researcher ELO: Energy Liaison Officer SECCCA: South-East Council Climate Change Alliance
Appendix 13: Data collection plan

Plan for data collection and analysis to provide evidence for answering the research question

<table>
<thead>
<tr>
<th>Research objectives</th>
<th>Focussed research questions</th>
<th>Techniques</th>
<th>Source of data</th>
<th>Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) What are the types and frequency of social influence evident for new actions and sustained household practices?</td>
<td>1.1 Is social influence evident?</td>
<td>Qualitative interviews</td>
<td>Themed interviews</td>
<td>EAP &amp; discourse analysis using NVivo Relationship mapping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ESS</td>
<td>Social influence form ELO through group allocation</td>
<td>Map social influence to new action taken</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most Significant Change</td>
<td>Social influence domain</td>
<td>Quantify presence</td>
</tr>
<tr>
<td></td>
<td>1.2 Whose opinion is of importance to participant?</td>
<td>Qualitative interviews</td>
<td>Themed interviews</td>
<td>Relationship mapping – bulls eye technique and discourse analysis using NVivo</td>
</tr>
<tr>
<td></td>
<td>1.3 Who in the participants social network practices these actions and is influential?</td>
<td>Qualitative interviews</td>
<td>Themed interviews</td>
<td>Discourse analysis using NVivo</td>
</tr>
<tr>
<td>b) In what ways do social influence combine with material and infrastructure and competency influences to impact new actions and sustained household practices</td>
<td>2.1 With a successful uptake of a new action?</td>
<td>Evaluation groups</td>
<td>Most Significant Change</td>
<td>Count stories by domain of influence Map influence patterns to actions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Qualitative interviews</td>
<td>Themed interviews 1</td>
<td>Discourse analysis under NVivo</td>
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<tr>
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<td>ESS</td>
<td>ESS final surveys</td>
<td>EAP results</td>
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<td>2.2 With a sustained new practice?</td>
<td>Qualitative interviews</td>
<td>Themed interviews 2</td>
<td>Discourse analysis in NVivo for interview 2</td>
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<tr>
<td>c) How and in what ways do householders use social influence to encourage and share new household energy practices?</td>
<td>3.1 Has leadership been evident by participants within their community?</td>
<td>Qualitative interviews</td>
<td>Themed interviews and observation</td>
<td>Discourse analysis in NVivo for interview 1</td>
</tr>
<tr>
<td></td>
<td>3.2 Determine if a leadership role has been played by the individual within household energy actions?</td>
<td>Qualitative interviews</td>
<td>Themed interviews and observation</td>
<td>Discourse analysis in NVivo of interview 1</td>
</tr>
<tr>
<td></td>
<td>3.3 What patterns are evident competency, networking and social influence?</td>
<td>Qualitative interviews</td>
<td>Themed interviews and observation</td>
<td>Discourse analysis in NVivo of interview 1</td>
</tr>
</tbody>
</table>
Appendix 14 – Typical energy consumption profile for Victorian households

Appendix 15: Ethics approval

SHR Project 2015/055 – The impact of different influences on household energy-based practices by senior Victorian householders – towards an effective model for change
Dr Vivienne Waller, Ms Lucy Allinson (Student), Professor John Fien, Dr Sam Wilson - SLI
Approved duration: 04-06-2015 to 25-08-2016 [adjusted]

I refer to the ethical review of the above project protocol by a Subcommittee (SHESC3) of Swinburne’s Human Research Ethics Committee (SUHREC). Your responses to the review, as per the emails sent by Lucy Allinson on 01 and 03 June 2015, were put to the Subcommittee delegate for consideration.

I am pleased to advise that, as submitted to date, the project may proceed in line with standard ongoing ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the current National Statement on Ethical Conduct in Human Research and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/ supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants any redress measures; (b)
proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project. Information on project monitoring, self-audits and progress reports can be found at: http://www.research.swinburne.edu.au/ethics/human/monitoringReportingChanges/

- A duly authorised external or internal audit of the project may be undertaken at any time.

Please contact the Research Ethics Office if you have any queries about on-going ethics clearance. The SHR project number should be quoted in communication. Researchers should retain a copy of this email as part of project recordkeeping.

Best wishes for the project.

Yours sincerely,
Astrid Nordmann
SHESC3 Secretary

----------------------------------------------
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